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TAX DISCLOSURE: FIRMS' GOVERNANCE CHARACTERISTICS AND UTILIZATION BY TAX AUTHORITIES

PhD thesis submitted for the degree of Doctor of Applied Economics at the University of Antwerp to be defended by Michiel Van Roy

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Summary

Tax disclosures are increasingly included in reporting frameworks and provide interested parties with valuable insights into a firm's tax affairs. Disclosing tax information informs shareholders, stakeholders and the public on a firm's tax management and payments and can lead to better and more efficient tax collections by tax authorities. However, it is an open question which companies demonstrate a higher level of public tax disclosure in their reporting practices. This question is of substantial relevance, particularly as regulators enforce mandatory tax disclosure standards. Analyzing mandatory tax disclosure practices sheds light on the levels of compliance with those standards, and analyzing voluntary tax disclosure practices reveals when firms are more likely to find tax reporting beneficial or costly. This information is useful for understanding which firms are affected the most by future mandatory disclosure obligations and can notify regulators of preferences or resistance to tax disclosures among firms.

This dissertation first focuses on the governance characteristics of firms and their relationship with tax disclosures through two archival studies. Subsequently, this dissertation examines the usefulness of tax disclosures based on a machine learning approach, as receiving tax data does not automatically translate to having useful, actionable information.

The first empirical study of this dissertation examines the relationship between family involvement in a firm, and this firm's level of tax disclosure. Using a newly developed measure to capture a firm's level of tax disclosure, this chapter illustrates that increasing family ownership in a firm is significantly negatively associated with the level of tax disclosures and the voluntary adoption of public CbCR and GRI 207. These effects are especially strong when the family holds large blocks of voting rights. It is likely that these families have private information channels to inform themselves about the tax management and payments of the firm, and want to avoid disclosing potentially costly proprietary information in the form of public tax disclosures. Furthermore, this study finds no robust evidence of a relationship between family involvement in management and tax disclosures, or between family involvement in the board of directors and tax disclosures. It therefore appears that family involvement in ownership is the main family-related factor influencing tax disclosures.

The second empirical study investigates the relationship between diversity on the board of directors of a form and the firm's level of tax disclosure and embeds these relationships in the institutional contexts of the countries in which they are formed. This chapter presents evidence of a positive relationship between employee representation on corporate boards and a firm's level of tax disclosure. Past literature demonstrated that employees are attentive to CSR issues, and are especially concerned with matters close to their interests, such as wages and job security. Tax disclosures inform these employees

about a company's financial health and the location of its resources, giving employees information on their position in wage negotiations. Furthermore, we do not find evidence of a relationship between gender diversity and a firm's level of tax disclosure. An important note this chapter makes is that board diversity is a multifaceted concept and that different forms of diversity (being task-related board diversity and non-task-related board diversity) act differently as antecedents for firm-level outcomes. Furthermore, we find a positive relationship between the existence of a CSR subcommittee and a firm's level of tax disclosure. We also show that the consequences of governance mechanisms are influenced by a country's formal and informal institutions.

Finally, the third empirical study develops and applies a valuation technique based on the theoretically sound Shapley value to assist the Belgian Federal Tax Authorities in managing large quantities of data received under various exchange of information agreements. This valuation technique values this data to determine which data is valuable to predict successful tax audits. This valuation technique is model-agnostic and can thus be applied to any kind of predictive model. The benefit of this valuation approach over other methods to calculate the Shapley value is that this method does not rely on the assumption that all features in the predictive model are independent. This assumption is highly unlikely in the context of tax disclosures since features representing tax data reported by the same firm are likely to be correlated. A violation of the independence assumption causes the allocation of too much weight to unlikely data points and is undesirable as it undermines the practical applicability of valuation methods in a real-world setting.

Overall, this dissertation intends to inform regulators and stakeholders of the pitfalls and effectiveness of governance mechanisms that could monitor a firm's tax management and payments. In addition, this thesis provides a framework to value tax disclosures. The results of the real-world case study in which we developed this valuation technique can effectively assist tax authorities in filtering out useful tax disclosures.

Samenvatting: Het Openbaar Maken van Belastinginformatie: Governancekarakteristieken van Bedrijven en het Gebruik door Belastingautoriteiten.

Deze dissertatie is voorgelegd tot het behalen van de graad van Doctor in de Toegepaste Economische Wetenschappen aan de Universiteit Antwerpen.

Belastinginformatie wordt steeds vaker opgenomen in rapportagekaders en biedt belanghebbenden waardevolle inzichten in de belastingzaken van een bedrijf. Het openbaar maken van belastinginformatie informeert aandeelhouders, stakeholders en het brede publiek over het belastingbeheer en de belastingbetalingen van een bedrijf. Dit kan leiden tot betere en efficiëntere belastinginningen door belastingautoriteiten.

Het blijft echter een open vraag welke bedrijven meer belastinginformatie publiceren in hun rapporten. Deze vraag is van aanzienlijk belang, vooral nu toezichthouders en regelgevers verplichte rapportagestandaarden ontwikkelen. Het analyseren van verplichte rapportagepraktijken biedt inzicht in de naleving van deze standaarden, terwijl het onderzoeken van vrijwillige rapportagepraktijken de voordelen en kosten kan aantonen waarmee bedrijven geconfronteerd worden wanneer ze belastinginformatie openbaar maken. Deze informatie biedt inzicht in welke bedrijven het meest worden beïnvloed door toekomstige rapportageverplichtingen en kan regelgevers helpen om voorkeuren en weerstand tegen openbare belastingrapportage te identificeren.

Dit proefschrift bevat drie empirische studies. De eerste twee empirische studies behandelen de relatie tussen governance-kenmerken van bedrijven en de hoeveelheid gepubliceerde belastinginformatie door middel van archiefonderzoek. Vervolgens onderzoekt dit proefschrift de bruikbaarheid van belastinginformatie op basis van een machine learning-aanpak, aangezien het ontvangen van belastinggegevens niet automatisch leidt tot bruikbare informatie voor de uiteindelijke gebruiker.

De eerste empirische studie van dit proefschrift onderzoekt de relatie tussen familiebetrokkenheid in bedrijven en de hoeveelheid gerapporteerde belastinginformatie door dat bedrijf. Door middel van een nieuw ontwikkelde maatstaf om de hoeveelheid gerapporteerde belastinginformatie van een bedrijf te meten, toont dit hoofdstuk aan dat aandeelhouderschap door de familie in een bedrijf significant negatief samenhangt met de hoeveelheid gerapporteerde belastinginformatie en de vrijwillige aanname van GRI 207. Dit resultaat is meer uitgesproken wanneer de familie grote blokken aandelen of stemrechten bezit. Een mogelijke verklaring voor dit fenomeen is dat families beschikken over private informatiekanalen. Op deze manier kunnen families vermijden dat potentieel kostbare bedrijfsinformatie openbaar wordt gemaakt, en zich toch kunnen informeren over het belastingbeleid

van het bedrijf. Voorts vindt deze studie geen robuust bewijs voor een relatie tussen familiebetrokkenheid in het management en de hoeveelheid gerapporteerde belastinginformatie, of tussen familiebetrokkenheid in de raad van bestuur en de hoeveelheid gerapporteerde belastinginformatie. Het bezit van aandelen en stemrechten door de familie lijkt dus de belangrijkste factor gerelateerd aan familiebetrokkenheid die de hoeveelheid gerapporteerde belastinginformatie beïnvloedt.

De tweede empirische studie onderzoekt de relatie tussen diversiteit in de raad van bestuur van een bedrijf en de hoeveelheid gerapporteerde belastinginformatie van het bedrijf, en plaatst deze relaties in de institutionele contexten van de landen waarin ze zich bevinden. Dit hoofdstuk toont het bestaan van een positieve relatie tussen werknemersvertegenwoordiging in de raad van bestuur en het niveau van belastingonthulling van een bedrijf. Eerdere literatuur toonde aan dat werknemers aandacht hebben voor MVO-kwesties (Maatschappelijk Verantwoord Ondernemen) en vooral bezorgd zijn over zaken die dicht bij hun belangen liggen, zoals lonen en werkzekerheid. Belastinginformatie informeert werknemers over de financiële gezondheid van een bedrijf en de locatie van diens middelen, waardoor werknemers informatie krijgen over hun positie in loononderhandelingen. Voorts vinden we geen bewijs voor een relatie tussen genderdiversiteit in de raad van bestuur en de hoeveelheid belastinginformatie van een bedrijf. Een belangrijke kanttekening die dit hoofdstuk maakt, is dat diversiteit in de raad van bestuur een veelzijdig concept is, en dat verschillende vormen van diversiteit (namelijk taakgerelateerde diversiteit in het bestuur en niet-taakgerelateerde diversiteit in het bestuur) verschillende invloeden hebben op het bedrijf. Verder vinden we een positieve relatie tussen het bestaan van een MVO-subcomité als deel van de raad van bestuur en de hoeveelheid gepubliceerde belastinginformatie van een bedrijf. We tonen ook aan dat de gevolgen van governance-mechanismen worden beïnvloed door de formele en informele instituties van een land.

Ten slotte ontwikkelt de derde empirische studie een waarderingstechniek om belastinginformatie te waarderen op basis van de theoretisch onderbouwde Shapley-waarde. Vervolgens past dit hoofdstuk deze methode toe op gegevens die worden ontvangen onder verschillende informatie-uitwisselingsakkoorden die zijn gesloten door de Belgische Federale Overheidsdienst Financiën. Onze methode waardeert deze data in functie van hun nut om succesvolle belastingcontroles te voorspellen, wat kan helpen om deze data beter te beheren. Deze waarderingstechniek is model-agnostisch en kan dus worden toegepast op elk voorspellingsmodel. Het voordeel van deze waarderingsmethode ten opzichte van andere methoden die ook Shapley-waarden berekenen, is dat deze methode niet afhankelijk is van de aanname dat alle variabelen in het voorspellingsmodel onafhankelijk zijn. Deze aanname is in de context van belastinginformatie hoogst onwaarschijnlijk, aangezien variabelen die belastinggegevens vertegenwoordigen die door eenzelfde bedrijf gerapporteerd zijn, waarschijnlijk

gecorreleerd zijn. Een schending van de onafhankelijkheidsaanname zorgt ervoor dat er te veel gewicht wordt toegekend aan onwaarschijnlijke datapunten, wat ongewenst is, omdat dit de praktische toepasbaarheid van waarderingsmethoden in een reële omgeving ondermijnt.

Dit proefschrift kan regelgevers en stakeholders informeren over de valkuilen en de effectiviteit van governance-mechanismen die het belastingbeheer en de belastingbetalingen van een bedrijf kunnen monitoren. Daarnaast biedt dit proefschrift een kader om belastinginformatie te waarderen. Deze resultaten kunnen belastingautoriteiten helpen bij het effectief filteren van bruikbare belastinginformatie.

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List of Abbreviations

AUC: Area Under Curve

BEPS: Base Erosion and Profit Shifting

CbCR: Country-by-Country Reporting

CEO: Chief Executive Officer

CSR: Corporate Social Responsibility

DAC: Directive on Administrative Cooperation

EITI: Extractive Industries and Transparency Initiative

ESG: Environmental, Social, Governance

EU: European Union

EU CRD IV: European Union Capital Requirements Directive four

FCNE: Family-Centered Non-Economic (goals)

GAAP: Generally Accepted Accounting Principles

GICS: Global Industry Classification Standard

GIR: GloBE Information Return

GloBE: Global Anti-Base Erosion Rules

GRI : Global Reporting Initiative

IAS: International Accounting Standards

IFRIC: IFRS Interpretations Committee

IFRS: International Financial Reporting Standards

IV-2SLS= Instrumental Variable - Two-Stage Least Squares

MNE: Multinational Enterprise

NACE: Nomenclature statistique des Activités économiques dans la Communauté Européenne

OECD : Organization for Economic Cooperation and Development

OLS: Ordinary Least Squares

PRI: Principles of Responsible Investment

PSM: Propensity Score Matching

SAGE: Shapley Additive Global Importance

SHAP: Shapley Additive Explanations

TRE: Tax Rulings Exchange

UK: United Kingdom

US: United States

VAT: Value Added Tax

VIF: Variance Inflation Factor

XML: eXtensible Markup Language

Some introductory notes

Many concepts in this dissertation can be defined in various ways, each with its own strengths and limitations. For instance, the term 'tax haven' can be defined according to Belgian law, European law, academic literature, and other sources. We have chosen to use the definitions most commonly found in recent academic literature unless otherwise specified while acknowledging that variations in definitions exist.

Chapter 1 Introduction

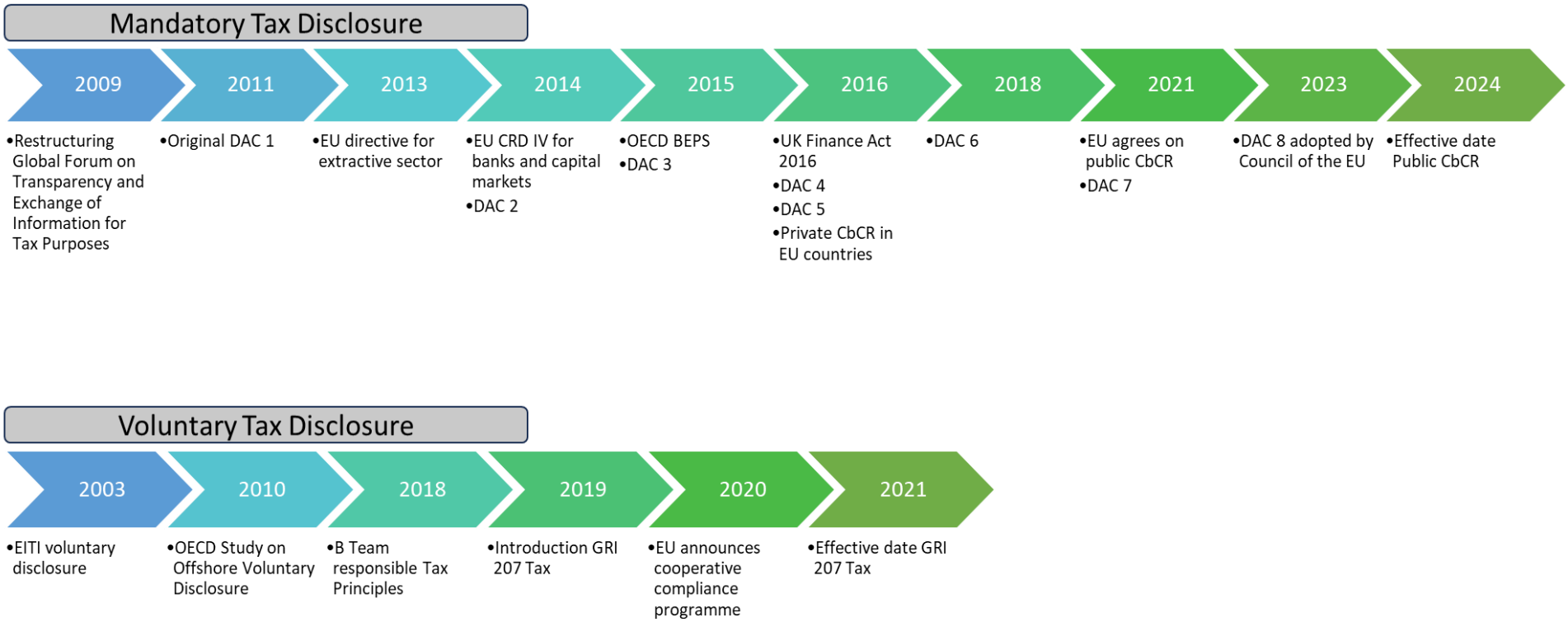
Disclosures play a vital part in global business and are central to accounting. Diverse groups with differing needs all have a demand for information (Birnberg, 1980). These diverse groups all advocate for incremental increases in disclosure satisfying everyone's requirements (Birnberg, 1980), which led to a significant increase in firm disclosure requirements over the past decades. More recently, firms are also expected to disclose information not only on their financial performance but also on their Corporate Social Responsibility (CSR) or Environmental, Social, and Governance (ESG) performance. Tax has gradually been included in CSR and ESG topics. Consequently, firms should report on their tax payments, tax collections, and overall tax management by issuing tax disclosures included in broader CSR and ESG disclosure frameworks.

The phenomenon of tax disclosure is not new. Tax disclosures have been an important source of information for tax authorities for over a century. In the 19th century and the beginning of the 20th century, many modern-day European countries introduced a general income tax. To inform tax authorities on their taxpayers' incomes, early versions of obligations to file income taxes were also introduced, such as in Belgium in 1919 (Hardewyn, 1997), in Sweden in 1903 (Henrekson & Stenkula, 2015), in France in 1914 (Piketty, 2001) and even already in 1799 in the United Kingdom (UK) with the Pitt's tax (Barker, 1996).

The increasing complexity of global business and a perception of large-scale tax avoidance by multinationals has spawned various tax disclosure regulations and recommendations. New propositions to disclose additional tax information are still being issued at a time when firms are already expected to disclose more than ever before (Müller, Spengel, & Vay, 2020). Over the last decade, the idea of tax disclosures towards a broader stakeholder group emerged. Many newly introduced tax disclosure frameworks aim to inform not only tax authorities, but also investors, the media, politicians, consumers, research organizations, and the public at large about a company's tax management and overall tax payments. The goal is still to stimulate the correct collection of taxes by tax authorities. The difference with tax disclosure frameworks that report only to tax authorities lies in the fact that interpreting and acting upon these tax disclosures is not solely entrusted to the tax authorities anymore. Instead, the European Union (EU) anticipates that mandating public tax disclosures will pressure firms to enhance tax compliance by increasing scrutiny from stakeholders and the public, as well as to inform the public debate on tax compliance by multinationals (European Parliament, 2019).

A timeline of the most prevalent mandatory and voluntary tax disclosure frameworks for large, listed European firms is presented in Figure 1.1. The restructuring of the Global Forum on Transparency and the Exchange of Information for Tax Purposes led to a new era of mandatory tax disclosure frameworks, with a strong focus on cooperation between jurisdictions. The Directives on Administrative Cooperation (DAC) allow tax authorities to exchange information on their taxpayers, such as financial account information and information on taxpayers' arrangements with a high risk of tax avoidance with other tax authorities. Extractive industries have additional tax disclosure rules given their sensitive status of managing and extracting a country's natural resources. The mandatory EU directive for Extractive Industries and the voluntary Extractive Industries Transparency Initiative (EITI) provide a disclosure framework to report payments to governments for these extractive industries. The UK introduced a general tax disclosure framework for tax strategies in the UK Finance Act of 2016. The UK Finance Act of 2016 mandates that UK companies provide information on how the company manages its tax risk and its relationship with the UK government. A milestone tax disclosure framework is the Country-by-Country Report (CbCR). The CbCR contains information on the location of a firm's activities, profits and tax payments per jurisdiction in which the firm is active. Initially, only tax authorities had access to this report. As of the financial year starting on June 22, 2024, companies located in the EU with global revenues above 750 million euros are required to publish this information publicly. In addition, initiatives such as the Global Reporting Initiative (GRI) and the B Team issue voluntary guidance on tax disclosure. Firms can use this guidance to provide tax disclosures in their financial and non-financial reports.

Figure 1.1 Mandatory and Voluntary Tax Disclosure Developments



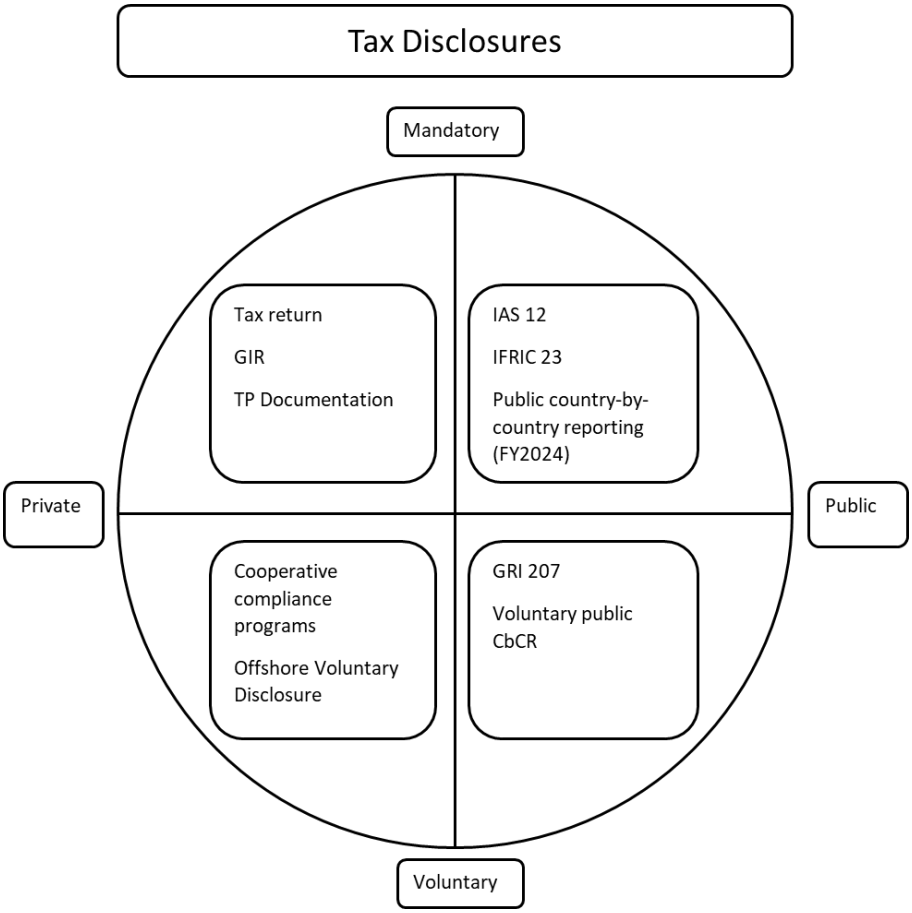
Source: own figure

Even though public tax disclosures are considered part of the CSR and ESG discussion, tax disclosure does not necessarily follow the same principles or patterns as either CSR and ESG disclosures or financial accounting disclosures. First of all, disclosing where the firm pays taxes and makes its profits might reveal proprietary information toward competitors, putting the firm at a competitive disadvantage much more than environmental or social disclosures would (Lenter, Slemrod, & Shackelford, 2003; Spengel, 2018). Furthermore, tax disclosures are aimed at a large set of stakeholders with differing goals. For example, investors are interested in tax disclosures to make appropriate after-tax cash flow forecasts (Frischmann, Shevlin, & Wilson, 2008; Luo, Ma, Omer, & Xie, 2023) and the public could be interested in knowing whether the tax system is 'fair' (Sheffrin, 1994). In contrast, financial disclosures are usually mainly aimed at current and potential investors to provide information on the firm's financial health. Issuing tax disclosures that suit everyone's goals is challenging. An additional risk of being aimed at multiple parties is that tax information can also easily be misunderstood, causing potential reputational damages that lack logical justification (Hoopes, Robinson, & Slemrod, 2018). Companies thus must ensure that, if they desire to provide information on their taxes publicly, these tax disclosures are not open for interpretation.

1.1 Types of Tax Disclosure

The full set of possible tax disclosures that firms must or could issue can be defined along two dimensions (Hoopes, Robinson, & Slemrod, 2023). The first dimension is whether tax disclosures are public or private. Private tax disclosures are tax disclosures that companies make to the tax authorities and are inaccessible to other parties. Conversely, public tax disclosures concern a firm's disclosures on its tax matters toward the public, mainly (potential) investors and stakeholders. Anyone can theoretically access this information. The second dimension is whether tax disclosures are mandatory or voluntary. Certain tax disclosures are mandated by the law, and companies must comply with them or face penalties. Other tax disclosures can be made at the discretion of the firm, and firms issuing these tax disclosures do this voluntarily (Hoopes et al., 2023).

Figure 1.2 Tax Disclosure Classifications in 2024



Source: own figure based on Hoopes et al. (2023)

Using these two dimensions, we can classify tax disclosures in the following way: Mandatory private tax disclosures, mandatory public tax disclosures, voluntary private tax disclosures and voluntary public tax disclosures. An overview of this classification is given in Figure 1.2. The prime example of mandatory private tax disclosure is the tax return each company must file annually to the tax authorities, which is confidential information in most countries. Other regulations such as transfer pricing documentation and the CbCR (OECD, 2022), which contains information on the location of a firm's activities, profits and tax payments, and the upcoming GloBE Information Return (GIR) (OECD, 2023), which is meant to inform tax authorities on where the firm pays less than the required 15% minimum tax and a top-up tax can be applied, are also mandatory for certain companies and are aimed at informing the tax authorities only. There is no way for investors and stakeholders to access this information. Firms also must mandatorily report certain tax information publicly. Most notably, all listed European firms must provide tax disclosures conforming with IAS 12 and disclosures conforming with IFRIC 23 on uncertain tax positions. Both IAS 12 and IFRIC 23 are mandatory tax disclosure standards aimed at informing investors about a firm's tax positions from an accounting perspective.

The goal of these standards is to account for both the current tax consequences of the company's transactions and business events and the future tax consequences of recovery or settlement of a company's assets and liabilities.

A form of voluntary private disclosure is cooperative compliance programs active in many European countries. When a firm agrees to enter into such a cooperative compliance program, the firm and tax authorities engage in a closer, trust-based relationship where for example a direct contact person of the tax administration is assigned to the firm and the company provides insights into its tax control framework (Wauters, 2023). This tax control framework needs to consist of strong fiscal management or governance with a validated tax strategy that aligns with broader firm objectives and reflects the expectations of the firm's stakeholders. In addition, the framework must highlight where the major tax risks within the company lie for various kinds of taxes (Federale Overheidsdienst Financien, 2021). The goal is to give the tax authorities insights into the tax department of an organization (Van de Vijver, 2014). In exchange, the firm expects to have lower compliance costs and faster dispute resolution. The public is not involved in this process, so this program is a private disclosure program. Another example of private, voluntary disclosure is self-disclosure programs in which taxpayers can declare (often offshore) income that was previously undeclared, usually at reduced penalties (OECD, 2010). Finally, voluntary public disclosure entails all information a firm gives about its taxes voluntarily to the public. The most prominent examples are reports published based on ESG and CSR standards, such as GRI 207. The main purpose is to inform the firm's stakeholders and all other interested parties on the tax behavior of the firm, instead of informing only shareholders or tax authorities.

1.2 Exchange of Information

Arguably, tax authorities remain the most crucial stakeholders of firms in tax matters and are the most interested party in tax disclosures. In the end, it is still the tax authorities who collect the tax revenues. The significant growth in taxpayer mobility, the international presence of firms across many countries, cross-border transactions, and the globalization of financial instruments pose challenges for states in accurately assessing taxes owed (European Union, 2011). Relying solely on information from taxpayers within one's jurisdiction is no longer sufficient. Many of the mandatory, private disclosures described in the previous section are often only made to the tax authorities where the focal entity of the company is located, which can make it difficult for tax authorities to assess whether taxpayers hide financial affairs abroad, but also increases the risk of double taxation (OECD, 2024). As a consequence, the Global Forum on Transparency and Exchange of Information for Tax Purposes of the OECD and the EU promote cooperation and the exchange of information between tax authorities. This form of

cooperation enables tax authorities to share and demand additional tax disclosures from participating tax authorities all over the world.

The prime example within the European Union (EU) of such a form of cooperation is the Directives on Administrative Cooperation (DACs). The EU adopted Directive 2011/16/EU of 15 February 2011 (DAC 1), which established the legal basis for administrative cooperation in the field of direct taxation in the EU. The directive defines three forms of cooperation: the exchange of information on request, the spontaneous exchange of information and the automated exchange of information. These forms of exchange of information are defined by Article 3 of the directive as follows: exchange of information on request means the exchange of information based on a request made by one state to another state in a specific case. The spontaneous exchange of information means the non-systematic communication, at any moment and without prior request, of information to another state. Finally, the automated exchange of information consists of systematic communication of predefined information to another state, without prior request, at pre-established regular intervals. The scope of the original directive has been expanded multiple times with new types of data to strengthen the administrative cooperation among tax authorities of Member States. Examples of this data are tax rulings, ultimate beneficial ownership information and CbCR information. For the OECD initiative, 171 countries are members of the Global Forum of Transparency and Exchange of Information for Tax Purposes, which supports similar exchanges of information like the DACs.

1.3 General Problem Statement

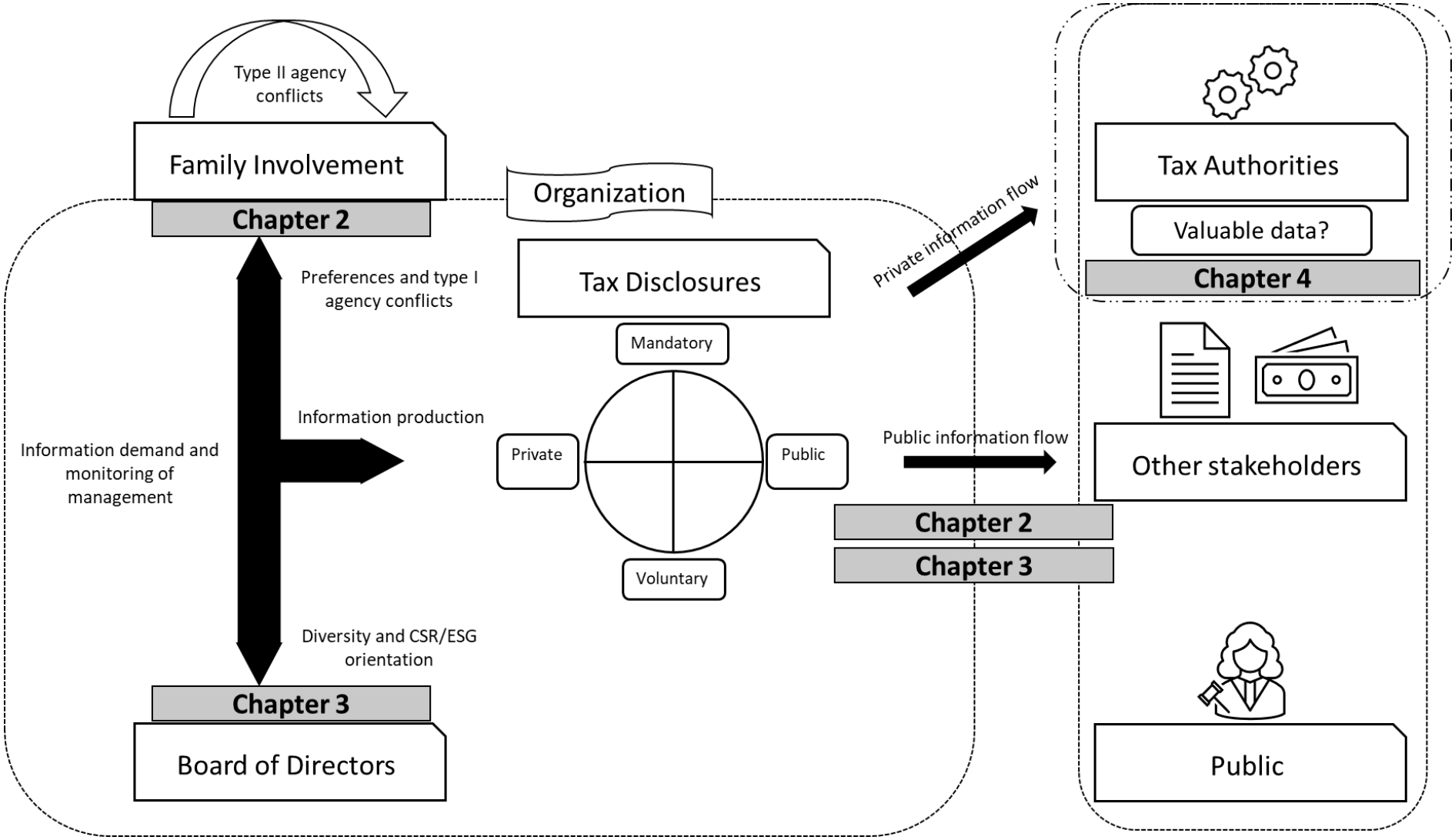
In this doctoral thesis, we study tax disclosures from the perspective of the issuing firms, as well as from the perspective of the tax authorities who use these tax disclosures. The first two empirical articles of the thesis examine the question of which companies demonstrate a higher level of public tax disclosure in their reporting practices. We define the 'level of tax disclosure' as the amount of tax information the firm publishes. This question is of substantial relevance, particularly as regulators enforce mandatory tax disclosure standards. Analyzing mandatory tax disclosure practices sheds light on the levels of compliance with those standards, and analyzing voluntary tax disclosure practices reveals when firms are more likely to find tax reporting beneficial or costly (Christensen, Hail, & Leuz, 2021). This information is useful for understanding which firms are affected the most by future mandatory disclosure obligations and can notify regulators of preferences or resistance to tax disclosures among firms.

We focus on the relationship between tax disclosures, family involvement in the firm and the board of directors. Examining the relationship between family involvement, board structure, and tax disclosures can offer insights to regulators and stakeholders into which agency conflicts might pose a threat to a

firm's information environment regarding taxes, and how monitoring mechanisms mitigate agency costs in tax management. For example, understanding the relationship between the firm's corporate governance and its tax disclosures can assist tax authorities in assessing whether the tax control framework used in cooperative compliance programs is sufficient to address potential agency conflicts. Moreover, by revealing the extent to which agency conflicts impact tax disclosure levels, regulators can assess whether mandating tax disclosures is necessary to prevent opaque tax management in firms as a result of these agency conflicts.

The third empirical article of the thesis examines the use of a firm's tax disclosures by tax authorities. Tax authorities have access to unprecedented amounts of data, but are also at risk of being overwhelmed by the large quantities of data since their ability to process data has not increased at the same rate as the amount of data itself (European Commission, 2017). To address this issue, we use machine learning to value data from private mandatory tax disclosures to determine which data is valuable to predict successful tax audits. Our method enables tax authorities to determine which data warrants their highest priority, in collaboration with the Belgian Federal Tax Authorities. We present a high-level overview of our research objectives in Figure 1.3.

Figure 1.3 General Research Framework



Source: Own figure

1.4 Structure of This Dissertation

In Chapter 2, we study empirically the relationship between tax disclosures and family involvement in the firm. In Chapter 3, we study empirically the relationship between tax disclosures and a firm's board of directors. In Chapter 4 we shift the attention from disclosing firms to tax authorities. Specifically, we study how tax authorities can value large quantities of data, enabling them to determine which data warrants their highest priority. The final chapter summarizes the main conclusions and limitations of this dissertation. Additionally, we point to interesting avenues for future research. We provide a summary of the empirical chapters in this introduction and refer to the individual empirical chapters for a more detailed view.

1.4.1 Chapter 2

Many listed firms have (controlling) family owners or members of the family in the firm's management or board of directors. Studying family firms through an agency lens, we observe a different type of agency conflict compared to the classic principal-agent conflict. Families tend to hold undiversified and concentrated equity positions in their firms, which provides families with strong incentives to monitor managers (Demsetz & Lehn, 1985). Another typical feature of family firms is the high presence of family members at the top management level of the firm and their personal ties to other executives in the firm (Hope, Langli, & Thomas, 2012). Family members have access to inside corporate information, which enables them to directly monitor management through private channels of information without being heavily dependent on public information (Chau & Gray, 2010; Chen, Chen, Cheng, & Shevlin, 2010). This leads family firms to disclose generally less information (Chen, Chen, & Cheng, 2008) which causes a related principal-principal problem (Chau & Gray, 2010) in which there is information asymmetry between the majority family shareholders and minority shareholders. Therefore, family firms might be less inclined to publicly disclose information on their tax management and payments.

On the other hand family firms are regarded to have a heightened concern for their reputation (Syed & Butt, 2017) and legitimacy (Deephouse & Jaskiewicz, 2013) increasing their inclination to disclose information. If a family firm wants to be considered as paying its fair share of taxes, it might be incentivized to provide more tax disclosures to have reputational benefits. We consider the relationship between a firm's level of tax disclosure and family involvement.

Chapter 2 – Research Objective 1: Is family involvement in a firm related to the firm's level of tax disclosure?

We show that family ownership is negatively related to a firm's level of tax disclosure and that this effect is especially strong in firms with large blocks of votes and shares owned by the family. Our findings are in line with previous literature based on type II agency problems in family firms signaling that family owners want to avoid costly proprietary disclosures to the detriment of minority shareholders (Chau & Gray, 2010; Chen et al., 2008; Vural, 2018). We do not find evidence of a relationship between tax disclosures and family involvement in management, or between tax disclosures and family involvement in the board of directors.

1.4.2 Chapter 3

The board of directors is central to internal corporate governance (Fama, 1980). Previous literature demonstrated the importance of the board of directors in a firm's disclosure decisions (e.g. Eng & Mak, 2003; Fernandez-Feijoo, Romero, & Ruiz, 2014; Laksmana, 2008). The relationship between board diversity for board processes and firm outcomes can be supported by agency theory complemented with a resource-based view of the firm (Katmon, Mohamad, Norwani, & Farooque, 2019). We consider the relationship between tax disclosure and two different types of board diversity, namely task-related diversity in the form of board employee representation and non-task-related board diversity in the form of board gender diversity.

Chapter 3 – Research Objective 1: Is board diversity related to the level of tax disclosure?

In addition, given that a firm's tax policy is currently also considered by several stakeholders of the firm as part of the firm's CSR and ESG policies, we include the presence of a CSR committee as a subcommittee to the board as an additional board characteristic.

Chapter 3 – Research Objective 2: Is the existence of a CSR Committee related to the level of tax disclosure?

We find that employee representation on corporate boards is positively associated with the firm's level of tax disclosures. This finding is in line with employees' increased attention to CSR issues (Barnea & Rubin, 2010) and employees wanting to have an idea of the firm's financial health, location of resources and their position in wage negotiations. We do not find evidence of a relationship between gender diversity on the board and the level of a firm's tax disclosures. We, therefore, demonstrate that task-related diversity is related in a different way to tax disclosures than non-task-related diversity. Finally, the existence of a CSR Committee is positively related to the level of tax disclosure of the firm.

Furthermore, institutional theory suggests that firm strategies and practices, as well as their outcomes, are conditioned by country-level institutional factors (North, 1990). Prior studies find that

national-level institutional factors significantly shape a firm's board systems as well as board practices and related firm outcomes (e.g. Castañer, Goranova, Hermes, Kavadis, & Zattoni, 2022; Zattoni, Dedoulis, Leventis, & Van Ees, 2020; Zattoni & van Ees, 2023). These institutional factors can be modeled as moderators to explain cross-country differences (Van Essen, Engelen, & Carney, 2013). As a result, we study the following research objective:

Chapter 3 – Research objective 3: Is the relationship between a firm's level of tax disclosure and the firm's board characteristics influenced by the institutional environment in which the firm operates?

We show that the institutional context moderates the relationship between firm-level board characteristics and tax disclosure decisions. Both formal and informal institutional characteristics moderate the relationship between employee board representation and the level of tax disclosure and between the existence of a CSR committee and the level of tax disclosure.

A central issue in examining the research objectives of Chapter 2 and Chapter 3 is to measure a firm's level of tax disclosure. We measure tax disclosure by performing content analysis based on a self-developed tax disclosure index, for which we conduct several validity tests.

1.4.2.1 Validity of the Disclosure Index and Scoring Process

An index can be considered to be valid if it means and measures what the researchers intended (Marston & Shrives, 1991). The validity of the tax disclosure index used in this thesis is examined based on several criteria. First, we examine the appropriateness of the content of the tax disclosure index based on previous literature on tax disclosure and the most relevant contemporary tax disclosure frameworks. As such, we do not redefine the concept of tax disclosure, but update it to ensure all relevant contemporary frameworks are included. For this study, we design a disclosure index to capture the overall level of voluntary tax disclosure based on a combination of the measurements used in the most prominent tax disclosure frameworks and prior studies. First, we start by including all necessary items from the GRI 207 Tax guidelines. Academics agree that the GRI guidelines are a good option available for sustainability reporting (Clarkson, Li, Richardson, & Vasvari, 2008; Hardeck & Kirn, 2016; Lozano & Huisingh, 2011). We include 27 items based on GRI 207 and an additional 2 items included in GRI G4-S08 that were also included in Hardeck and Kirn (2016). The items from GRI 207 are also included in CbCR. No items stem uniquely from CbCR since the GRI 207 standard contains a copy of the requirements for CbCR disclosures. All requirements from the UK Finance Act 2016 are also included in the GRI guidelines. In addition, we add all items stemming from the Australian Voluntary Tax Transparency Code (Kays, 2022). One additional item that provides geographical information on an item from Kays (2022) is also added. Furthermore, we add four items from Hardeck and Kirn (2016) that are not yet included in the index based on the previously described tax disclosure

frameworks. We also include whether a company provides extra guidance with the mandatorily reported effective tax rate reconciliation, as such guidance is a voluntary reporting practice and this reconciliation can be complex and difficult to understand for both firm insiders and outsiders (Olson & Ordyna, 2023). All items are assigned equal weights to avoid subjectivity. We also use an alternative weighting approach where we distinguish the level of detail in geographical information, which earns two points when the item is disclosed on a regional basis and three points when the item is disclosed on a country-by-country basis analogously to previous research (Clarkson et al., 2008; Hardeck & Kirn, 2016). Subsequently, we normalize each item in this alternative weighting approach by calculating the items' z-scores as an indication of how far each company scores on an item from the mean (Bloom & Van Reenen, 2007; Bromley & Sharkey, 2017; Clarkson, Fang, Li, & Richardson, 2013). The latter approach also implies that all items are weighted equally, but preserves the possibility to distinguish the level of detail of reported geographical information.

We note that three elements in our tax disclosure index are mandatory public tax disclosures up to 2019, and one additional item becomes mandatory as of financial years starting 1 January 2019. All firms comply with three of these items, and 98.9% of observations comply with the fourth item. The variation in tax disclosures that we observe thus stems almost uniquely from public voluntary tax disclosures.

To gauge construct validity, we review the literature on characteristics that are both theoretically expected and empirically demonstrated to be correlated with tax disclosure (Fiechter, Hitz, & Lehmann, 2022). We calculate simple correlation statistics, as we merely want to demonstrate construct validity and not establish any causal evidence. We calculate the correlation statistics based on the sample used in Chapter 2 of this thesis. A challenge to this approach is that most previous findings on tax disclosure are mixed (see Müller et al. (2020) for an extensive review). For firm size, however, the vast majority of previous research points towards a positive relationship (e.g. Hardeck & Kirn, 2016; Joshi, 2020; Robinson & Schmidt, 2013). Larger firms are expected to disclose more tax information because of higher visibility and thus a larger possibility of reputational costs (Watts & Zimmerman, 1978). We observe a statistically significant correlation at the 1% level of 0.219 between firm size and the tax disclosure index. Secondly, given the gradual inclusion of tax disclosures in ESG and CSR, we also expect a positive relationship between the tax disclosure index and a company's ESG and CSR rating. These ESG ratings are based on the information a firm discloses (Eikon Refinitiv, 2022), and thus also reflect the level of ESG and CSR disclosure of these companies. We observe a positive statistically significant correlation at the 1% level of 0.178 between a firm's ESG rating and the tax disclosure index. Finally, corporate tax disclosure decisions are likely influenced by a firm's general information environment. Transparent firms are likely to be more inclined to disclose information

about their tax positions. Current literature in financial accounting primarily uses analyst coverage as an indicator of the quality of a company's information environment. We observe a statistically significant correlation at the 1% level of 0.105 between a firm's analyst following and the tax disclosure index.

Finally, the relationship between tax disclosure and tax avoidance is the most studied. Previous literature finds mixed evidence, with positive, negative or no significant relationships observed (e.g. Akamah, Hope, & Thomas, 2018; Ayers, Schwab, & Utke, 2015; Dyreng, Lindsey, Markle, & Shackelford, 2015; Hardeck, Inger, Moore, & Schneider, 2020; Hardeck & Kirn, 2016; Hope, Ma, & Thomas, 2013). Theoretically, tax avoidance could be both positively or negatively associated with tax disclosure. On the one hand, tax-avoiding firms could disclose less tax information to avoid attracting attention to their tax avoidance schemes from tax authorities and other stakeholders. On the other hand, tax-avoiding firms could also disclose more tax information to legitimize themselves in the eyes of society. We find a negative yet insignificant correlation of -0.024 between a firm's tax avoidance and the tax disclosure index, potentially reflecting both phenomena in our data. Of course, a correlation analysis does not fully exclude the possibility that the tax disclosure index is measuring something else or is correlated with an omitted variable which is the "true" predictor of the outcome (Black, de Carvalho, Khanna, Kim, & Yurtoglu, 2017).

For the validity of the scoring process of the tax disclosure index, we calculate inter-rater consistency. One researcher coded most of the documents, and three other researchers coded a smaller part of the population. To check inter-rater consistency, we calculate Krippendorff's alpha on 10% of our observations (Krippendorff, 1980). Values of 80% and above are acceptable (Krippendorff, 1980; Neuendorf, 2002). Krippendorff's alpha is 92,9% and is considered satisfactory.

1.4.3 Chapter 4

The past decade has been characterized by an explosion in tax disclosures, which poses a challenge for tax authorities who run the risk of being overwhelmed by the enormous quantities of information received. Tax authorities receive data on taxpayers within their jurisdiction from local taxpayers as well as related data on these taxpayers from foreign tax authorities. Determining the value of the data exchanged under various international agreements for predicting successful tax audits could help tax authorities filter this information and allow them to make informed decisions on which data sources they should invest in. We define a successful tax audit as an audit that resulted in an amendment in a taxpayer's declaration resulting in additional revenue collections by the tax authorities.

Chapter 4 – Research objective 1: Which data received by tax authorities under various exchange of information agreements is valuable to predict successful tax audits?

The data valuation problem can be understood as a cooperative game. We therefore review whether the Shapley value is a suitable method to value data. The main downside of the Shapley value is its computational complexity, which constrains its possibility to be applied in large-scale settings. Therefore, we examine whether an approximation of the Shapley value can adequately assess the value data.

Chapter 4 – Research objective 2: Can the (approximated) Shapley value be applied to large datasets to determine which data received by tax authorities under various exchange of information schedules is valuable to predict successful tax audits?

The results of our analyses can be used to value tax disclosures and tax data, especially when features are correlated. Past research has ignored this issue when examining tax disclosures (Guenther, Peterson, Searcy, & Williams, 2023). Our results also demonstrate the varying importance of different data sources and can be used as an assistance tool for tax authorities to manage large quantities of data. Examples for which our results can be used include global model explanations, determining which data should be acquired or quality-checked with priority, determining which data should get priority in the data cleaning process or determining which data should be disseminated to other departments of the tax authorities. Based on sampling techniques from Castro, Gómez, and Tejada (2009) and Castro, Gómez, Molina, and Tejada (2017), we show that the Shapley value can be successfully applied to value tax disclosures received by the tax authorities under various exchange of information schedules.

Chapter 2 Tax Disclosures of Listed Companies in Europe: Does Family Involvement Matter?

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Abstract: This study examines the relationship between family involvement and the level of public tax disclosures of large listed companies in Europe. We hand-collected qualitative and quantitative tax disclosures made in annual reports, sustainability reports and financial statements of 234 firms over seven years, resulting in 1,638 firm-year observations. Our results indicate that family ownership and voting power are negatively associated with the level of tax disclosures and the early adoption of GRI 207. Concerning the early adoption of public CbCR, we only find a negative relationship between family voting power in listed firms and the early adoption of public CbCR. We do not find evidence of a relationship between family involvement in management or family involvement in the board of directors and the firm's level of public tax disclosure. From 2015-2021, we notice an increase in qualitative tax disclosures.

Keywords: Tax Disclosures, Family Ownership, Family Management, Country-by-Country Reporting, GRI 207

2.1 Introduction

Following several major tax scandals like LuxLeaks, SwissLeaks and Panama Papers, attention to tax fairness and tax transparency has increased substantially over the past decade. The Summary Report of the Public Consultation on the Review of the Non-Financial Reporting Directive of the European Union shows that corporate tax behavior and tax transparency are some of the top priority items in the area of non-financial disclosure (European Union, 2020). The EU report on social taxonomy also explicitly marks transparent and non-aggressive tax planning as an ESG concern (European Commission, 2022). This increased attention to tax fairness and transparency has been a driver for the recent promulgation of tax disclosure legislation on both national and supranational levels (European Parliament, 2021a; OECD, 2015). Whereas public tax disclosures are available to all interested parties, private tax disclosures are only available to certain parties such as tax authorities (Hoopes et al., 2023). In the remainder of this study, we refer to public tax disclosures when we discuss the concept of tax disclosure. When discussing private tax disclosures, we refer to tax disclosures made to fiscal authorities.

Since 2016, large multinational companies have been required to report country-by-country reporting (CbCR) information directly to tax authorities following the Organisation for Economic Co-operation and Development's (OECD) BEPS Action Plan 13. This private CbCR consists of information on a firm's revenue, profits, assets and activities in jurisdictions where the firm is active. Large multinationals with over 750 million euros in consolidated revenue have to comply with private CbCR since 2016. As of the financial year starting on June 22, 2024, the largest companies in the European Union will need to report this CbCR information to the public on a mandatory basis (European Parliament, 2021a). Up until 2024, public CbCR is done voluntarily. However, companies have been aware of the upcoming mandatory public CbCR in the EU for several years now. In addition to new regulations on mandatory private and public tax disclosures, the growing public attention to both tax fairness and corporate sustainable tax behavior has led to the development of voluntary tax disclosure frameworks. The Global Reporting Initiative (GRI), which has developed a sustainability disclosure framework that targets the wider stakeholder community, introduced 'GRI 207 Tax' in 2019 (GRI, 2019). GRI 207 suggests the following tax disclosures: quantitative data on revenues, profits and tax paid on a country-by-country basis, as well as information on a firm's tax strategy, tax governance mechanisms and the firm's approach to stakeholder engagement on tax. The GRI suggests the adoption of GRI 207 from 2021 onwards, with the option for early adoption of GRI 207 as well.

Recently, corporate tax behavior and the associated tax disclosures are increasingly considered to be a part of corporate social responsibility (CSR) and CSR reporting (Bird & Davis-Nozemack, 2018). There

is a growing consensus among a firm's stakeholders that sustainable corporate tax practices constitute a part of companies' responsibilities to stakeholders and tax disclosures could stimulate tax fairness through mandatory tax disclosures. However, despite the regulatory and societal attention for tax fairness and tax transparency, evidence is available that disclosing information publicly on tax behavior is less on the agenda of firms and investors in comparison to other sustainability issues like climate, environment and social matters (see European Union, 2020; Ylönen & Laine, 2015). In addition, it is still an open question as to whether or not disclosures lead indeed to more transparency on a firm's behavior or stimulate window-dressing (Christensen et al., 2021).

Building upon these observations, we examine in this paper whether public tax disclosures of large, listed European firms increased over the period 2015-2021. Since family firms play a pivotal role in the European and global market (Burkart, Panunzi, & Shleifer, 2003; Siciliano & Weiss, 2023), we aim to gain more insight into how a family's influence in a firm acts as an antecedent to public tax disclosure of large, listed European firms. In this paper, we capture a family's influence in a firm by focusing on all three levels at which a family can influence firm behavior, namely a family's involvement in ownership, a family's involvement in management and a family's involvement in the board of directors (Jaskiewicz & Dyer, 2017; Neubaum, Kammerlander, & Brigham, 2019). In this paper, 'family' is defined as the founding family or parties related to the founding family with a different surname, such as spouses and cousins. Therefore, we examine the relationship between family involvement in ownership, management and governance in a listed firm and the level of public tax disclosure.

Prior research on the antecedents of tax disclosures has been conducted on specific items of tax information (e.g. Ayers et al., 2015; Dyreng, Hoopes, Langetieg, & Wilde, 2020; Robinson & Schmidt, 2013) or is limited to the study of either quantitative (Gupta, Mills, & Towery, 2014) or qualitative tax disclosures (Balakrishnan, Blouin, & Guay, 2019; Bilicka, Casi-Eberhard, Seregni, & Stage, 2021), or disclosures about a specific framework like CbCR disclosures (Adams, Demers, & Klassen, 2022; Brown, Jorgensen, & Pope, 2019; Joshi, Outslay, & Persson, 2020). To the best of our knowledge, only one other study examined tax disclosures as a combination of most of these elements, being the study of Hardeck and Kirn (2016). This measurement does not include these tax disclosures related to GRI 207 and public CbCR.

For this study, we developed a comprehensive tax disclosure index that is based on the recently added tax disclosure frameworks GRI 207 and CbCR in combination with published measurements of tax disclosures used in prior literature (Akamah et al., 2018; Bilicka et al., 2021; Dyreng et al., 2020; Gupta et al., 2014; Hardeck & Kirn, 2016; Henry, Massel, & Towery, 2016; Hope et al., 2013; Joshi et al., 2020; Robinson & Schmidt, 2013). Our tax disclosure index takes into account both mandatory financial

statement tax disclosures as well as voluntary tax disclosures designed to inform stakeholders and the public about a firm's tax policy.

We test our hypotheses using a sample of 234 European listed companies over the 2015-2021 period representing 1,638 firm-year observations. We differentiate between mandatory and voluntary tax disclosures, observing that there is no significant difference in the level of mandatory tax disclosure between family and non-family firms. Concerning voluntary tax disclosures, we find that the level of family ownership is significantly negatively related to the level of voluntary tax disclosures. This relationship is statistically the most significant and economically the most important when the family holds large blocks of shares or holds a substantial amount of voting rights. Focusing on the various reporting frameworks within the group as potential voluntary tax disclosures, we find that family ownership is negatively associated with the early adoption of GRI 207. We find that family involvement in large listed firms is negatively related to the early adoption of public CbCR, but only when families hold a substantial amount of voting rights. We find no significant relationship between family involvement in management or on the board of directors and the level of voluntary tax disclosures, including the early adoption of GRI 207 and public CbCR.

With this study, we contribute to the literature on tax disclosures in the following ways. First, we study tax disclosures by using a more comprehensive measurement than previous studies since we include the latest additions to upcoming mandatory and voluntary tax disclosures. Second, our tax disclosure index allows us to answer the call for research of Müller et al. (2020) on how governance structures, more specifically family owners, family directors and family managers relate to tax disclosure decisions. Our study differs from Hardeck and Kirn (2016) by using a tax disclosure measurement that incorporates the latest voluntary and upcoming mandatory frameworks, and by using a larger research sample, including more countries and firm-year observations. Finally, many studies focus on tax disclosures in sustainability reports only. We provide a more complete view of public tax disclosures by examining tax disclosures included in a firm's annual reports, financial statements and sustainability reports.

This paper proceeds as follows. In section 2, the existing literature will be reviewed and hypotheses will be developed. Section 3 provides a detailed description of the research sample, the measurement of the variables and the research methods used. Results are reported in section 4. Finally, a discussion of the results and conclusion are presented in section 5.

2.2 Literature Review and Hypothesis Development

2.2.1 Tax Transparency and the Role of Tax Disclosures

Tax transparency by companies involves providing public disclosures that allow stakeholders and society at large to evaluate the firm's activities whereby it is often mobilized as a means to some other end, rather than a goal in itself (Nielsen & Madsen, 2009). Thus, tax transparency can be interpreted as the degree to which companies provide tax disclosures to allow investors and stakeholders to understand their tax management, including their tax payments and collections. Traditionally, different stakeholders of a firm are interested in a firm's tax information for different reasons. For example, investors are interested in tax disclosures to make appropriate after-tax cash flow forecasts (Frischmann et al., 2008) or to monitor management (Jensen & Meckling, 1976), stakeholders could be interested in knowing how a firm's tax behavior affects their position (Payne & Raiborn, 2018).

More recently, tax disclosures are considered to be situated at the intersection between financial disclosures and broader sustainability disclosures. As taxes are a major source of revenue for governments and are crucial to finance health care programs, education and social security (like pensions and unemployment benefits), several authors argue that paying taxes constitutes a part of a firm's CSR policy (e.g. Avi-Yonah, 2008; Dowling, 2014; Lanis & Richardson, 2012, 2015). Tax avoidance causes deprivation of financial support for public systems, giving rise to free-riding problems between taxpayers and tax avoiders (Bird & Davis-Nozemack, 2018).

In this perspective, the primary goal of increasing tax disclosures and enhancing transparency is to lower tax avoidance by firms and promote trust and credibility in the tax system (GRI, 2019; OECD, 2015). However, it is to be seen if tax transparency is a possible mechanism constraining unacceptable tax avoidance, as excessive information may obscure and could become a smokescreen to disguise firm activities (Freedman, 2018). While governments and international organizations mandate tax disclosures, the effects of this increased tax transparency policy are largely unknown (Overesch & Wolff, 2021). This paper does not assess whether large listed firms are truly transparent about their tax behavior. Instead, it focuses on how these firms, especially those influenced by families, respond to the growing demand for tax disclosures.

2.2.2 Benefits and Costs of Tax Disclosures

In this study, we define management's public tax disclosure as the communication by managers of tax-related information to outsiders (investors, other stakeholders, the public,…) either on a mandatory or a voluntary basis. These tax disclosures are accessible to everyone. The overall level of tax disclosures made by management depends on (1) mandatory tax reporting rules, (2) management's discretion available and exercised under these mandatory reporting rules and (3) the

amount of voluntary disclosure made (Müller et al., 2020). In most countries, tax return information communicated to the tax authorities is confidential and outsiders of a firm try to draw inferences on a firm's actual tax rate based on a firm's publicly disclosed tax information (Kays, 2022).

The decision to voluntarily disclose information or to use discretion in a mandatory disclosure context is a result of managers' incentives to disclose information and the firm's governance structure. Using an agency theory lens, the provision of information disclosures is known to reduce information asymmetry (Francis, Khurana, Martin, & Pereira, 2008) and to help mitigate the principal (owner)/agent (management) conflict in a firm (Jensen & Meckling, 1976). Especially when ownership is dispersed, owners lack direct communication with management and are more dependent on public accounting information for monitoring purposes. From a management's perspective, however, disclosure decisions are associated with both benefits and costs (Lewis, Walls, & Dowell, 2014) and management will only disclose information when they believe disclosure benefits outweigh disclosure costs (Verrecchia, 1983).

In the context of tax disclosures, more precise information and fuller disclosure of tax strategies permit external parties to better assess how the firms' observed tax outcomes are achieved and how the firm's tax strategies compare to those of peer firms (Adams et al., 2022). This, in turn, might lead to capital market benefits like lower dispersion of analysts' earnings forecast, smaller forecast errors, smaller bid-ask spread higher market liquidity and lower cost of debt (Beatty, Liao, & Weber, 2010; Healy, Hutton, & Palepu, 1999; Leuz & Verrecchia, 2000; Sengupta, 1998)

Tax disclosures are also associated with direct and indirect costs. Direct costs relate to the costs of setting up information systems to provide the information. Indirect costs can occur in the form of proprietary costs (Verrecchia, 1983) because multiple audiences (e.g. competitors, labor unions, regulators) can use the information provided to act upon it. Increased tax disclosures can reveal information on a firm's tax planning strategy which might represent proprietary information toward competitors (Lenter et al., 2003; Spengel, 2018). Certain tax strategies can for example be derived from public CbCR disclosures. These strategies include profit shifting across the value chain of an MNE, as CbCR disclosures provide a comprehensive breakdown of crucial operational, financial, and tax data for all countries where an MNE conducts its operations. Another type of indirect costs related to tax disclosures are compliance or litigation costs. Bozanic, Hoopes, Thornock, and Williams (2017) have shown that tax authorities make use of tax-related disclosures in financial statements in case they contain incremental information to tax return data sent to the tax authorities. Management may be hesitant to transparently disclose the organizational details related to certain tax strategies if doing so would provide tax authorities with a roadmap for an audit (Balakrishnan et al., 2019). Moreover, when

stakeholders can derive aggressive tax planning from the disclosures, this could result in reputational costs as well (Lanis & Richardson, 2012; Overesch & Wolff, 2021). Reputational costs are detrimental in a tax context as they could change stakeholders' perception of the firm (Gallemore, Maydew, & Thornock, 2014) in the sense that the firm will be perceived as not paying its fair share of taxes.

Reputational concerns might incentivize management to disclose either more tax information or less information since the relationship between tax and CSR is contentious (Davis, Guenther, Krull, & Williams, 2016). According to Müller et al. (2020), tax disclosures are – to some degree – subject to diverse objective functions since corporate tax behavior faces the conflict between profit maximization and fulfilling the interests of other stakeholders and society in general. Firms might increase tax disclosures to reap reputational benefits, especially when consumers (Hardeck & Hertl, 2014) and investors (Emerson, Yang, & Xu, 2020) perceive paying taxes as socially responsible. However, highlighting tax payments and efforts to become a socially responsible taxpayer may generate rather than mitigate reputational costs if investors perceive a firm is paying too much tax (Davis et al., 2016). According to Cockfield and MacArthur (2015), the extent of reputational risk is likely to depend on a firm's business model and industry. Hardeck and Kirn (2016) state that it is ultimately an empirical question of which incentives prevail under which conditions. Thus, the costs of disclosing and withholding information depend on how third parties react to disclosure and non-disclosure (Beyer, Cohen, Lys, & Walther, 2010).

Whereas the public seems to appreciate sustainable tax behavior, it is still an open question whether investors have preferences beyond shareholder value maximization and whether they do take into account the firm's impact on the environment and society (Christensen et al., 2021 p.1178). Under the assumption of value maximization, firms that act rationally will engage in tax avoidance strategies, as long as the marginal benefits of these strategies exceed the marginal costs (Hanlon & Heitzman, 2010). These tax avoidance strategies generate tax savings and allow the shareholders to benefit from higher after-tax earnings (Hanlon & Heitzman, 2010).

Consequently, firms pursuing tax avoidance strategies might be reluctant to disclose tax information, if management foresees a negative reaction of shareholders towards tax avoidance. On the one hand, economics-based theories, such as signaling theory, suggest that companies paying their 'fair share' of taxes are more likely to provide disclosures, as these can point to a lower risk of tax audits and reputational concerns. On the other hand, socio-political theories, such as stakeholder theory and legitimacy theory, predict that firms accused of tax avoidance or facing increased tax-related stakeholder scrutiny are more likely to provide disclosures (Hardeck & Kirn, 2016). If these firms want

to provide the impression of pursuing sustainable tax behavior, incentives might be present to provide superficial or symbolic disclosures that are not necessarily grounded in reality (Hardeck et al., 2020).

Like other disclosures, increased tax disclosures might allow investors to better predict a firm's future cash flows and evaluate its tax risk strategy. The demand for accounting information, including tax disclosures, arises for two reasons. First, investors need information ex-ante to forecast expected profitability and cash flows, as firm value depends on these expected cash flows and the associated risks (Beyer et al., 2010). While successful tax avoidance can reduce cash outflows, it also increases the risk of tax audits and potential reputational damage, which can lead to higher cash outflows or lower cash inflows. Drake, Lusch, and Stekelberg (2019) find that investors generally value corporate tax avoidance positively, whereas Lewellen, Mauler, and Watson (2021) suggest that certain forms of tax avoidance may be viewed negatively. Empirical studies thus provide mixed evidence on investors' reactions towards tax avoidance. Second, the ex-post demand for accounting information stems from the separation of ownership and control, as outsiders need to evaluate management's stewardship and behavior (Beyer et al., 2010).

Since management's decision to disclose information depends on both management's incentives and the firm's governance systems in place, we now examine how a family's involvement in a firm, as an element of firm governance, is related to the level of public disclosures made by these family firms. We do so by focusing on different types of family involvement in the firm and comparing the level of public tax disclosures made by family firms with disclosures made by firms with no family influence.

2.2.3 Hypothesis Development

2.2.3.1 Disclosure Behavior and Family Influence

As discussed earlier in this paper, disclosures are important both ex-ante and ex-post investment in the firm. Ex-ante, they help predict a firm's expected profitability and cash flows by considering the company's risk strategy and risk management policies. Ex-post, they allow for the evaluation of management's stewardship, particularly in the context of the separation between ownership and control.

When we shift our focus to family firms and analyze them through an agency lens, a different type of agency conflict arises compared to the classic principal-agent conflict found in non-family firms. In family firms, families often hold undiversified and concentrated equity positions, giving them strong incentives to closely monitor managers (Demsetz & Lehn, 1985). Additionally, family members typically possess superior knowledge of the firm's operations, which enables them to oversee management more effectively (Ali, Chen, & Radhakrishnan, 2007; Anderson & Reeb, 2003).

Another typical feature of family firms is the high presence of family members at the top management level of the firm and their personal ties to other executives in the firm (Hope et al., 2012). Family firms led by family CEOs are believed to differ systematically from those managed by non-family CEOs due to variations in their willingness to pursue family-centered non-economic (FCNE) goals, their ability to exercise discretionary power in selecting goals and strategies, and their capability to formulate and implement appropriate strategies to achieve firm goals. (De Massis, Kotlar, Campopiano, & Cassia, 2013). The presence of a family CEO will increase the ability of the family to influence the decision-making in the firm.

Moreover, family members have access to inside corporate information, allowing them to directly monitor management through private channels without relying heavily on public information (Chau & Gray, 2010; Chen et al., 2010). As a result, family firms generally tend to disclose less information (Chen et al., 2008) leading to a principal-principal problem (Chau & Gray, 2010) where information asymmetry arises between majority family shareholders and minority shareholders.

If family members gain control as a group, they may use the firm to generate private benefits that are not shared with other shareholders. (Shleifer & Vishny, 1997). When ownership reaches a certain level, controlling shareholders may get entrenched and extract private benefits from minority shareholders (Shleifer & Vishny, 1997). These type II agency problems can result in reduced disclosures in family firms, either to conceal the adverse effects of related-party transactions or to facilitate the entrenchment of family members in management positions (Ali et al., 2007). When families engage in private rent-seeking through related-party transactions or managerial entrenchment, increased disclosures could expose these activities to the market, potentially leading to substantial costs through reduced equity value (Ali et al., 2007). Disclosing information carries the risk that stakeholders' responses may challenge a family's unrestricted control, which can result in greater potential costs than benefits. Research suggests that as family ownership increases to very high levels, family owners feel less compelled to comply with external pressures (Miller, Minichilli, & Corbetta, 2013). In addition, because families often hold large equity stakes in their firms and plan to do so for multiple generations (Chua, Chrisman, & Sharma, 1999), they are less concerned with short-term market valuations, which reduces their need to disclose information.

When family control is low, the firm is exposed to the influence of various non-family owners, such as institutional shareholders or dispersed individual shareholders, making the market value of the company a greater concern. Reducing information asymmetry with outside investors becomes more important in such cases. A family's ability to influence or control the firm can be through involvement in ownership, management, and/or the board.

While traditional agency theory suggests that family involvement leads to less disclosure, research indicates that family firms often have a heightened concern for their reputation (Syed & Butt, 2017) and legitimacy (Deephouse & Jaskiewicz, 2013), which can increase their inclination to disclose information. For instance, if a family firm wants to be perceived as paying its fair share of taxes for reputational purposes, it may be motivated to provide more tax disclosures to gain reputational benefits. We expect that family firms with the family name included in the firm name will have higher reputational concerns.

In a family firm, the outcome of a disclosure decision is influenced by both the family's incentives and the firm management's incentives. The overall level of public tax disclosures consists of disclosures made in response to mandatory public tax reporting requirements and the amount of voluntary public tax disclosures issued.

2.2.3.2 Public Mandatory Tax Disclosures

Within the disclosure literature, firm compliance with mandatory disclosure requirements has received less research attention (Ayers et al., 2015). Mandatory disclosures compel companies to make both proprietary and non-proprietary information public (Leuz & Wysocki, 2008), as well as both "good" news and "bad" news (Verrecchia, 2001). Although most studies assume that firms comply with mandatory disclosure requirements (e.g. Botosan, 1997; Collins, Hand, & Shackelford, 2000; Francis, Nanda, & Olsson, 2008), other research documents instances of noncompliance with required disclosures, such as those for tax contingencies (Gleason & Mills, 2002; Robinson & Schmidt, 2013). Evidence from studies on compliance indicates that compliance increases with the size and estimated materiality of the item (Chen, Hou, Richardson, & Ye, 2015) as well as with litigation risk and the visibility of the firm (Gleason & Mills, 2002; Robinson & Schmidt, 2013).

Given that the firms in our study are highly visible, subject to audits, and under stock exchange supervision, we assume that family and non-family firms will not exhibit different levels of public mandatory tax disclosures. Therefore, we hypothesize that:

H1: The level of public mandatory tax disclosures of family firms will not be significantly different from the level of public mandatory tax disclosures made by non-family firms.

2.2.3.3 Voluntary Tax Disclosures

From the perspective of the individual firm, mandatory disclosure is externally mandated, whereas, in voluntary disclosure settings, there is an element of self-selection (Leuz & Wysocki, 2016). In a family firm, the choice of voluntary disclosures will depend on both management's and the family's incentives. Family members with significantly higher shareholdings stand to benefit more from tax

savings or rent extraction that could be concealed through aggressive tax practices (Chen et al., 2010; Desai & Dharmapala, 2006). However, if aggressive tax activities are detected by tax authorities or the public, the resulting potential price discount can be costly for family firms. Considering the cost-benefit balance, the literature suggests that the benefits of aggressive tax planning and withholding tax disclosures are higher for family firms, especially when ownership stakes are larger (Chen et al., 2010). This leads to the prediction that higher levels of family involvement in ownership will result in fewer voluntary tax disclosures.

Masking insider entrenchment and providing fewer disclosures is only possible when the family can influence and control the firm. This control can be achieved through high ownership stakes, holding the position of CEO, or having multiple seats on the board of directors. Based on agency theory and the related principal-principal agency conflict, we hypothesize that higher family involvement in ownership, management, and the board will lead to fewer voluntary tax disclosures. Thus, we propose the following hypothesis:

H2a: Family firms with higher family involvement in ownership (i), in management (ii) and in the board (iii) will issue fewer public voluntary tax disclosures than non-family firms or family firms with lower family involvement.

Building on the family business literature regarding reputational concerns, we assume that family firms with their family name included in the firm's name will provide more voluntary tax disclosures to protect the perception that they are paying their fair share of taxes. Such family firms may also be more concerned about tax audits and litigation risks, which can impact their reputation. Therefore, we hypothesize that:

H2b: Family firms that include the family name in the firm's name will issue more public voluntary tax disclosures compared to non-family firms or family firms that do not include the family name in their firm's name.

2.2.3.4 Early Adoption of Public CbCR Disclosures

Throughout the study period from 2015 to 2021, public CbCR disclosures were voluntary. However, from 2016 onwards, private CbCR disclosures to tax authorities became mandatory for all companies in our research population. Additionally, when private CbCR became mandatory, discussions began in

the EU about also mandating public CbCR reporting for these firms[1]. In 2021, the EU decided that starting in 2024, CbCR information would become publicly mandatory for all firms with consolidated revenues exceeding 750 million euros, irrespective of the industry they operate in.

Research on changes in firm behavior following alterations in tax regulation and related disclosures provides mixed evidence on whether firms actually change their behavior. Research on private CbCR is starting to generate evidence that affected firms change their tax behavior in various ways. For example, studies show increases in effective tax rates (ETRs) (Hugger, 2024; Joshi, 2020; Overesch & Wolff, 2021) and reduced presence in tax havens (De Simone & Olbert, 2022) after the introduction of private CbCR. However, there is also evidence that MNEs reduced their corporate transparency following the initiation of private CbCR in 2016. Balakrishnan et al. (2019) show that aggressive tax planning is associated with lower corporate transparency. Their results indicate that mandating U.S. MNEs to provide detailed private CbCR reports to foreign tax authorities led these firms to further reduce their corporate transparency, particularly regarding public disclosures about foreign operations. In addition, before CbCR became mandatory for tax authorities, Hope et al. (2013) found that firms not disclosing geographic earnings information had lower ETRs compared to firms that provided such disclosures. They attributed this finding to managers' perceptions that not disclosing geographic earnings helps conceal tax avoidance activities.

CbCR disclosures reveal how an MNE allocates profits across the countries where it has subsidiaries. This information is proprietary not only to competitors but also to minority shareholders, who can better detect rent extraction with insights into profit allocation. Since tax authorities already have access to private CbCR information, public disclosure might not significantly increase the risk of tax audits. Building on hypothesis H2a regarding voluntary disclosure, we assume that family firms that benefit most from tax-influenced profit allocation, through reduced tax costs and rent extraction, will disclose less public CbCR information. Therefore, we hypothesize that:

H3a: Family firms with higher family involvement in ownership (i), in management (ii) and in the board (iii) will issue fewer voluntary public CbCR disclosures than non-family firms or family firms with lower family involvement.

Consistent with the literature on family firm reputation, we expect that family firms aiming to protect both their family's and the firm's reputation will use voluntary public CbCR disclosures to avoid

[1] Public CbCR was already mandatory for financial industries in the EU since 2013, and extractive and logging industries in the EU must report 'payments to governments' publicly in their reports since 2004.

perceptions of insider entrenchment or not paying their fair share of taxes, which could lead to reputational damage. Therefore, we hypothesize that:

H3b: Family firms with the name of the family in the name of the firm will issue more voluntary public CbCR disclosures than non-family firms or family firms with low family involvement.

2.3 Research Method

2.3.1 Research Sample

To test our hypotheses, we use a balanced panel dataset of large, listed groups in Europe over the 2015-2021 period. The final research sample of large listed companies in Europe used in this study is based on several selection criteria to ensure comparability within the sample. First, all companies must be the ultimate parent firm of their respective groups and have, based on the country-by-country reporting guidelines of the OECD a group revenue of over 750 million euros for each of the years. This leads to 4,495 companies worldwide. By choosing this specific set of companies, we avoid that companies might argue that gathering the necessary information on certain tax disclosures is too costly since they need this CbCR information for their private tax disclosure requirements vis-à-vis tax authorities (Hanlon, 2018). Another consequence of this choice is that the sample will be more homogenous concerning mandatory reporting requirements.

Second, only listed companies in the EU and United Kingdom were selected as they are subject in the period of our study to the non-financial reporting directive of the EU (European Union, 2014) and thus must mandatorily report on a series of CSR topics from 2017 onwards. This diminishes the sample to 615 companies. Although companies from the United Kingdom are no longer part of the EU since Brexit on January 31, 2020, combining listed UK firms with those from the EU is appropriate for this study, as the UK was part of the EU for most of the sampling period. Second, UK groups meeting the criteria for public CbCR with subsidiaries in the EU will also be subject to the EU Directive on Public Country-by-Country Reporting approved by the European Parliament on 11 November 2021. Since all UK companies in our sample have at least one subsidiary in an EU country, they will be obliged to disclose public CbCR information. As one of the examined document types for the measurement of the tax disclosure index is the financial statements of the firm, all companies must report according to the IFRS Standards so that variation in mandatory financial statement tax disclosures cannot be attributed to differences in accounting standards. Both listed firms in the EU and the UK must prepare financial statements in compliance with IFRS Standards.

Third, companies from the financial industries (NACE codes 64-66) and extractive and forestry industries (NACE codes 02, 05-09) are excluded from the research sample due to industry-specific

reporting standards on taxes and payments to governments. Financial industries are subject to Article 89 of Directive 2013/36/EU, which foresees country-by-country reporting to tax authorities by these firms. Extractive and forestry industries are subject to Chapter 10 of Directive 2013/34/EU, which foresees reporting of payments to governments, which overlap considerably with taxes. These selection criteria, which are represented in Table 2.1 leave us with a sample of 435 companies.

Table 2.1 Sampling Procedure

Table 2.1. Sampling Procedure

Selection criteria	Number of companies left in the sample
Ultimate parent with 750M euro consolidated revenue for all sample years	4,495
Listed companies in the EU or UK	615
Exclusion of financial, extractive and forestry industries	435
France, Finland, Germany, Netherlands, UK, Sweden	331
At least 5 companies in the NACE industry	291
Manual check on (de)mergers	285
Manual check on listing in 2015	279
Manual check on firm location	271
Manual check on missing information	237
Manual check listing period over the entire sample period	234

Note: This table reports the sampling procedure.

To ensure that the subgroups in the final sample are sufficiently large, only companies in countries with at least 25 companies meeting the previous thresholds are selected[2]. The resulting countries are Finland, France, Germany, the Netherlands, the United Kingdom and Sweden, and represent 76% of the companies matching all the previous criteria.

Next, only NACE industries with at least five companies meeting the previous criteria are included in the sample, leading to 291 companies. Subsequently, we manually deleted six companies that (de)merged over the period, as well as six companies that became listed in 2015 to avoid confounding effects on our variables of interest. After manually checking on the firm location, another eight companies are deleted from the sample. These are companies that Orbis classified as belonging to one of the countries in our sample but are not in practice such as the X5 group, which is a Russian-based firm.

Next, companies with missing data for our independent variables were also eliminated. Eighteen companies had missing data to calculate the three-year effective tax rate (ETR) for 2015, for which data for 2013 and 2014 was necessary and unavailable for most firms that became listed in 2015. Another eight companies had missing market values for 2015. Six companies did not make annual reports available for one or more years in the examined period. Two companies had missing data on the number of analysts covering the firm. Lastly, after eliminating three companies that are not listed

[2] We choose a threshold of 25 companies since the country with the 7th most companies meeting the previous criteria had 17 companies meeting all previous criteria, which is considerably less than 25 companies.

over the entire seven-year period, we are left with a final sample of 234 companies over seven years, and thus 1,638 firm-year observations. Table 2.2 shows that well over a third of companies are UK companies. The largest industry is GICS 20 which is the 'industrials' industry, with over 38% of companies belonging to this industry.

Table 2.2 Sample Breakdown by Industry and Country per Firm-Year Observation

Table 2.2. Sample Breakdown by Industry and Country per Firm-Year Observation

Industries	N	%
GICS10 - Energy	14	0.85
GICS15 - Materials	182	11.11
GICS20 - Industrials	630	38.46
GICS25 – Consumer discretionary	343	20.94
GICS30 – Consumer staples	126	7.69
GICS35 – Healthcare	105	6.41
GICS45 – Information technology	126	7.69
GICS50 – Communication services	98	5.98
GICS55 - Utilities	14	0.85
Countries	N	%
Germany	294	17.95
Finland	140	8.55
France	294	17.95
United Kingdom	567	34.62
The Netherlands	112	6.84
Sweden	231	14.10

Note: This table reports the sample breakdown per industry and country per firm-year observation.

2.3.2 Data Collection

We hand-collect the tax-related disclosures to calculate a tax disclosure index for each firm every year, leading up to 1.638 firm-year observations for the data collection. We perform a content analysis on financial statements, firm annual reports and sustainability reports. In case a firm presents an online appendix on tax information, this appendix will only be taken into account if it is attributable to a specific year and referred to in either the annual report, financial statements or the sustainability report of the firm.

To address the large number of disclosures, a general keyword search on all documents was performed on the word 'tax*', after which several keywords (presented in Appendix 2.1) assigned to individual items were searched to ensure no information would be missed. Paragraphs containing the

keywords were examined further to control whether a certain item was disclosed. Additionally, several sections of the annual report are always examined completely. These sections are the notes on income taxes and the notes on segment reporting for geographical disclosures in the IFRS financial statements, as well as the 'Group overview' section which is present in many annual reports. A detailed overview of the keywords and sections used during the scoring process can be found in Appendix 2.1. It is to be mentioned that the mandatory 'Tax Strategy' that large UK companies need to publish under the UK's Finance Act 2016 is only considered when it is included in one of the previously mentioned documents. Furthermore, we note that all EU companies in the sample have a UK affiliate obliged to publish a tax strategy. However, these strategies are only at the level of the UK affiliates and thus do not necessarily represent the point of view of the entire group. One researcher coded the majority of the documents, and three other researchers coded a smaller part of the population. To check inter-rater consistency, we calculate Krippendorff's alpha on 10% of our observations (Krippendorff, 1980). Values of 80% and above are acceptable (Krippendorff, 1980; Neuendorf, 2002). The obtained Krippendorff's alpha is 92,9% and is considered not to signal any issues of inter-rater consistency.

A common problem in the voluntary disclosure literature is making a distinction between non-disclosure of an item because a firm wants to retain this information, and non-disclosure of an item simply because it is not relevant (Patelli & Prencipe, 2007). We believe this issue might have a lesser impact on our study. First, all companies have foreign subsidiaries and are thus active in at least two or more countries, making country-by-country disclosures relevant for every firm. Second, none of the disclosures in our index are based on specific industry standards but are based on general mandatory and voluntary tax disclosure frameworks that can be applied to all industries. Given that tax is a topic all listed multinational companies are confronted with, we believe that the number of items not disclosed due to irrelevance will be rather low.

2.3.3 Measurement of the Variables

2.3.3.1 Dependent Variable

In past studies, tax disclosures have been measured in several different ways. One strand of literature examines geographical disclosures on tax matters (Akamah et al., 2018; Dyreng et al., 2020; Hope et al., 2013; Joshi et al., 2020). A second strand focuses on the disclosures mandated by IAS 12 (Kvaal & Nobes, 2013). A third strand of literature examines disclosures relating to uncertain tax positions (Gupta et al., 2014; Henry et al., 2016; Robinson & Schmidt, 2013). A fourth strand of literature focuses on disclosures stemming from country-specific disclosure frameworks like the UK Finance Act 2016

and the Australian Voluntary Tax Transparency Code[3] (Bilicka et al., 2021; Kays, 2022). Finally, one study so far also examines the overall level of tax disclosure in a comprehensive way (Hardeck & Kirn, 2016). This study did not include GRI 207 and public CbCR.

For this study, we design a tax disclosure index that captures both mandatory and voluntary tax disclosures. This index includes GRI 207, public CbCR and measurements used in previous studies. The first part of the index includes all items that need to be mandatorily reported under IAS 12, IAS 7 and IFRIC 23 leading to the inclusion of four items in the index. Furthermore, we include items from the GRI framework. Academics agree that the GRI guidelines are a good option available for sustainability reporting (Clarkson et al., 2008; Hardeck & Kirn, 2016; Lozano & Huisingh, 2011). Specifically, we include all items that are considered 'necessary' by GRI 207-1 (Approach to tax), GRI 207-2 (Tax governance, control & risk management), GRI 207-3 (Stakeholder engagement and management of concerns related to tax) and GRI 207-4 (Country-by-country reporting) and an additional two items included in GRI G4-S08. No items stem uniquely from CbCR since the GRI 207-4 standard contains a copy of the requirements for CbCR disclosures. All requirements from the UK Finance Act 2016 are also included in the GRI guidelines. We note that two items from the GRI 207 guidelines need to be mandatorily reported under IAS 7 and IFRIC 23. These items are cash taxes paid, and significant uncertain tax positions. These items are included under mandatory disclosures, as well as under GRI 207 in the analyses. We also include whether a firm provides additional guidance on the mandatory effective tax rate reconciliation, as this reconciliation can be complex and difficult to understand for both firm insiders and outsiders (Olson & Ordyna, 2023).

In addition, we add all items stemming from the Australian Voluntary Tax Transparency Code as voluntary tax disclosures (Kays, 2022). One additional item that provides geographical information on an item from the study of Kays (2022) is also added. Furthermore, we complement our index with four items from the study of Hardeck and Kirn (2016) that are not yet included in the index based on the previously described tax disclosure frameworks. All items included in the tax disclosure index are described in Appendix 2.1. Finally, we divide the tax disclosure index by the number of items in the index to obtain a relative percentage. The final tax disclosure index measures how many of the items

[3] Six items are suggested to be disclosed: (1) a reconciliation of income before tax to income tax expense that details temporary and permanent differences, (2) a reconciliation of income tax expense to income taxes paid, (3) a summary of corporate taxes paid, (4) a discussion of a firms' tax policy, governance and tax risk management, (5) material transactions with offshore related parties and (6) Australian specific and global effective tax rates (Kays, 2022).

mentioned above organizations report on. A higher level of tax disclosure means that an organization reports more items, resulting in a higher score on the tax disclosure index.

This leads to a tax disclosure index with different elements: Mandatory tax disclosures (MANDISC), voluntary tax disclosures (VOLDISC), CbCR-related disclosures (CbCR) and GRI 207-related disclosures (GRI207). Finally, we can also distinguish between qualitative disclosures and quantitative disclosures.

All items of the index are assigned equal weights to avoid subjectivity for the main analyses. (Kao & Liao, 2021; Lokuwaduge & Heenetigala, 2017; Mallin, Farag, & Ow-Yong, 2014; Platonova, Asutay, Dixon, & Mohammad, 2018). As a robustness test, we also use an alternative weighting approach where we distinguish the level of detail in geographical information, which earns two points when the item is disclosed on a regional basis and three points when the item is disclosed on a country-by-country basis analogously to previous research (Clarkson et al., 2008; Hardeck & Kirn, 2016). Subsequently, we normalize each item in this alternative weighting approach by calculating the items' z-scores as an indication of how far each firm scores on an item from the mean (Bloom & Van Reenen, 2007; Bromley & Sharkey, 2017; Clarkson et al., 2013). The latter approach also implies that all items are weighted equally.

2.3.3.2 Independent Variables

In this study, we examine a family's ability to influence firm behavior by considering three factors: the level of family involvement in ownership, the level of family involvement in management and the level of family involvement in the board of directors (see Nordqvist, Sharma, & Chirico, 2014). We measure family involvement in ownership using three different specifications. The first measure is the *percentage of family ownership* in a firm's capital (FOWN). Second, we also use a measurement of family ownership based on La Porta, Lopez-de-Silanes, and Shleifer (1999) and Faccio and Lang (2002) for which the *family must possess at least 20% of the voting rights* to be classified as a family firm (FVOTE 20%). Firms in which the family possesses 20% or more of the voting rights are classified as '1', and the other firms as '0'. Third, along the lines suggested by (La Porta et al., 1999) we also measure family involvement in ownership with the use of a dummy variable which is coded as '1' if the *family owns more than 20% of the shares*, and '0' otherwise (FOWN 20%).

Considering definitions of a family firm in the family business literature, Villalonga and Amit (2006) illustrate that when family members are involved in the management or on the board of the firm, families need less family involvement in ownership to control the firm, especially when other shareholders are dispersed. Hence, we also use the definition of a family firm of Villalonga and Amit (2006) and score firms as '1' if *a member of the family is an officer, a director or owns more than five percent of the firm's equity, individually or as a group* (FAMF). In addition, we also measure family

involvement through management by taking into account whether the CEO of the firm is a family member. In this case, we code the dummy variable *family CEO* (FCEO) as '1', otherwise '0'. Next, we measure family involvement in the board of directors as the *percentage of family members on the board of directors* (FBOARD). While the FOWN, FVOTE 20% and FOWN 20% focus on family involvement through ownership and voting power, FAMF, FCEO and FBOARD focus on family involvement through management and governance. Finally, we also use whether *the family name is included in the firm name* (FNAME) since previous literature suggests that reputational concerns might be higher for family firms having the family name as the firm name. Data on family firms are collected from the NRG Metrics database.

To establish which people constitute "family", the NRG Metrics database identifies evidence of "family" in each firm, such as the surname of the founder and large shareholders. Then, the NRG Metrics database checks firm reports and board compositions for other family relationships. For example, firms regularly report family relationships in the footnotes below the shareholding structure. This way, family members who do not share the common surname are also identified, such as spouses and cousins.

2.3.3.3 Control Variables

Based on previous literature, we include several firm-specific characteristics that are expected to be related to the level of tax disclosure as control variables (Akamah et al., 2018; Ayers et al., 2015; Balakrishnan et al., 2019; Boone & White, 2015; Hardeck & Kirn, 2016; Khan, Srinivasan, & Tan, 2017). Firstly, *firm size* (SIZE) is expected to be positively correlated with disclosure and is measured as the natural logarithm of total assets (Robinson & Schmidt, 2013). Secondly, we control for the level of tax avoidance of the firm (Balakrishnan et al., 2019). As Hanlon and Heitzman (2010) discuss extensively, several measures for tax avoidance exist, all with their strengths and disadvantages. We calculate a firm's three-year effective tax rate as the accumulated *tax expenses over three years, divided by the accumulated pre-tax income over three years* (ETR) using the companies' financial statements published in compliance with the IFRS standards. By accumulating tax expenses and pre-tax income over three years, we control for taxation over a longer period as a single-year ETR does not take into account fluctuations due to the transient nature of these GAAP ETRs. We also censor this variable between 0 and 1 (Dyreng, Hanlon, & Maydew, 2019). A multi-year-based measure allows us to better track the effective tax cost over the long run (Dyreng, Hanlon, & Maydew, 2008). In addition, we also correct this measure for the statutory tax rate in each country in our sample (Adams et al., 2022; Overesch & Wolff, 2021).

Thirdly, *leverage* (LEV) is measured as the total long-term debt to total assets ratio. Fourthly, the *market-to-book ratio* (MTB) is calculated as the market value of total assets divided by the book value of total assets. Fifthly, *return on assets* (ROA) is calculated as profit or loss before interest and tax divided by total assets. Sixthly, we also control for a firm's geographical complexity by calculating the Herfindahl-Hirsch index based on the geographical spread of a firm's subsidiaries (GEOGR COMPL) (Chkir, Dutta, & Hassan, 2020). We reverse this index, so higher values mean a wider geographical spread of the firm's subsidiaries. Seventhly, we control for cross-listing on a US stock exchange (US CROSSLIST) to control for a firm's information environment (Lang, Lins, & Miller, 2003), together with a firm's analyst following (ANAFOL) (Balakrishnan et al., 2019; Boone & White, 2015) and a firm's percentage of institutional ownership (IO) (Boone & White, 2015). Eighthly, we control whether a firm has a subsidiary in a tax haven (HAVEN) (Akamah et al., 2018). Finally, we implement country, year and industry fixed effects. Industry effects are based on the Global Industry Classification Standard (GICS). GICS is often regarded as a better proxy for industries than for example the classic Fama-French 12 industry approach (Bhojraj, Lee, & Oler, 2003; Hrazdil & Zhang, 2012). All control variables are collected from BvD's Orbis Global, except analyst following which is retrieved from I/B/E/S. All variable definitions are summarized in Appendix 2.2.

2.3.4 Method of Analysis

To test our hypotheses, we estimate the following equations based on panel data:

$$MANDISC_{i,t} = \beta_0 + \beta_1 Family\ Involvement_{i,t} + \beta_{2-11} Controls_{i,t} + Country\ effects_i + Industry\ effects_i + Year\ effects_t + \varepsilon_{i,t} \quad (1)$$

$$VOLDISC_{i,t} = \beta_0 + \beta_1 Family\ Involvement_{i,t} + \beta_{2-11} Controls_{i,t} + Country\ effects_i + Industry\ effects_i + Year\ effects_t + \varepsilon_{i,t} \quad (2)$$

$$CbCR_{i,t} = \beta_0 + \beta_1 Family\ Involvement_{i,t} + \beta_{2-11} Controls_{i,t} + Country\ effects_i + Industry\ effects_i + Year\ effects_t + \varepsilon_{i,t} \quad (3)$$

We perform a standard OLS regression. As our measures for family involvement are rather stable across time, a firm fixed effects approach is not appropriate. In addition, we winsorize all variables between the 5th and 95th percentiles to reduce the influence of outliers. Standard errors are clustered at the firm level. As robustness checks, we also re-estimate these models with a Poisson regression on the absolute value of the tax disclosure index score without dividing this index by the number of items in the index. Second, we also run regressions with z-score weightings of the tax disclosure index as the dependent variable. In additional analyses, we also provide results on disclosures stemming from the

most prominent stakeholders-oriented voluntary public tax disclosure framework, GRI 207, and on qualitative and quantitative disclosures.

2.4 Results

2.4.1 Descriptive Statistics

Table 2.3 shows that companies score on average 91.662% on MANDISC, 20.754% on VOLDISC, 27.091% on CbCR and 25.689% on GRI. Even though the scores for VOLDISC, CbCR and GRI207 are quite low, an increase in the scores from 2015 to 2021 is noticeable. VOLDISC ranges from 15.80% in 2015 to 25.30% in 2021, CbCR ranges from 20.257% in 2015 to 28.417% in 2021 and GRI207 ranges from 20.323% in 2015 to 30.611% in 2021.

Table 2.3 Descriptive Statistics

Table 2.3. Descriptive Statistics

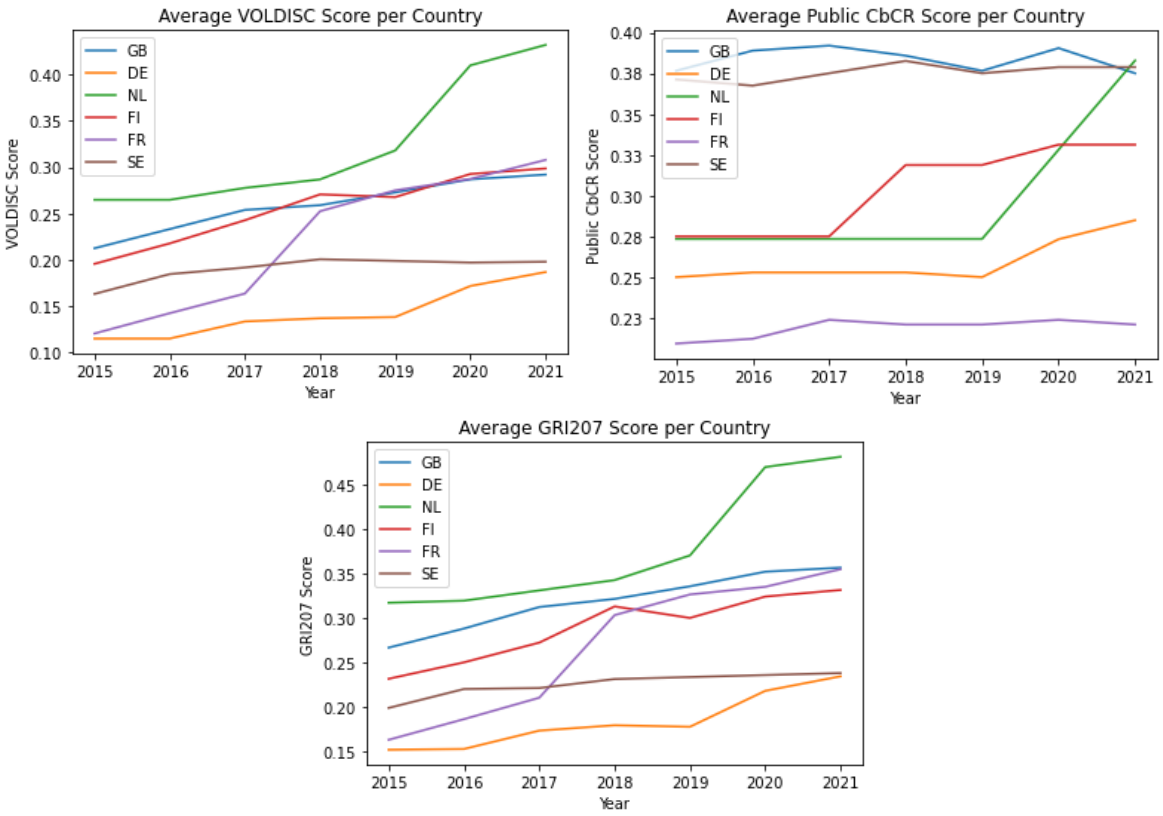
Variable	N	Mean	Std	Min	Q1	Median	Q3	Max
MANDISC	1,638	0.917	0.120	0.500	0.750	1.000	1.000	1.000
VOLDISC	1,638	0.208	0.124	0.000	0.114	0.176	0.286	0.647
CbCR	1,638	0.271	0.209	0.000	0.125	0.125	0.375	0.875
GRI207	1,638	0.257	0.137	0.037	0.148	0.222	0.333	0.815
QUALDISC	1,638	0.272	0.180	0.00	0.150	0.200	0.400	0.800
QUANDISC	1,638	0.264	0.102	0.167	0.222	0.333	0.444	0.667
FOWN (%)	1,615	3.342	10.706	0.000	0.000	0.000	0.000	65.500
FVOTE 20%	1,638	0.075	0.264	0.000	0.000	0.000	0.000	1.000
FOWN 20%	1,615	0.087	0.282	0.000	0.000	0.000	0.000	1.000
FAMF	1,638	0.177	0.382	0.000	0.000	0.000	0.000	1.000
FCEO	1,638	0.096	0.294	0.000	0.000	0.000	0.000	1.000
FBOARD	1,601	0.026	0.085	0.000	0.000	0.000	0.000	1.000
FNAME	1,615	0.223	0.416	0.000	0.000	0.000	0.000	1.000
GEOGR	1,638	0.683	0.269	0.000	0.598	0.788	0.876	0.971
COMPL								
IO	1,638	0.534	0.218	0.046	0.371	0.538	0.704	1.000
ETR	1,638	0.001	0.163	-0.333	-0.069	-0.004	0.048	0.810
SIZE	1,638	22.353	1.424	19.174	21.267	22.177	23.197	26.435
ROA	1,638	0.073	0.066	-0.373	0.042	0.069	0.101	0.543
LEV	1,638	0.680	0.914	0.000	0.251	0.461	0.805	13.785
MTB	1,638	1.070	0.866	0.034	0.498	0.820	1.380	8.940
ANALYST	1,638	2.597	0.617	0.000	2.197	2.773	3.091	3.664
HAVEN	1,638	0.863	0.344	0.000	1.000	1.000	1.000	1.000
US CROSSLIST	1,638	0.376	0.485	0.000	0.000	0.000	1.000	1.000

Note: This table reports basic descriptive statistics for the variables employed in the main empirical analysis. See Appendix 2.2 for variable definitions Our sample period spans 2015-2021. For 23 firm-year observations, data on exact share ownership is missing.

We plot the average VOLDISC score per country over the sample period in Figure 2.1. The graphs indicate that large listed European companies increased their voluntary disclosures over the sample period. As the mean of VOLDISC is slightly above the median, a couple of companies appear to have rather high scores which causes the distribution to be lightly right skewed. We observe a similar trend for CbCR information, GRI207 information, qualitative and quantitative disclosures.

No single firm achieves the maximum tax disclosure index. Around 18% of firms in our sample are considered family firms according to the FAMF definition of Villalonga and Amit (2006). Looking only at firms that have family ownership in the research sample, we observe that the average ownership stake of families within this group is 21.503%. In our sample, 9.584% of all firms are led by a family CEO. Amongst the group of family firms according to the definition of Villalonga and Amit (2006), 14.828% are led by a family CEO. On average, 2.617% of board members are family members. Amongst the group of family firms according to the definition of Villalonga and Amit (2006), 15.125% of the board members are family members. 22.219% of the firms in our sample carry the family name. Amongst the group of family firms according to the definition of Villalonga and Amit (2006), 33.688% carry the family name.

Figure 2.1 Average VOLDISC, Public CbCR and GRI207 Score per Country



2.4.2 Univariate Differences Between Family and Non-Family Firms

To highlight the differences between family and non-family firms, we first conducted univariate t-tests for the subcategories in the tax disclosure index and the control variables, similar to Vural (2018) (see Table 2.4). For these univariate tests of differences between family firms and non-family firms, we follow the definition of Villalonga and Amit (2006). If we classify the results according to FVOTE 20% or FOWN 20%, the results are consistent. Table 2.4 shows that family firms tend to score lower on MANDISC, VOLDISC, CbCR and GRI207. When looking at the individual items (see Appendix 2.3), family firms appear to score significantly lower on the large majority of tax disclosure items than non-family firms. There is one exception. Family firms do score higher at a declaration of adherence to the arm's length principle at a statistical significance level of 5%. This item can be related to transfer pricing, but might have a more general character in family firms to reassure minority shareholders that related party transactions are not used to tunnel profits from the firm to the controlling family. All firms in our research sample disclose the following two items: the effective tax rate reconciliation from the statutory tax rate and a breakdown of the deferred tax assets and liabilities over the balance items. These are disclosures mandated by IAS 12, and their disclosure is therefore no surprise. Compliance with disclosure of uncertain tax positions under IFRIC 23 is rather low as this item only became mandatory in 2019. Finally, none of the companies in our sample disclosed the item 'Balance of intra-group debt'. However, intra-group debt plays a large role in optimizing tax payments within the group in the form of debt shifting, and this item is also included in the commentary on the GRI 207 disclosures. We note that this item could be available on the level of the individual group members, as local financial statements often contain more local GAAP-specific detailed information on the local entity compared to the consolidated financial statements of the group (Beuselinck, Elfers, Gassen, & Pierk, 2023). For example, the 'Belfirst' database in Belgium contains information on debt in affiliated companies. However, on the overall group level, no firm reported intra-group debt in their annual reports, financial statements or sustainability reports. Overall based on univariate t-statistics, family firms seem to disclose less tax information.

Table 2.4 Descriptives per Subcategory of the Tax Disclosure Index and Control Variables

Table 2.4. Descriptives per Subcategory of the Tax Disclosure Index and Control Variables

	All	Family firms	Non-family firms	Difference t-stat
MANDISC	0.917	0.903	0.919	2.19**
	(0.003)	(0.008)	(0.003)	
VOLDISC	0.208	0.161	0.217	7.10***
	(0.003)	(0.007)	(0.003)	
CbCR	0.271	0.224	0.281	4.21***
	(0.005)	(0.011)	(0.006)	
GRI207	0.257	0.206	0.268	7.14***
	(0.003)	(0.008)	(0.004)	
IO	0.535	0.444	0.555	8.03***
	(0.005)	(0.013)	(0.006)	
GEOGR COMPL	0.683	0.715	0.676	-2.23**
	(0.007)	(0.017)	(0.007)	
ETR	0.001	-0.003	0.002	0.48
	(0.004)	(0.009)	(0.005)	
SIZE	22.353	21.791	22.481	7.96***
	(0.035)	(0.068)	(0.039)	
ROA	0.073	0.070	0.074	0.83
	(0.002)	(0.003)	(0.002)	
LEV	0.680	0.563	0.705	2.41**
	(0.023)	(0.038)	(0.261)	
MTB	1.070	1.238	1.033	-3.67***
	(0.021)	(0.056)	(0.023)	
ANALYST	2.597	2.403	2.639	5.96***
	(0.015)	(0.036)	(0.017)	
HAVEN	0.863	0.800	0.877	3.47***
	(0.008)	(0.024)	(0.009)	
US CROSSLISTING	0.376	0.266	0.400	4.31***
	(0.012)	(0.026)	(0.013)	

Note: This table reports univariate t-statistic differences between FAMF and non-FAMF firms for the tax disclosure index categories and independent variables employed in the main empirical analysis. Independent variables are defined in Appendix 2.2. The six disclosure categories are explained in section 3.2.1, and the items belonging to these categories can be found in Appendix 2.1.

2.4.3 Correlations

Pearson correlation coefficients are presented in Table 2.5. All family involvement variables are negatively correlated at the 5% level with VOLDISC, CbCR and GRI207 hinting towards a negative relationship between tax disclosure and family involvement. FAMF is also negatively related to MANDISC at the 5% level. We note that a strong positive correlation of 0.864 exists between FVOTE 20% and FOWN 20%. To check for multicollinearity, we calculate variance inflation factors (VIF). All VIFs are well under 10, meaning that multicollinearity issues can be ruled out with adequate certainty.

Table 2.5 Pearson Correlation Coefficients

Table 2.5. Pearson Correlation Coefficients

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) MANDISC	1.000									
(2) VOLDISC	-0.063*	1.000								
(3) CbCR	-0.032	0.396*	1.000							
(4) GRI207	-0.032	0.878*	0.673*	1.000						
(5) FAMF	-0.054*	-0.173*	-0.119*	-0.160*	1.000					
(6) FVOTE 20%	-0.003	-0.171*	-0.156*	-0.192*	0.608*	1.000				
(7) FOWN	-0.011	-0.153*	-0.126*	-0.156*	0.732*	0.910*	1.000			
(8) FOWN 20%	-0.018	-0.160*	-0.080*	-0.155*	0.582*	0.864*	0.951*	1.000		
(9) FCEO	0.007	0.030	-0.057*	-0.030	0.083*	0.010	0.060*	-0.027	1.000	
(10) IO	0.067*	0.086*	0.030	0.104*	-0.192*	-0.309*	-0.293*	-0.250*	-0.198*	1.000
(11) GEOGR COMPL	0.049*	-0.112*	-0.331*	-0.139*	0.053*	0.028	0.044	-0.066*	0.108*	-0.158*
(12) ETR	0.021	-0.025	0.028	-0.001	-0.013	0.002	0.010	0.027	-0.103*	0.144*
(13) SIZE	0.008	0.215*	0.023	0.184*	-0.196*	-0.131*	-0.164*	-0.189*	0.253*	-0.224*
(14) ROA	0.136*	0.030	0.058*	0.057*	-0.023	-0.014	0.009	-0.033	-0.051*	0.178*
(15) LEV	-0.064*	-0.026	-0.143*	-0.046	-0.073*	-0.015	-0.036	-0.023	0.039	-0.024
(16) MTB	-0.010	0.021	-0.118*	-0.001	0.097*	0.011	0.062*	-0.015	-0.025	0.227*
(17) ANALYST	0.072*	0.101*	-0.119*	0.063*	-0.159*	-0.129*	-0.159*	-0.213*	0.208*	0.001
(18) HAVEN	0.095*	-0.011	-0.102*	0.017	-0.085*	-0.069*	-0.069*	-0.116*	0.087*	0.015
(19) US CROSSLISTING	0.033	0.045	-0.093*	0.054*	-0.106*	-0.149*	-0.128*	-0.178*	0.073*	0.011

Table 2.5. Continued

Variables	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(11) GEOGR COMPL	1.000								
(12) ETR	0.007	1.000							
(13) SIZE	0.231*	-0.105*	1.000						
(14) ROA	-0.015	0.128*	-0.176*	1.000					
(15) LEV	-0.027	0.003	0.217*	-0.231*	1.000				
(16) MTB	0.098*	0.039	-0.200*	0.612*	-0.170*	1.000			
(17) ANALYST	0.230*	-0.090*	0.724*	0.031	0.130*	0.117*	1.000		
(18) HAVEN	0.509*	0.059*	0.276*	0.027	0.024	0.010	0.239*	1.000	
(19) US CROSSLISTING	0.268*	-0.030	0.526*	-0.033	0.046	0.113*	0.483*	0.155*	1.000

Note: This table reports Pearson correlation statistics for the variables employed in the main empirical analyses. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. * represents statistical significance at the 5% level.

2.4.4 Regression Results

In this section, we present the results of the relationship between family involvement and MANDISC, VOLDISC and CbCR. We look at seven different types of family involvement, being family involvement in ownership, family involvement in management and family ownership in the board of directors. We also consider whether the family name is included in the firm name.

2.4.4.1 Family Involvement and Mandatory Tax Disclosures

We present the results of the relationship between MANDISC and family involvement in Table 2.6. We do not find a statistically significant relationship between any variable measuring family involvement and MANDISC. Although we recognize that a statistically insignificant relationship does not rule out the possibility of an actual underlying relationship between family involvement and MANDISC, we also do not find evidence to support the opposite conclusion.

Concerning the control variables, we notice that SIZE, GEOGR COMPL and HAVEN are positively associated with MANDISC. It appears that larger firms comply more with mandatory tax disclosures, potentially due to the high levels of scrutiny they face. Similarly, firms that openly disclose their presence in tax havens tend to comply better with mandatory tax disclosures. Finally, geographically complex firms comply better with mandatory tax disclosures.

Table 2.6 Family Involvement and Mandatory Tax Disclosures (OLS)

Table 2.6. Family Involvement and Mandatory Tax Disclosures (OLS)

MANDISC	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
FOWN	0.003	0.06												
	(0.045)													
FVOTE 20%			0.010	0.72										
			(0.013)											
FOWN 20%					0.004	0.31								
					(0.012)									
FAMF							-0.008	-0.90						
							(0.008)							
FCEO									0.005	0.37				
									(0.015)					
FBOARD											-0.056	-1.30		
											(0.043)			
FNAME													-0.009	-1.36
													(0.007)	
IO	-0.001	-0.03	0.006	0.31	0.002	0.12	-0.003	-0.16	0.000	0.01	-0.006	-0.29	-0.002	-0.08
	(0.018)		(0.019)		(0.018)		(0.019)		(0.020)		(0.019)		(0.020)	
GEOGR COMPL	0.036**	2.56	0.038***	2.67	0.039***	2.75	0.040***	2.93	0.039***	2.76	0.036**	2.51	0.036**	2.53
	(0.014)		(0.014)		(0.014)		(0.014)		(0.014)		(0.014)		(0.014)	
ETR	0.002	0.06	0.001	0.04	0.001	0.06	0.003	0.13	0.002	0.08	0.005	0.18	0.000	0.00
	(0.025)		(0.024)		(0.024)		(0.025)		(0.024)		(0.025)		(0.025)	
SIZE	0.008**	2.14	0.009**	2.22	0.009**	2.17	0.008**	2.06	0.008**	2.14	0.008**	2.03	0.009**	2.24
	(0.004)		(0.004)		(0.004)		(0.004)		(0.004)		(0.004)		(0.004)	
ROA	0.086	1.01	0.093	1.11	0.092	1.09	0.082	1.00	0.092	1.11	0.084	0.97	0.086	1.01

	(0.085)		(0.083)		(0.084)		(0.082)		(0.083)		(0.086)		(0.085)	
LEV	0.000	0.04	0.000	0.03	0.000	0.03	-0.000	-0.03	0.000	0.02	-0.001	-0.10	-0.001	-0.12
	(0.006)		(0.006)		(0.006)		(0.006)		(0.006)		(0.006)		(0.006)	
MTB	-0.008	-1.22	-0.008	-1.23	-0.008	-1.20	-0.007	-1.09	-0.008	-1.24	-0.007	-1.07	-0.008	-1.28
	(0.007)		(0.006)		(0.006)		(0.006)		(0.006)		(0.007)		(0.007)	
ANAFOL	-0.004	-0.50	-0.004	-0.46	-0.003	-0.42	-0.004	-0.49	-0.004	-0.45	-0.005	-0.60	-0.004	-0.55
	(0.008)		(0.008)		(0.008)		(0.008)		(0.008)		(0.008)		(0.008)	
HAVEN	0.016**	1.99	0.015*	1.89	0.015*	1.86	0.014*	1.82	0.015*	1.87	0.018**	2.09	0.017**	2.09
	(0.008)		(0.008)		(0.008)		(0.008)		(0.008)		(0.009)		(0.008)	
US CROSSLIST	-0.004	-0.54	-0.003	-0.49	-0.004	-0.55	-0.004	-0.62	-0.004	-0.56	-0.004	-0.52	-0.005	-0.72
	(0.007)		(0.007)		(0.007)		(0.007)		(0.007)		(0.007)		(0.007)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	0.762***	9.97	0.746***	9.49	0.752***	9.59	0.772***	10.08	0.760***	9.93	0.781***	10.50	0.760***	9.79
	(0.076)		(0.079)		(0.078)		(0.077)		(0.076)		(0.074)		(0.078)	
R^2 adjusted	0.631		0.636		0.636		0.636		0.636		0.630		0.632	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (OLS) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and MANDISC on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

2.4.4.2 Family Involvement and Voluntary Tax Disclosures

Next, to test hypothesis H2a, we consider the relationship between VOLDISC and family involvement (see Table 2.7). We see that FOWN is statistically significantly negatively related to VOLDISC at the 10% level. Both FVOTE 20% and FOWN 20% are statistically significantly negatively related to VOLDISC at the 5% level. Using the definitions of family firms that focus on family involvement in management and governance, we do not find a statistically significant relationship between either FAMF and VOLDISC, between FCEO and VOLDISC or between FBOARD and VOLDISC. It thus appears that we can only confirm hypothesis H2a when examining family involvement through ownership and voting power. Finally, we also find no evidence of a relationship between FNAME and VOLDISC, leaving us unable to confirm or reject H2b.

In terms of the economic importance of the effect of FOWN, we see that an increase of 1% in FOWN is associated with a decrease of 0.088% on the tax disclosure index. Firms, where a family holds 20% or more voting rights, score 4.653% lower on VOLDISC, and firms, where the family owns more than 20% of the shares score 3.979% lower on VOLDISC.

To examine whether family involvement in ownership combined with family involvement in management is significantly associated with the level of tax disclosure, we test the interaction effect of FOWN and FCEO on the level of tax disclosure. We find no statistically significant interaction effect (see Table 2.8).

Concerning the control variables, we notice that firm size is positively associated with VOLDISC. In addition, more leveraged firms are significantly associated with fewer tax disclosures. Control variables related to tax avoidance, being ETR and HAVEN are not significantly related to VOLDISC in any of the regressions. In some of the regressions, US CROSSLIST is also negatively related to VOLDISC at the statistical significance level of 10%, but the other control variables for the information environment, IO and ANAFOL, are insignificantly related to VOLDISC.

Table 2.7 Family Involvement and Voluntary Tax Disclosures (OLS)

Table 2.7. Family Involvement and Voluntary Tax Disclosures (OLS)

VOLDISC	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
FOWN	-0.088*	-1.90												
	(0.046)													
FVOTE 20%			-0.047**	-2.57										
			(0.018)											
FOWN 20%					-0.040**	-2.31								
					(0.017)									
FAMF							-0.018	-1.35						
							(0.014)							
FCEO									0.016	0.96				
									(0.017)					
FBOARD											-0.045	-1.01		
											(0.044)			
FNAME													-0.013	-0.98
													(0.014)	
IO	-0.040	-1.22	-0.046	-1.43	-0.042	-1.32	-0.026	-0.83	-0.018	-0.58	-0.024	-0.71	-0.021	-0.62
	(0.033)		(0.032)		(0.032)		(0.032)		(0.032)		(0.033)		(0.033)	
GEOGR COMPL	-0.021	-0.74	-0.017	-0.63	-0.021	-0.77	-0.020	-0.71	-0.023	-0.86	-0.026	-0.93	-0.026	-0.95
	(0.028)		(0.027)		(0.027)		(0.028)		(0.027)		(0.028)		(0.028)	
ETR	-0.037	-1.03	-0.038	-1.09	-0.037	-1.06	-0.040	-1.14	-0.043	-1.23	-0.040	-1.09	-0.043	-1.22
	(0.036)		(0.035)		(0.035)		(0.035)		(0.035)		(0.036)		(0.036)	
SIZE	0.026***	3.43	0.026***	3.45	0.026***	3.55	0.027***	3.46	0.027***	3.54	0.027***	3.46	0.028***	3.57
	(0.008)		(0.007)		(0.007)		(0.008)		(0.008)		(0.008)		(0.008)	
ROA	0.165	1.44	0.163	1.48	0.157	1.41	0.154	1.39	0.180	1.60	0.172	1.48	0.170	1.47

	(0.114)		(0.110)		(0.111)		(0.111)		(0.112)		(0.116)		(0.116)	
LEV	-0.024**	-2.43	-0.024**	-2.49	-0.025**	-2.50	-0.025**	-2.46	-0.024**	-2.38	-0.024**	-2.34	-0.025**	-2.41
	(0.010)		(0.010)		(0.010)		(0.010)		(0.010)		(0.010)		(0.011)	
MTB	-0.002	-0.27	-0.002	-0.25	-0.002	-0.24	-0.001	-0.15	-0.004	-0.44	-0.003	-0.32	-0.004	-0.43
	(0.009)		(0.009)		(0.009)		(0.009)		(0.008)		(0.009)		(0.009)	
ANAFOL	0.002	0.10	0.004	0.23	0.001	0.08	0.002	0.11	0.003	0.15	0.001	0.08	0.001	0.07
	(0.017)		(0.017)		(0.017)		(0.017)		(0.018)		(0.018)		(0.018)	
HAVEN	-0.011	-0.63	-0.015	-0.83	-0.015	-0.83	-0.014	-0.81	-0.013	-0.71	-0.008	-0.44	-0.009	-0.51
	(0.018)		(0.018)		(0.018)		(0.018)		(0.018)		(0.019)		(0.018)	
US CROSSLIST	-0.023*	-1.67	-0.024*	-1.79	-0.024*	-1.76	-0.022	-1.64	-0.021	-1.58	-0.021	-1.52	-0.023*	-1.71
	(0.014)		(0.014)		(0.014)		(0.014)		(0.013)		(0.014)		(0.014)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	-0.447***	-3.16	-0.448***	-3.18	-0.454***	-3.25	-0.467***	-3.23	-0.496***	-3.44	-0.479***	-3.30	-0.501***	-3.44
	(0.142)		(0.141)		(0.140)		(0.145)		(0.144)		(0.145)		(0.146)	
R^2 adjusted	0.345		0.350		0.349		0.344		0.342		0.338		0.342	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (OLS) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and VOLDISC on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Table 2.8 Regressions with Interactions between FOWN and FCEO

Table 2.8. Regressions with Interactions between FOWN and FCEO

	Standard weighting		Absolute weighting		Z-score weighting	
	OLS		Poisson		OLS	
VOLDISC	Coef.	t-value	Coef.	z-value	Coef.	t-value
FOWN	-0.087*	-1.85	-0.550	-1.81	-0.215*	-1.77
	(0.047)		(0.304)		(0.122)	
FCEO	-0.014	-0.49	-0.051	-0.32	-0.015	-0.20
	(0.028)		(0.158)		(0.076)	
FOWN*FCEO	0.026	0.29	0.034	0.07	0.028	0.12
	(0.090)		(0.524)		(0.243)	
IO	-0.039	-1.18	-0.158	-0.98	-0.090	-1.01
	(0.033)		(0.162)		(0.089)	
GEOGR COMPL	-0.020	-0.71	-0.115	-0.91	0.030	0.41
	(0.028)		(0.126)		(0.072)	
ETR	-0.038	-1.05	-0.206	-1.19	-0.057	-0.62
	(0.036)		(0.173)		(0.092)	
SIZE	0.026***	3.40	0.129***	3.80	0.073***	3.85
	(0.008)		(0.034)		(0.019)	
ROA	0.153	1.32	0.740	1.37	0.480	1.57
	(0.116)		(0.540)		(0.306)	
LEV	-0.025**	-2.45	-0.106**	-2.19	-0.071***	-2.67
	(0.010)		(0.048)		(0.026)	
MTB	-0.001	-0.14	0.001	0.03	-0.008	-0.36
	(0.009)		(0.044)		(0.023)	
ANAFOL	0.001	0.06	0.008	0.11	-0.001	-0.02
	(0.018)		(0.078)		(0.043)	
HAVEN	-0.011	-0.63	-0.050	-0.58	-0.026	-0.54
	(0.018)		(0.086)		(0.049)	
US CROSSLIST	-0.023*	-1.66	-0.120*	-1.77	-0.042	-1.21
	(0.014)		(0.068)		(0.035)	
FIXED EFFECTS						
Country FE	YES		YES		YES	
Industry FE	YES		YES		YES	
Year FE	YES		YES		YES	
Constant	-0.443***	-3.11	-1.433**	-2.22	-1.880***	-5.37
	(0.142)		(0.646)		(0.358)	
R^2 adjusted	0.346		0.130		0.341	
N	1,615		1,615		1,615	

Note: This table reports results (OLS, Poisson and z-score) on the interaction between FOWN and FCEO, and the association with VOLDISC. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

2.4.4.3 Family Involvement and Public Country-by-Country Disclosures

When we zoom in on the relationship between family involvement and early adoption of public CbCR (see Table 2.9), we do not find a statistically significant relationship between either FOWN and public CbCR, or between FOWN 20% and CbCR. Consistent with the results of VOLDISC, FVOTE 20% is negatively associated with public CbCR at the 5% level. We partly confirm hypothesis H3a for those firms where the family holds more than 20% of the voting rights. Only this group of firms makes significantly fewer public CbCR disclosures. For none of the variables measuring family involvement through management or governance we find a statistically significant relationship with public CbCR. In addition, the relationship between FNAME and CbCR is statistically insignificant, leaving us unable to confirm or reject H3b.

Focusing on the variable GEOGR COMPL, we find that GEOGR COMPL is statistically significantly negatively related to public CbCR and reflects that when geographical complexity is higher, firms are less inclined to issue public CbCR disclosures. Also, firms with higher MTB provide statistically significantly less CbCR disclosures. In addition, firms that are cross-listed on a US stock exchange also issue less public CbCR disclosures.

Table 2.9 Family Involvement and Early Adoption of Public CbCR (OLS)

Table 2.9. Family Involvement and Early Adoption of Public CbCR (OLS)

CbCR	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
FOWN	-0.097	-1.27												
	(0.076)													
FVOTE 20%			-0.067**	-2.10										
			(0.032)											
FOWN 20%					-0.034	-0.95								
					(0.036)									
FAMF							-0.002	-0.09						
							(0.024)							
FCEO									0.028	1.09				
									(0.026)					
FBOARD											0.063	0.79		
											(0.081)			
FNAME													-0.028	-1.15
													(0.024)	
IO	-0.042	-0.76	-0.058	-1.08	-0.038	-0.70	-0.019	-0.36	-0.017	-0.32	-0.014	-0.25	-0.021	-0.37
	(0.055)		(0.054)		(0.054)		(0.053)		(0.054)		(0.057)		(0.056)	
GEOGR COMPL	-0.392***	-7.01	-0.401***	-7.29	-0.408***	-7.35	-0.409***	-7.46	-0.410***	-7.45	-0.397***	-7.02	-0.399***	-7.14
	(0.056)		(0.055)		(0.055)		(0.055)		(0.055)		(0.057)		(0.056)	
ETR	-0.075	-1.40	-0.078	-1.48	-0.079	-1.50	-0.084	-1.60	-0.084	-1.60	-0.083	-1.53	-0.085	-1.58
	(0.054)		(0.053)		(0.053)		(0.053)		(0.053)		(0.054)		(0.053)	
SIZE	0.016	1.35	0.015	1.27	0.016	1.41	0.017	1.48	0.017	1.43	0.018	1.53	0.019	1.59
	(0.012)		(0.012)		(0.012)		(0.012)		(0.012)		(0.012)		(0.012)	
ROA	0.296	1.47	0.233	1.17	0.235	1.15	0.248	1.18	0.259	1.24	0.303	1.46	0.302	1.47

	(0.201)		(0.200)		(0.203)		(0.210)		(0.209)		(0.207)		(0.205)	
LEV	-0.054***	-2.97	-0.053***	-3.05	-0.054***	-2.97	-0.053***	-2.87	-0.053***	-2.90	-0.052***	-2.78	-0.056***	-3.00
	(0.018)		(0.017)		(0.018)		(0.019)		(0.018)		(0.019)		(0.019)	
MTB	-0.035**	-2.20	-0.033**	-2.10	-0.033**	-2.11	-0.034**	-2.05	-0.035**	-2.18	-0.036**	-2.22	-0.037**	-2.33
	(0.016)		(0.016)		(0.016)		(0.017)		(0.016)		(0.016)		(0.016)	
ANAFOL	-0.025	-0.91	-0.028	-1.08	-0.031	-1.15	-0.030	-1.10	-0.030	-1.12	-0.024	-0.86	-0.026	-0.94
	(0.027)		(0.026)		(0.027)		(0.027)		(0.027)		(0.028)		(0.027)	
HAVEN	0.022	0.57	0.025	0.65	0.026	0.67	0.027	0.71	0.028	0.73	0.021	0.53	0.025	0.66
	(0.039)		(0.038)		(0.038)		(0.038)		(0.038)		(0.040)		(0.039)	
US CROSSLIST	-0.050**	-2.42	-0.051	-2.49	-0.049**	-2.38	-0.047**	-2.30	-0.046**	-2.30	-0.048**	-2.32	-0.052**	-2.54
	(0.020)		(0.020)		(0.020)		(0.020)		(0.020)		(0.021)		(0.021)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	0.216	0.94	0.267	1.16	0.228	1.00	0.190	0.82	0.200	0.86	0.139	0.59	0.151	0.65
	(0.231)		(0.229)		(0.229)		(0.231)		(0.231)		(0.236)		(0.232)	
R^2 adjusted	0.470		0.486		0.481		0.479		0.480		0.467		0.471	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (OLS) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and CbCR on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

2.4.5 Robustness Checks

We perform a Tobit regression on VOLDISC to take into account the left censorship of our data, as it is impossible to observe negative values of the tax disclosure index. Our results remain unchanged and thus are robust to this alternative estimation method (see Appendix 2.4).

As a second robustness check, our index can also be rewritten in the form of a nonnegative, discrete 'count' type of variable, not divided by the total number of items in the index. Therefore, a Poisson regression is appropriate as a robustness test (Cameron & Trivedi, 2001). We do this for all three dependent variables (see Appendix 2.5 for MANDISC, Appendix 2.6 for VOLDISC, and Appendix 2.7 for CbCR). We note that FNAME is negatively related at the statistical significance level of 10% with MANDISC in the Poisson specification. The z-value of this relationship only nearly meets the threshold for statistical significance, so we attribute little importance to this finding. For all other relationships with all dependent variables, the results are consistent with our main analyses.

As a third robustness check, we also note that the disclosures from the UK Finance Act 2016 are included in VOLDISC. While we choose not to examine tax strategies published by UK firms under the Finance Act 2016, it could still be that spillover effects exist between these tax strategies and the annual reports, sustainability reports or financial statements of UK firms. Therefore, we re-run the analyses on VOLDISC and exclude all items that need to be mandatorily reported under the UK Finance Act 2016. Results are presented in Appendix 2.8. We see that all results are consistent with the main analysis on VOLDISC.

As a fourth robustness check, several studies also allocate weights to the level of detail in reported information (e.g. Clarkson et al., 2013; Clarkson et al., 2008; Hardeck & Kirn, 2016). We therefore follow these studies by attributing different scores to the level of detail in geographical reporting. Specifically, geographical information earns one point when there is a distinction between foreign and domestic information, two points for regional information and three points for country-level information. Only the country-level information truly complies with private CbCR reporting and the upcoming mandatory public CbCR reporting. Subsequently, we normalize each item by calculating z-scores so that all items are weighted equally, but the level of detail in each item is preserved (Bromley & Sharkey, 2017; Clarkson et al., 2013). Since MANDISC does not contain disclosures where the level of detail of geographical information could vary, we do not provide analyses with z-scores for this variable. Again, all results for all dependent variables are consistent with our main analyses (see Appendix 2.9 for VOLDISC, and Appendix 2.10 for CbCR).

As a fifth robustness test to examine the relationship between large family ownership blocks and family control rights on the one hand and tax disclosures on the other hand, we perform two

additional analyses. Since a difference-in-difference analysis is not possible due to the absence of pre- and post-treatment observations for our treatment variable ('Is the firm a family firm?'), we use matching. Matching can provide a useful robustness check for a regression-based analysis (Roberts & Whited, 2013). Descriptive statistics show that several observable characteristics differ substantially between firms with 20% or more voting rights and other firms, such as the size of the firm. Given the binary nature of FVOTE 20% (La Porta et al., 1999), we perform entropy balancing (Hainmueller, 2012) and propensity score matching (PSM) (Rosenbaum & Rubin, 1983) to obtain matched samples for treatment and control groups within our research sample groups and decrease model dependence.[4] Entropy balancing allows a researcher to search for the set of weights such that post-weighting covariate distributions of treatment and control observations match exactly on all prespecified moments researchers impose (Berger & Lee, 2022).

We match on the first and second moments, as matching also on the third moment leads to non-convergence. We also do not match on IO, as literature has demonstrated that institutional owners are less inclined to invest in family firms (Fernando, Schneible, & Suh, 2014), and variables that are affected by the treatment should not be included in the set of covariates (Roberts & Whited, 2013). Entropy balancing also does not discard information, resulting in an efficiency advantage over PSM. The results of the balancing procedures are reported in Table 2.10. The maximum weight is 1.321, showing that no single observation is excessively overweighted in achieving covariate balance. However, the match ratio, defined as the number of observations in the control group receiving a greater-than-equal weight (McMullin & Schonberger, 2022) is only 0.33%, suggesting that very few observations were upscaled to achieve a matched sample. The results of the matching analysis must thus be interpreted with caution.

[4] Entropy balancing and PSM applied to FOWN 20% also returns results consistent with the main analyses (untabulated)

Table 2.10 Entropy Balancing Covariates after Matching

Table 2.10. Entropy Balancing Covariates after Matching

Covariate balance Entropy balancing	Treated Mean	Treated Variance	Pre-balance Control Mean	Pre-balance Control Variance	Post-balance Control Mean	Post-balance Control Variance	sDiff Pre	SDiff Post
GEOGR	0.708	0.073	0.680	0.073	0.708	0.073	0.105*	0.003
COMPL								
ETR	-0.008	0.015	-0.009	0.015	-0.008	0.014	0.008	0.001
SIZE	21.740	0.895	22.396	0.895	21.710	0.893	-0.697*	0.025
ROA	0.070	0.002	0.073	0.002	0.070	0.002	-0.054	0.001
LEV	0.570	0.298	0.598	0.298	0.570	0.298	-0.052	0.001
MTB	1.057	0.684	1.028	0.684	1.056	0.683	0.035	0.001
ANAFOL	2.361	0.246	2.636	0.246	2.359	0.246	-0.555*	0.005
HAVEN	0.781	0.173	0.870	0.173	0.780	0.172	-0.215*	0.002
US	0.122	0.108	0.397	0.108	0.122	0.107	-0.836*	-0.001
CROSSLIST								

Note: This table reports the results of the matching procedure based on entropy balancing between FVOTE 20% and non-FVOTE 20% firms. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Industry, country and year dummies are not shown for the sake of brevity but were included in the matching procedure. * indicates standardized differences outside of the +/- 0.1 bounds suggested by Rubin (2001)

For PSM, we use a 1-on-1 matching and define that the propensity score must lie within a 0.01 range following Mattei, Merlo, and Monaco (2023). This approach causes 4 single-year observations to be dropped but ensures that we have a close match between the remaining 119 treated and 119 control group observations. No maximum unit weight is specified, but the maximum unit weight observed after matching is 3. Results on covariate balances as a result of PSM are reported in Table 2.11.

After matching following both entropy balancing and PSM, we re-run our regression analyses and present the results in Table 2.12 and Table 2.13. We observe the effect of FVOTE 20% to be $-4.688\%;\ t = -3.66\ (p < 0.001)$ and $-4.381\%;\ t = -2.45\ (p = 0.017)$ respectively. Both estimation techniques return a statistically significant result at conventional levels. These tests show that our results obtained in the main analyses are robust.

Table 2.11 PSM Covariates after Matching

Table 2.11. PSM Covariates after Matching

Covariate balance PSM	Treated	Control	t-test	p-value
GEOGR COMPL	0.704	0.718	-0.41	0.679
ETR	-0.006	-0.003	-0.24	0.807
SIZE	21.758	21.907	-0.99	0.323
ROA	0.072	0.074	-0.32	0.751
LEV	0.576	0.629	-0.75	0.453
MTB	1.072	1.087	-0.14	0.885
ANAFOL	2.376	2.470	-1.30	0.195
HAVEN	0.790	0.823	-0.65	0.513
US CROSSLIST	0.126	0.084	1.06	0.292

Note: This table reports the results of the matching procedure based on propensity score matching between FVOTE 20% and non-FVOTE 20% firms. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Industry, country and year dummies are not shown for the sake of brevity but were included in the matching procedure.

Table 2.12 OLS on Entropy-Balanced Sample

Table 2.12. OLS on Entropy-Balanced Sample

VOLDISC	Coef.	t-value
FVOTE 20%	-0.047***	-3.60
	(0.013)	
IO	-0.054	-1.06
	(0.051)	
GEOGR COMPL	-0.026	-0.90
	(0.029)	
ETR	0.010	0.31
	(0.031)	
SIZE	0.023**	2.03
	(0.011)	
ROA	0.351*	1.70
	(0.207)	
LEV	-0.036**	-2.53
	(0.014)	
MTB	-0.000	-0.04
	(0.011)	
ANAFOL	0.005	0.21
	(0.022)	
HAVEN	-0.042***	-2.65
	(0.016)	
US CROSSLIST	0.026*	1.73
	(0.015)	
FIXED EFFECTS		
Country FE	YES	
Industry FE	YES	
Year FE	YES	
Constant	-0.294	-1.36
	(0.216)	
R^2 adjusted	0.442	
N	1,638	
Match ratio	0.33%	
Maximum weight	1.321	

Note: This table reports regression results (OLS) after the matching procedure based on entropy balancing between FVOTE 20% and non-FVOTE 20% firms. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Table 2.13 OLS on PSM Sample

Table 2.13. OLS on PSM Sample

VOLDISC	Coef.	t-value
FVOTE 20%	-0.044**	-2.45
	(0.018)	
IO	-0.059	-0.80
	(0.074)	
GEOGR COMPL	-0.050	-1.06
	(0.047)	
ETR	0.019	0.30
	(0.065)	
SIZE	0.029**	2.19
	(0.013)	
ROA	0.321	1.21
	(0.266)	
LEV	-0.044**	-2.48
	(0.018)	
MTB	-0.009	-0.63
	(0.014)	
ANAFOL	-0.009	-0.35
	(0.026)	
HAVEN	-0.032	-1.13
	(0.028)	
US CROSSLIST	0.009	0.32
	(0.027)	
FIXED EFFECTS		
Country FE	YES	
Industry FE	YES	
Year FE	YES	
Constant	-0.430	-1.63
	(0.264)	
R^2 adjusted	0.432	
N	1,638	

Note: This table reports regression results (OLS) after the matching procedure based on propensity score matching between FVOTE 20% and non-FVOTE 20% firms. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

2.4.6 Additional Analyses

Since GRI 207 is the most prominent stakeholder-oriented framework to publicly and voluntarily disclose tax information, we also present results of the relationship between family involvement and an alternative specification of our tax disclosure index which only contains items stemming from GRI 207 (see Table 2.14). We observe that FOWN is negatively related to the early adoption of GRI207 at the statistical significance level of 10%. We find that FVOTE 20% and FOWN 20% are also negatively associated with GRI 207 at the statistical significance levels of 1% and 5% respectively, consistent with the results for VOLDISC. Also consistent with the results for VOLDISC, we do not find statistically significant relationships between GRI207 and the variables measuring family involvement through management and governance, or between FNAME and GRI207. We also provide results according to a Poisson estimation (see Appendix 2.11) and with the z-score of GRI207 as the dependent variable (see Appendix 2.12). All results remain consistent.

Furthermore, our tax disclosure index allows us to distinguish between qualitative and quantitative tax disclosures. Therefore, we explore whether family involvement is associated with one of the two types of disclosure. The relationships between different types of family involvement and these disclosures are estimated using OLS and reported in Table 2.15 and Table 2.16.

Concerning family firms, the results regarding qualitative disclosures are consistent with the results of the full VOLDISC index. Qualitative disclosures are negatively associated with FOWN, FVOTE 20% and FOWN 20%. Interestingly, we also find that qualitative disclosures are negatively associated with FBOARD at the 5% level. Notably, for quantitative items in the index, we find a statistically significant and negative relationship between FVOTE 20% and the amount of quantitative items disclosed. Given the considerable overlap between quantitative disclosures and CbCR, this is in line with the main results reported above. In addition, we also find a negative statistically significant coefficient for the relationship between FNAME and CbCR. It is worth noting that the variable GEOGR COMPL has a significant coefficient in regressions with both qualitative and quantitative disclosures as the dependent variable. However, the direction is different according to the dependent variable. Higher GEORG COMPL is significantly related to less quantitative tax disclosures, whereas higher GEORG COMPL is significantly positively related to more qualitative tax disclosures. It seems that complex geographical firms tend to avoid disclosing quantitative information as this might reveal more about their operations towards competitors, and try to compensate for the lack of tax disclosures with qualitative disclosures.

Table 2.14 Family Involvement and Early Adoption of GRI 207 (OLS)

Table 2.14. Family Involvement and Early Adoption of GRI 207 (OLS)

GRI207	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
FOWN	-0.100*	-1.94												
	(0.051)													
FVOTE 20%			-0.055***	-2.63										
			(0.021)											
FOWN 20%					-0.044**	-2.17								
					(0.020)									
FAMF							-0.022	-1.35						
							(0.016)							
FCEO									0.014	0.73				
									(0.020)					
FBOARD											-0.052	-1.02		
											(0.051)			
FNAME													-0.016	-0.96
													(0.016)	
IO	-0.047	-1.30	-0.054	-1.54	-0.046	-1.35	-0.030	-0.86	-0.021	-0.59	-0.028	-0.76	-0.024	-0.67
	(0.036)		(0.035)		(0.034)		(0.035)		(0.035)		(0.036)		(0.037)	
GEOGR COMPL	-0.034	-1.06	-0.031	-1.02	-0.036	-1.17	-0.034	-1.09	-0.038	-1.25	-0.040	-1.26	-0.040	-1.29
	(0.032)		(0.031)		(0.031)		(0.031)		(0.031)		(0.032)		(0.031)	
ETR	-0.048	-1.20	-0.049	-1.24	-0.048	-1.22	-0.051	-1.29	-0.054	-1.38	-0.051	-1.26	-0.055	-1.38
	(0.040)		(0.039)		(0.039)		(0.039)		(0.039)		(0.041)		(0.040)	
SIZE	0.027***	3.23	0.027***	3.26	0.028***	3.36	0.028***	3.28	0.029***	3.39	0.028***	3.29	0.030***	3.40
	(0.008)		(0.008)		(0.008)		(0.008)		(0.009)		(0.009)		(0.009)	
ROA	0.218*	1.65	0.211*	1.67	0.205	1.60	0.201	1.57	0.229*	1.76	0.225*	1.67	0.224*	1.66

	(0.132)		(0.127)		(0.128)		(0.128)		(0.130)		(0.135)		(0.135)	
LEV	-0.024**	-2.03	-0.025**	-2.10	-0.025	-2.10	-0.025**	-2.09	-0.024**	-2.00	-0.024**	-1.97	-0.026**	-2.03
	(0.012)		(0.012)		(0.012)		(0.012)		(0.012)		(0.012)		(0.013)	
MTB	-0.005	-0.48	-0.005	-0.46	-0.005	-0.46	-0.004	-0.36	-0.007	-0.62	-0.005	-0.50	-0.007	-0.63
	(0.011)		(0.011)		(0.011)		(0.010)		(0.010)		(0.011)		(0.011)	
ANAFOL	-0.001	-0.05	0.001	0.04	-0.002	-0.11	-0.002	-0.08	-0.001	-0.03	-0.001	-0.07	-0.001	-0.07
	(0.019)		(0.018)		(0.019)		(0.019)		(0.019)		(0.019)		(0.019)	
HAVEN	-0.006	-0.27	-0.009	-0.45	-0.009	-0.44	-0.009	-0.43	-0.007	-0.33	-0.002	-0.11	-0.003	-0.15
	(0.021)		(0.020)		(0.020)		(0.021)		(0.021)		(0.022)		(0.021)	
US CROSSLIST	-0.015	-1.00	-0.017	-1.13	-0.016	-1.07	-0.015	-0.97	-0.014	-0.89	-0.013	-0.85	-0.016	-1.05
	(0.015)		(0.015)		(0.015)		(0.015)		(0.015)		(0.015)		(0.015)	
FIXED EFFECTS	1615													
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	-0.434***	-2.73	-0.431***	-2.73	-0.442***	-2.81	-0.454***	-2.80	-0.490***	-3.05	-0.472***	-2.89	-0.496***	-3.04
	(0.159)		(0.158)		(0.157)		(0.162)		(0.161)		(0.163)		(0.163)	
R^2 adjusted	0.340		0.346		0.343		0.339		0.336		0.333		0.337	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (OLS) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF and FCEO on the one hand, and GRI207 on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Table 2.15 Family Involvement and Qualitative Tax Disclosures (OLS)

Table 2.15. Family Involvement and Qualitative Tax Disclosures (OLS)

MANDISC	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
FOWN	-0.142*	-1.72												
	(0.074)													
FVOTE 20%			-0.062**	-2.20										
			(0.028)											
FOWN 20%					-0.062***	-2.27								
					(0.027)									
FAMF							-0.034	-1.62						
							(0.021)							
FCEO									0.021	0.79				
									(0.026)					
FBOARD											-0.129**	-2.06		
											(0.063)			
FNAME													-0.010	-0.45
													(0.021)	
IO	-0.071	-1.25	-0.072	-1.28	-0.071	-1.30	-0.050	-0.91	-0.035	-0.65	-0.048	-0.85	-0.038	-0.69
	(0.057)		(0.056)		(0.055)		(0.055)		(0.054)		(0.056)		(0.056)	
GEOGR COMPL	0.125***	2.91	0.134***	3.17	0.129***	3.10	0.132***	3.11	0.126***	2.98	0.115***	2.67	0.117***	2.75
	(0.043)		(0.042)		(0.042)		(0.043)		(0.042)		(0.043)		(0.042)	
ETR	-0.039	-0.68	-0.039	-0.69	-0.036	-0.64	-0.039	-0.70	-0.045	-0.80	-0.040	-0.70	-0.047	-0.83
	(0.057)		(0.056)		(0.056)		(0.056)		(0.056)		(0.058)		(0.057)	
SIZE	0.040***	3.02	0.040***	3.08	0.041***	3.15	0.041***	3.04	0.042***	3.15	0.041***	3.03	0.043***	3.12
	(0.013)		(0.013)		(0.013)		(0.013)		(0.013)		(0.013)		(0.014)	
ROA	0.224	1.25	0.240	1.36	0.228	1.30	0.219	1.23	0.262	1.47	0.234	1.31	0.232	1.29

	(0.179)		(0.177)		(0.176)		(0.177)		(0.178)		(0.179)		(0.181)	
LEV	-0.022	-1.38	-0.022	-1.40	-0.023	-1.43	-0.024	-1.45	-0.022	-1.35	-0.023	-1.39	-0.023	-1.35
	(0.016)		(0.016)		(0.016)		(0.016)		(0.016)		(0.017)		(0.017)	
MTB	0.010	0.70	0.009	0.68	0.010	0.70	0.011	0.84	0.007	0.54	0.009	0.69	0.008	0.58
	(0.014)		(0.014)		(0.014)		(0.013)		(0.013)		(0.014)		(0.014)	
ANAFOL	0.002	0.05	0.006	0.22	0.003	0.10	0.004	0.12	0.005	0.16	0.001	0.03	0.001	0.05
	(0.030)		(0.030)		(0.030)		(0.030)		(0.031)		(0.031)		(0.031)	
HAVEN	-0.032	-1.14	-0.039	-1.42	-0.040	-1.44	-0.040	-1.42	-0.037	-1.31	-0.026	-0.90	-0.030	-1.05
	(0.028)		(0.028)		(0.028)		(0.028)		(0.028)		(0.029)		(0.028)	
US CROSSLIST	-0.027	-1.29	-0.029	-1.40	-0.029	-1.39	-0.027	-1.30	-0.025	-1.22	-0.024	-1.14	-0.026	-1.26
	(0.021)		(0.021)		(0.021)		(0.021)		(0.021)		(0.021)		(0.021)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	-0.809***	-3.40	-0.837***	-3.50	-0.834***	-3.55	-0.844***	-3.44	-0.901***	-3.69	-0.841***	-3.46	-0.891***	-3.63
	(0.238)		(0.239)		(0.235)		(0.246)		(0.244)		(0.243)		(0.245)	
R^2 adjusted	0.326		0.332		0.333		0.330		0.326		0.323		0.321	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (OLS) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and qualitative tax disclosures on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Table 2.16 Family Involvement and Quantitative Tax Disclosures (OLS)

Table 2.16. Family Involvement and Quantitative Tax Disclosures (OLS)

MANDISC	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
FOWN	-0.029	-0.91												
	(0.032)													
FVOTE 20%			-0.024*	-1.83										
			(0.013)											
FOWN 20%					-0.012	-0.81								
					(0.015)									
FAMF							-0.008	-0.72						
							(0.011)							
FCEO									0.004	0.34				
									(0.012)					
FBOARD											0.014	0.32		
											(0.042)			
FNAME													-0.019*	-1.66
													(0.011)	
IO	-0.029	-1.03	-0.037	-1.36	-0.029	-1.08	-0.026	-0.94	-0.022	-0.82	-0.022	-0.76	-0.023	-0.83
	(0.029)		(0.027)		(0.027)		(0.027)		(0.027)		(0.029)		(0.028)	
GEOGR COMPL	-0.157***	-5.97	-0.160***	-6.17	-0.163***	-6.23	-0.162***	-6.23	-0.164***	-6.27	-0.159***	-5.93	-0.160***	-6.14
	(0.026)		(0.026)		(0.026)		(0.026)		(0.026)		(0.027)		(0.026)	
ETR	-0.050*	-1.91	-0.053**	-2.04	-0.054**	-2.06	-0.054**	-2.10	-0.056**	-2.15	-0.053**	-1.98	-0.055**	-2.09
	(0.026)		(0.026)		(0.026)		(0.026)		(0.026)		(0.027)		(0.026)	
SIZE	0.016***	2.60	0.016**	2.54	0.016***	2.64	0.016***	2.60	0.017***	2.64	0.017***	2.68	0.018***	2.84
	(0.006)		(0.006)		(0.006)		(0.006)		(0.006)		(0.006)		(0.006)	
ROA	0.132	1.21	0.111	1.03	0.111	1.02	0.108	0.99	0.118	1.06	0.132	1.18	0.134	1.21

	(0.109)		(0.108)		(0.109)		(0.110)		(0.111)		(0.112)		(0.110)	
LEV	-0.029***	-3.55	-0.029***	-3.61	-0.029***	-3.57	-0.029***	-3.58	-0.029***	-3.52	-0.029***	-3.46	-0.031***	-3.70
	(0.008)		(0.008)		(0.008)		(0.008)		(0.008)		(0.008)		(0.008)	
MTB	-0.016*	-1.93	-0.015*	-1.82	-0.015*	-1.83	-0.014	-1.75	-0.015*	-1.85	-0.016*	-1.89	-0.017**	-2.04
	(0.008)		(0.008)		(0.008)		(0.008)		(0.008)		(0.008)		(0.008)	
ANAFOL	-0.012	-0.83	-0.013	-0.93	-0.013	-0.98	-0.013	-0.97	-0.013	-0.95	-0.012	-0.81	-0.012	-0.89
	(0.014)		(0.014)		(0.014)		(0.014)		(0.014)		(0.014)		(0.014)	
HAVEN	0.013	0.76	0.015	0.86	0.015	0.89	0.015	0.88	0.016	0.92	0.013	0.72	0.015	0.88
	(0.017)		(0.017)		(0.017)		(0.017)		(0.017)		(0.018)		(0.017)	
US CROSSLIST	-0.023**	-2.08	-0.023**	-2.13	-0.023**	-2.05	-0.022**	-2.02	-0.022**	-1.99	-0.022	-2.00	-0.025**	-2.28
	(0.011)		(0.011)		(0.011)		(0.011)		(0.011)		(0.011)		(0.011)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	-0.008	-0.07	0.014	0.11	-0.001	-0.01	-0.001	-0.00	-0.014	-0.11	-0.030	-0.24	-0.031	-0.26
	(0.238)		(0.121)		(0.121)		(0.122)		(0.122)		(0.124)		(0.121)	
R^2 adjusted	0.430		0.439		0.437		0.437		0.436		0.427		0.434	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (OLS) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and quantitative tax disclosures on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

2.5 Discussion and Conclusion

Following the increasing attention to tax disclosures and tax transparency, understanding the antecedents influencing the level of tax disclosure is important for improving our insight into firm behavior related to tax reporting. Family firms, which play a significant role in global business, face unique agency conflicts that affect management's discretion in disclosing tax information. This study examines whether family involvement in large listed European firms is related to the level of tax disclosure. To address this research question, we used a comprehensive measure of tax disclosure that includes both mandatory and voluntary public disclosures, such as those related to GRI 207 and the forthcoming mandatory public Country-by-Country Reporting (CbCR). Analyzing hand-collected data from 234 firms over seven years, we find robust evidence that increasing family ownership is significantly negatively associated with voluntary tax disclosures, including the voluntary adoption of public CbCR and early adoption of GRI 207. However, our analysis did not find significant results regarding the influence of family management or board membership on tax disclosure practices. In addition, the results of our study cannot confirm that reputational concerns, captured by focusing on family firms that have the family name in the name of the family firm, lead to significantly more tax disclosures.

Our results align with the literature suggesting that when family ownership is high, the costs of disclosures may outweigh the benefits. This is because increased transparency could lead to challenges to family control from other shareholders based on the information disclosed (Ali et al., 2007). Our results indicate that the difference in the level of voluntary tax disclosures between family and non-family firms grows as family shareholders' equity stakes increase. This significant negative relationship is particularly strong in firms where the family holds large blocks of shares (20% or more) or has substantial voting power (20% or more of the votes). We also observe significantly fewer voluntary public Country-by-Country Reporting (CbCR) disclosures only when controlling families have 20% or more voting rights. The voluntary publication of public CbCR information does not differ between family firms with small ownership stakes and non-family firms. This finding aligns with previous literature on type II agency problems in family firms, which suggests that family owners seek to avoid costly proprietary disclosures, often at the expense of minority shareholders (Chau & Gray, 2010; Chen et al., 2008; Vural, 2018). However, family firms disclose the use of the arm's length principle more often than non-family firms, possibly to avoid attracting scrutiny from minority shareholders on related party transactions.

Regarding mandatory tax disclosures, our results show no significant difference between family firms and non-family firms. This finding suggests that mandatory disclosure regulations and the requirement

for audited information may restrict the discretion of owners and managers in deciding whether to disclose tax information. Additionally, our analysis reveals that the antecedents of mandatory and voluntary tax disclosures differ significantly when considering the control variables. The results show that geographical complexity and a firm's presence in tax havens are significantly positively related to the level of mandatory tax disclosures. However, these variables are not significantly related to the overall level of voluntary tax disclosures, except voluntary public CbCR disclosures. While the presence in tax havens does not significantly affect CbCR disclosures, geographical complexity is significantly negatively related to CbCR disclosures. This finding suggests that CbCR information may be considered proprietary, particularly for firms with complex geographical structures, where disclosing CbCR information could especially reduce information asymmetry. Another difference between antecedents of mandatory and voluntary tax disclosures is the cross-listing status of a company. While being cross-listed in the US does not affect the level of mandatory tax disclosures, EU firms that are cross-listed in the US provide significantly fewer voluntary tax disclosures, particularly public CbCR disclosures, compared to EU firms that are not cross-listed in the US. Finally, leverage is significantly negatively related to the level of voluntary tax disclosures but is not significantly related to mandatory tax disclosures. These differences in the significance of explanatory variables between mandatory and voluntary tax disclosures suggest that managers and owners weigh different factors when making cost/benefit disclosure decisions under mandatory versus voluntary disclosure contexts.

The current study has several limitations which at the same time present avenues for future research. As all the firms examined are very large firms in Europe, it might be reductive to generalize these results to a broader set of companies. Therefore the results should best be interpreted in their context. A future path of research might be to expand the sample beyond large listed companies in Europe and focus on small and medium-sized listed firms. In addition, the data on family involvement is quite stable through time and prevents more powerful analyses from establishing causal relationships, such as a difference-in-differences design. Furthermore, external shocks in family involvement are difficult to find. Future research could try to delve deeper into the causal effects of the results found in this study.

2.6 Appendix

Appendix 2.1 Tax Disclosure Index Scores, Keywords, Sources in Literature, Origins, Mandatory or Voluntary Classification and Qualitative or Quantitative Classification

Appendix 2.1. Tax Disclosure Index Scores, Keywords, Sources in Literature, Origins, Mandatory or Voluntary Classification and Qualitative or Quantitative Classification

Item	Score	Specific keywords and sections	Source in literature	Origin	Mandatory/Voluntary public disclosure	Qualitative/Quantitative
IAS 7, IAS 12 & IFRIC 23						
Income taxes paid on a global basis for the current reporting period	0-1	tax* paid, cashflow statement	Hardeck and Kirn (2016)	IAS 7, GRI 207, BEPS Action 13 Ch.5 Annex 3	Mandatory	Quantitative
Effective tax rate reconciliation from statutory tax rate	0-1	Reconciliation, Note to income taxes	Chychyla, Falsetta, and Ramnath (2022); Hardeck and Kirn (2016); Kvaal and Nobes (2013)	IAS 12, Australian TTC	Mandatory	Quantitative
Deferred tax assets and liabilities breakdown by nature	0-1	Note to income taxes/deferred taxes	Kvaal and Nobes (2013)	IAS 12	Mandatory	Quantitative
Significant uncertain tax positions	0-1	Uncertain tax, Uncertainty over tax, Note to income taxes	Gupta et al. (2014), Henry et al. (2016), Robinson and Schmidt (2013)	IFRIC 23, GRI 207, Schedule UTP, FIN 48	Mandatory as of 2019	Quantitative

GRI 207-1 Approach to tax						
Reference to a tax strategy or code of conduct with regard to taxes	0-1	Tax policy, Tax strategy, Tax code	Bilicka et al. (2021), Hardeck and Kirn 2016	GRI 207, UK Finance Act 2016	Voluntary (except in UK Tax Strategy)	Qualitative
Governance body responsible for approval of the tax strategy	0-1	Approv*, Tax policy, Tax strategy, Tax code	Bilicka et al. (2021), Hardeck and Kirn (2016)	GRI 207, UK Finance Act 2016	Voluntary (except in UK Tax Strategy)	Qualitative
Approach to regulatory compliance	0-1	Compl*, Tax law, Legal, Adherence to	Bilicka et al. (2021), Hardeck & Kirn (2016)	GRI 207, OECD MNE guidelines ch. XI	Voluntary	Qualitative
Compliance with the spirit of tax laws	0-1	Spirit, Intent	Hardeck & Kirn (2016)	GRI 207-1 commentary, OECD MNE guidelines ch. XI	Voluntary	Qualitative
How the approach to tax is linked to the business and sustainable development strategies of the organization	0-1	'Where profit is/are…', 'activities are located', 'approach'	Own addition	GRI 207	Voluntary	Qualitative
Use of tax havens	0-1	Haven, Secrecy, Non-coöp	Akamah et al. (2018); Dyreng et al. (2020)	GRI 207-1 commentary	Voluntary	Qualitative
Approach to tax planning	0-1	Planning	Bilicka et al. (2021)	GRI 207-1 commentary, UK Finance Act 2016	Voluntary (except in UK Tax Strategy)	Qualitative

GRI 207-2 Tax governance, control and risk management						
The governance body or executive-level position within the organization accountable for compliance with the tax strategy	0-1	Responsib* for, 'tax management', 'tax governance'	Bilicka et al. (2021); Hardeck and Kirn (2016)	GRI 207, UK Finance Act 2016, Australian TTC	Voluntary (except in UK Tax Strategy)	Qualitative
Corporation's approach to tax risk management & how the approach to tax is embedded within the organization & how compliance with the tax governance and control framework is evaluated	0-1	Tax risk, Risk management	Bilicka et al. (2021); Hardeck and Kirn (2016)	GRI 207, UK Finance Act 2016, Australian TTC	Voluntary (except in UK Tax Strategy)	Qualitative
A description of the mechanisms for reporting concerns about unethical or unlawful behaviour and the organization's integrity in relation to tax	0-1	Whistle, Hotline, Grievance, Internal reporting, Breach, Speak up	Own addition	GRI 207	Voluntary	Qualitative
A description of the assurance process for disclosures on tax and, if applicable, a reference to the assurance report, statement, or opinion	0-1	Independent auditor's report section	Own addition	GRI 207	Voluntary	Qualitative
Commitment to tax transparency	0-1	Transparen*	Bilicka et al. (2021), Hardeck & Kirn (2016)	GRI 207-2 commentary, OECD MNE guidelines ch. XI	Voluntary	Qualitative
GRI 207-3 Stakeholder engagement and						

management of concerns related to tax						
Cooperation with/approach to tax authorities	0-1	Authorit*, Administr*	Bilicka et al. (2021), Hardeck & Kirn (2016)	GRI 207, OECD MNE guidelines ch. XI, UK Finance Act 2016	Voluntary (except in UK Tax Strategy)	Qualitative
Participation in tax initiatives to which the company subscribes	0-1	Tax initiative, Partnership	Hardeck and Kirn (2016)	GRI 207-3 commentary	Voluntary	Qualitative
Disclosure of lobbying activities in tax matters	0-1	Lobb*, Advoca*	Hardeck and Kirn (2016)	GRI 207-3 commentary	Voluntary	Qualitative
GRI 207-4 Country-by-country reporting						
Number of employees	0-1	Employees by, Workforce by, Group overview section	Joshi et al. (2020)	GRI 207, BEPS Action 13 Ch.5 Annex 3	Voluntary (mandatory private)	Quantitative
Revenues from third-party sales	0-1	Revenue by, Turnover by, note to segment information	Hope et al. (2013); Joshi et al. (2020)	GRI 207, BEPS Action 13 Ch.5 Annex 3	Voluntary (mandatory private)	Quantitative
Differentiation between internal and external revenue	0-1	Revenue by, Turnover by, note to segment information	Own addition	GRI 207, BEPS Action 13 Ch.5 Annex 3	Voluntary (mandatory private)	Quantitative
Profit/loss before interest & tax	0-1	Income by, profit by, loss by, profit/loss by, note to segment information	Joshi et al. (2020)	GRI 207, BEPS Action 13 Ch.5 Annex 3	Voluntary (mandatory private)	Quantitative

(Tangible) assets other than cash and cash equivalent	0-1	Assets by, note to segment information	Own addition	GRI 207, BEPS Action 13 Ch.5 Annex 5	Voluntary (mandatory private)	Quantitative
Corporate income tax paid/expensed on profit/loss by geographic location	0-1	tax* paid, by region, by geograph*	Joshi et al. (2020)	GRI 207, BEPS Action 13 Ch.5 Annex 3	Voluntary (mandatory private)	Quantitative
Reasons for the difference between corporate income tax accrued on profit/loss and the tax due if the statutory tax rate is applied to profit/loss before tax per country	0-1	Reconciliation, note to income taxes	Own addition	GRI 207	Voluntary	Quantitative
Balance of intra-group debt	0-1	Intra, Inter, Internal debt	Own addition	GRI 207-4 commentary	Voluntary	Quantitative
GRI G4-S08						
Disclosure of amounts/fines/interest penalties for tax non-compliance	0-1	Fine, Penalt*, Dispute, Legal	Hardeck and Kirn (2016)	GRI G4-S08	Voluntary	Quantitative
Disclosure of legal actions/disputes pending for non-compliance with tax law	0-1	Dispute, Legal	Hardeck and Kirn (2016)	GRI G4-S08	Voluntary	Qualitative
Additional items from various milestone initiatives and sources						
All taxes paid	0-1	tax* paid	Own addition	Australian TTC	Voluntary	Quantitative
All taxes paid/accrued by geographic location	0-1	Tax* paid, by region, by geograph*	Own addition	/	Voluntary	Quantitative

Numerical differentiation between taxes borne and taxes collected in global terms	0-1	Borne, Collected	Hardeck & Kirn (2016)	/	Voluntary	Quantitative
Reporting numerical information on at least two other taxes besides income tax (VAT, sales, duties, withholding, must include indirect taxes)	0-1	VAT, Withholding, Payroll tax, Indirect tax*	Own addition	Australian TTC	Voluntary	Quantitative
Textual description of tax reconciliation (90% of line items explained, important foreign jurisdictions mentioned)	0-1	Note to income taxes	Own addition	/	Voluntary	Qualitative
Income tax expense to income tax paid reconciliation	0-1	Reconciliation, note to income taxes	Own addition	Australian TTC	Voluntary	Quantitative
Adherence to the arm's length principle	0-1	Arm's length, ALP, OECD	Hardeck & Kirn (2016)	OECD TP guidelines, OECD MNE guidelines ch. XI	Voluntary	Qualitative
Taxes as a contribution to society	0-1	Contribut*, Group overview section	Hardeck & Kirn (2016)	OECD MNE guidelines ch. XI	Voluntary	Qualitative
Paying a fair or appropriate share of taxes	0-1	Fair share, fairness, fair (NOT fair value)	Hardeck & Kirn (2016)	OECD MNE guidelines ch. XI	Voluntary	Qualitative

Notes: This table provides an overview of the line items of the tax disclosure index, the score attributed to each item and the keywords used to search for the items in financial statements, annual reports and sustainability reports of companies in our sample.

Appendix 2.2 Variable Definitions

Appendix 2. Variable Definitions

Name	Definition
MANDISC	Mandatory items from Index score (see Appendix 2.1)
VOLDISC	Voluntary items from Index score (see Appendix 2.1)
CbCR	CbCR items from Index score (see Appendix 2.1)
GRI207	GRI 207 items from Index score (see Appendix 2.1)
FOWN	Percentage of shares held by the family
FAMF	Dummy equal to 1 if the family owns at least 5% of the shares, a family members holds a position in the board or, a family members holds a position in top management of the firm, else 0
FCEO	Dummy equal to 1 if the CEO is a family member, else 0
FVOTE 20%	Dummy equal to 1 if the family owns at least 20% of the voting rights, else 0
FOWN 20%	Dummy equal to 1 if the family owns at least 20% of the shares, else 0
FBOARD	Percentage of family members on the board
FNAME	Dummy equal to 1 if the firm name is the same as the family name, else 0
IO	Percentage of shares held by institutional owners
GEOGR COMPL	$1 - \sum_{k=1}^{n} S_k^2$, S *being the fraction of subsidiaries in country* k *and* N *is the total number of countries where the firms has subsidiaries*
ETR	Three-year IFRS effective tax rate – three-year statutory tax rate in the country
SIZE	Ln (Total assets)
ROA	$\frac{\text{Profit or loss before interst and tax}}{\text{Total assets}}$
LEV	$\frac{\text{Long term debt}}{\text{Total assets}}$
MTB	$\frac{\text{Market value assets}}{\text{Book value assets}}$
ANALYST	Ln (number of analysts following)
HAVEN	Dummy equal to 1 if the firm has a subsidiary in a tax haven according to Dyreng et al. (2015), else 0
US CROSSLISTING	Dummy equal to 1 if the firm is cross-listed on a US stock exchange, else 0

Note: This table contains variable definitions

Appendix 2.3 Tax Disclosure Items Family Firm vs Non-Family Firm

Appendix 2.3. Tax Disclosure Items Family Firm vs Non-Family Firm

Item	All	Family firms	Non-Family Firms	Difference-in-t-stat
IAS 7, IAS 12 & IFRIC 23				
Income taxes paid on a global basis for the current reporting period	0.989	0.962	0.995	4.88***
	(0.003)	(0.011)	(0.002)	
Effective tax rate reconciliation from statutory tax rate	1.000	1.000	1.000	/
	(0.000)	(0.000)	(0.000)	
Deferred tax assets and liabilities breakdown by nature	1.000	1.000	1.000	/
	(0.000)	(0.000)	(0.000)	
Significant uncertain tax positions	0.211	0.148	0.225	2.90***
	(0.010)	(0.021)	(0.011)	
GRI 207-1 Approach to tax				
Reference to a tax strategy or code of conduct with regard to taxes	0.381	0.262	0.407	4.62***
	(0.012)	(0.026)	(0.013)	
Governance body responsible for approval of the tax strategy	0.147	0.110	0.155	1.95*
	(0.009)	(0.018)	(0.010)	
Approach to regulatory compliance	0.744	0.693	0.754	2.17**
	(0.011)	(0.027)	(0.012)	
Compliance with the spirit of tax laws	0.066	0.031	0.073	2.64***
	(0.006)	(0.010)	(0.007)	
How the approach to tax is linked to the business and sustainable development	0.230	0.134	0.250	4.26***
strategies of the organization	(0.010)	(0.020)	(0.012)	
Use of tax havens	0.109	0.110	0.108	-0.10

	(0.008)	(0.018)	(0.008)	
Approach to tax planning	0.234	0.193	0.243	1.81*
	(0.010)	(0.023)	(0.012)	
GRI 207-2 Tax governance, control and risk management				
The governance body or executive-level position within the organization	0.265	0.162	0.287	4.40***
accountable for compliance with the tax strategy	(0.011)	(0.022)	(0.012)	
Corporation's approach to tax risk management & how the approach to tax is	0.285	0.272	0.288	0.53
embedded within the organization & how compliance with the tax governance and control framework is evaluated	(0.011)	(0.026)	(0.012)	
A description of the mechanisms for reporting concerns about unethical or	0.880	0.779	0.902	5.90***
unlawful behaviour and the organization's integrity in relation to tax	(0.008)	(0.024)	(0.008)	
A description of the assurance process for disclosures on tax and, if applicable, a	0.225	0.159	0.239	2.98***
reference to the assurance report, statement, or opinion	(0.010)	(0.021)	(0.012)	
Commitment to tax transparency	0.279	0.176	0.301	4.34***
	(0.011)	(0.022)	(0.013)	
GRI 207-3 Stakeholder engagement and management of concerns related to tax				
Cooperation with/approach to tax authorities	0.286	0.238	0.296	1.99**
	(0.011)	(0.025)	(0.012)	
Participation in tax initiatives to which the company subscribes	0.047	0.031	0.051	1.46
	(0.005)	(0.010)	(0.006)	
Disclosure of lobbying activities in tax matters	0.032	0.024	0.034	0.87
	(0.004)	(0.009)	(0.005)	
GRI 207-4 Country-by-country reporting				
Number of employees	0.303	0.224	0.320	3.25***

	(0.011)	(0.025	(0.013)	
Revenues from third-party sales	0.270	0.148	0.297	5.20***
	(0.011)	(0.021)	(0.012)	
Differentiation between internal and external revenue	0.059	0.076	0.056	-1.32
	(0.006)	(0.016)	(0.006)	
Profit/loss before interest & tax	0.142	0.124	0.146	0.97
	(0.009)	(0.019)	(0.010)	
(Tangible) assets other than cash and cash equivalent	0.300	0.197	0.322	4.25***
	(0.011)	(0.023)	(0.013)	
Corporate income tax paid/expensed on profit/loss by geographic location	0.092	0.024	0.107	4.44***
	(0.007)	(0.009)	(0.008)	
Reasons for the difference between corporate income tax accrued on profit/loss and the tax due if the statutory tax rate is applied to profit/loss before tax per country	0.001	0.000	0.001	0.66
	(0.001)	0.000	(0.001)	
Balance of intra-group debt	0.000	0.000	0.000	/
	(0.000)	(0.000)	(0.000)	
GRI G4-S08				
Disclosure of amounts/fines/interest penalties for tax non-compliance	0.164	0.093	0.180	3.62***
	(0.009)	(0.017)	(0.010)	
Disclosure of legal actions/disputes pending for non-compliance with tax law	0.264	0.197	0.278	2.87***
	(0.011)	(0.023)	(0.012)	
Additional items from various milestone initiatives and sources				
All taxes paid	0.122	0.079	0.132	2.49**
	(0.008)	(0.016)	(0.009)	

All taxes paid/accrued by geographic location	0.021	0.014	0.023	0.98
	(0.004)	(0.007)	(0.004)	
Numerical differentiation between taxes borne and taxes collected in global terms	0.060	0.007	0.072	4.24***
	(0.006)	(0.005)	(0.007)	
Reporting numerical information on at least two other taxes besides income tax (VAT, sales, duties, withholding, must include indirect taxes)	0.059	0.034	0.065	1.97**
	(0.006)	(0.011)	(0.007)	
Textual description of tax reconciliation (90% of line items explained, important foreign jurisdictions mentioned)	0.041	0.003	0.049	3.56***
	(0.005)	(0.003)	(0.006)	
Income tax expense to income tax paid reconciliation	0.012	0.000	0.014	2.04**
	(0.003)	(0.000)	(0.003)	
Adherence to the arm's length principle	0.615	0.669	0.604	-2.07**
	(0.012)	(0.027)	(0.013)	
Taxes as a contribution to society	0.395	0.234	0.430	6.23***
	(0.012)	(0.025)	(0.013)	
Paying a fair or appropriate share of taxes	0.140	0.100	0.149	2.17**
	(0.009)	(0.018)	(0.010)	

Appendix 2.4 Tobit Regression Results (Absolute Weighting)

Appendix 2.4. Tobit Regression Results (Absolute Weighting)

VOLDISC	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
FOWN	-0.088*	-1.92												
	(0.046)													
FVOTE 20%			-0.047***	-2.59										
			(0.018)											
FOWN 20%					-0.040**	-2.33								
					(0.017)									
FAMF							-0.018	-1.36						
							(0.014)							
FCEO									0.016	0.97				
									(0.017)					
FBOARD											-0.045	-1.02		
											(0.044)			
FNAME													-0.013	-0.99
													(0.014)	
IO	-0.040	-1.23	-0.046	-1.45	-0.042	-1.33	-0.026	-0.83	-0.018	-0.58	-0.024	-0.71	-0.021	-0.63
	(0.033)		(0.032)		(0.031)		(0.032)		(0.031)		(0.033)		(0.033)	
GEOGR COMPL	-0.021	-0.74	-0.017	-0.64	-0.021	-0.78	-0.020	-0.72	-0.023	-0.86	-0.026	-0.94	-0.026	-0.96
	(0.028)		(0.027)		(0.027)		(0.027)		(0.027)		(0.028)		(0.027)	
ETR	-0.037	-1.04	-0.038	-1.10	-0.037	-1.06	-0.040	-1.15	-0.043	-1.24	-0.040	-1.10	-0.043	-1.23
	(0.036)		(0.035)		(0.035)		(0.035)		(0.035)		(0.036)		(0.035)	
SIZE	0.026***	3.46	0.026***	3.48	0.026***	3.58	0.027***	3.49	0.027***	3.57	0.027***	3.50	0.028***	3.60

	(0.007)		(0.007)		(0.007)		(0.008)		(0.008)		(0.008)		(0.008)	
ROA	0.165	1.46	0.163	1.49	0.157	1.43	0.154	1.40	0.180	1.62	0.172	1.49	0.170	1.48
	(0.113)		(0.109)		(0.110)		(0.110)		(0.111)		(0.115)		(0.115)	
LEV	-0.024**	-2.45	-0.024**	-2.52	-0.025**	-2.52	-0.025**	-2.48	-0.024**	-2.40	-0.024**	-2.36	-0.025**	-2.43
	(0.010)		(0.010)		(0.010)		(0.010)		(0.010)		(0.010)		(0.010)	
MTB	-0.002	-0.27	-0.002	-0.25	-0.002	-0.24	-0.001	-0.15	-0.004	-0.45	-0.003	-0.32	-0.004	-0.44
	(0.009)		(0.009)		(0.009)		(0.008)		(0.008)		(0.009)		(0.009)	
ANAFOL	0.002	0.10	0.004	0.23	0.001	0.08	0.002	0.11	0.003	0.15	0.001	0.08	0.001	0.08
	(0.017)		(0.017)		(0.017)		(0.017)		(0.017)		(0.018)		(0.018)	
HAVEN	-0.011	-0.63	-0.015	-0.84	-0.015	-0.84	-0.014	-0.82	-0.013	-0.71	-0.008	-0.45	-0.009	-0.52
	(0.018)		(0.017)		(0.017)		(0.018)		(0.018)		(0.019)		(0.018)	
US CROSSLIST	-0.023*	-1.68	-0.024*	-1.81	-0.024*	-1.77	-0.022*	-1.66	-0.021	-1.59	-0.021	-1.53	-0.023*	-1.72
	(0.013)		(0.014)		(0.013)		(0.013)		(0.013)		(0.014)		(0.014)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	-0.447***	-3.19	-0.448***	-3.21	-0.454***	-3.28	-0.467***	-3.25	-0.496**	-3.47	-0.479***	-3.32	-0.501***	-3.12
	(0.140)		(0.140)		(0.139)		(0.144)		(0.143)		(0.144)		(0.144)	
R^2 adjusted	0.279		0.282		0.281		0.276		0.274		0.272		0.275	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (Tobit) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and VOLDISC on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Appendix 2.5 Family Involvement and Mandatory Tax Disclosures (Poisson)

Appendix 2.5. Family Involvement and Mandatory Tax Disclosures (Poisson)

MANDISC	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value
FOWN	0.046	1.33												
	(0.035)													
FVOTE 20%			0.020	1.50										
			(0.013)											
FOWN 20%					0.011	0.90								
					(0.013)									
FAMF							-0.004	-0.41						
							(0.009)							
FCEO									0.006	0.45				
									(0.014)					
FBOARD											-0.017	-0.74		
											(0.023)			
FNAME													-0.013*	-1.67
													(0.008)	
IO	-0.011	-0.50	-0.008	-0.38	-0.013	-0.65	-0.021	-1.03	-0.020	-0.94	-0.023	-1.07	-0.022	-1.03
	(0.022)		(0.021)		(0.021)		(0.021)		(0.021)		(0.022)		(0.021)	
GEOGR COMPL	0.049***	2.93	0.052***	3.18	0.054***	3.32	0.055***	3.41	0.054***	3.37	0.051***	3.06	0.051***	3.08
	(0.017)		(0.016)		(0.016)		(0.016)		(0.016)		(0.017)		(0.016)	
ETR	-0.013	-0.43	-0.012	-0.42	-0.012	-0.41	-0.010	-0.33	-0.010	-0.36	-0.010	-0.33	-0.013	-0.45
	(0.030)		(0.029)		(0.029)		(0.029)		(0.029)		(0.030)		(0.029)	
SIZE	0.009*	1.91	0.009**	1.97	0.008*	1.89	0.008*	1.75	0.008*	1.79	0.008*	1.73	0.008*	1.95
	(0.005)		(0.004)		(0.004)		(0.004)		(0.004)		(0.004)		(0.004)	
ROA	0.043	0.54	0.052	0.68	0.053	0.67	0.044	0.55	0.050	0.64	0.036	0.46	0.040	0.51

	(0.079)		(0.077)		(0.078)		(0.079)		(0.077)		(0.079)		(0.079)	
LEV	-0.000	-0.01	-0.000	-0.05	-0.000	-0.04	-0.001	-0.09	-0.000	-0.07	-0.001	-0.08	-0.002	-0.24
	(0.007)		(0.007)		(0.007)		(0.007)		(0.007)		(0.008)		(0.007)	
MTB	-0.006	-0.89	-0.005	-0.84	-0.005	-0.82	-0.005	-0.71	-0.005	-0.82	-0.004	-0.68	-0.006	-0.90
	(0.006)		(0.006)		(0.006)		(0.006)		(0.006)		(0.007)		(0.006)	
ANAFOL	-0.003	-0.28	-0.003	-0.27	-0.002	-0.18	-0.002	-0.25	-0.002	-0.24	-0.004	-0.38	-0.003	-0.36
	(0.010)		(0.010)		(0.010)		(0.010)		(0.010)		(0.010)		(0.010)	
HAVEN	0.016**	1.96	0.015*	1.84	0.015*	1.76	0.014*	1.68	0.014*	1.74	0.017*	1.95	0.017**	2.06
	(0.008)		(0.008)		(0.008)		(0.008)		(0.008)		(0.009)		(0.008)	
US CROSSLIST	-0.000	-0.03	0.000	0.00	-0.001	-0.07	-0.001	-0.16	-0.001	-0.13	-0.000	-0.06	-0.003	-0.33
	(0.008)		(0.008)		(0.008)		(0.008)		(0.008)		(0.008)		(0.008)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	0.836***	9.40	0.828***	9.40	0.838***	9.54	0.860***	9.76	0.856***	10.01	0.865***	9.95	0.856***	10.15
	(0.089)		(0.088)		(0.088)		(0.088)		(0.085)		(0.087)		(0.084)	
R^2 Adjusted	0.003		0.003		0.003		0.003		0.003		0.003		0.003	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (Poisson) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and MANDISC on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Appendix 2.6 Family Involvement and Voluntary Tax Disclosures (Poisson)

Appendix 2.6. Family Involvement and Voluntary Tax Disclosures (Poisson)

VOLDISC	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value
FOWN	-0.575**	-2.01												
	(0.286)													
FVOTE 20%			-0.293***	-2.60										
			(0.112)											
FOWN 20%					-0.238**	-2.26								
					(0.105)									
FAMF							-0.101	-1.32						
							(0.077)							
FCEO									0.077	0.96				
									(0.080)					
FBOARD											-0.247	-1.01		
											(0.245)			
FNAME													-0.074	-1.09
													(0.069)	
IO	-0.163	-1.00	-0.195	-1.23	-0.166	-1.06	-0.081	-0.51	-0.039	-0.25	-0.065	-0.40	-0.040	-0.24
	(0.163)		(0.158)		(0.156)		(0.159)		(0.157)		(0.163)		(0.165)	
GEOGR COMPL	-0.117	-0.94	-0.104	-0.85	-0.123	-1.01	-0.116	-0.93	-0.131	-1.07	-0.144	-1.14	-0.146	-1.19
	(0.125)		(0.122)		(0.121)		(0.125)		(0.123)		(0.126)		(0.123)	
ETR	-0.204	-1.17	-0.214	-1.25	-0.203	-1.18	-0.211	-1.23	-0.224	-1.30	-0.206	-1.16	-0.233	-1.33
	(0.174)		(0.171)		(0.171)		(0.171)		(0.173)		(0.177)		(0.175)	
SIZE	0.129***	3.84	0.128***	3.84	0.132***	3.95	0.134***	3.86	0.138***	3.93	0.135***	3.87	0.143***	3.97
	(0.034)		(0.033)		(0.033)		(0.035)		(0.035)		(0.035)		(0.036)	
ROA	0.787	1.48	0.777	1.51	0.742	1.43	0.756	1.45	0.872*	1.65	0.845	1.56	0.813	1.50

	(0.532)		(0.516)		(0.520)		(0.523)		(0.527)		(0.540)		(0.541)	
LEV	-0.105**	-2.19	-0.106**	-2.23	-0.108**	-2.24	-0.112**	-2.26	-0.109**	-2.20	-0.109**	-2.17	-0.116**	-2.26
	(0.048)		(0.047)		(0.048)		(0.049)		(0.050)		(0.050)		(0.051)	
MTB	-0.002	-0.06	-0.003	-0.06	-0.002	-0.05	0.000	0.01	-0.011	-0.26	-0.007	-0.17	-0.010	-0.23
	(0.043)		(0.043)		(0.043)		(0.042)		(0.041)		(0.043)		(0.042)	
ANAFOL	0.012	0.15	0.024	0.32	0.011	0.15	0.011	0.13	0.015	0.19	0.011	0.13	0.010	0.12
	(0.078)		(0.076)		(0.076)		(0.079)		(0.080)		(0.080)		(0.080)	
HAVEN	-0.050	-0.58	-0.065	-0.78	-0.066	-0.79	-0.064	-0.75	-0.057	-0.67	-0.037	-0.41	-0.040	-0.46
	(0.086)		(0.084)		(0.084)		(0.086)		(0.085)		(0.090)		(0.086)	
US CROSSLIST	-0.121*	-1.79	-0.128*	-1.90	-0.124*	-1.85	-0.117*	-1.73	-0.111*	-1.66	-0.110	-1.61	-0.125*	-1.82
	(0.067)		(0.067)		(0.067)		(0.068)		(0.067)		(0.068)		(0.069)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	-1.454**	-2.27	-1.454**	-2.28	-1.484**	-2.34	-1.584**	-2.39	-1.734	-2.63	-1.646**	-2.48	-1.781***	-2.64
	(0.641)		(0.637)		(0.634)		(0.662)		(0.660)		(0.663)		(0.674)	
R^2 adjusted	0.130		0.132		0.131		0.129		0.129		0.127		0.129	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (Poisson) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and VOLDISC on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Appendix 2.7 Family Involvement and Early Adoption of Public CbCR (Poisson)

Appendix 2.7. Family Involvement and Early Adoption of Public CbCR (Poisson)

CBC	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value
FOWN	-0.454	-1.25												
	(0.363)													
FVOTE 20%			-0.271*	-1.88										
			(0.144)											
FOWN 20%					-0.111	-0.84								
					(0.132)									
FAMF							-0.051	-0.57						
							(0.090)							
FCEO									0.137	1.19				
									(0.115)					
FBOARD											0.036	0.22		
											(0.162)			
FNAME													-0.120	-1.31
													(0.092)	
IO	0.135	-0.72	-0.180	-1.01	-0.107	-0.59	-0.074	-0.41	-0.050	-0.27	-0.049	-0.25	-0.062	-0.32
	(0.186)		(0.179)		(0.181)		(0.180)		(0.184)		(0.194)		(0.196)	
GEOGR COMPL	-1.179***	-7.28	-1.189***	-7.39	-1.216***	-7.51	-1.217***	-7.63	-1.230***	-7.69	-1.200***	-7.32	-1.216***	-7.40
	(0.162)		(0.161)		(0.162)		(0.160)		(0.160)		(0.164)		(0.164)	
ETR	-0.282	-1.40	-0.293	-1.53	-0.283	-1.47	-0.293	-1.53	-0.296	-1.53	-0.290	-1.43	-0.323	-1.62
	(0.201)		(0.191)		(0.193)		(0.191)		(0.193)		(0.203)		(0.199)	
SIZE	0.071	1.58	0.066	1.48	0.071	1.57	0.072	1.60	0.071	1.58	0.077*	1.67	0.083*	1.78
	(0.045)		(0.045)		(0.045)		(0.045)		(0.045)		(0.046)		(0.046)	
ROA	1.011	1.47	0.769	1.15	0.795	1.16	0.836	1.20	0.899	1.29	1.042	1.48	1.020	1.48

	(0.687)		(0.669)		(0.686)		(0.697)		(0.695)		(0.705)		(0.690)	
LEV	-0.136**	-2.02	-0.129**	-1.99	-0.134**	-2.00	-0.138**	-2.03	-0.137**	-2.02	-0.140**	-2.01	-0.152**	-2.18
	(0.067)		(0.065)		(0.067)		(0.068)		(0.068)		(0.070)		(0.070)	
MTB	-0.117*	-1.86	-0.108*	-1.76	-0.112*	-1.80	-0.112*	-1.76	-0.118*	-1.87	-0.122*	-1.90	-0.125**	-1.98
	(0.063)		(0.061)		(0.062)		(0.064)		(0.063)		(0.064)		(0.063)	
ANAFOL	-0.116	-1.23	-0.122	-1.35	-0.134	-1.45	-0.133	-1.42	-0.131	-1.42	-0.116	-1.21	-0.114	-1.22
	(0.094)		(0.090)		(0.093)		(0.094)		(0.092)		(0.096)		(0.094)	
HAVEN	0.077	0.76	0.081	0.82	0.091	0.91	0.093	0.94	0.102	1.03	0.082	0.79	0.101	0.98
	(0.102)		(0.098)		(0.100)		(0.099)		(0.099)		(0.105)		(0.103)	
US CROSSLIST	-0.231***	-2.77	-0.235***	-2.84	-0.224***	-2.70	-0.222***	-2.65	-0.214***	-2.65	-0.226***	-2.67	-0.246***	-2.93
	(0.083)		(0.083)		(0.083)		(0.084)		(0.081)		(0.084)		(0.084)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	-0.059	-0.07	-0.104	0.12	-0.001	-0.00	-0.063	-0.07	-0.072	-0.08	-0.239	-0.27	-0.292	-0.32
	(0.872)		(0.867)		(0.873)		(0.871)		(0.880)		(0.897)		(0.901)	
R^2 adjusted	0.150		0.156		0.155		0.154		0.155		0.149		0.150	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (Poisson) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and CbCR on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Appendix 2.8 Family Involvement and Voluntary Tax Disclosures without UK Finance Act Disclosures (OLS)

Appendix 2.8. Family Involvement and Voluntary Tax Disclosures without UK Finance Act Disclosures (OLS)

MANDISC	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
FOWN	-0.069*	-1.80												
	(0.038)													
FVOTE 20%			-0.040***	-2.58										
			(0.015)											
FOWN 20%					-0.031**	2.11								
					(0.015)									
FAMF							-0.017	-1.57						
							(0.011)							
FCEO									0.011	0.77				
									(0.015)					
FBOARD											-0.017	-1.58		
											(0.011)			
FNAME													-0.013	-1.11
													(0.012)	
IO	-0.033	-1.16	-0.041	-1.48	-0.036	-1.31	-0.025	-0.92	-0.017	-0.65	-0.025	-0.92	-0.018	-0.62
	(0.028)		(0.028)		(0.027)		(0.027)		(0.027)		(0.027)		(0.028)	
GEOGR COMPL	-0.045*	-1.86	-0.043*	-1.87	-0.047**	-2.02	-0.045*	-1.94	-0.048**	-2.10	-0.046**	-1.99	-0.049**	-2.09
	(0.024)		(0.023)		(0.023)		(0.023)		(0.023)		(0.023)		(0.023)	
ETR	-0.027	-0.86	-0.030	-0.97	-0.029	-0.95	-0.031	-1.01	-0.034	-1.11	-0.030	-1.00	-0.032	-1.04
	(0.031)		(0.031)		(0.031)		(0.030)		(0.030)		(0.030)		(0.031)	
SIZE	0.024***	3.63	0.023***	3.59	0.024***	3.70	0.024***	3.60	0.025***	3.67	0.024***	3.58	0.026***	3.75
	(0.007)		(0.006)		(0.006)		(0.007)		(0.007)		(0.007)		(0.007)	
ROA	0.165	1.65	0.159	1.65	0.155	1.59	0.150	1.54	0.173*	1.75	0.147	1.49	0.169*	1.66

	(0.100)		(0.096)		(0.098)		(0.098)		(0.099)		(0.098)		(0.102)	
LEV	-0.026***	-3.23	-0.026***	-3.29	-0.026***	-3.28	-0.026***	-3.26	-0.026***	-3.15	-0.026***	-3.26	-0.027***	-3.20
	(0.008)		(0.008)		(0.008)		(0.008)		(0.008)		(0.008)		(0.008)	
MTB	-0.008	-1.04	-0.007	-0.99	-0.007	-0.99	-0.006	-0.88	-0.008	-1.17	-0.006	-0.89	-0.009	-1.20
	(0.007)		(0.007)		(0.007)		(0.007)		(0.007)		(0.007)		(0.007)	
ANAFOL	0.001	0.07	0.003	0.18	0.001	0.05	0.001	0.07	0.002	0.11	0.001	0.05	0.001	0.04
	(0.016)		(0.015)		(0.016)		(0.016)		(0.016)		(0.016)		(0.016)	
HAVEN	-0.006	-0.39	-0.007	-0.50	-0.007	-0.49	-0.007	-0.50	-0.006	-0.39	-0.007	-0.46	-0.004	-0.27
	(0.015)		(0.015)		(0.015)		(0.015)		(0.015)		(0.015)		(0.015)	
US CROSSLIST	-0.025**	-2.15	-0.026**	-2.25	-0.026**	-2.21	-0.025**	-2.13	-0.024**	-2.06	-0.024**	-2.07	-0.026**	-2.22
	(0.012)		(0.012)		(0.012)		(0.012)		(0.011)		(0.012)		(0.012)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	-0.373***	-3.09	-0.364***	-3.03	0.373***	-3.13	-0.378***	-3.09	-0.406***	-3.29	-0.374***	-3.03	0.416***	-3.35
	(0.120)		(0.120)		(0.119)		(0.123)		(0.123)		(0.124)		(0.124)	
R^2 adjusted	0.365		0.370		0.368		0.364		0.361		0.364		0.362	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (OLS) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and VOLDISC without UK Finance Act disclosures on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Appendix 2.9 Family Involvement and Voluntary Tax Disclosures (z-score)

Appendix 2.9. Family Involvement and Voluntary Tax Disclosures (z-score)

VOLDISC	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
FOWN	-0.217*	-1.85												
	(0.117)													
FVOTE 20%			-0.121***	-2.69										
			(0.045)											
FOWN 20%					-0.099**	-2.28								
					(0.043)									
FAMF							-0.047	-1.33						
							(0.035)							
FCEO									0.037	0.84				
									(0.044)					
FBOARD											-0.099	-0.92		
											(0.107)			
FNAME													-0.032	-0.91
													(0.035)	
IO	-0.092	-1.03	-0.112	-1.29	-0.097	-1.15	-0.060	-0.70	-0.039	-0.46	-0.054	-0.60	-0.043	-0.48
	(0.089)		(0.087)		(0.084)		(0.086)		(0.085)		(0.090)		(0.089)	
GEOGR COMPL	0.029	0.40	0.040	0.57	0.030	0.43	0.033	0.47	0.024	0.34	0.019	0.26	0.016	0.22
	(0.072)		(0.069)		(0.069)		(0.070)		(0.070)		(0.073)		(0.070)	
ETR	-0.057	-0.61	-0.061	-0.68	-0.058	-0.65	-0.065	-0.72	-0.073	-0.81	-0.064	-0.68	-0.072	-0.79
	(0.092)		(0.090)		(0.090)		(0.090)		(0.090)		(0.093)		(0.092)	
SIZE	0.073***	3.88	0.073***	3.89	0.074***	4.00	0.075***	3.89	0.077***	3.98	0.076***	3.92	0.079***	4.00
	(0.019)		(0.019)		(0.019)		(0.019)		(0.019)		(0.019)		(0.020)	
ROA	0.493	1.61	0.489*	1.66	0.475	1.60	0.469	1.59	0.531*	1.78	0.490	1.58	0.506	1.64

	(0.306)		(0.295)		(0.298)		(0.295)		(0.298)		(0.311)		(0.309)	
LEV	-0.070***	-2.67	-0.070***	-2.73	-0.071***	-2.72	-0.071***	-2.69	-0.069***	-2.61	-0.071***	-2.61	-0.073***	-2.65
	(0.026)		(0.026)		(0.026)		(0.026)		(0.026)		(0.027)		(0.027)	
MTB	-0.010	-0.42	-0.009	-0.39	-0.009	-0.39	-0.007	-0.31	-0.013	-0.57	-0.010	-0.41	-0.013	-0.57
	(0.023)		(0.023)		(0.023)		(0.022)		(0.022)		(0.023)		(0.023)	
ANAFOL	-0.000	-0.00	0.006	0.15	-0.000	-0.00	0.001	0.03	0.003	0.07	-0.002	-0.05	-0.001	-0.03
	(0.043)		(0.041)		(0.042)		(0.043)		(0.043)		(0.044)		(0.043)	
HAVEN	-0.026	-0.54	-0.034	-0.71	-0.033	-0.70	-0.033	-0.69	-0.029	-0.59	-0.023	-0.46	-0.021	-0.43
	(0.049)		(0.048)		(0.048)		(0.048)		(0.048)		(0.051)		(0.049)	
US CROSSLIST	-0.042	-1.22	-0.047	-1.35	-0.045	-1.30	-0.042	-1.20	-0.039	-1.13	-0.038	-1.08	-0.044	-1.25
	(0.035)		(0.035)		(0.035)		(0.035)		(0.035)		(0.035)		(0.035)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	-1.884***	-5.30	-1.876***	-5.31	-1.900***	-5.42	-1.930***	-5.30	-2.004***	-5.55	-1.964***	-5.36	-2.017***	-5.52
	(0.356)		(0.353)		(0.350)		(0.364)		(0.361)		(0.366)		(0.365)	
R^2 adjusted	0.341		0.348		0.345		0.341		0.338		0.333		0.338	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (z-score) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and VOLDISC on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Appendix 2.10 Family Involvement and Early Adoption of Public CbCR (z-score)

Appendix 2.10. Family Involvement and Early Adoption of Public CbCR (z-score)

CbCR	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
FOWN	-0.171	-0.96												
	(0.178)													
FVOTE 20%			-0.149**	-2.02										
			(0.074)											
FOWN 20%					-0.057	-0.66								
					(0.086)									
FAMF							0.019	0.31						
							(0.062)							
FCEO									0.095	1.60				
									(0.060)					
FBOARD											0.293	1.65		
											(0.178)			
FNAME													-0.070	-1.26
													(0.056)	
IO	-0.088	-0.64	-0.134	-1.02	-0.078	-0.59	-0.038	-0.29	-0.043	-0.33	-0.043	-0.31	-0.051	-0.37
	(0.138)		(0.132)		(0.132)		(0.133)		(0.132)		(0.139)		(0.137)	
GEOGR COMPL	-0.538***	-4.22	-0.556***	-4.45	-0.572***	-4.53	-0.579***	-4.60	-0.576***	-4.59	-0.532***	-4.19	-0.551***	-4.38
	(0.128)		(0.125)		(0.126)		(0.126)		(0.126)		(0.127)		(0.126)	
ETR	-0.036	-0.28	-0.050	-0.39	-0.056	-0.43	-0.068	-0.52	-0.065	-0.50	-0.059	-0.44	-0.057	-0.43
	(0.131)		(0.129)		(0.130)		(0.129)		(0.129)		(0.133)		(0.131)	
SIZE	0.095***	3.53	0.091***	3.46	0.095***	3.60	0.098***	3.65	0.095***	3.54	0.102***	3.73	0.101***	3.74
	(0.027)		(0.026)		(0.027)		(0.027)		(0.027)		(0.027)		(0.027)	
ROA	1.210**	2.45	1.053**	2.11	1.065**	2.11	1.111**	2.15	1.120**	2.21	1.149**	2.25	1.221**	2.43

	(0.495)		(0.498)		(0.505)		(0.516)		(0.508)		(0.511)		(0.503)	
LEV	-0.146***	-3.41	-0.144***	-3.48	-0.144***	-3.38	-0.142***	-3.26	-0.143***	-3.32	-0.142***	-3.24	-0.153***	-3.45
	(0.043)		(0.041)		(0.043)		(0.044)		(0.043)		(0.044)		(0.044)	
MTB	-0.088**	-2.23	-0.082**	-2.10	-0.083**	-2.11	-0.086**	-2.14	-0.089**	-2.24	-0.087**	-2.15	-0.092**	-2.33
	(0.039)		(0.039)		(0.039)		(0.040)		(0.040)		(0.041)		(0.039)	
ANAFOL	-0.126**	-2.08	-0.134**	-2.27	-0.139**	-2.31	-0.136**	-2.24	-0.138**	-2.30	-0.130**	-2.10	-0.129**	-2.12
	(0.061)		(0.059)		(0.060)		(0.061)		(0.060)		(0.062)		(0.061)	
HAVEN	0.062	0.63	0.068	0.70	0.072	0.73	0.076	0.77	0.076	0.78	0.044	0.43	0.071	0.73
	(0.098)		(0.097)		(0.098)		(0.098)		(0.097)		(0.102)		(0.097)	
US CROSSLIST	-0.029	-0.56	-0.033	-0.64	-0.027	-0.52	-0.023	-0.45	-0.021	-0.42	-0.025	-0.49	-0.037	-0.72
	(0.051)		(0.051)		(0.051)		(0.051)		(0.051)		(0.052)		(0.051)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	-1.464***	-2.79	-1.328**	-2.56	-1.436***	-2.77	-1.544***	-2.89	-1.461***	-2.78	-1.645***	-3.08	-1.587***	-3.05
	(0.524)		(0.518)		(0.518)		(0.534)		(0.525)		(0.534)		(0.520)	
R^2 adjusted	0.338		0.344		0.338		0.337		0.339		0.344		0.343	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (z-score) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and CbCR on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Appendix 2.11 Family Involvement and Early Adoption of GRI 207 (Poisson)

Appendix 2.11. Family Involvement and Early Adoption of GRI 207 (Poisson)

GRI207	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value
FOWN	-0.516**	2.01												
	(0.257)													
FVOTE 20%			-0.279***	-2.61										
			(0.107)											
FOWN 20%					-0.209**	-2.09								
					(0.100)									
FAMF							-0.098	-1.35						
							(0.072)							
FCEO									0.053	0.71				
									(0.075)					
FBOARD											-0.237	-1.04		
											(0.227)			
FNAME													-0.067	-1.03
													(0.065)	
IO	-0.161	-1.12	-0.193	-1.39	-0.157	-1.13	-0.084	-0.59	-0.043	-0.31	-0.073	-0.50	-0.049	-0.34
	(0.144)		(0.139)		(0.139)		(0.142)		(0.140)		(0.145)		(0.147)	
GEOGR COMPL	-0.142	-1.24	-0.133	-1.20	-0.152	-1.38	-0.145	-1.28	-0.160	-1.44	-0.166	-1.44	-0.169	-1.51
	(0.115)		(0.111)		(0.110)		(0.114)		(0.111)		(0.115)		(0.112)	
ETR	-0.201	-1.27	-0.207	-1.34	-0.198	-1.28	-0.205	-1.33	-0.217	-1.39	-0.204	-1.28	-0.228	-1.42
	(0.158)		(0.155)		(0.155)		(0.155)		(0.157)		(0.160)		(0.160)	
SIZE	0.109***	3.54	0.108***	3.55	0.112***	3.66	0.113***	3.60	0.118***	3.72	0.115***	3.62	0.121***	3.72
	(0.031)		(0.030)		(0.030)		(0.031)		(0.032)		(0.032)		(0.033)	
ROA	0.831*	1.66	0.801*	1.67	0.774	1.59	0.780	1.60	0.887*	1.79	0.878*	1.72	0.854*	1.67

	(0.500)		(0.481)		(0.487)		(0.486)		(0.496)		(0.510)		(0.511)	
LEV	-0.085*	-1.84	-0.086*	-1.89	-0.088*	-1.90	-0.091*	-1.94	-0.088*	-1.86	-0.089*	-1.85	-0.094*	-1.92
	(0.046)		(0.046)		(0.046)		(0.047)		(0.048)		(0.048)		(0.049)	
MTB	-0.013	-0.31	-0.013	-0.30	-0.013	-0.31	-0.010	-0.24	-0.020	-0.48	-0.016	-0.38	-0.020	-0.47
	(0.042)		(0.042)		(0.042)		(0.041)		(0.041)		(0.042)		(0.042)	
ANAFOL	-0.001	-0.01	0.008	0.11	-0.005	-0.07	-0.006	-0.08	-0.001	-0.01	-0.003	-0.04	-0.003	-0.04
	(0.070)		(0.068)		(0.069)		(0.071)		(0.072)		(0.072)		(0.072)	
HAVEN	-0.021	-0.25	-0.034	-0.43	-0.034	-0.43	-0.033	-0.41	-0.026	-0.32	-0.009	-0.10	-0.011	-0.13
	(0.082)		(0.079)		(0.079)		(0.081)		(0.081)		(0.086)		(0.082)	
US CROSSLIST	-0.069	-1.14	-0.076	-1.26	-0.071	-1.19	-0.066	-1.08	-0.060	-1.00	-0.060	-0.98	-0.073	-1.18
	(0.061)		(0.060)		(0.060)		(0.061)		(0.060)		(0.061)		(0.061)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	-0.985*	-1.66	-0.964*	-1.65	-1.013*	-1.73	-1.088*	-1.80	-1.246**	-2.07	-1.164*	-1.91	-1.282***	-2.08
	(0.592)		(0.585)		(0.587)		(0.605)		(0.602)		(0.609)		(0.617)	
R^2 adjusted	0.114		0.116		0.114		0.113		0.112		0.111		0.112	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (Poisson) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and GRI207 on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Appendix 2.12 Family Involvement and Early Adoption of GRI 207 (z-score)

Appendix 2.12. Family Involvement and Early Adoption of GRI 207 (z-score)

GRI207	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
FOWN	-0.235*	-1.84												
	(0.127)													
FVOTE 20%			-0.134***	-2.62										
			(0.051)											
FOWN 20%					-0.103**	-2.10								
					(0.049)									
FAMF							-0.049	-1.20						
							(0.041)							
FCEO									0.036	0.72				
									(0.049)					
FBOARD											-0.098	-0.83		
											(0.117)			
FNAME													-0.034	-0.86
													(0.040)	
IO	-0.099	-1.05	-0.121	-1.32	-0.101	-1.13	-0.062	-0.68	-0.041	-0.45	-0.059	-0.62	-0.046	-0.49
	(0.094)		(0.092)		(0.089)		(0.091)		(0.091)		(0.095)		(0.095)	
GEOGR COMPL	0.022	0.28	0.031	0.41	0.020	0.26	0.023	0.30	0.014	0.18	0.012	0.15	0.008	0.10
	(0.079)		(0.076)		(0.076)		(0.078)		(0.076)		(0.080)		(0.078)	
ETR	-0.071	-0.71	-0.076	-0.77	-0.073	-0.75	-0.080	-0.82	-0.089	-0.90	-0.080	-0.79	-0.088	-0.88
	(0.100)		(0.098)		(0.097)		(0.098)		(0.098)		(0.101)		(0.100)	
SIZE	0.079***	3.87	0.078***	3.89	0.080***	4.00	0.081***	3.90	0.083***	4.02	0.082***	3.94	0.085***	4.02
	(0.020)		(0.020)		(0.020)		(0.021)		(0.021)		(0.021)		(0.021)	
ROA	0.681**	2.00	0.667**	2.03	0.654**	1.97	0.647**	1.98	0.712**	2.14	0.673*	1.93	0.695**	2.02

	(0.340)		(0.328)		(0.332)		(0.327)		(0.332)		(0.348)		(0.344)	
LEV	-0.070**	-2.36	-0.070**	-2.41	-0.070**	-2.41	-0.071**	-2.39	-0.069**	-2.30	-0.071**	-2.31	-0.073**	-2.35
	(0.030)		(0.029)		(0.029)		(0.030)		(0.030)		(0.030)		(0.031)	
MTB	-0.016	-0.58	-0.015	-0.55	-0.015	-0.55	-0.013	-0.48	-0.019	-0.71	-0.015	-0.55	-0.019	-0.72
	(0.027)		(0.027)		(0.027)		(0.026)		(0.026)		(0.027)		(0.027)	
ANAFOL	-0.018	-0.40	-0.013	-0.30	-0.020	-0.44	-0.018	-0.40	-0.016	-0.36	-0.021	-0.46	-0.019	-0.42
	(0.045)		(0.043)		(0.044)		(0.045)		(0.045)		(0.046)		(0.046)	
HAVEN	-0.010	-0.17	-0.017	-0.32	-0.017	-0.31	-0.017	-0.30	-0.012	-0.21	-0.008	-0.13	-0.004	-0.08
	(0.056)		(0.054)		(0.054)		(0.055)		(0.055)		(0.059)		(0.056)	
US CROSSLIST	-0.014	-0.37	-0.019	-0.51	-0.017	-0.45	-0.013	-0.34	-0.010	-0.27	-0.009	-0.24	-0.016	-0.41
	(0.038)		(0.038)		(0.038)		(0.038)		(0.038)		(0.038)		(0.038)	
FIXED EFFECTS														
Country FE	YES		YES		YES		YES		YES		YES		YES	
Industry FE	YES		YES		YES		YES		YES		YES		YES	
Year FE	YES		YES		YES		YES		YES		YES		YES	
Constant	-2.007***	-5.14	-1.994***	-5.16	-2.025***	-5.27	-2.058***	-5.18	-2.137***	-5.46	-2.098***	-5.25	-2.150***	-5.42
	(0.391)		(0.386)		(0.385)		(0.398)		(0.392)		(0.399)		(0.397)	
R^2 adjusted	0.337		0.342		0.339		0.335		0.333		0.326		0.333	
N	1,615		1,638		1,638		1,638		1,638		1,601		1,615	

Note: This table reports results (z-score) on the association between FOWN, FVOTE 20%, FOWN 20%, FAMF, FCEO, FBOARD and FNAME on the one hand, and GRI207 on the other hand. All accounting variables have been winsorized at the 5% and 95% percentiles. See Appendix 2.2 for variable definitions. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Chapter 3 The Relationship between Board Diversity and Voluntary Tax Disclosures of Large, Listed European Firms: Do Institutional Characteristics Matter?

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Abstract: An increasing number of countries issue regulations on different aspects of board diversity, causing research attention to the antecedents and consequences of board diversity to grow. In this study, we focus on two different types of board diversity, namely gender diversity and employee board representation diversity and examine whether both types of diversity act as antecedents to voluntary tax disclosures in large listed European firms. In addition, we also examine whether the presence of a CSR committee is related to a firm's voluntary tax disclosures. Subsequently, we study whether country-level formal and informal institutional characteristics moderate the relationships between these board characteristics and voluntary tax disclosures. To test our hypotheses, we hand-collected voluntary tax disclosures in annual and sustainability reports of 229 firms over seven years, resulting in 1,603 firm-year observations. We find that employee board representation and the existence of a CSR committee are significantly positively associated with more voluntary tax disclosures. In addition, both relationships are moderated by a country's formal institutions captured by the level of tax enforcement, and a country's informal institutions captured by the country's level of tax morale. Specifically, we find that the positive relationship between employee board representation and the level of voluntary tax disclosure is stronger in societies with strict tax enforcement and societies with high tax morale. In addition, we find that the positive relationship between the presence of a CSR Committee and the level of voluntary tax disclosure is stronger in societies with weak

tax enforcement and societies with high tax morale. Finally, our results suggest that board gender diversity is not related to the level of voluntary tax disclosure. Our results indicate that different types of board diversity lead to different firm outcomes and that the consequences of board governance mechanisms on firm outcome variables can only be understood considering the national context in which they are embedded.

Keywords: Tax disclosure, Corporate Governance, CSR, Employee Board Representation, Gender Diversity, Formal and Informal Institutions

3.1 Introduction

In recent years, public awareness of sustainable corporate behavior and the role of companies in society has grown (Baldini, Maso, Liberatore, Mazzi, & Terzani, 2018), as has the interest in a firm's tax policies. Various high-profile cases of aggressive tax planning by corporations and information leaks on tax planning arrangements have raised concerns among regulators and led to reactions from the public. For example, Starbucks's tax strategies in the UK did not go unnoticed. When reported in the press, consumers protested and in response, Starbucks pledged to pay £20 million in taxes in the UK (Graetz & Doud, 2013). It was arguably through this payment that Starbucks regained its social license to operate in the UK public sphere (Christians, 2013).

This growing call for fair tax payments has caused tax disclosures and tax transparency to become the most prominent demand for many parties (Oats & Tuck, 2019). Tax disclosures, which can be defined as the information provided by a firm on its tax payments and collections, have gained such traction over the past years that it has been gradually recognized as an element of Corporate Social Responsibility (CSR) or Environmental, Social and Governance (ESG). As a result, tax is now also considered to belong to the domain of ESG/CSR reporting practices (henceforth: sustainability disclosures)[5] (Krieg & Li, 2021; Silvola & Landau, 2021). For example, the "Summary Report of the Public Consultation on the Review of the Non-Financial Reporting Directive of the European Union" shows that tax and tax transparency are among the top priority items in the area of non-financial disclosure (European Union, 2020). There is a growing consensus among firm stakeholders that sustainable corporate tax practices constitute a part of companies' responsibilities to stakeholders (De la Cuesta-González & Pardo, 2019; European Union, 2020). Moreover, scholars have also argued that the duties of ESG and CSR prescribe that firms comply responsibly with tax law since tax revenue is fundamental to the existence of society and the provision of public goods (Bird & Davis-Nozemack, 2018). Non-compliance with tax laws and tax avoidance suffocates the state's ability to provide essential public services today and in the future (Bird & Davis-Nozemack, 2018). According to several authors (Arora & Dharwadkar, 2011; Ntim & Soobaroyen, 2013), it is to be expected that companies with good corporate governance have better monitoring and are more attentive to CSR issues.

Extending the observation above, we study in this paper the relationship between board characteristics and a firm's voluntary tax disclosures, considering the national context in which these

[5] We are aware that information on ESG, CSR and sustainability overlap but do not contain the exact same topics. However for the sake of readability, we group them under the term 'sustainability disclosures'

governance mechanisms are embedded. Previous research demonstrates that corporate tax issues are increasingly on the radar of corporate boards, and are no longer just an issue of the finance and accounting department (Beasley, Goldman, Lewellen, & McAllister, 2021). We focus on two types of board diversity that are either mandated by law in several countries or are a voluntary practice in other countries. Specifically, we focus on board employee representation, which involves employees who are appointed as directors on corporate boards by other firm employees through, for example, their local trade union, as a form of task-related board diversity. We also focus on board gender diversity as a form of non-task-related board diversity and examine whether these two types of board diversity are associated with the level of voluntary tax disclosures of a firm. In addition, given that a firm's tax policy is currently also considered by several stakeholders of the firm as part of the firm's CSR policies, we include the presence of a CSR committee as a subcommittee to the board as an additional board characteristic.

Since prior studies find that national-level institutional factors significantly shape a firm's board systems as well as board practices and related firm outcomes (e.g. Castañer et al., 2022; Zattoni et al., 2020; Zattoni & van Ees, 2023), we also examine how cross-country differences affect the relationship between a board's diversity or a board's CSR attention, and a firm's level of voluntary tax disclosures. To explain possible country variation, we adopt an institutional theory lens. A central premise of institutional theory is that firm strategies and practices, as well as their outcomes, are conditioned by country-level institutional factors (North, 1990), which can subsequently be modelled as moderators to explain cross-country differences in the relationship between board characteristics and firm outcome variables (Van Essen et al., 2013). Governance scholars are increasingly exploring how institutional factors affect and interact with governance mechanisms (Zattoni et al., 2017). These studies support the idea that national institutions influence firm-level governance mechanisms and may either support or impede their impact on firm-level outcomes (Zattoni et al., 2017). Institutional influences are divided into formal institutional characteristics and informal institutional characteristics. Formal institutions such as legal and political aspects are known to shape the nature of a firm's stakeholder relationships (Judge, Douglas, & Kutan, 2008). Informal institutions in the form of culture, values and norms are more ingrained and influence society and its economy through mimetic and normative adoption practices (Scott, 2008; Whitley, 1992, p. 596). These institutions develop over time and prescribe behaviors that are legitimized in specific societies (Suchman, 1995).

Prior research has demonstrated the effect of institutional characteristics on a broad range of managerial phenomena including ESG reporting (Baldini et al., 2018; Chan, Watson, & Woodliff, 2014; Lagasio & Cucari, 2019). Taking into account the findings of prior literature, we study in this paper whether the relationship between board characteristics in terms of board diversity and the presence

of a CSR subcommittee and voluntary tax disclosures is moderated by country-level formal institutions captured by a country's strength of tax enforcement and a country's informal institutions, captured by a country's tax morale. We test our hypotheses using a sample of 229 large, listed European companies from six countries, Finland, France, Germany, Sweden, the Netherlands and the United Kingdom observed over seven years, leading to 1,603 firm-year observations. These countries provide an appropriate research population since they differ in the regulation on mandatory employee board representation, as well as on the regulation concerning board gender quota. The adoption of a CSR subcommittee to the board of directors is a voluntary practice in all countries in our research sample. To measure a firm's level of voluntary tax disclosures, we develop an extensive tax disclosure index based on previous literature and the most relevant contemporary voluntary tax disclosure frameworks that can voluntarily be used during the period of the study.

Our results indicate that employee board representation is positively associated with the level of voluntary tax disclosure. Our analyses show that this result is not driven by country, industry, firm or time fixed effects. In addition, we exploit a change in legislation in employee board representation in France to estimate a difference-in-difference model confirming our results and therefore provide evidence of a causal link. In addition, we find no evidence of a relationship between board gender diversity and the level of voluntary tax disclosure. An instrumental variable analysis taking into account reverse causality also does not provide evidence of a relationship between board gender diversity and the level of voluntary tax disclosure. Furthermore, we find that the presence of a CSR sub-committee on the board of directors is positively associated with the level of voluntary tax disclosures and that these results are robust to a difference-in-differences estimation. We also find moderating influences of both a country's tax enforcement as a formal institutional characteristic and a country's tax morale as an informal institutional characteristic. Specifically, we observe that strict tax enforcement and high tax morale strengthen the relationship between employee board representation and the level of voluntary tax disclosure. In addition, we find that the positive relationship between a CSR Committee and the level of voluntary tax disclosure is especially strong in societies with weak tax enforcement and in societies with high tax morale. Our results indicate that the consequences of board governance mechanisms on firm outcome variables should be understood considering the national context in which they are embedded.

3.2 Literature Review and Hypothesis Development

While the literature on board characteristics and voluntary information disclosure in general is in a mature stage and an increasing number of studies also focus on the relationship between board characteristics and ESG disclosure, the literature on board characteristics and public voluntary tax disclosures is almost non-existent.

To address this gap, this paper focuses on public voluntary tax disclosures made by listed companies and tries to deepen the understanding of how board characteristics are related to a firm's level of voluntary tax disclosures and whether this relationship is moderated by country-level characteristics. A firm's public tax disclosures can be split into mandatory and voluntary tax disclosures. Mandatory tax disclosures are tax disclosures that a firm must issue to be compliant with the regulations they are subject to. Voluntary tax disclosures are at the discretion of each firm and relate to all information a firm discloses about its taxes voluntarily to the public in its annual report, sustainability report or other type of written communication. This paper focuses on voluntary disclosures. More recently, tax disclosures are considered to be situated at the intersection between financial disclosures and broader sustainability disclosures, with many stakeholders being interested in tax disclosures for different reasons. For example, investors are interested in tax disclosures to make appropriate after-tax cash flow forecasts (Frischmann et al., 2008), the public could be interested in knowing whether the tax system is 'fair' (Sheffrin, 1994), which in turn also interests politicians who can leverage such issues to get re-elected (Frank, Hoopes, & Lester, 2022), and tax authorities can pick up this voluntarily publicly disclosed information in addition to the private tax information they have received from the firm to finetune tax audits (Bozanic et al., 2017), Past research has shown that firms have good reason to increase voluntary disclosure and decrease information asymmetries because it benefits the firm with lower costs of capital (Amihud & Mendelson, 1986; Diamond & Verrecchia, 1991), lower costs of debt (Sengupta, 1998), increases in stock liquidity (Healy et al., 1999) and reputational benefits taking the form of gaining legitimacy with stakeholders (Chan et al., 2014; Michelon & Parbonetti, 2012). However, disclosures also entail direct and indirect costs, mainly in the form of proprietary costs, costs of risk of litigation and reputational costs (Verrecchia, 1983).

Prior governance literature focusing on 'general' disclosures as well as CSR disclosure provides evidence that governance characteristics influence disclosure decisions by firms. The board of directors is a key element of corporate governance. The importance of board diversity for board processes and firm outcomes can be supported by agency theory complemented with a resource-based view of the firm (Katmon et al., 2019). According to agency theory, corporate boards act as the first line of defense against agency problems in companies (Farooq, Gan, & Nadeem, 2023). Boards

can mitigate agency problems by providing a better information environment for their stakeholders (Armstrong, Core, & Guay, 2014), which implies providing more disclosures. From a resource-based perspective, diverse boards are expected to be better monitors. Resource-based theory stipulates that more diverse knowledge on the board can be seen as a strength (Wernerfelt, 1984). Board diversity is an intangible resource of a firm, as diverse boards offer heterogeneous perspectives in decision-making (Rao & Tilt, 2016). Boards can be diverse in different ways and different types of diversity have different impacts on monitoring and disclosure (Katmon et al., 2019).

It is unclear whether all types of board diversity impact firm outcomes in similar ways. To answer this question, we consider two different types of board diversity in this paper, namely diversity as a result of board employee representation and board gender diversity. We have chosen these two different types of diversity for the following reasons. Both forms of diversity are governed by regulations in several countries, but they relate to two different types of board diversity, namely task-related diversity and non-task-related diversity. Adams, De Haan, Terjesen, and Van Ees (2015) argue that it is possible to distinguish between these two types of diversity, as task-related diversity refers to diversity in educational and functional background, and non-task-related diversity refers to diversity in gender, race and nationality. Task-related diversity of directors encompasses job- and skill-related characteristics such as education and tenure that create differences in directors' functional capabilities. Non-task-related diversity of directors relates to personal characteristics such as age, gender, and nationality which primarily enhance building interpersonal relationships (Khatri, 2024).

Hillman (2015) points out that while the literature on board diversity has predominantly emphasized gender diversity, there are also significant benefits to be gained from other forms of diversity, such as functional diversity. Employee board representation is a type of functional board diversity and matters to be studied in the context of tax disclosures since labor unions and employees are interested in a firm's tax behavior (Gleason, Kieback, Thomsen, & Watrin, 2021; Samani, Overland, & Sabelfeld, 2023). As such, we follow Adams et al. (2015) and capture both task-related board diversity as well as non-task-related board diversity in our research design.

3.2.1 Employee Board Representation

Employee board representation is a type of board diversity that is mandatory in several countries and is a voluntary practice in other countries. Previous literature demonstrated that employee representatives on corporate boards possess unique operational knowledge of the firm that is unknown to other board members and shareholders (Fauver & Fuerst, 2006). Possessing such knowledge provides boards with a clear advantage, as Grant (1996) argues that the success of any firm depends crucially on the knowledge of its employees. As employee representatives often have

different backgrounds than shareholder-elected directors, they add to the functional diversity of the board, increase perspectives taken into consideration, raising task conflicts, thereby improving decision-making and increasing the board's resilience against tunnel vision and groupthink (Overland & Samani, 2022). The presence of employee representatives on the board is thus a form of task-related board diversity, given their unique knowledge and different functional backgrounds compared to other directors. Kieback, Gleason, Thomsen, and Watrin (2023) argue and find that employee representatives on corporate boards provide the board with valuable information, which allows boards to require more accurate disclosures from managers. These more accurate disclosures lead to more detailed financial reporting and management guidance in financial reports (Kieback et al., 2023).

Employee board representatives are also likely to adopt a vigilant stance on matters closely related to their core interests, being wages and job security (Gleason et al., 2021; Samani et al., 2023). Tax disclosures can align with these core interests of employees, as tax disclosures provide information on the financial health of the firm. Tax disclosures could help employees paint a picture of the companies' financial health in their country, and allow them to build a stronger case for wage demands. In addition, tax disclosures could show the result of corporate restructuring, and inform worker unions if assets and capital are moved elsewhere (European Commission, 2016). Employees could also be interested in tax disclosures from a CSR perspective. Barnea and Rubin (2010) show that employee board representatives may be more concerned about CSR performance than other board members and shareholders. The literature suggests that employees prefer organizations to behave responsibly toward their stakeholders (Jones, Willness, & Madey, 2014; Triana, Jayasinghe, Pieper, Delgado, & Li, 2019; Zhang, Di Fan, & Zhu, 2014), which would increase their preferences for tax disclosure, given the inclusion of tax in CSR and ESG matters. As a consequence, informed employees who are part of the board can make managers more forthcoming with disclosures close to the interests of employees (Samani et al., 2023).

However, agency theory stipulates that employee representatives on the board can be a liability, and suboptimal as a governance model (Jensen & Meckling, 1976). From an agency perspective, a more diverse board could increase agency conflicts because employees do not necessarily have the same interests as other directors (Barnea & Rubin, 2010). The representation of labor may be seen as a policy to balance forces (labor and capital) on the board and employee directors may present concerns of different stakeholders rather than focusing solely on shareholders (Nekhili, Boukadhaba, & Nagati, 2021). From a shareholders' point of view, tax disclosures can reveal sensitive information on a firm's tax planning strategy which might reveal proprietary information toward competitors, putting the firm at a competitive disadvantage (Lenter et al., 2003; Spengel, 2018). Shareholders thus have a clear

incentive not to disclose this tax information, and employees also benefit indirectly from working in a strategically strong firm in the form of job security.

Additionally, labor has a hierarchical dependence relationship with management and employee board representation might encourage managerial entrenchment (Hollandts, Aubert, Ben Abdelhamid, & Prieur, 2018). Available evidence suggests that employee directors may increase CEO entrenchment by protecting management from antitakeover decisions (Pagano & Volpin, 2005) or by providing 'friendly' monitoring (Guedri & Hollandts, 2008). In this perspective, employee directors would not resist disclosure decisions taken by management and favored by other directors. If employees are indeed a demanding party for tax disclosures, they probably must hold considerable power to influence their firms in issuing tax disclosures. From interviews with employee representatives, Overland and Samani (2022) find that employee representatives are actively involved in the preparation of financial reports. These employee representatives could thus be powerful enough to request tax disclosures from the firm and include this information in the firm's reports.

Following the supposition that employees are more concerned about matters closely aligned with their interests and their firm's socially responsible activities, we argue that employee board representation might make employees powerful and as a result, employee representation on the board will be related to more voluntary tax disclosures.

H1: (More) employee representation on the board of directors is positively associated with a higher level of voluntary tax disclosures

3.2.2 Board Gender Diversity

Many countries have implemented quotas or recommendations for the proportion of women on corporate boards. Board diversity in terms of gender can change the nature and dynamics of board deliberations and board outcomes such as information disclosure to the public (Banno et al., 2023). The disclosure literature predicts a positive influence of board gender diversity on firm disclosures based on the resource-based view of the firm. Corporate governance literature assumes that the characteristics of the board members determine the board's ability to monitor and control managers and to monitor compliance with applicable laws and regulations (Carter, D'Souza, Simkins, & Simpson, 2010). Hillman and Dalziel (2003) suggest that effective monitoring requires boards with diverse skills, experience, expertise and knowledge. Board gender diversity adds demographic diversity. Adams and Ferreira (2009) provide evidence that a gender-diverse board allocates more effort to monitoring. Empirical studies show a positive link between financial reporting quality and the presence of gender-diverse boards (Gul, Srinidhi, & Ng, 2011; Labelle, Makni Gargouri, & Francoeur, 2010; Srinidhi, Gul, & Tsui, 2011). Gul et al. (2011) show that gender diversity increases firm disclosure and Srinidhi et al.

(2011) show that gender-diverse boards and gender-diverse audit committees are associated with higher earnings quality. Beasley (1996) and Cumming, Leung, and Rui (2015) find that boards with non-executive outsider female directors are associated with less occurrence of corporate financial frauds, increased transparency and reduced agency costs.

Female representation on boards is thus linked to a better information environment (Gul et al., 2011; Nadeem, 2020). As the board of directors is ultimately responsible for overseeing the financial reporting processes undertaken by management (Bamber, Jiang, Petroni, & Wang, 2010), the gender composition of the board may explain variations in the information environment of the firm. The literature focussing on CSR disclosure adds a gender role theory lens to the resource-based view, which argues that men and women differ in values and personality traits in their childhood (Dawson, 1997), where women are guided by communal goals – caring for others' interests and developing interpersonal relationships, and men are mostly guided by agentic goals – focusing on personal achievements (Cumming et al., 2015). As a result, board gender diversity has been associated with more CSR activities (Bear, Rahman, & Post, 2010; Hussain, Rigoni, & Orij, 2018). In terms of effects on disclosure, recent studies argue that increasing gender diversity in the board room will benefit firms with better sustainability reporting (Fernandez-Feijoo et al., 2014; Post, Rahman, & Rubow, 2011). Past studies show that gender-diverse boards give more attention to sustainability issues and that female directors are positively associated with sustainability disclosures (Elmagrhi, Ntim, Elamer, & Zhang, 2019; Hollindale, Kent, Routledge, & Chapple, 2019; Jizi, 2017; Liao, Luo, & Tang, 2015).

Notably, some studies only find a relationship between female board representation and increased disclosure when a certain 'critical mass' of female board members is present, with three or more female directors being required to notice a significant difference (Ben-Amar, Chang, & McIlkenny, 2017; Hollindale et al., 2019; Jia & Zhang, 2013). A few studies also found a negative relationship between women on boards and ESG disclosure, although these studies had hypothesized a positive relationship (Cucari, Esposito De Falco, & Orlando, 2018; Husted & Sousa-Filho, 2019). These studies attribute the opposing finding to the presence of only a limited number of women on boards, resulting in a limited impact of these female directors in their sample. Finally, Hussain et al. (2018) fail to find any statistically significant relationship between women on the board and disclosure.

We follow the argument that a gender-diverse board takes more perspectives into account and that women on the board are more guided by communal goals, leading to increased reporting on sustainability issues. Based on resource-based theory and the results of past literature on accounting quality and board gender diversity, as well as the more communal attitude of women evidenced by

prior research, we expect board gender diversity to be positively related to the level of voluntary tax disclosure of the firm.

H2: More gender-diverse boards are positively associated with a higher level of voluntary tax disclosures

3.2.3 The Presence of a CSR Committee

Finally, we consider whether or not a CSR Committee has been installed as a subcommittee of the board and if the presence of such a committee is related to a higher level of voluntary tax disclosures. The existence of a CSR committee symbolizes the board's orientation and commitment to its stakeholders (Ullmann, 1985) and sustainable development (Hussain et al., 2018). The purpose of such a CSR committee is to systematically plan, implement and review sustainability policies and activities (Liao et al., 2015). A CSR committee can be viewed as a means to deal with stakeholders and increase legitimacy (Michelon & Parbonetti, 2012). It can therefore be expected that one of the roles of the CSR committee is to provide adequate CSR disclosures (Liao et al., 2015). Liao et al. (2015) and Peters and Romi (2014) indeed find that the presence of a CSR committee greatly enhances greenhouse gas disclosure quality. Similarly, the presence of a CSR committee is positively associated with the quality of CSR and sustainability disclosures (Amran, Lee, & Devi, 2014; Cucari et al., 2018; Helfaya & Moussa, 2017). Some studies do however report non-significant results (Michelon & Parbonetti, 2012; Rupley, Brown, & Marshall, 2012). If a board sets up a CSR committee, then CSR attention becomes institutionalized as a governance-related mechanism at the firm level. The open question is whether setting up such a formal mechanism affects firm outcomes (Kumar & Zattoni, 2016) and more specifically tax disclosures. Given the gradual inclusion of tax in CSR/ESG issues and based on the majority of empirical studies finding a positive relationship between the presence of a CSR subcommittee to the board and CSR-related disclosures, we hypothesize a positive relationship between the existence of a CSR committee and the level of voluntary tax disclosures.

H3: The presence of a CSR Committee as a subcommittee to the board is positively associated with a higher level of voluntary tax disclosures

3.2.4 The Moderating Role of a Country's Formal and Informal Institutions.

Recent calls in corporate governance research highlight the need for studies exploring the intersection between country-level- and firm-level governance (Guedhami, Johan, Lopez-de-Silanes, & Terjesen, 2022). The effect of firm-level governance characteristics on firm outcome and firm behavior could very well depend on the national institutional context, and it is unclear whether country-level and firm-level governance form complements or substitutes (Guedhami et al., 2022; Hope, 2003; Jaggi & Low, 2000). The stream of research examining national influences is grounded in institutional theory.

Institutional theory predicts that actors in a country act by the rules of the game in a society (North, 1990). In a multi-country study, considering institutions will shed more light on underlying variables that can be linked to cross-country variation in the relationship between board characteristics and the level of voluntary tax disclosures. Institutional theory scholars distinguish between formal and informal institutions (North, 1990). Institutional theory suggests that social and economic behaviors are guided by a country's specific informal institutions (such as norms, customs and traditions) which in turn manifest themselves in formal institutions (such as legal, political and financial systems) (Ioannou & Serafeim, 2012).

To gain more insights into the relationship between governance and disclosure, not only firm-level governance characteristics but also country-level governance characteristics need to be examined (Ernstberger & Grüning, 2013; Francis, Khurana, & Pereira, 2005). Scholars agree that these institutional characteristics matter for disclosure decisions. However, which characteristics and how they matter is often an open question (Jackson & Deeg, 2008) and different types of disclosure would probably be influenced by different types of institutional characteristics. In disclosure studies in the area of financial reporting, a country's level of investor protection rights and the rule of law are often found as influencing factors in disclosure decisions (e.g. Daske, Hail, Leuz, & Verdi, 2008; Garcia-Meca & Sanchez-Ballesta, 2010; Garcia-Sanchez, Cuadrado-Ballesteros, & Frias-Aceituno, 2016). As we focus on voluntary tax disclosures in this study, we aim to research whether those formal and informal institutional characteristics that are more closely related to tax payments and tax behavior in a society moderate the relationships between firm-level governance mechanisms and voluntary tax disclosure.

3.2.4.1 The Role of Formal Institutions

Formal institutions refer to a society's written rules, regulations and laws as well as supporting apparatuses and infrastructures that prescribe expectations for societal behaviors and outcomes (North, 1990). Prior research indicates the importance of a country's formal institutions for the quality of accounting information (Wysocki, 2011). Several studies provide evidence that strong formal institutions incentivize firms to comply with the law (in particular accounting standards) and this will result in high-quality information (Brüggemann, Hitz, & Sellhorn, 2013; Daske et al., 2008; Pope & McLeay, 2011). In the context of taxation, Dyck and Zingales (2004) and Desai, Dyck, and Zingales (2007) illustrated that tax enforcement plays a governance role in supervising corporate insiders in developed markets. In addition, Zhang, Peng, Fu, Zhang, and Wang (2023) find that tax authorities can reduce agency problems in corporate decision-making processes. Prior literature shows that in developed markets, stricter tax enforcement can improve the quality of financial reports (Hanlon, Hoopes, & Shroff, 2014; Mason & Williams, 2022). In addition, tax enforcement is found to curtail related party trades (Desai et al., 2007) and to alleviate information asymmetry (Hanlon et al., 2014;

Mason & Williams, 2022). Moreover, evidence is available that strengthening tax enforcement reduces information asymmetry by restraining corporate tax avoidance and earnings management (Bauer, Fang, & Pittman, 2021; Guedhami & Pittman, 2008; Hanlon et al., 2014; Hoopes, Mescall, & Pittman, 2012; Xiao & Shao, 2020).

Consequently, in the context of voluntary tax disclosures, we argue that the strength of tax enforcement in a country will influence a firm's tax behavior both concerning the choice of tax planning strategies as well as concerning voluntary tax disclosures. On the one hand, when citizens of a country (including preparers of financial information, shareholders and stakeholders of the firm) perceive a country's tax enforcement as strict and strong, they might be less likely to choose tax-avoiding strategies which might result in less demand by shareholders and stakeholders for tax disclosures. On the other hand, it could also be that when firms pursue more sustainable tax behavior, they may use voluntary tax disclosures to signal their sustainable behavior. Based on the available evidence that strong tax enforcement makes firms comply more with the tax law and that strong tax enforcement can act as a substitute for firm-level governance, we hypothesize that the strength of a country's tax enforcement moderates the previously hypothesized relationships in that:

H4a: The positive relationship between employee board representation and the level of voluntary tax disclosure is stronger in societies with weak tax enforcement.

H4b: The positive relationship between board gender diversity and the level of voluntary tax disclosure is stronger in societies with weak tax enforcement.

H4c: The positive relationship between the existence of a CSR Committee and the level of voluntary tax disclosure is stronger in societies with weak tax enforcement.

3.2.4.2 The Role of Informal Institutions

Informal institutions encompass a society's manners, values and beliefs and provide a complementary set of prescriptions for what is appropriate (North, 1990). So far, cross-national governance research has examined a much smaller number of informal institutions compared to research conducted on the influence of formal institutions. Scholars have noted that a country's cultural system affects managerial discretion in the decision-making process (Crossland & Hambrick, 2011; Hambrick & Finkelstein, 1987). A cultural element or value in society that is directly related to the tax behavior of individuals and companies is the level of tax morale in a country. Tax morale can be defined as intrinsic non-pecuniary motivations toward tax compliance and paying taxes (Kemme, Parikh, & Steigner, 2020). Tax morale is thus the intrinsic motivation to pay taxes or feel guilt from failure to comply (Luttmer & Singhal, 2014) and research has demonstrated that tax morale varies strongly across

different cultures (Andriani, Bruno, Douarin, & Stepien-Baig, 2022). Low tax morale has been linked to both domestic and international tax evasion (Halla, 2012; Kemme et al., 2020), as individuals view cheating on paying taxes as more acceptable in countries with low tax morale (Kemme et al., 2020). Prior literature on financial disclosure suggests that culture affects both mandatory and voluntary disclosures (e.g. Jaggi & Low, 2000; Mazzi, Slack, & Tsalavoutas, 2018). Studying public tax disclosures in the form of CbCR, Göttsche, Habermann, and Sieber (2024) find that non-professional investors' willingness to invest increases when companies provide public CbCR, and that this effect is the strongest when these investors have high tax morale. Investors and stakeholders in societies with higher tax morale are thus more interested in the tax behavior of their firms. Therefore, we assume that corporate boards are aware of this interest and that the item of corporate tax disclosures will be more present on the agenda of the board of directors than in countries with low tax morale. As a consequence, we expect higher levels of voluntary tax disclosure when tax morale is high in a country, We expect a moderating effect of tax morale on the relationship between board characteristics and tax disclosures where positive relationships are strengthened when a country has high tax morale, and negative relationships are suppressed when a country has low tax morale.

H5a: The positive relationship between employee board representation and the level of voluntary tax disclosure is stronger in societies with high tax morale.

H5b: The positive relationship between board gender diversity and the level of voluntary tax disclosure is stronger in societies with high tax morale.

H5c: The positive relationship between the existence of a CSR Committee and the level of voluntary tax disclosure is stronger in societies with high tax morale.

3.3 Research Method

3.3.1 Sample Selection

We establish a balanced panel dataset of large, listed groups in Europe over the 2015-2021 period, applying several selection criteria to ensure that the final sample contains comparable observations. Table 3.1 illustrates the selection procedure. First, all companies must be the ultimate parent firm of their respective groups with a group revenue of over 750 million euros for each of the years, based on the country-by-country reporting (CbCR) guidelines of the OECD. By choosing this specific set of companies, we avoid that companies might argue that gathering the necessary information on certain tax disclosures is too costly since they need this information for their private tax disclosure requirements vis-à-vis tax authorities (Hanlon, 2018). This leaves us with 4,495 companies. Next, we only select listed companies from the EU or the UK to ensure that all companies have similar reporting

obligations in our period of study. We note that companies from the United Kingdom are no longer part of the EU since Brexit in 2020. We see two reasons why this should not be problematic. Firstly, the United Kingdom was part of the EU for the largest part of the sampling period. Therefore, the anticipation of public CbCR is also an item for these firms for the majority of the sampling period.

Secondly, all companies in our sample have at least one subsidiary in an EU country and thus will be obliged to publish CbCR information in compliance with the EU directive on public CbCR. This leads to 615 firms. Furthermore, companies from the financial industries (NACE codes 64-66) and extractive and forestry industries (NACE codes 02, 05-09) are excluded due to separate reporting standards on taxes and payments to governments, leaving 435 companies in the research sample so far.

Next, only companies in countries with at least 25 companies meeting the previous thresholds are selected to ensure large enough subgroups at the country level. Table 3.2 shows a breakdown of our sample by country and by GICS industry. These countries are Finland, France, Germany, the Netherlands, the United Kingdom and Sweden and represent 76% of the companies matching all the previous criteria. All six countries have different levels of employee representation in corporate boards both by law and voluntarily, and different regulations on board gender quotas. Next, only industries with at least 5 companies meeting all previous criteria are included in the sample. Furthermore, we delete companies who (de)merged over the period, as well as companies that became listed in 2015 to avoid confounding effects on our variables of interest. Companies with missing data are eliminated manually.[6] Lastly, after eliminating companies that are not listed over the entire seven-year period, we are left with a final research sample of 229 companies over seven years, and thus 1,603 firm-year observations. Table 3.1 presents a detailed overview of the sample selection process.

[6] The majority of missing values was due to missing data to calculate the three-year ETR for 2015, as selecting the companies based on listing only happened from 2015 on. Six companies did not post annual reports for one or more years in the examined period. Two companies had missing data on the number of analysts covering the firm. Sixteen companies had missing market values for 2015. Two companies had missing data from BoardEX. Two companies did not have information on family ownership.

Table 3.1 Sampling Procedure

Table 3.1. Sampling Procedure

Selection criteria	Number of companies left in the sample
Ultimate parent with 750M euro consolidated revenue for all sample years	4,495
Listed companies in the EU or UK	615
Exclusion of financial, extractive and forestry industries	435
France, Finland, Germany, Netherlands, UK, Sweden	331
At least 5 companies in the NACE industry	291
Manual check on (de)mergers	285
Manual check on listing in 2015	279
Manual check on firm location	271
Manual check on missing information	234
Manual check listing period over the entire sample period	229

Note: This table reports the sampling procedure.

We also note that, because we applied the above criteria, all companies in our sample have a large number of employees which causes them to be subject to their countries' regulations or recommendations on employee representation on the board the board, if such regulation or recommendation exists in the country.

Table 3.2 Sample Breakdown by Country and Industry

Table 3.2. Sample Breakdown by Country and Industry

Country	**N**	**Industry**	**N**
Germany	280	Industrials	616
Finland	140	Information technology	112
France	294	Communication services	98
The Netherlands	112	Materials	182
Sweden	217	Utilities	14
United Kingdom	560	Healthcare	105
		Consumer Staples	126
		Consumer Discretionary	336
		Energy	14
Total	1,603	Total	1,603

Note: This table reports the sample breakdown by country and industry

3.3.2 Board Structures in the Research Sample

Different board structures can be observed in the countries we examine in our research, namely a unitary board or a dual board structure consisting of a management board and a supervisory board. In Germany and the Netherlands, the dual-tier structure is traditionally the norm, as described in the respective countries' corporate governance codes (Bezemer, Zajac, Naumovska, van den Bosch, & Volberda, 2015; Joecks, Pull, & Scharfenkamp, 2023). In Germany, the dual-tier structure is compulsory, whereas in the Netherlands companies have the choice between a unitary board or a dual-tier board. In Finland, almost all publicly listed companies have a unitary board structure with a management director reporting to this board, although a dual structure is also allowed under a 'comply or explain' principle (Finnish Corporate Governance Code, 2020). In the United Kingdom and Sweden, a unitary board is legally required. In France, companies are free to choose between a unitary or a dual-tier board. However, contrary to the Netherlands, most French companies choose a unitary board structure. Taking these differences into account is key in our study. Prior empirical studies include different board structures in different ways in their research designs, ranging from controlling for dual-tier structures with a dummy variable (Li & Song, 2013; Vallelado & García-Olalla, 2022), calculating board-level variables with data from the supervisory board only in case of dual-tier structures (John, De Masi, & Paci, 2016; Li & Song, 2013) or acknowledging the existence of multiple board structures, but not including specific controls to account for possible differences (Bonini & Lagasio, 2021; Kuzman, Talavera, & Bellos, 2018). We follow John et al. (2016) and Li and Song (2013) by calculating board-level variables with data from the supervisory board only in the case of dual-tier structures.

3.3.2.1 Employee Board Representation in the Research Sample

Employee board representation varies considerably between the countries in our sample, as well as within countries. Below, we provide a summary of the main regulations and recommendations in each country in our sample concerning employee representation in corporate boards.

Germany is the most well-known example of employee representatives on corporate boards. The requirement for worker representatives on the board of a German firm varies depending on the firm's size and legal structure. Firms with fewer than 500 domestic workers are not obligated to include worker representation. Firms with over 500 domestic workers are subject to the Industrial Constitution Act of 1952 and the Third Part Act of 2004, necessitating the inclusion of workers in the boardroom. For firms surpassing this threshold, one-third of their supervisory board seats must be allocated to worker representatives. For companies with more than 2,000 employees, half of the supervisory board seats are assigned to employees. Companies from the iron, coal and steel industry

must already assign half of the board seats to employees when they have more than 1,000 employees. We note that German firms rarely face sanctions when they do not abide by co-determination laws, however (Chyz, Eulerich, Fligge, & Romney, 2023). In our sample, all German companies have more than 2,000 employees and thus half of the supervisory board members must be employee representatives according to the law.

In France, companies with more than 1,000 employees in France or 5,000 employees worldwide are subject to the Bill on Social Dialogue and Employment of 17 August 2015. This means that they must include one employee representative on the board if the board size is below 12, and two if above. In 2019, the threshold of 12 members was lowered to 8, so companies with a board of 8 or more members must already designate two seats to employee representatives (Belot & Waxin, 2022). All French companies in our sample have to comply with this regulation.

In Finland, companies with at least 150 employees are entitled to employee representation in management decisions according to the Act on Personnel Representation in the Firm Administration (725/1990). However, the specific form is left to the discretion of each firm. The firm can choose whether these employees are represented on the board of directors, in a specially set-up additional board, or at the management level for the firm's operating units. Employees are entitled to a minimum of one seat and a maximum of four seats on this representation body, with a maximum of one-fourth of available seats designated to employees (Videbæk Munkholm, 2018). We note that Finland passed the Co-operation Act in 2021 which stipulates that companies must agree on some form of worker participation. If no form is agreed, employee representation defaults to one-fifth of board members. The majority of Finish companies in our sample have this special additional board, and only very few companies choose to include employee representatives in the board of directors itself.

In the Netherlands, companies with more than 50 employees must establish a works council (Dutch Works Council Act). In companies with more than 16 million euros issued capital and over 100 employees, the works council has the right to appoint up to one-third of the members of the supervisory board (Dutch Civil Code, Book 2, article 158). These appointed directors cannot be employees or trade union members themselves, which makes this form of employee representation indirect. This form of indirect employee representation applies to all Dutch companies in our sample.

In Sweden, the Board Representation Act of 1987 stipulates that in companies with more than 25 employees, at least two employee representatives must be on the board. For companies with more than 1,000 employees, this number increases to three. Employees can hold up to 50% of the board seats. All Swedish companies in our sample have at least 1,000 employees.

In the United Kingdom, no form of worker representation in corporate boards exists by law. The revised version of the UK Corporate Governance Code from 2018 addresses this topic shortly and leaves open the option to appoint an employee director, designate a non-executive director as responsible for workforce interests, or set up a workforce advisory committee. This recommendation follows a comply-or-explain principle. In our sample, only one UK firm chooses to voluntarily include employee representatives on the board.

In our study, employee representation must be direct, meaning that employees themselves must be present on the board. In our sample, we observe no employees on the board in the Netherlands and Finland. In the UK, only one firm in our sample has employees on its board, while all other instances of employee representation are found in France, Germany, and Sweden.

3.3.2.2 Gender Quota in the Research Sample

Similar to employee board representation, gender quota regulations vary considerably between the countries in our sample. Only France and Germany have set up strict quotas in which respectively 40% and 30% of the board members must be female from 2016 onwards for the largest companies[7] (European Parliament, 2021b). In the Netherlands, a quorum of 30% was proposed in 2013 up until 2020, but under a comply-or-explain principle. In addition, no sanctions were imposed when a firm did not follow this quorum. All other countries in our research sample have no hard quota but do have recommendations and best practices to stimulate female representation on corporate boards (European Parliament, 2021b). By 30 June 2026, all member states must ensure that, in listed companies members of the underrepresented sex hold at least 40 % of non-executive director positions, and members of the underrepresented sex hold at least 33 % of all director positions, including both executive and non-executive directors (European Parliament, 2022). Even though many of these quotas and recommendations have been installed before our sampling period, it is necessary to be aware of them to avoid interpreting potentially spurious correlations as evidence for our hypotheses.

3.3.3 Data Collection

We hand-collect the tax-related disclosures to calculate a disclosure score for each firm every year, leading up to 1,603 firm-year observations for the data collection. We perform content analysis on

[7] These quota apply to the supervisory board in the dual-tier system, and to the non-executive positions in the unitary system. For Germany, DAX-registered companies were subjected to this quotum. For France, companies in the CAC40 were subjected to this quotum.

financial statements, firm management reports and sustainability reports[8]. Suppose a firm provides an online appendix concerning tax information. In that case, it will only be considered in the scoring procedure if it pertains to a specific year and is referenced in the firm's management report, financial statements, or sustainability report. All items are assigned equal weights analogously to earlier research to avoid subjectivity (e.g. Kao & Liao, 2021; Mallin et al., 2014; Platonova et al., 2018).

To address the large number of disclosures, we conducted a broad keyword search across all documents using the term 'tax*'. Following this, specific keywords (outlined in Appendix 3.1) assigned to individual items were searched to decrease the chance of missing items. Paragraphs containing these keywords were then scrutinized to ensure the relevant items were disclosed. Furthermore, certain sections of the annual report were always examined completely. These sections are the notes on income taxes and segment reporting for geographical disclosures in the IFRS financial statements, along with the 'Group overview' section commonly found in many annual reports. A detailed overview of the keywords and sections used during the scoring process can be found in Appendix 3.1. It is important to note that the mandatory 'Tax Strategy' required for large UK companies under the UK's Finance Act 2016 is not considered unless it is integrated into one of the previously mentioned documents, as it cannot be separated from those documents in that case. Furthermore, we note that all EU companies in the sample have a UK affiliate obliged to publish a tax strategy. Nonetheless, these strategies are solely at the UK affiliate level and may not necessarily reflect the perspective of the entire group. The majority of the documents were coded by one researcher, with three other researchers coding a smaller portion of the population. To check inter-rater consistency, we calculate Krippendorff's alpha on 10% of our observations (Krippendorff, 1980). Values of 80% and above are acceptable (Krippendorff, 1980; Neuendorf, 2002). Krippendorff's alpha is 92,9% and is considered satisfactory.

A common problem in the voluntary disclosure literature is distinguishing between the non-disclosure of an item because a firm intends to withhold the information and the non-disclosure because the information isn't deemed relevant to the firm (Patelli & Prencipe, 2007). We believe this issue might have a limited impact on our study. Firstly, all companies included in our study have at least one foreign subsidiary, thereby engaging in activities across multiple countries, making country-by-country disclosures relevant for each firm. Secondly, the disclosures in our index are not based on specific

[8] We decide to examine annual reports consisting of financial statements and management reports, and sustainability reports to provide a comprehensive view of the overall level of voluntary tax disclosure.

industry standards but rather on general frameworks applicable across all industries. Given that tax is a universal concern for all listed multinational companies, we expect the number of items not disclosed due to irrelevance to be minimal.

Prior literature stresses the importance of distinguishing between mandatory and voluntary disclosures as each has different underlying incentives (Einhorn, 2005; Elshandidy & Neri, 2015; La Rosa, Caserio, & Bernini, 2019). Three elements of the tax disclosure index used in this study need to be reported mandatorily since they are required by IAS 12. These requirements did not change over the sample period, and all companies always disclosed the mandatory information under IAS 12. The only exception is 'income taxes paid'. One percent of companies disclosed this item together with interests paid without differentiating between how much of the disclosed amount is interest or tax, for a total of 18 firm years. These companies did not receive a point for this item in those years. With this minor factor aside, our results are driven by the voluntary component of the tax disclosure index.

3.3.4 Measurement of the Variables

3.3.4.1 Dependent Variable

In past studies, tax disclosures have been measured in the following different ways. One strand of literature examines geographical disclosures on tax matters (Akamah et al., 2018; Dyreng et al., 2020; Hope et al., 2013; Joshi et al., 2020). A second strand of literature examines disclosures relating to uncertain tax positions (Gupta et al., 2014; Henry et al., 2016; Robinson & Schmidt, 2013). A third strand focuses on the disclosures mandated by IAS 12 (Kvaal & Nobes, 2013). A fourth strand of literature focuses on disclosures stemming from country-specific disclosure frameworks like the UK Finance Act 2016 and the Australian Voluntary Tax Transparency Code[9] (Bilicka et al., 2021; Kays, 2022). Finally, one study so far also examines the level of tax disclosure in a comprehensive way (Hardeck & Kirn, 2016), however, GRI 207 and CbCR were not yet included.

For this study, we design a tax disclosure index to capture the overall level of voluntary tax disclosure based on a combination of the measurements used in these prior studies. First, we start by including all necessary items from the GRI 207 Tax guidelines. Academics agree that the GRI guidelines are a good option available for sustainability reporting (Clarkson et al., 2008; Hardeck & Kirn, 2016; Lozano

[9] Six items are suggested to be disclosed: (1) a reconciliation of income before tax to income tax expense that details temporary and permanent differences, (2) a reconciliation of income tax expense to income taxes paid, (3) a summary of corporate taxes paid, (4) a discussion of a firms' tax policy, governance and tax risk management, (5) material transactions with offshore related parties and (6) Australian specific and global effective tax rates (Kays, 2022).

& Huisingh, 2011). We include 27 items based on GRI 207 and an additional 2 items included in GRI G4-S08. The items from GRI 207 are also included in CbCR. No items stem uniquely from CbCR since the GRI 207 standard contains a copy of the requirements for CbCR disclosures. We also note that all requirements from the UK Finance Act 2016 are also included in the GRI guidelines[10]. Next, we remove 2 items from the GRI 207 guidelines, as they need to be mandatorily reported under IAS 7 and IFRIC 23 and we focus on voluntary disclosures. These items are cash taxes paid, and significant uncertain tax positions. In addition, we add all items stemming from the Australian Voluntary Tax Transparency Code (Kays, 2022). One additional item that provides geographical information on an item from Kays (2022) is also added. Furthermore, we add four items from Hardeck and Kirn (2016) that are not yet included in the index based on the previously described tax disclosure frameworks. We also include whether a firm provides extra guidance with the mandatorily reported effective tax rate reconciliation, as such guidance is a voluntary reporting practice and this reconciliation can be complex and difficult to understand for both firm insiders and outsiders (Olson & Ordyna, 2023). As such, the tax disclosure index measures how many of the items mentioned above organizations report on. A higher level of voluntary tax disclosure means that an organization reports more items, resulting in a higher score on the tax disclosure index.

3.3.4.2 Independent Variables

To test hypothesis H1, we define employee board representation *(EMPRATIO)* as the number of employee representatives on a unitary or supervisory board divided by the total number of directors. We also use an alternative specification where we use a binary indicator indicating whether an employee representative is present on the board *(BINARY_EMP)*. Gender diversity on the board is defined as the Blau index calculated based on the percentage of men and women on the board *(GDIVERSITY).* The Blau index measures diversity, and its maximum value of 0.500 signals an equal number of men and women on the board. We also use the percentage of women on the board as a robustness check *(PCTWOMEN).* Finally, to test hypothesis H3, the presence of a CSR committee *(CSR COMMITTEE)* is a binary indicator, with a value of 1 when a CSR committee or a similar committee is present in the firm, and 0 in all other situations. We note that the amount of employees on CSR Committees is too low to perform meaningful statistical inferences and that over 90% of the firms with a CSR Committee in our sample have at least one woman on this committee. All data on board variables is collected from BoardEX.

[10] In a robustness analysis, we exclude items from the UK Finance Act 2016, as they are mandatory for UK firms in our sample and therefore do not qualify as voluntary tax disclosures across all countries.

To test hypothesis H4, we use the strength of a country's tax enforcement (*ENFORCEMENT*) as a moderator. We use tax enforcement from the World Competitiveness Report, similar to Atwood, Drake, Myers, and Myers (2012). Specifically, we code ENFORCEMENT as '1' if the score on the question 'Tax evasion is not a threat to your economy' is above the sample median, and '0' in the other case.[11] To test hypothesis H5, we use a country's tax morale (*MORALE*) as a moderator. We use tax morale from the World Value Survey, with a value of 1 when the proportion of people believing it is justifiable to cheat on taxes is above the world median, and 0 otherwise following (Kemme et al., 2020).

3.3.4.3 Control Variables

We employ several firm-specific control variables that are expected to impact the level of voluntary tax disclosure based on previous literature (Akamah et al., 2018; Ayers et al., 2015; Balakrishnan et al., 2019; Boone & White, 2015; Hardeck & Kirn, 2016; Khan et al., 2017). Firstly, we include the size of the board of directors *(BSIZE)*. The idea is that the decision-making process in larger boards is supported by broader knowledge and diverse viewpoints which might enhance directors' monitoring abilities (Husted & Sousa-Filho, 2019; Post et al., 2011). However, larger boards can also be characterized by inefficiency in making decisions and controlling management (Jensen, 1993; Yermack, 1996). Furthermore, we control for board independence (*BINDEP*) as this board characteristic is traditionally linked with greater voluntary disclosure. (Core, Holthausen, & Larcker, 1999; Eng & Mak, 2003; Haniffa & Cooke, 2005; Rosenstein & Wyatt, 1990). We rely on BoardEx's definition of independent directors: A director is considered independent if they have no affiliation with the firm and are not employed by the firm.[12] We also control for CEO duality *(DUALITY)* where the chair also holds the CEO position and usually has considerable power and discretion in setting the agenda (Jensen, 1993; Jizi, Salama, Dixon, & Stratling, 2014). Firm size *(SIZE)* is expected to be positively correlated with voluntary tax disclosures and is measured as the natural logarithm of total assets. Furthermore, we control for the level of tax avoidance of the firm *(ETR)*. As Hanlon and Heitzman (2010) discussed extensively, several measures for tax avoidance exist, all with their strengths and disadvantages. We calculate the (inverse) level of tax avoidance as a firm's three-year effective tax rate as the accumulated tax expenses over three years, divided by the accumulated pre-tax income over three years using the companies' financial statements published in compliance with

[11] We choose the sample median for this variable as all our countries score above the world median, and thus are all perceived as strong countries with strong tax enforcement.

[12] According to the BoardEx, affiliated directors are former employees of the firm, providers of professional services to the firm, the firm's customers or suppliers or family members of current employees of the firm

the IFRS standards. We censor this variable between 0 and 1 (e.g. Dyreng et al., 2019). A multi-year-based measure allows us to better track the effective tax cost over a longer period, as sudden increases or decreases in the effective tax rates unrelated to the overall tax avoidance levels are 'smoothed out' (Dyreng et al., 2008). We correct for the three-year average statutory tax rate in a country.

We include a firm's leverage *(LEVERAGE)*, measured as the total long-term debt to total assets ratio. The market-to-book ratio *(MTB)* is calculated as the market value of total assets divided by the book value of total assets and a firm's return on assets *(ROA)* which is calculated as profit or loss before interest and tax divided by total assets. We also control for the percentage of family ownership within the firm *(FOWN)*, as families often influence their respective firm's disclosure practices (Vural, 2018). Furthermore, we control for cross-listing and analyst following to control for a firm's information environment (Lang et al., 2003). We also control for a firm's geographical complexity *(GEOGR COMPL)* by calculating the Herfindahl-Hirsch index based on the geographical spread of a firm's subsidiaries (Chkir et al., 2020) and whether a firm has a subsidiary in a tax haven *(HAVEN)*. We include a firm's cross-listing on a US stock exchange *(US CROSSLIST)* to control for a firm's information environment (Lang et al., 2003), together with a firm's analyst following *(ANALYST)* (Balakrishnan et al., 2019; Boone & White, 2015).

Finally, we add country, year and industry fixed effects. Industry effects are based on the Global Industry Classification Standard *(GICS).* GICS is regarded as a better proxy for industries than for example the classic Fama-French 12 industry approach (Bhojraj et al., 2003; Hrazdil & Zhang, 2012). To estimate the moderating relationships, we run regressions where we replace the country-fixed effects with country characteristics that are linked with general firm disclosure, being the Rule of Law *(ROL)* and the anti-self-dealing index *(ASDI)* (e.g. Daske et al., 2008; Djankov, La Porta, Lopez-de-Silanes, & Shleifer, 2008; Garcia-Meca & Sanchez-Ballesta, 2010; Garcia-Sanchez et al., 2016). We also run firm-fixed effects regressions.

All control variables are collected from BvD's Orbis Global, except analyst following which is retrieved from I/B/E/S, ROL which is retrieved from the World Bank Indicators, and ASDI which is retrieved from Djankov et al. (2008). All variables are summarized in APPENDIX III.

3.3.5 Method of Analysis

Given that the index is count data, we use a Poisson regression. Specifically, we estimate the direct relationships between our variables of interest and the tax disclosure index with the following equation:

$$TaxDisc_{i,t} = \beta_0 + \beta_1 EMPRATIO_{i,t} + \beta_2 GDIVERSITY_{i,t} + \beta_3 CSR\ COMMITTEE_{i,t} + \sum_{r=4}^{13} \beta_r controls_{i,t} + Country\ effects_i + Industry\ effects_i + Year\ effects_t + \varepsilon_{i,t} \quad (1)$$

All variables are winsorized at the 5% and 95% levels. Standard errors are clustered at the firm level to account for intra-group correlation and heteroscedasticity. As a robustness check, we also estimate the above equations with OLS.

A challenge in disentangling causal effects in empirical research is the effect of unobservable confounders. In this case, it is plausible that a firm's (stakeholder-oriented or gender diversity-oriented) culture influences both the number of employee representatives on the board, gender diversity on the board and the level of TAXDISC simultaneously. Our estimations could thus suffer from omitted variable bias. We observe that EMPRATIO varies considerably over time within a single firm, with 293/1386 possible changes observed in our sample period. Gender diversity changes 1068/1368 times throughout the sample. Therefore, a firm fixed effects approach is also appropriate and allows us to eliminate time-constant confounders (Model 2). We believe it is reasonable to assume that firm culture is relatively stable over the short amount of time that our panel spans. In addition, because of the way we encoded CSR COMMITTEE, the estimator is equivalent to a staggered difference-in-difference design where the treatment is whether or not a firm has a CSR COMMITTEE. Three observations abolished their CSR Committee in the sample period, becoming 'untreated' again. We delete these observations from this estimation. Thus, we also estimate the direct relationships between our variables of interest and the tax disclosure index using the models specified below.

$$TaxDisc_{i,t} = \beta_0 + \beta_1 EMPRATIO_{i,t} + \beta_2 GDIVERSITY_{i,t} + \beta_3 CSR\ COMMITTEE_{i,t} + \sum_{r=4}^{10} \beta_r controls_{i,t} + firm\ fixed\ effects + Year\ effects_t + \varepsilon_{i,t} \quad (2)$$

Note: $CSR\ Committee = Treatment * Year\ effect$

The use of country-fixed effects in Model 1, and firm-fixed effects in Model 2 do not allow us to study the moderating influences of MORALE and ENFORCEMENT. Therefore, we replace these fixed effects with MORALE, ENFORCEMENT, ASDI and ROL in Model 3, Model 4 and Model 5. Model 3 contains the interaction of our variables of interest with ENFORCEMENT, Model 4 contains the interaction of our

variables of interest with MORALE, and Model 5 contains the interaction of our variables of interest with MORALE and ENFORCEMENT.

$$\begin{aligned} TaxDisc_{i,t} = {} & \beta_0 + \beta_1 EMPRATIO_{i,t} + \beta_2 GDIVERSITY_{i,t} + \beta_3 CSR\ COMMITTEE_{i,t} \\ & + \beta_4 Tax\ Morale + \beta_5 Tax\ Enforcement \\ & + \beta_{6-8} Interaction\ effects\ ENFORCEMENT + \sum_{r=9}^{20} \beta_r controls_{i,t} \\ & + Industry\ effects + Year\ effects_t + \varepsilon_{i,t} \end{aligned} \quad (3)$$

$$\begin{aligned} TaxDisc_{i,t} = {} & \beta_0 + \beta_1 EMPRATIO_{i,t} + \beta_2 GDIVERSITY_{i,t} + \beta_3 CSR\ COMMITTEE_{i,t} \\ & + \beta_4 Tax\ Morale + \beta_5 Tax\ Enforecement \\ & + \beta_{6-8} Interaction\ effects\ MORALE + \sum_{r=9}^{20} \beta_r controls_{i,t} \\ & + Industry\ effects + Year\ effects_t + \varepsilon_{i,t} \end{aligned} \quad (4)$$

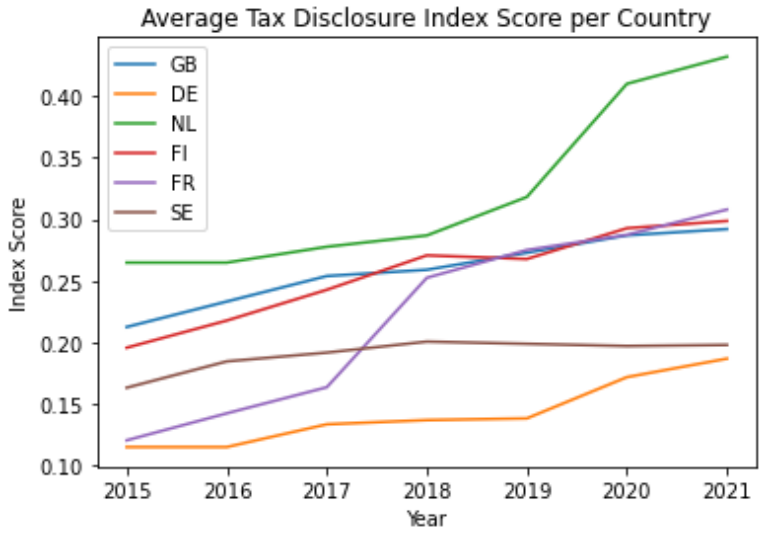
$$\begin{aligned} TaxDisc_{i,t} = {} & \beta_0 + \beta_1 EMPRATIO_{i,t} + \beta_2 GDIVERSITY_{i,t} + \beta_3 CSR\ COMMITTEE_{i,t} \\ & + \beta_4 Tax\ Morale + \beta_5 Tax\ Enforecement + \beta_{6-11} Interaction\ effects \\ & + \sum_{r=12}^{23} \beta_r controls_{i,t} + Industry\ effects + Year\ effects_t + \varepsilon_{i,t} \end{aligned} \quad (5)$$

3.4 Results

3.4.1 Descriptives

Table 3.3 provides descriptive statistics on both the tax disclosure index and the variables of interest. Companies score on average 20.76% on the tax disclosure index, which is a score of 9-10 out of 34 in absolute numbers. Even though this is still rather low, an increase in the tax disclosure index is noticeable from 15.86% in 2015 to 25.30% in 2021, which continues the trend observed by Hardeck and Kirn (2016).

Figure 3.1 Average Tax Disclosure Index Score per Country



We plot the average disclosure score per country throughout the years in Figure 3.1. We see that companies from the Netherlands tend to score the highest on average, whereas companies from Germany score the lowest on average. No single firm achieves the maximum tax disclosure index score, disclosing all items present in the index. Pairwise correlations are reported in Table 3.4. All variance inflation factors are well below 10, suggesting that multicollinearity is not an issue.

Table 3.3 Descriptive Statistics

Table 3.3. Descriptive Statistics

Variable	N	Mean	Std	Min	Q1	Median	Q3	Max
TAXDISC (max 34)	1,638	7.059	4.218	0	4	6	9	23
EMPRATIO	1,624	0.115	0.168	0.000	0.000	0.000	0.200	0.577
BINARY_EMP	1,638	1.786	2.848	0.000	0.000	0.000	3.000	15.000
GDIVERSITY	1,596	0.399	0.094	0.000	0.346	0.420	0.469	0.500
PCTWOMEN	1,617	0.304	0.111	0.000	0.222	0.300	0.375	0.667
CSR COMMITTEE	1,624	0.185	0.389	0.000	0.000	0.000	0.000	1.000
MORALE	1,638	0.333	0.472	0.000	0.000	0.000	1.000	1.000
ENFORCEMENT	1,638	0.396	0.489	0.000	0.000	0.000	1.000	1.000
BSIZE	1,624	12.472	3.853	6.000	10.000	12.000	14.000	29.000
BINDEP	1,617	0.633	0.217	0.000	0.500	0.636	0.778	1.000
DUALITY	1,638	0.262	0.440	0.000	0.000	0.000	1.000	1.000
FOWN	1,624	0.033	0.107	0.000	0.000	0.000	0.000	0.655
GEOGR COMPL	1,638	0.683	0.269	0.000	0.598	0.788	0.876	0.971
ETR	1,638	0.001	0.163	-0.333	-0.069	-0.004	0.048	0.810
SIZE	1,638	22.353	1.424	19.174	21.267	22.177	23.197	26.435
ROA	1,638	0.073	0.066	-0.373	0.042	0.069	0.101	0.543
LEV	1,638	0.680	0.914	0.000	0.251	0.461	0.805	13.785
MTB	1,638	1.070	0.866	0.034	0.498	0.820	1.380	8.940
ANALYST	1,638	2.597	0.617	0.000	2.197	2.773	3.091	3.664
HAVEN	1,638	0.863	0.344	0.000	1.000	1.000	1.000	1.000
US CROSSLIST	1,638	0.376	0.485	0.000	0.000	0.000	1.000	1.000

Note: This table reports basic descriptive statistics for the variables employed in the main empirical analysis. See Appendix 3.2 for variable definitions. Our sample period spans 2015-2021. For 23 firm-year observations, data on exact share ownership is missing. 1,587 observations have complete data.

Table 3.4 Pearson Correlation Coefficients

Table 3.4. Pearson Correlation Coefficients

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) TAXDISC	1.000									
(2) EMPRATIO	-0.253*	1.000								
(3) BINARY_EMP	-0.159*	0.828*	1.000							
(4) GDIVERSITY	0.082*	0.125*	0.261*	1.000						
(5) PCTWOMEN	0.079*	0.085*	0.243*	0.955*	1.000					
(6) CSR COMMITTEE	0.264*	-0.118*	0.063*	0.183*	0.202*	1.000				
(7) BSIZE	-0.071*	0.501*	0.590*	0.225*	0.168*	0.259*	1.000			
(8) BINDEP	0.219*	-0.419*	-0.440*	-0.023	-0.041	0.026	-0.323*	1.000		
(9) DUALITY	0.022	0.312*	0.337*	0.114*	0.118*	0.177*	0.135*	-0.062*	1.000	
(10) FOWN	-0.163*	0.045	0.062*	-0.031	-0.021	-0.015	-0.066*	-0.167*	0.074*	1.000
(11) GEOGR COMPL	0.118*	0.211*	0.218*	0.102*	0.083*	0.061*	0.254*	0.113*	0.163*	0.059*
(12) ETR	-0.025	-0.099*	-0.110*	-0.050*	-0.053*	-0.032	-0.105*	0.000	-0.186*	0.005
(13) SIZE	0.211*	0.229*	0.296*	0.193*	0.152*	0.389*	0.592*	0.075*	0.205*	-0.155*
(14) ROA	0.032	-0.148*	-0.151*	-0.039	-0.029	-0.087*	-0.156*	0.007	-0.134*	0.017
(15) LEV	-0.029	0.004	-0.018	0.051*	0.038	0.124*	0.156*	0.019	0.027	-0.038
(16) MTB	0.020	-0.202*	-0.205*	-0.007	-0.004	-0.079*	-0.161*	0.083*	-0.104*	0.043
(17) ANALYST	0.097*	0.203*	0.207*	0.124*	0.077*	0.232*	0.464*	0.082*	0.201*	-0.150*
(18) HAVEN	-0.019	0.041	0.062*	0.033	0.030	0.127*	0.175*	0.084*	0.068*	-0.043
(19) US CROSSLIST	0.041	0.123*	0.066*	0.011	-0.025	0.161*	0.341*	0.128*	0.107*	-0.127*

Table 3.4: Continued

Variables	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(11) GEOGR COMPL	1.000								
(12) ETR	0.007	1.000							
(13) SIZE	0.231*	-0.105*	1.000						
(14) ROA	-0.015	0.128*	-0.176*	1.000					
(15) LEV	-0.027	0.003	0.217*	-0.231*	1.000				
(16) MTB	0.098*	0.039	-0.200*	0.612*	-0.170*	1.000			
(17) ANALYST	0.230*	-0.090*	0.724*	0.031	0.130*	0.117*	1.000		
(18) HAVEN	0.509*	0.059*	0.276*	0.027	0.024	0.010	0.239*	1.000	
(19) US CROSSLIST	0.268*	-0.030	0.526*	-0.033	0.046	0.113*	0.483*	0.155*	1.000

Note: This table reports pairwise correlation coefficients. Significances are indicated by **** p<0.01, ** p<0.05 and * p<0.1 respectively*.

3.4.2 Results on Employee Board Representation

First, we present the results of Model 1 in Table 3.5. We observe that EMPRATIO is positively associated with TAXDISC at the 1% statistical significance level, confirming hypothesis H1. In terms of economic magnitude, a 1% increase in EMPRATIO is associated with an increase by factor $e^{0.01041} = 1.010$ in TAXDISC according to the Poisson estimation, and an increase of 0.160% in TAXDISC according to the OLS estimation. To better understand the effect size, we calculate the difference between the first quartile (Q1) and the third quartile (Q3) of our results. The interquartile range is a difference of 3.200% in TAXDISC. These results are similar for the relationship between BINARY_EMP and TAXDISC (see Appendix 3.3). To take time-constant unobserved factors into account, we present the results of the firm fixed effects approach from Model 2 in Table 3.6. We see that EMPRATIO is positively statistically significantly related to TAXDISC at the 5% level, which again confirms hypothesis H1. An increase of 1% in EMPRATIO is associated with an increase of 0.162% in TAXDISC. The interquartile range is a difference of 3.240% in TAXDISC. Again, these results are similar for the relationship between BINARY_EMP and TAXDISC (see Appendix 3.3).

Table 3.5 Regression Results Model 1 (Industry and Country Fixed Effects)

Table 3.5. Regression Results Model 1 (Industry and Country Fixed Effects)				
	OLS		Poisson	
Variable	Coef.	t-value	Coef.	z-value
EMPRATIO	0.160***	3.32	1.041***	3.53
	(0.048)		(0.295)	
GDIVERSITY	-0.057	-0.91	-0.377	-1.30
	(0.062)		(0.290)	
CSR COMMITTEE	0.032**	2.15	0.127**	2.06
	(0.015)		(0.061)	
BSIZE	-0.038	-1.62	-0.183	-1.51
	(0.023)		(0.121)	
BINDEP	0.015	0.59	0.137	0.98
	(0.025)		(0.139)	
DUALITY	0.036***	2.77	0.196***	2.77
	(0.013)		(0.071)	
FOWN	-0.074	-1.61	-0.547*	-1.90
	(0.046)		(0.288)	
GEOGR COMPL	-0.021	-0.70	-0.115	-0.85
	(0.030)		(0.136)	
ETR	-0.041	-1.19	-0.207	-1.21
	(0.035)		(0.170)	
SIZE	0.026***	3.47	0.123***	3.58
	(0.008)		(0.034)	
ROA	0.198	1.76	0.916*	1.72
	(0.112)		(0.534)	
LEV	-0.019*	-1.95	-0.083*	-1.74
	(0.010)		(0.048)	
MTB	-0.001	-0.12	0.006	0.15
	(0.009)		(0.043)	
ANALYST	-0.002	-0.14	0.000	0.00
	(0.017)		(0.076)	
HAVEN	-0.012	-0.66	-0.027	-0.31
	(0.018)		(0.086)	
US CROSSLIST	-0.023	-1.67	-0.116*	-1.72
	(0.014)		(0.068)	
FIXED EFFECTS				
Country FE	YES		YES	
Industry FE	YES		YES	
Year FE	YES		YES	
Constant	-0.431***	-3.12	-1.350	-2.18
	(0.138)		(0.620)	
R^2 adjusted	0.363		0.144	
N	1,603		1,603	

Note: This table reports results (OLS and Poisson). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Table 3.6 Regression Results Model 2 (Firm Fixed Effects)

Table 3.6. Regression Results Model 2 (Firm Fixed Effects)		
	OLS	
Variable	Coef.	t-value
EMPRATIO	0.162**	2.17
	(0.075)	
GDIVERSITY	-0.041	-1.04
	(0.039)	
CSR COMMITTEE	0.029*	1.84
	(0.016)	
BSIZE	-0.037**	-2.06
	(0.018)	
BINDEP	-0.023	-0.82
	(0.028)	
DUALITY	-0.006	-0.38
	(0.015)	
FOWN	0.022	0.34
	(0.064)	
ETR	-0.035	-1.43
	(0.024)	
SIZE	0.013	0.91
	(0.015)	
ROA	-0.042	-0.66
	(0.064)	
LEV	0.004	0.49
	(0.008)	
MTB	0.010	1.31
	(0.008)	
ANALYST	0.046***	3.04
	(0.015)	
FIXED EFFECTS		
Year FE	YES	
Firm FE	YES	
R^2 adjusted	0.293	
N	1,582	

Note: This table reports results (OLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

3.4.3 Results on Board Gender Diversity

We find no statistically significant evidence for a relationship between GDIVERSITY and TAXDISC for the Poisson and OLS estimations (see Model 1 in Table 3.5). These results are similar for the relationship between PCTWOMEN and TAXDISC (see Appendix 3.4). In addition, we also find no evidence of a relationship between GDIVERSITY and TAXDISC after controlling for firm fixed effects

(see Model 2 in Table 3.6). This result does not change when we take PCTWOMEN as a measure of gender diversity (see Appendix 3.4), leaving us unable to confirm or reject hypothesis H2.

3.4.4 Results of the Presence of a CSR Committee

In Model 1 (see Table 3.5), we observe that CSR COMMITTEE is positively associated with TAXDISC at the 5% statistical significance level, confirming hypothesis H3. In terms of economic magnitude, the existence of a CSR COMMITTEE is associated with an increase in the TAXDISC score by a factor $e^{0.127} = 1.135$ according to the Poisson estimation, and an increase of 3.191% on the TAXDISC score according to the OLS estimation from Model 1.

In the firm fixed approach in Model 2, we also find that CSR COMMITTEE is statistically significantly positively related to TAXDISC at the 10% statistical significance level. The existence of a CSR Committee is associated with a 2.906% increase in TAXDISC, confirming hypothesis H3. Since Model 2 is equivalent to a difference-in-difference design where CSR COMMITTEE is the treatment, we examine whether the parallel trends assumption could be violated. We re-estimate Model 2 by including separate interaction variables between firms that have or will have a CSR COMMITTEE in our sample with our year indicators, analogously to Joshi (2020). The joint significance of these terms would suggest that firms who have or will have a CSR COMMITTEE are inherently different from those who do not have a CSR COMMITTEE, pointing to a violation of the parallel trends assumption. We present the interaction terms between the treatment firms and the year-fixed effects in Table 3.7. We see that the interaction terms are jointly insignificant, suggesting that the parallel trends assumption is met.

The statistical significance of control variables between Model 1 and Model 2 differs due to the different types of fixed effects included in the respective models. Whereas panel data techniques such as firm-fixed effects can solve some endogeneity issues, these solutions are often costly as they are paired with variance reduction (Roberts & Whited, 2013). For example, SIZE is significant in Model 1 since firm size differences between the firms in our sample are still quite large, but insignificant in Model 2 as the within variation in SIZE in these very large corporations is rather limited over seven years. It is unclear whether this relationship is the true result of taking unobserved heterogeneity into account, a violation of the strict exogeneity assumption that is necessary for a firm-fixed effects approach, or the result of reducing the variance too strongly, leading to inconsistent results.

Table 3.7 Interaction Coefficients between Firms where CSR COMMITTEE=1 Sometime in the Sample Period and Year Fixed Effects

Table 3.7. Interaction Coefficients between Firms where CSR COMMITTEE=1 Sometime in the Sample Period and Year Fixed Effects

Variable	Coef.	t-value
Treatment * Year2016	-0.000	0.02
	(0.007)	
Treatment * Year2017	-0.012	-1.29
	(0.010)	
Treatment * Year2018	0.017	1.21
	(0.014)	
Treatment * Year2019	0.014	0.89
	(0.016)	
Treatment * Year2020	0.023	1.43
	(0.016)	
Treatment * Year2021	0.016	0.93
	(0.017)	
		Test of joint-significance
	F(6; 225)	1.79
		Prob>F=0.102

Note: This table reports the results (OLS) of interaction coefficients between a variable indicating all firms that are or will be treated in the sample period and year fixed effects. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

3.4.5 Results on the Moderating Role of Institutions

We present the results of the moderating role of formal and informal institutions in Table 3.8. To interpret the results of the interactions, we follow the recommendations of Ai and Norton (2003) and Brambor, Clark, and Golder (2006) by also presenting the marginal effects of EMPRATIO, GDIVERSITY and CSR COMMITTEE in Table 3.9.

In Model 3, we observe a positive, statistically significant coefficient of the interaction between EMPRATIO and ENFORCEMENT at the 10% level. We do not observe a statistically significant interaction coefficient between GDIVERSITY and ENFORCEMENT. Furthermore, we observe a negative statistically significant interaction coefficient between CSR COMMITTEE and ENFORCEMENT at the 10% level. Interpreting the marginal effects in Table 3.9, we see that EMPRATIO is statistically significantly positively associated with TAXDISC in societies with strict ENFORCEMENT at the 1% level. We do not observe any statistically significant marginal effects of GDIVERSITY. Finally, in societies with weak ENFORCEMENT, a CSR COMMITTEE is statistically significantly positively associated with a higher level of TAXDISC at the 5% level.

Table 3.8 Regression Results of Interaction Models with Institutional Characteristics as Moderators

Table 3.8. Regression Results of Interaction Models with Institutional Characteristics as Moderators						
	Model 3		Model 4		Model 5	
	OLS	t-stat	OLS	t-stat	OLS	t-stat
Variable	Coef.		Coef.		Coef.	t-value
ENFORCEMENT	0.012	0.47	0.008	1.12	0.008	0.37
	(0.025)		(0.007)		(0.023)	
MORALE	0.126***	6.88	0.132**	2.26	0.141**	2.46
	(0.018)		(0.058)		(0.057)	
EMPRATIO	0.084	1.61	0.100**	2.09	0.085	1.63
	(0.052)		(0.048)		(0.052)	
EMPRATIO* ENFORCEMENT	0.063*	1.74			0.064*	1.76
	(0.036)				(0.036)	
EMPRATIO*MORALE			0.060	0.50	0.040	0.33
			(0.121)		(0.123)	
GDIVERSITY	-0.027	-0.38	-0.036	-0.55	-0.033	-0.45
	(0.069)		(0.066)		(0.073)	
GDIVERSITY* ENFORCEMENT	-0.021	-0.31			-0.013	-0.19
	(0.068)				(0.065)	
GDIVERSITY* MORALE			0.003	0.02	-0.008	-0.06
			(0.139)		(0.138)	
CSR COMMITTEE	0.038**	2.50	0.052**	2.35	0.066***	2.81
	(0.015)		(0.022)		(0.024)	
CSR COMMITTEE* ENFORCEMENT	-0.030*	-1.68			-0.041**	-2.51
	(0.018)				(0.016)	
CSR COMMITTEE* MORALE			-0.048*	-1.65	-0.055*	-1.89
			(0.029)		(0.029)	
BSIZE	-0.041*	-1.83	-0.032	-1.46	-0.039*	-1.81
	(0.022)		(0.022)		(0.022)	
BINDEP	0.020	0.79	0.015	0.61	0.015	0.59
	(0.026)		(0.025)		(0.026)	
DUALITY	0.028**	2.31	0.029**	2.40	0.030**	2.49
	(0.012)		(0.012)		(0.012)	
FOWN	-0.082*	-1.86	-0.090**	-2.02	-0.087**	-1.98
	(0.044)		(0.045)		(0.044)	
GEOGR COMPL	-0.025	-0.83	-0.027	-0.90	-0.025	-0.86
	(0.030)		(0.030)		(0.030)	
ETR	-0.036	-1.05	-0.034	-0.99	-0.033	-0.98
	(0.034)		(0.034)		(0.034)	
SIZE	0.028***	3.74	0.026***	3.52	0.026***	3.55
	(0.008)		(0.007)		(0.007)	
ROA	0.157	1.38	0.145	1.29	0.145	1.29

	(0.114)		(0.113)		(0.112)	
LEV	-0.022**	-2.26	-0.021**	-2.18	-0.019**	-1.99
	(0.010)		(0.010)		(0.010)	
MTB	0.003	0.30	0.003	0.37	0.003	0.32
	(0.009)		(0.009)		(0.009)	
ANALYST	-0.006	-0.35	-0.004	-0.23	-0.002	-0.13
	(0.017)		(0.016)		(0.016)	
HAVEN	-0.014	-0.79	-0.018	-0.98	-0.018	-0.99
	(0.018)		(0.018)		(0.018)	
US CROSSLIST	-0.023*	-1.70	-0.024*	-1.78	-0.023*	-1.70
	(0.014)		(0.014)		(0.014)	
ROL	0.253***	6.77	0.250***	6.83	0.258***	7.08
	(0.037)		(0.037)		(0.036)	
ASDI	0.212***	6.85	0.205***	6.31	0.208***	6.47
	(0.031)		(0.033)		(0.032)	
FIXED EFFECTS						
Country FE	NO		NO		NO	
Industry FE	YES		YES		YES	
Year FE	YES		YES		YES	
Constant	-0.935***	-6.00	-0.900***	-5.59	-0.912***	-5.94
	(0.156)		(0.161)		(0.160)	
R^2 adjusted	0.366		0.369		0.372	
N	1,603		1,603		1,603	

Note: This table reports results (OLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

In Model 4, we observe a negative statistically significant coefficient of the interaction between CSR COMMITTEE and MORALE, but no statistically significant coefficients of the interactions between EMPRATIO and MORALE, and GDIVERSITY and MORALE. Interpreting the marginal effects in Table 3.9, we see that EMPRATIO is statistically significantly positively associated with TAXDISC in societies with high MORALE at the 5% level. We do not observe a statistically significant relationship between GDIVERSITY and TAXDISC, nor that this relationship is moderated by MORALE. Furthermore, we observe that, in societies with high MORALE, a CSR COMMITTEE is statistically significantly positively associated with a higher level of TAXDISC at the 5% level.

Table 3.9 Marginal Effects of Interaction Models

Table 3.9. Marginal Effects of Interaction Models

Model 3	Marginal effect of EMPRATIO		Marginal effect of GDIVERSITY		Marginal effect of CSR COMMITTEE	
0 (weak enforcement)	0.084	1.61	-0.027	-0.38	0.038**	2.50
	(0.052)		(0.074)		(0.015)	
1 (strict enforcement)	0.147***	3.09	-0.047	-0.68	0.008	0.37
	(0.047)		(0.070)		(0.021)	

Model 4	Marginal effect of EMPRATIO		Marginal effect of GDIVERSITY		Marginal effect of CSR COMMITTEE	
0 (high morale)	0.100**	2.09	-0.036	-0.55	0.052**	2.35
	(0.048)		(0.066)		(0.022)	
1 (low morale)	0.160	1.32	-0.033	-0.26	0.004	0.21
	(0.121)		(0.128)		(0.018)	

Model 5	Marginal effect of EMPRATIO		Marginal effect of GDIVERSITY		Marginal effect of CSR COMMITTEE	
MORALE						
0 (high morale)	0.110**	2.34	-0.038	-0.58	0.050**	2.26
	(0.047)		(0.065)		(0.022)	
1 (low morale)	0.150	1.21	-0.046	-0.36	-0.005	-0.28
	(0.124)		(0.128)		(0.018)	
ENFORCEMENT						
0 (weak enforcement)	0.095*	1.74	-0.035	-0.51	0.052***	2.86
	(0.055)		(0.068)		(0.018)	
1 (strict enforcement)	0.158***	2.93	-0.047	-0.68	0.012	0.59
	(0.054)		(0.069)		(0.019)	

*** p<.01, ** p<.05, * p<.1

Finally, we also combine both moderators in Model 5. For MORALE, we observe a negative significant interaction term for CSR COMMITTEE and MORALE at the 10% level, but no statistically significant coefficients of the interaction between EMPRATIO and MORALE, and GDIVERSITY and MORALE. Interpreting the marginal effects in Table 3.9, we find that EMPRATIO is positively associated with TAXDISC at the 5% level when MORALE is high. We do not observe any statistically significant marginal effects of GDIVERSITY. For a CSR Committee, we observe that the existence of a CSR committee is positively associated with TAXDISC at the 5% level when MORALE is high.

For ENFORCEMENT, we observe a positive statistically significant coefficient for the interaction between EMPRATIO and ENFORCEMENT at the 10% level and a negative statistically significant coefficient for the interaction between ENFORCEMENT and CSR COMMITTEE at the 5% level. We do not find a statistically significant interaction coefficient between GDIVERSITY and ENFORCEMENT. Interpreting marginal effects, we find that EMPRATIO is positively associated with TAXDISC at the 10% level when ENFORCEMENT is weak, and a positive association between TAXDISC and EMPRATIO at the 1% level when ENFORCEMENT is strict. We do not observe any statistically significant marginal effects of GDIVERSITY. Finally, we observe that in societies with weak ENFORCEMENT, the marginal effect of CSR COMMITTEE on TAXDISC is positively statistically significant at the 1% level.

Overall, we reject H4a in that the relationship between employee board representation and the level of voluntary tax disclosure is more positive in societies with weak ENFORCEMENT. The relationship between EMPRATIO and TAXDISC appears to be more positive in countries with strict ENFORCEMENT. Furthermore, we find no evidence of a moderating influence of ENFORCEMENT on the relationship between gender diversity on the board and the level of voluntary tax disclosure, leaving us unable to confirm or reject H4b. Finally, we find that the relationship between the existence of a CSR committee and the level of voluntary tax disclosure is stronger in societies with weak ENFORCEMENT, confirming H4c.

We confirm H5a, in that MORALE strengthens the positive relationship between employee board representation and the level of voluntary tax disclosure. We find no evidence of a moderating influence of MORALE on the relationship between gender diversity on the board and the level of voluntary tax disclosure, leaving us unable to confirm or reject H5b. Furthermore, we confirm H5c that high MORALE strengthens the positive relationship between the existence of a CSR committee and the level of voluntary tax disclosure.

3.4.6 Robustness Checks

We acknowledge that the relationship between GDIVERSITY and TAXDISC can be driven by reverse causality. We therefore also present a two-stage least-squares analysis with an instrumental variable in Table 3.10. A challenge in performing an instrumental variable regression is finding a good instrument. Research on board gender diversity often relies on industry averages and lagged values of independent variables (Farooq et al., 2023; Nadeem, 2020; Ye, Deng, Liu, Szewczyk, & Chen, 2019). The issue with a lagged instrument is that when using lagged values of the endogenous regressor, one assumes that the exogenous part of the regressor persists over time, but that the endogenous part does not persist over time (Larcker & Rusticus, 2010). In the case of disclosures, which tend to be sticky, this is highly unlikely. Similarly, industry averages only work when the endogenous part of the

variable varies only within the industry. It is very likely however that the endogenous part of disclosure also varies between industries, which is why we controlled for industry-fixed effects in Model 1. Therefore, we employ the Bartik instrument (Bartik, 1991), which is an instrument also based on the industry a firm operates in, but relies on milder assumptions (Sieweke, Bostandzic, & Smolinski, 2023).

To construct the instrument, we follow Sieweke et al. (2023) who apply the Bartik instrument to estimate causal relationships between gender diversity in the top management team and firm performance. In the first step, we decompose a firm's GDIVERSITY in a year into two parts: a firm's growth rate in GDIVERSITY in that year, weighted by the firm's shares in GDIVERSITY in a base year. Then, we decompose the firm's growth rate into a firm-specific growth rate and the industry growth rate. The firm-specific growth rate is most likely influenced by firm-specific unobservable, time-varying confounders and is therefore endogenous. The industry rate however is much less likely to be impacted by these firm-specific confounders and is the first part of our instrument. We calculate the industry growth rate excluding the focal firm to strengthen the exogeneity assumption (Flabbi, Macis, Moro, & Schivardi, 2019). For the second part of the instrument, we need to determine the firm share in a base year. Ideally, the shares in the base year should be exogenous conditional on firm-fixed effects. We use the first year of our panel as the base year due to data availability, although it is better to take an earlier year which would strengthen the exogeneity assumption (Flabbi et al., 2019). The final instrument is the interaction between the industry growth rate and the industry shares in the base year.

We can only provide theoretical reasoning on whether the exclusion restriction is satisfied. In line with Sieweke et al. (2023), the shift part of the instrument (the growth rate in GDIVERSITY per industry) is unlikely to be related to other environmental dynamics that may affect firm disclosure behavior and that are not yet controlled for by including year-fixed effects. Given that our base year is the first year of our panel, it could be that this base year is not entirely exogenous. However, if either the shift or share part of the instrument is exogenous, the shift-share instrument will produce unbiased estimates, giving it an advantage over industry-averaged instruments (Borusyak, Hull, & Jaravel, 2022; Breuer, 2022; Goldsmith-Pinkham, Sorkin, & Swift, 2020). The results of this analysis are presented in Table 3.10.

Table 3.10 Regression Results IV-2SLS

Table 3.10. Regression Results IV-2SLS				
		First stage		Second stage
	OLS		OLS	
Variable	Coef.	t-value	Coef.	z-value
Shift-share instrument	-0.942**	-2.28		
	(0.413)			
EMPRATIO	0.049	1.18	0.163**	2.24
	(0.041)		(0.073)	
GDIVERSITY			-0.159	-1.43
			(0.111)	
CSR COMMITTEE	0.008	0.83	0.028*	1.80
	(0.009)		(0.016)	
BSIZE	0.021*	1.73	-0.034*	-1.89
	(0.012)		(0.018)	
BINDEP	0.100***	3.56	-0.009	-0.31
	(0.028)		(0.030)	
DUALITY	0.010	0.88	-0.004	-0.25
	(0.011)		(0.015)	
FOWN	-0.081	-1.63	0.014	0.21
	(0.050)		(0.067)	
ETR	0.007	0.48	-0.033	-1.36
	(0.015)		(0.024)	
SIZE	-0.005	-0.34	0.013	0.91
	(0.013)		(0.014)	
ROA	0.012	0.24	-0.042	-0.65
	(0.049)		(0.064)	
LEV	0.006	0.85	0.004	0.49
	(0.006)		(0.008)	
MTB	-0.005	-0.72	0.009	1.14
	(0.007)		(0.008)	
ANALYST	0.008	0.74	0.048***	3.06
	(0.011)		(0.016)	
FIXED EFFECTS				
Year FE	YES		YES	
Firm FE	YES		YES	
R^2 adjusted	0.430		0.285	
N	1,582		1,582	
F-stat	32.02			

Note: This table reports results (2SLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Whereas we can only provide theoretical arguments to support the exclusion restriction, we can assess the strength of our instrument based on our data. In the first stage, the F-statistic = 32.02, which rejects the weak instrument assumption. In the second stage of our regression, we find no

statistically significant relationship between GDIVERSITY and TAXDISC, again leaving us unable to confirm or reject H2. We again find a statistically significant positive relationship between EMPRATIO and TAXDISC at the 5% level, supporting H1, and a statistically significant positive relationship between CSR COMMITTEE and TAXDISC at the 10% level, supporting H3. We also note that the effect sizes are very similar to the standard OLS estimates from our previous models.

In addition, the relationship between EMPRATIO and TAXDISC could also be driven by time-varying confounders for which we have not controlled yet. The use of a Bartik instrument is not appropriate, as the F-stat in the first stage is 3.33, which is far below the recommended threshold for instrument strength of Stock and Yogo (2005). We exploit the change in legislation in France as an exogenous shock to employee representation. While the amount of firms impacted in our sample is limited (126 firm-year observations) and results must thus be interpreted in this light, this shock is exogenous and might provide some evidence of a causal relationship between EMPRATIO and TAXDISC. We perform a difference-in-difference analysis where the treated firms are French firms with 8 or more directors, but less than 12 directors (see Table 3.11). We find a significantly positive interaction coefficient at the 10% level between the treated firms and the post-treatment period, indicating that in firms where employee board representation increased, TAXDISC also increased. This analysis hints towards causal evidence that employee board representation causes an increase in TAXDISC, and confirms H1.

As a placebo test to check the validity of the external shock we use in the difference-in-differences design, we take firms with 8 or more directors but less than 12 directors in the countries where employee board representation is prevalent, Germany and Sweden (see Table 3.11). When using German firms as a placebo, we find no statistically significant relationship interaction coefficients between the placebo-treated firms and the post-treatment period. For Swedish firms, we even see a statistically significantly negative relationship at the 1% level between the placebo-treated firms and the post-treatment period.

Table 3.11 Regression Results Difference-in-Differences Employee Representation Shock

Table 3.11. Regression Results Difference-in-Differences Employee Representation Shock						
	Treated = French firms with 8-11 directors		Treated = German firms with 8-11 directors (PLACEBO)		Treated = Swedish firms with 8-11 directors (PLACEBO)	
	OLS		OLS		OLS	
Variable	Coef.	t-value	Coef.	t-value	Coef.	t-value
Treated						
Post	0.081***	8.55	0.085***	9.09	0.088***	9.52
	(0.009)		(0.010)		(0.009)	
Treated*Post	0.033*	1.86	-0.019	-1.41	-0.050***	-5.42
	(0.018)		(0.013)		(0.009)	
GDIVERSITY	-0.032	-0.81	-0.042	-1.07	-0.058	-1.48
	(0.039)		(0.040)		(0.039)	
CSR COMMITTEE	0.029*	1.86	0.031*	1.95	0.031*	1.96
	(0.016)		(0.016)		(0.016)	
BSIZE	-0.030*	-1.80	-0.029*	-1.68	-0.030*	-1.75
	(0.017)		(0.017)		(0.017)	
BINDEP	-0.031	-1.14	-0.035	-1.29	-0.033	-1.23
	(0.028)		(0.027)		(0.027)	
DUALITY	-0.003	-0.23	-0.009	-0.58	-0.009	-0.54
	(0.015)		(0.016)		(0.016)	
FOWN	0.032	0.52	0.026	0.42	0.016	0.25
	(0.063)		(0.063)		(0.063)	
ETR	-0.034	-1.40	-0.034	-1.37	-0.033	-1.32
	(0.024)		(0.025)		(0.025)	
SIZE	0.013	0.88	0.013	0.90	0.019	1.28
	(0.015)		(0.015)		(0.015)	
ROA	-0.050	-0.79	-0.041	-0.64	-0.049	-0.78
	(0.063)		(0.064)		(0.063)	
LEV	0.005	0.55	0.004	0.48	0.004	0.46
	(0.008)		(0.009)		(0.009)	
MTB	0.011	1.50	0.009	1.17	0.015**	2.04
	(0.007)		(0.007)		(0.007)	
ANALYST	0.045***	3.00	0.047***	3.12	0.042***	2.74
	(0.015)		(0.015)		(0.015)	
FIXED EFFECTS						
Year FE	YES		YES		YES	
Firm FE	YES		YES		YES	
R^2 adjusted	0.292		0.288		0.301	
N	1,582		1,582		1,582	

Note: This table reports results (OLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Furthermore, previous literature has demonstrated that peer firms tend to mimic each other's disclosures (Lin, Mao, & Wang, 2018; Tuo, Yu, & Zhang, 2020). Therefore, we also rerun Model 1 and Model 2 with an industry-corrected measure for TAXDISC. Specifically, we calculate how a firm differs from the industry average (see Table 3.12). We again observe a statistically significantly positive relationship between EMPRATIO and TAXDISC at the 1% level in Model 1 and the 5% level in Model 2, confirming hypothesis H1. We do not find a statistically significant relationship between GDIVERSITY and TAXDISC leaving us unable to confirm or reject hypothesis H2. Finally, we observe a statistically significantly positive relationship between CSR COMMITTEE and TAXDISC at the 5% level in Model 1 and the 10% level in Model 2, confirming hypothesis H3.

Finally, we also note that the disclosures from the UK Finance Act 2016 are included in our TAXDISC measure. While we choose not to examine tax strategies published by UK firms under the Finance Act 2016, it could still be that spillover effects exist between these tax strategies and the annual reports, sustainability reports or financial statements of UK firms. Therefore, we re-run the analyses on TAXDISC and exclude all items that need to be mandatorily reported under the UK Finance Act 2016. Results are presented in Appendix 3.5. We see that all results are largely consistent with the main analysis on TAXDISC. The relationship between a CSR Committee and TAXDISC disappears in the industry and country fixed effects approach, but is still present in the firm fixed effects specification.

Table 3.12 Regression Results of Industry-Adjusted Measure of TAXDISC

Table 3.12. Regression Results of Industry-Adjusted Measure of TAXDISC				
	Model 1 industry adjusted OLS		Model 2 industry adjusted OLS	
Variable	Coef.	t-value	Coef.	t-value
EMPRATIO	0.155***	3.29	0.159**	2.20
	(0.047)		(0.072)	
GDIVERSITY	-0.059	-1.01	-0.039	-1.02
	(0.058)		(0.038)	
CSR		2.05		1.89
COMMITTEE	0.029**		0.029*	
	(0.014)		(0.015)	
BSIZE	-0.038	-1.68	-0.038**	-2.23
	(0.023)		(0.017)	
BINDEP	0.017	0.69	-0.023	-0.84
	(0.024)		(0.027)	
DUALITY	0.032**	2.64	-0.005	-0.37
	(0.012)		(0.015)	
FOWN	-0.077*	-1.75	0.029	0.47
	(0.044)		(0.063)	
GEOGR				
COMPL	-0.018	-0.64		
	(0.028)			
ETR	-0.039	-1.18	-0.033	-1.36
	(0.033)		(0.024)	
SIZE	0.026***	3.64	0.014	0.98
	(0.007)		(0.014)	
ROA	0.191*	1.74	-0.053	-0.87
	(0.110)		(0.060)	
LEV	-0.020**	-2.10	0.002	0.30
	(0.009)		(0.008)	
MTB	0.000	0.04	0.009	1.25
	(0.009)		(0.007)	
ANALYST	-0.005	-0.30	0.043***	2.94
	(0.016)		(0.015)	
HAVEN	-0.015	-0.91		
	(0.017)			
US CROSSLIST	-0.023*	-1.70		
	(0.013)			
FIXED				
EFFECTS				
Country FE	YES		NO	
Industry FE	YES		NO	
Year FE	YES		YES	
Firm FE	NO		YES	
Constant	-0.650***	-4.90		

	(0.133)	
R^2 adjusted	0.337	0.292
N	1,603	1,582

Note: This table reports results (OLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

3.4.7 Additional Analyses

We run several additional analyses to shed more light on possible underlying elements that could explain the insignificant results concerning board gender diversity and the level of voluntary tax disclosures. According to Torchia, Calabrò, and Huse (2011), the nature of the relation between group members can substantially improve once a token minority group increases to the point where the group is no longer considered as a token. According to Kramer, Konrad, Erkut, and Hooper (2006), this appears to happen when three or more women serve as directors on corporate boards. This phenomenon is known as 'critical mass theory' and is confirmed by several studies focusing on the consequences of board gender diversity (Ben-Amar et al., 2017; Hollindale et al., 2019; Jia & Zhang, 2013). We therefore estimate Model 1 and Model 2 with a binary indicator (*CRITMASS*) which takes the value of '1' if the board of directors contains three or more female directors (see Table 3.13). We find no statistically significant between CRITMASS and TAXDISC in either Model 1 or Model 2, leaving us unable to confirm or reject hypothesis H2.

Table 3.13 Regression Results of Critical Mass Theory for Female Directorship

Table 3.13. Regression Results of Critical Mass Theory for Female Directorship						
	Model 1 critical mass Poisson		Model 1 critical mass OLS		Model 2 critical mass OLS	
Variable	Coef.	z-value	Coef.	t-value	Coef.	t-value
EMPRATIO	1.020***	3.43	0.157***	3.26	0.160**	2.14
	(0.297)		(0.048)		(0.075)	
CRITMASS	-0.064	-1.40	-0.008	-0.77	-0.006	-1.09
	(0.046)		(0.010)		(0.006)	
CSR		2.09		2.15		1.83
COMMITTEE	0.128**		0.032**		0.029*	
	(0.061)		(0.015)		(0.016)	
BSIZE	-0.137	-1.10	-0.033	-1.34	-0.033*	-1.79
	(0.124)		(0.025)		(0.018)	
BINDEP	0.145	1.06	0.016	0.63	-0.024	-0.87
	(0.137)		(0.025)		(0.028)	
DUALITY	0.194***	2.75	0.036***	2.77	-0.007	-0.44
	(0.071)		(0.013)		(0.015)	
FOWN	-0.537*	-1.88	-0.073	-1.58	0.023	0.36
	(0.285)		(0.046)		(0.063)	
GEOGR						
COMPL	-0.112	-0.83	-0.020	-0.68		
	(0.135)		(0.030)			
ETR	-0.209	-1.23	-0.042	-1.20	-0.036	-1.46
	(0.169)		(0.035)		(0.024)	
SIZE	0.122***	3.63	0.026***	3.49	0.013	0.92
	(0.034)		(0.008)		(0.015)	
ROA	0.909*	1.70	0.196*	1.75	-0.043	-0.67
	(0.533)		(0.112)		(0.063)	
LEV	-0.084*	-1.77	-0.019**	-1.97	0.004	0.51
	(0.048)		(0.010)		(0.008)	
MTB	0.004	0.09	-0.001	-0.16	0.010	1.29
	(0.043)		(0.009)		(0.007)	
ANALYST	-0.000	-0.00	-0.003	-0.16	0.045***	3.03
	(0.076)		(0.017)		(0.015)	
HAVEN	-0.028	-0.33	-0.012	-0.66		
	(0.086)		(0.018)			
US CROSSLIST	-0.116*	-1.74	-0.023*	-1.68		
	(0.066)		(0.014)			
FIXED EFFECTS						
Country FE	YES		YES		NO	
Industry FE	YES		YES		NO	
Year FE	YES		YES		YES	
Firm FE	NO		NO		YES	
Constant	-1.536**	-2.47	-0.457***	-3.32		

	(0.621)	(0.138)	
R^2 adjusted	0.144	0.363	0.293
N	1,603	1,603	1,582

Note: This table reports results (Poisson and OLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Several studies focusing on the consequences of board gender diversity also distinguish between female executive directors and female non-executive directors. Whilst female executive directors have close proximity to business operations, female independent directors are associated with better monitoring of managerial actions due to them being independent of management and assuming the fiduciary duty to protect shareholders' interests (Nadeem, 2022). As a result, prior studies document that female independent directors and female executive directors can have different impacts on corporate policies. Therefore we run as additional analyses the regressions with the percentage of female executive directors on the board (*FEXEC*), as well as the percentage of female non-executive directors (*FNONEXEC*) on the board as the independent variable. For these analyses, we consider in case of a dual-tier board structure both the supervisory board and the management board. These additional analyses lead to the following results (see Table 3.14). FEXEC is statistically significantly negatively associated with TAXDISC at the 5% level, contrary to hypothesis H2. However, this relationship disappears when we control for firm-fixed effects. We find no statistically significant relationship between FNONEXEC and TAXDISC in any specification. In conclusion, these findings are consistent with our main analyses and do not provide robust evidence for the existence of a relationship between gender diversity on the board and the level of voluntary tax disclosure of the firm.

Table 3.14 Regression Results of Female Executives and Female Non-Executives

Table 3.14. Regression Results of Female Executives and Female Non-Executives												
	Model 1 Female executives		Model 1 Female executives		Model 2 Female executives		Model 1 Female non-executives		Model 1 Female non-executives		Model 2 Female non-executives	
	Poisson		OLS		OLS		Poisson		OLS		OLS	
Variable	Coef.	z-value	Coef.	t-value	Coef.	t-value	Coef.	z-value	Coef.	t-value	Coef.	t-value
EMPRATIO	1.037***	3.55	0.158***	3.34	0.160**	2.10	1.053***	3.57	0.162***	3.37	0.162**	2.15
	(0.292)		(0.047)		(0.076)		(0.295)		(0.048)		(0.075)	
FEXEC	-0.389**	-2.08	-0.083**	-2.07	-0.027	-0.82						
	(0.189)		(0.040)		(0.032)							
FNONEXEC							-0.347	-1.64	-0.060	-1.30	-0.003	-0.09
							(0.211)		(0.046)		(0.034)	
CSR COMMITTEE	0.138**	2.23	0.034**	2.32	0.030*	1.87	0.131**	2.14	0.033**	2.20	0.029*	1.85
	(0.062)		(0.015)		(0.016)		(0.061)		(0.015)		(0.016)	
BSIZE	-0.179	-1.48	-0.038	-1.60	-0.038**	-2.11	-0.195	-1.61	-0.040	-1.71	-0.038**	-2.12
	(0.121)		(0.023)		(0.018)		(0.121)		(0.024)		(0.018)	
BINDEP	0.124	0.91	0.012	0.50	-0.024	-0.87	0.134	0.97	0.015	0.59	-0.027	-0.96
	(0.136)		(0.025)		(0.027)		(0.138)		(0.025)		(0.028)	
DUALITY	0.201***	2.90	0.037***	2.90	-0.006	-0.39	0.194***	2.75	0.036***	2.75	-0.006	-0.41
	(0.069)		(0.013)		(0.015)		(0.071)		(0.013)		(0.015)	
FOWN	-0.539*	-1.90	-0.076*	-1.67	0.023	0.36	-0.557*	-1.93	-0.076	-1.65	0.024	0.39
	(0.284)		(0.045)		(0.063)		(0.288)		(0.046)		(0.063)	
GEOGR COMPL	-0.095	-0.70	-0.017	-0.56			-0.114	-0.84	-0.021	-0.69		
	(0.135)		(0.030)				(0.136)		(0.030)			
ETR	-0.200	-1.18	-0.042	-1.20	-0.037	-1.50	-0.209	-1.23	-0.041	-1.19	-0.036	-1.45
	(0.170)		(0.035)		(0.025)		(0.170)		(0.035)		(0.024)	
SIZE	0.124***	3.68	0.027***	3.59	0.013	0.87	0.122***	3.62	0.026***	3.49	0.013	0.91
	(0.034)		(0.008)		(0.015)		(0.034)		(0.008)		(0.015)	

ROA	0.924*	1.74	0.199*	1.77	-0.041	-0.65	0.914*	1.71	0.197*	1.76	-0.042	-0.67
	(0.530)		(0.112)		(0.063)		(0.533)		(0.112)		(0.064)	
LEV	-0.074	-1.54	-0.018*	-1.81	0.004	0.51	-0.086*	-1.80	-0.020**	-2.00	0.004	0.48
	(0.048)		(0.010)		(0.008)		(0.048)		(0.010)		(0.008)	
MTB	0.003	0.08	-0.001	-0.14	0.010	1.29	0.007	0.17	-0.001	-0.09	0.010	1.36
	(0.043)		(0.009)		(0.007)		(0.043)		(0.009)		(0.007)	
ANALYST	0.002	0.03	-0.002	-0.14	0.046***	3.08	-0.002	-0.03	-0.003	-0.17	0.045***	3.02
	(0.076)		(0.017)		(0.015)		(0.076)		(0.017)		(0.015)	
HAVEN	-0.041	-0.48	-0.014	-0.81			-0.027	-0.31	-0.012	-0.66		
	(0.085)		(0.018)				(0.085)		(0.018)			
US CROSSLIST	-0.119*	-1.78	-0.024*	-1.74			-0.117*	-1.75	-0.023*	-1.70		
	(0.067)		(0.014)				(0.067)		(0.014)			
FIXED EFFECTS												
Country FE	YES		YES		NO		YES		YES		NO	
Industry FE	YES		YES		NO		YES		YES		NO	
Year FE	YES		YES		YES		YES		YES		YES	
Firm FE	NO		NO		YES		NO		NO		YES	
Constant	-1.538**	-2.46	-0.473***	-3.42			-1.351**	-2.18	-0.432***	-3.14		
	(0.624)		(0.138)				(0.619)		(0.138)			
R^2 adjusted	0.146		0.368		0.293		0.145		0.364		0.292	
N	1,603		1,603		1,582		1,603		1,603		1,582	

Note: This table reports results (Poisson and OLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

We also split our TAXDISC index into disclosures stemming from GRI (GRI), and disclosures stemming from CbCR (CbCR) and repeat the analyses in Model 1 and Model 2. Results are presented in Table 3.15 and Table 3.16. We see that EMPRATIO is positively statistically significantly associated with GRI in all specifications at conventional levels, in line with the results for the full TAXDISC index. Similarly, we find no statistically significant relationship between GDIVERSITY and GRI. Finally, the presence of a CSR COMMITTEE is positively statistically significantly associated with disclosures stemming from GRI in Model 1 at the 5% level. We note that this relationship disappears after controlling for firm fixed effects, however.

Table 3.15 Analyses with GRI Disclosures as the Dependent Variable

Table 3.15. Analyses with GRI Disclosures as the Dependent Variable						
		Model 1	Model 1 alternative		Model 2 alternative	
	Poisson		OLS		OLS	
Variable	Poisson	z-value	Coef.	t-value	Coef.	t-value
EMPRATIO	0.749***	2.62	0.141**	2.37	0.157**	2.03
	(0.286)		(0.059)		(0.077)	
GDIVERSITY	-0.408	-1.54	-0.085	-1.22	-0.046	-1.03
	(0.264)		(0.070)		(0.044)	
CSR		2.46		2.60		1.56
COMMITTEE	0.134**		0.043**		0.027	
	(0.055)		(0.017)		(0.017)	
BSIZE	-0.153	-1.39	-0.036	-1.34	-0.041**	-2.06
	(0.110)		(0.027)		(0.020)	
BINDEP	0.121	1.04	0.019	0.71	-0.020	-0.66
	(0.117)		(0.027)		(0.030)	
DUALITY	0.117*	1.95	0.028**	2.01	0.000	0.03
	(0.060)		(0.014)		(0.017)	
FOWN	-0.459*	-1.82	-0.083	-1.64	0.000	0.00
	(0.252)		(0.051)		(0.079)	
GEOGR						
COMPL	-0.147	-1.20	-0.035	-1.05	-0.052	
	(0.122)		(0.034)		(0.028)	
ETR	-0.209	-1.38	-0.054	-1.38	0.019*	-1.85
	(0.152)		(0.039)		(0.016)	
SIZE	0.108***	3.48	0.027***	3.24	-0.058	1.17
	(0.031)		(0.008)		(0.067)	
ROA	0.923*	1.84	0.244*	1.84	0.004	-0.86
	(0.501)		(0.133)		(0.010)	
LEV	-0.067	-1.51	-0.020*	-1.69	0.010	0.39
	(0.044)		(0.012)		(0.008)	
MTB	-0.006	-0.14	-0.004	-0.34	0.051	1.19
	(0.043)		(0.011)		(0.017)	
ANALYST	-0.009	-0.14	-0.004	-0.23	0.032***	2.97
	(0.068)		(0.019)		(0.014)	

HAVEN	-0.018	-0.23	-0.006	-0.28	
	(0.080)		(0.021)		
US CROSSLIST	-0.072	-1.19	-0.016	-1.03	
	(0.060)		(0.015)		
FIXED EFFECTS					
Country FE	YES		YES		NO
Industry FE	YES		YES		NO
Year FE	YES		YES		YES
Firm FE	NO		NO		YES
Constant	-0.879	-1.60	-0.404***	-2.69	
	(0.551)		(0.150)		
R^2 adjusted	0.121		0.363		0.295
N	1,603		1,603		1,582

Note: This table reports results (Poisson and OLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

When looking at the results for CbCR, we see a different picture. We find no statistically significant relationship between EMPRATIO and CbCR. In this case, it could be that the stakeholder-oriented disclosures of GRI are preferred by employee representatives, as they are likely to be easier to understand. We do note however that CbCR constitutes a part of the GRI disclosures (see Appendix 1 for more details on disclosures belonging to GRI and disclosures belonging to CbCR). Similarly, we do not observe a statistically significant relationship between CbCR and GDIVERSITY in any specification. We find a positive statistically significant relationship between CSR COMMITTEE and CbCR at the 10% level, which disappears after controlling for firm fixed effects. This could again be because, while GRI is specifically aimed at informing a broad stakeholder group, CbCR disclosures stem from the private disclosures originally targeted only at tax authorities. In CSR reporting, the GRI guidelines could be preferred over CbCR reporting, which causes the CSR COMMITTEE to focus more on GRI disclosures than on CbCR disclosures.

Table 3.16 Analyses with CbCR Disclosures as the Dependent Variable

Table 3.16. Analyses with CbCR Disclosures as the Dependent Variable						
		Model 1	Model 1 alternative		Model 2 alternative	
	Poisson		OLS		OLS	
Variable	Poisson	z-value	Coef.	t-value	Coef.	t-value
EMPRATIO	-0.121	-0.26	0.055	0.45	0.004	0.09
	(0.457)		(0.122)		(0.051)	
GDIVERSITY	-0.086	-0.23	-0.020	-0.19	-0.002	-0.03
	(0.366)		(0.106)		(0.045)	
CSR		1.91		1.74		-0.34
COMMITTEE	0.153*		0.040*		-0.004	
	(0.080)		(0.023)		(0.013)	
BSIZE	0.120	0.76	0.032	0.73	-0.012	-0.67
	(0.157)		(0.043)		(0.019)	
BINDEP	-0.103	-0.64	-0.007	-0.17	-0.012	-0.45
	(0.163)		(0.043)		(0.026)	
DUALITY	-0.074	-0.81	-0.016	-0.84	-0.003	-0.42
	(0.092)		(0.019)		(0.007)	
FOWN	-0.441	-1.14	-0.084	-1.04	-0.121	-0.95
	(0.387)		(0.082)		(0.127)	
GEOGR						
COMPL	-1.186***	-7.26	-0.390***	-6.94		
	(0.163)		(0.056)			
ETR	-0.322*	-1.65	-0.086	-1.59	-0.060***	-2.64
	(0.195)		(0.054)		(0.023)	
SIZE	0.049	1.03	0.010	0.81	-0.008	-0.43
	(0.047)		(0.012)		(0.018)	
ROA	1.036	1.47	0.305	1.48	0.046	0.76
	(0.703)		(0.206)		(0.060)	
LEV	-0.133**	-2.03	-0.051***	-2.84	0.011	1.35
	(0.066)		(0.018)		(0.008)	
MTB	-0.115	-1.80	-0.034**	-2.06	0.009	1.06
	(0.064)		(0.016)		(0.008)	
ANALYST	-0.113	-1.17	-0.028	-1.03	0.012	0.72
	(0.096)		(0.027)		(0.016)	
HAVEN	0.043	0.41	0.014	0.36		
	(0.103)		(0.040)			
US CROSSLIST	-0.225***	-2.66	-0.050**	-2.39		
	(0.085)		(0.021)			
FIXED						
EFFECTS						
Country FE	YES		YES		NO	
Industry FE	YES		YES		NO	
Year FE	YES		YES		YES	
Firm FE	NO		NO		YES	
Constant	0.275	0.29	0.274	1.15		

	(0.952)	(0.238)	
R^2 adjusted	0.148	0.467	0.034
N	1,603	1,603	1,582

Note: This table reports results (Poisson and OLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

As a final additional analysis, we also check whether a firm's tax avoidance behavior (ETR) can influence the relationship between board diversity and TAXDISC (see Appendix 3.6). We only find a positive statistically significant interaction coefficient at the 5% level between EMPRATIO and ETR in the firm-fixed effects specification. While the evidence is limited, it appears that the positive relationship between EMPRATIO and TAXDISC is especially strong in firms with less tax avoidance behavior.

3.5 Discussion and Conclusion

This paper contributes to the disclosure literature and more specifically to the relationship between board characteristics and voluntary tax disclosure, taking into account possible moderating influences of country-level characteristics. We consider in this study several board characteristics, namely board gender diversity, employee board representation diversity and the presence of a CSR subcommittee to the board. We focus on whether or not different types of board diversity and the presence of a CSR subcommittee are related to a firm's level of voluntary tax disclosure. Using 1,603 firm-year observations, we find that only board employee representation diversity and the presence of a CSR committee are related to the firm's level of voluntary tax disclosure. Board gender diversity is not related to the level of voluntary tax disclosures provided by large listed, European firms. Moreover, country variation in formal and informal institutions strengthens or weakens the relationship between employee board representation and the presence of a CSR committee, and voluntary tax disclosures.

Our results indicate that employee board representation is positively related to a firm's level of voluntary tax disclosure. Additional tests point in the direction of a causal relationship running from employee board representation to voluntary tax disclosures. Whereas task-related employee board diversity does matter to explain voluntary tax disclosures, non-task-related board diversity in the form of board gender diversity is not statistically significantly related to the level of voluntary tax disclosures. Taking into account firm fixed effects, insights from critical mass theory, potential endogeneity by an instrumental variable approach and after distinguishing between female executive directors and female non-executive directors, we do not find any evidence for a relationship between board gender diversity and the firm's level of voluntary tax disclosure. Our results do not confirm that higher board gender diversity leads to more firm-specific disclosures as Ahmed, Monem, Delaney, and

Ng (2017), Gul et al. (2011) and Nadeem (2020) find. However, our results can be explained by the following observation. Studies suggest that women in leadership roles may behave more similarly to their male counterparts than what is typically observed in the general population (Schein, Mueller, Lituchy, & Liu, 1996). With our results on employee board representation diversity and board gender diversity, we respond to the calls of Adams et al. (2015) and Hillman (2015) and provide evidence that different types of board diversity affect firm outcome variables differently. Finally, we find evidence that the existence of a CSR committee leads to more voluntary tax disclosures and that this relationship is robust to a staggered difference-in-difference specification.

Focusing on the moderating character of country-level institutional characteristics, we observe that strict tax enforcement and high tax morale strengthen the relationship between employee board representation and the level of voluntary tax disclosure. Furthermore, tax enforcement and the presence of a CSR committee seem to act as substitute governance mechanisms. We find that the positive relationship between a CSR Committee and the level of voluntary tax disclosure is especially strong in societies with weak tax enforcement. However, the level of tax morale in a country seems to be a complement to a firm's CSR committee, as the positive relationships between the presence of a CSR committee and the level of voluntary tax disclosure are stronger in societies with high tax morale. Our results provide evidence that the consequences of firm-level governance mechanisms are context-dependent.

We encounter several limitations in our study. First of all, the lack of employee representatives on CSR Committees prevents an in-depth analysis of the effect of the configuration of the CSR Committee on voluntary tax disclosure. Future research could explore whether different individuals on the CSR committee influence voluntary tax disclosures. Furthermore, even though our sample represents various systems of employee representation in corporate boards, the sample is still limited to six European countries. Further research could examine whether our findings hold in different contexts with different forms of employee representation. Additionally, all countries in our sample score above the world median on tax enforcement. Differences in tax enforcement are thus limited and our findings must best be interpreted in this context. Further research could expand the sample to also include countries with tax enforcement levels below the world median. In addition, researching country-level institutional characteristics is challenging, as it is difficult to ensure the effect of all other country-level confounders is controlled for. Finally, Filippin, Fiorio, and Viviano (2013) illustrate that tax enforcement can be a driver of tax morale. Stricter enforcement enhances tax morale, which then leads to better tax compliance. Future research could explore a mediation analysis to disentangle the exact effects stemming directly from tax morale and the effects stemming from tax enforcement on voluntary tax disclosures.

3.6 Appendix

Appendix 3.1 Tax Disclosure Index Scores, Keywords, Sources in Literature, Origins, Mandatory or Voluntary Classification and Qualitative or Quantitative Classification

Appendix 3.1. Tax Disclosure Index Scores, Keywords, Sources in Literature, Origins, Mandatory or Voluntary Classification and Qualitative or Quantitative Classification

Item	Score	Specific keywords and sections	Source in literature	Origin	Mandatory/Voluntary public disclosure	Qualitative/Quantitative
GRI 207-1 Approach to tax						
Reference to a tax strategy or code of conduct with regard to taxes	0-1	Tax policy, Tax strategy, Tax code	Bilicka et al. (2021), Hardeck and Kirn 2016	GRI 207, UK Finance Act 2016	Voluntary (except in UK Tax Strategy)	Qualitative
Governance body responsible for approval of the tax strategy	0-1	Approv*, Tax policy, Tax strategy, Tax code	Bilicka et al. (2021), Hardeck and Kirn (2016)	GRI 207, UK Finance Act 2016	Voluntary (except in UK Tax Strategy)	Qualitative
Approach to regulatory compliance	0-1	Compl*, Tax law, Legal, Adherence to	Bilicka et al. (2021), Hardeck & Kirn (2016)	GRI 207, OECD MNE guidelines ch. XI	Voluntary	Qualitative
Compliance with the spirit of tax laws	0-1	Spirit, Intent	Hardeck & Kirn (2016)	GRI 207-1 commentary, OECD MNE guidelines ch. XI	Voluntary	Qualitative

How the approach to tax is linked to the business and sustainable development strategies of the organization	0-1	'Where profit is/are…', 'activities are located', 'approach'	Exploratory	GRI 207	Voluntary	Qualitative
Use of tax havens	0-1	Haven, Secrecy, Non-coöp	Akamah et al. (2018); Dyreng et al. (2020)	GRI 207-1 commentary	Voluntary	Qualitative
Approach to tax planning	0-1	Planning	Bilicka et al. (2021)	GRI 207-1 commentary, UK Finance Act 2016	Voluntary (except in UK Tax Strategy)	Qualitative
GRI 207-2 Tax governance, control and risk management						
The governance body or executive-level position within the organization accountable for compliance with the tax strategy	0-1	Responsib* for, 'tax management', 'tax governance'	Bilicka et al. (2021); Hardeck and Kirn (2016)	GRI 207, UK Finance Act 2016, Australian TTC	Voluntary (except in UK Tax Strategy)	Qualitative
Corporation's approach to tax risk management & how the approach to tax is embedded within the organization & how compliance with the tax governance and control framework is evaluated	0-1	Tax risk, Risk management	Bilicka et al. (2021); Hardeck and Kirn (2016)	GRI 207, UK Finance Act 2016, Australian TTC	Voluntary (except in UK Tax Strategy)	Qualitative
A description of the mechanisms for reporting concerns about unethical or	0-1	Whistle, Hotline, Grievance, Internal	Exploratory	GRI 207	Voluntary	Qualitative

unlawful behaviour and the organization's integrity in relation to tax		reporting, Breach, Speak up				
A description of the assurance process for disclosures on tax and, if applicable, a reference to the assurance report, statement, or opinion	0-1	Independent auditor's report section	Exploratory	GRI 207	Voluntary	Qualitative
Commitment to tax transparency	0-1	Transparen*	Bilicka et al. (2021), Hardeck & Kirn (2016)	GRI 207-2 commentary, OECD MNE guidelines ch. XI	Voluntary	Qualitative
GRI 207-3 Stakeholder engagement and management of concerns related to tax						
Cooperation with/approach to tax authorities	0-1	Authorit*, Administr*	Bilicka et al. (2021), Hardeck & Kirn (2016)	GRI 207, OECD MNE guidelines ch. XI, UK Finance Act 2016	Voluntary (except in UK Tax Strategy)	Qualitative
Participation in tax initiatives to which the firm subscribes	0-1	Tax initiative, Partnership	Hardeck and Kirn (2016)	GRI 207-3 commentary	Voluntary	Qualitative
Disclosure of lobbying activities in tax matters	0-1	Lobb*, Advoca*	Hardeck and Kirn (2016)	GRI 207-3 commentary	Voluntary	Qualitative
GRI 207-4 Country-by-country reporting						
Number of employees	0-1	Employees by, Workforce by, Group overview section	Joshi et al. (2020)	GRI 207, BEPS Action 13 Ch.5 Annex 3	Voluntary (mandatory private)	Quantitative

Revenues from third-party sales	0-1	Revenue by, Turnover by, note to segment information	Hope et al. (2013); Joshi et al. (2020)	GRI 207, BEPS Action 13 Ch.5 Annex 3	Voluntary	(mandatory private)	Quantitative
Differentiation between internal and external revenue	0-1	Revenue by, Turnover by, note to segment information	Exploratory	GRI 207, BEPS Action 13 Ch.5 Annex 3	Voluntary	(mandatory private)	Quantitative
Profit/loss before interest & tax	0-1	Income by, profit by, loss by, profit/loss by, note to segment information	Joshi et al. (2020)	GRI 207, BEPS Action 13 Ch.5 Annex 3	Voluntary	(mandatory private)	Quantitative
(Tangible) assets other than cash and cash equivalent	0-1	Assets by, note to segment information	Exploratory	GRI 207, BEPS Action 13 Ch.5 Annex 5	Voluntary	(mandatory private)	Quantitative
Corporate income tax paid/expensed on profit/loss by geographic location	0-1	tax* paid, by region, by geograph*	Joshi et al. (2020)	GRI 207, BEPS Action 13 Ch.5 Annex 3	Voluntary	(mandatory private)	Quantitative
Reasons for the difference between corporate income tax accrued on profit/loss and the tax due if the statutory tax rate is applied to profit/loss before tax per country	0-1	Reconciliation, note to income taxes	Exploratory	GRI 207	Voluntary		Quantitative
Balance of intra-group debt	0-1	Intra, Inter, Internal debt	Exploratory	GRI 207-4 commentary	Voluntary		Quantitative
GRI G4-S08							

Disclosure of amounts/fines/interest penalties for tax non-compliance	0-1	Fine, Penalt*, Dispute, Legal	Hardeck and Kirn (2016)	GRI G4-S08	Voluntary	Quantitative
Disclosure of legal actions/disputes pending for non-compliance with tax law	0-1	Dispute, Legal	Hardeck and Kirn (2016)	GRI G4-S08	Voluntary	Qualitative
Additional items from various milestone initiatives and sources						
All taxes paid	0-1	tax* paid	Exploratory	Australian TTC	Voluntary	Quantitative
All taxes paid/accrued by geographic location	0-1	Tax* paid, by region, by geograph*	Exploratory	/	Voluntary	Quantitative
Numerical differentiation between taxes borne and taxes collected in global terms	0-1	Borne, Collected	Hardeck & Kirn (2016)	/	Voluntary	Quantitative
Reporting numerical information on at least two other taxes besides income tax (VAT, sales, duties, withholding, must include indirect taxes)	0-1	VAT, Withholding, Payroll tax, Indirect tax*	Exploratory	Australian TTC	Voluntary	Quantitative
Textual description of tax reconciliation (90% of line items explained, important foreign jurisdictions mentioned)	0-1	Note to income taxes	Exploratory	/	Voluntary	Qualitative
Income tax expense to income tax paid reconciliation	0-1	Reconciliation, note to income taxes	Exploratory	Australian TTC	Voluntary	Quantitative

Adherence to the arm's length principle	0-1	Arm's length, ALP, OECD	Hardeck & Kirn (2016)	OECD TP guidelines, OECD MNE guidelines ch. XI	Voluntary	Qualitative
Taxes as a contribution to society	0-1	Contribut*, Group overview section	Hardeck & Kirn (2016)	OECD MNE guidelines ch. XI	Voluntary	Qualitative
Paying a fair or appropriate share of taxes	0-1	Fair share, fairness, fair (NOT fair value)	Hardeck & Kirn (2016)	OECD MNE guidelines ch. XI	Voluntary	Qualitative

Notes: This table provides an overview of the line items of the tax disclosure index, the score attributed to each item and the keywords used to search for the items in financial statements, annual reports and sustainability reports of companies in our sample. The final score is divided by the maximum score of 34.

Appendix 3.2 Variable Definitions

Appendix 3.2. Variable Definitions

Name	Definition
TAXDISC	Index score (see Appendix 3.1)
EMPRATIO	$\frac{Number\ of\ employee\ representatives\ on\ the\ board}{Total\ number\ of\ board\ memebers}$
BINARY_EMP	$Dummy\ equal\ to\ 1\ if\ employee\ representative\ is\ present\ on\ the\ board, else\ 0$
GDIVERSITY	$1-\sum_{g=1}^{n} P_g^2$ $where\ P\ is\ the\ percentage\ of\ board\ members\ in\ each\ category\ g$ $and\ n\ is\ the\ total\ number\ of\ categories.$
PCTWOMEN	$\frac{Number\ of\ female\ board\ members}{Total\ number\ of\ board\ members}$
CSR COMMITTEE	Dummy equal to 1 if the firm has a CSR committee, else 0
MORALE	Dummy equal to 1 if tax morale from World Value Survey is above the median, else 0
ENFORCEMENT	Dummy equal to 1 if tax enforcement from the World Competitiveness Report is above the m else 0
BSIZE	$Natural\ logarithm\ of\ number\ of\ board\ members$
BINDEP	$\frac{Number\ of\ independent\ board\ members}{Total\ number\ of\ board\ members}$
CEO DUALITY	Dummy equal to 1 if the CEO is both CEO and chair of the board of directors, else 0
FOWN	Percentage of shares held by the family owners
GEOGR COMPL	$1-\sum_{k=1}^{n} S_k^2$, $S\ being\ the\ fraction\ of\ subsidiaries\ in\ country\ k$ $and\ N\ is\ the\ total\ number\ of\ countries\ where\ the\ firms\ has\ subsidiaries$
ETR	Three-year IFRS effective tax rate – three-year statutory tax rate in the country
SIZE	Ln (Total assets)
ROA	$\frac{\text{Profit or loss before interst and tax}}{\text{Total assets}}$
LEV	$\frac{\text{Long term debt}}{\text{Total assets}}$
MTB	$\frac{\text{Market value assets}}{\text{Book value assets}}$
ANALYST	Ln (number of analysts following)
HAVEN	Dummy equal to 1 if the firm has a subsidiary in a tax haven according to Dyreng et al. (2015), else 0
US CROSSLISTING	Dummy equal to 1 if the firm is cross-listed on a US stock exchange, else 0

ROL	$Rule\ of\ Law\ indicator\ of\ World\ Bank\ Worldwide\ Governance\ Indicators$
ASDI	$Anti-self\ dealing\ index\ of\ Djankov\ et\ al.$ (2008)

Note: This table contains variable definitions

Appendix 3.3 Regression Results with Alternative Definition BINARY_EMP

Appendix 3.3. Regression Results with Alternative Definition BINARY_EMP						
	Model 1 alternative Poisson		Model 1 alternative OLS		OLS	Model 2
Variable	Coef.	z-value	Coef.	t-value	Coef.	t-value
BINARY_EMP	0.356***	4.13	0.056***	4.19	0.048**	2.58
	(0.086)		(0.013)		(0.019)	
GDIVERSITY	-0.349	-1.21	-0.049	-0.79	-0.036	-0.91
	(0.289)		(0.062)		(0.040)	
CSR COMMITTEE	0.119*	1.95	0.030**	2.04	0.028*	1.73
	(0.061)		(0.015)		(0.016)	
BSIZE	-0.180	-1.55	-0.037*	-1.68	-0.037**	-2.10
	(0.116)		(0.022)		(0.018)	
BINDEP	0.120	0.89	0.014	0.57	-0.026	-0.95
	(0.135)		(0.025)		(0.027)	
DUALITY	0.182***	2.62	0.033**	2.56	0.002	0.11
	(0.070)		(0.013)		(0.015)	
FOWN	-0.575**	-2.02	-0.075	-1.65	0.028	0.45
	(0.285)		(0.046)		(0.063)	
GEOGR COMPL	-0.101	-0.74	-0.018	-0.61		
	(0.135)		(0.030)			
ETR	-0.234	-1.37	-0.045	-1.30	-0.035	-1.47
	(0.171)		(0.035)		(0.024)	
SIZE	0.124***	3.66	0.026***	3.48	0.012	0.81
	(0.034)		(0.007)		(0.015)	
ROA	0.915*	1.72	0.198*	1.75	-0.046	-0.73
	(0.533)		(0.113)		(0.063)	
LEV	-0.081*	-1.70	-0.019*	-1.91	0.004	0.45
	(0.048)		(0.010)		(0.008)	
MTB	0.006	0.15	-0.001	-0.10	0.011	1.42
	(0.043)		(0.009)		(0.008)	
ANALYST	-0.016	-0.21	-0.005	-0.27	0.046***	3.04
	(0.075)		(0.017)		(0.015)	
HAVEN	-0.042	-0.49	-0.014	-0.77		
	(0.085)		(0.018)			
US CROSSLIST	-0.104	-1.56	-0.021	-1.52		
	(0.067)		(0.014)			
FIXED EFFECTS						
Country FE	YES		YES		NO	
Industry FE	YES		YES		NO	
Year FE	YES		YES		YES	
Firm FE	NO		NO		YES	
Constant	-1.231**	-2.01	-0.411***	-2.99		

	(0.613)	(0.137)	
R^2 adjusted	0.147	0.369	0.298
N	1,603	1,603	1,582

Note: This table reports results (Poisson and OLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Appendix 3.4 Regression Results with Alternative Definition PCTWOMEN

Appendix 3.4. Regression Results with Alternative Definition PCTWOMEN						
		Model 1	Model 1 alternative		Model 2 alternative	
	Poisson		OLS		OLS	
Variable	Poisson	z-value	Coef.	t-value	Coef.	t-value
EMPRATIO	1.050***	3.56	0.162***	3.35	0.164**	2.19
	(0.295)		(0.048)		(0.075)	
PCTWOMEN	-0.345	-1.45	-0.058	-1.13	-0.031	-0.94
	(0.238)		(0.051)		(0.033)	
CSR		2.10		2.18		1.86
COMMITTEE	0.129**		0.032**		0.029*	
	(0.061)		(0.015)		(0.016)	
BSIZE	-0.195	-1.60	-0.040*	-1.70	-0.038**	-2.10
	(0.121)		(0.024)		(0.018)	
BINDEP	0.130	0.94	0.014	0.56	-0.023	-0.84
	(0.138)		(0.025)		(0.028)	
DUALITY	0.195***	2.77	0.036***	2.77	-0.006	-0.39
	(0.071)		(0.013)		(0.015)	
FOWN	-0.555*	-1.92	-0.075	-1.64	0.022	0.35
	(0.289)		(0.046)		(0.063)	
GEOGR						
COMPL	-0.115	-0.85	-0.021	-0.70		
	(0.135)		(0.030)			
ETR	-0.209	-1.23	-0.041	-1.20	-0.035	-1.44
	(0.170)		(0.035)		(0.024)	
SIZE	0.123***	3.58	0.026***	3.47	0.013	0.90
	(0.034)		(0.008)		(0.015)	
ROA	0.920*	1.72	0.199*	1.76	-0.043	-0.67
	(0.534)		(0.113)		(0.063)	
LEV	-0.083*	-1.74	-0.019*	-1.95	0.004	0.50
	(0.048)		(0.010)		(0.008)	
MTB	0.007	0.17	-0.001	-0.10	0.010	1.33
	(0.043)		(0.009)		(0.007)	
ANALYST	-0.001	-0.01	-0.003	-0.15	0.045***	3.03
	(0.077)		(0.017)		(0.015)	
HAVEN	-0.026	-0.30	-0.011	-0.65		
	(0.085)		(0.018)			
US CROSSLIST	-0.117*	-1.73	-0.023*	-1.68		
	(0.067)		(0.014)			
FIXED						
EFFECTS						
Country FE	YES		YES		NO	
Industry FE	YES		YES		NO	
Year FE	YES		YES		YES	
Firm FE	NO		NO		YES	
Constant	-1.362**	-2.19	-0.433***	-3.13		

	(0.622)	(0.143)	
R^2 adjusted	0.145	0.364	0.293
N	1,603	1,603	1,582

Note: This table reports results (Poisson and OLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Appendix 3.5 Regression Results of TAXDISC without UK Finance Act 2016 Disclosures

Appendix 3.5. Regression Results of TAXDISC without UK Finance Act 2016 Disclosures						
		Model 1		Model 1		Model 2
	Poisson		OLS		OLS	
Variable	Coef.	z-value	Coef.	t-value	Coef.	t-value
EMPRATIO	1.111***	3.62	0.173***	3.77	0.172***	2.89
	(0.307)		(0.046)		(0.060)	
GDIVERSITY	-0.224	-0.85	-0.035	-0.67	-0.018	-0.54
	(0.265)		(0.052)		(0.033)	
CSR		1.41		1.52		1.91
COMMITTEE	0.077		0.019		0.022*	
	(0.055)		(0.012)		(0.012)	
BSIZE	-0.117	-1.03	-0.023	-1.09	-0.033**	-2.47
	(0.113)		(0.021)		(0.014)	
BINDEP	0.168	1.33	0.023	11.03	-0.007	-0.32
	(0.126)		(0.022)		(0.022)	
DUALITY	0.137**	2.18	0.025**	2.38	-0.007	-0.76
	(0.063)		(0.011)		(0.009)	
FOWN	-0.445*	-1.72	-0.058	-1.49	-0.024	-0.45
	(0.259)		(0.039)		(0.053)	
GEOGR						
COMPL	-0.244	-2.01	-0.047*	-1.89		
	(0.121)		(0.025)			
ETR	-0.162	-1.01	-0.030	-0.99	-0.030	-1.51
	(0.161)		(0.031)		(0.020)	
SIZE	0.124***	3.70	0.023***	3.44	0.009	0.73
	(0.034)		(0.007)		(0.012)	
ROA	1.019**	1.99	0.191*	1.91	-0.006	-0.12
	(0.512)		(0.100)		(0.051)	
LEV	-0.102**	-2.38	-0.022***	-2.75	0.000	0.01
	(0.043)		(0.008)		(0.006)	
MTB	-0.021	-0.52	-0.006	-0.81	0.009	1.40
	(0.040)		(0.007)		(0.006)	
ANALYST	-0.023	-0.30	-0.004	-0.26	0.042***	3.29
	(0.077)		(0.016)		(0.013)	
HAVEN	-0.027	-0.36	-0.006	-0.41		
	(0.074)		(0.015)			
US CROSSLIST	-0.142**	-2.27	-0.026**	-2.20		
	(0.063)		(0.012)			
FIXED						
EFFECTS						
Country FE	YES		YES		NO	
Industry FE	YES		YES		NO	
Year FE	YES		YES		YES	
Firm FE	NO		NO		YES	
Constant	-1.621***	-2.63	-0.380***	-3.32		

	(0.617)	(0.124)	
R^2 adjusted	0.112	0.381	0.278
N	1,603	1,603	1,582

Note: This table reports results (Poisson and OLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Appendix 3.6 Regression Results with ETR as Moderator

Appendix 3.6. Regression Results with ETR as Moderator						
	Poisson	Model 1	OLS	Model 1 alternative	OLS	Model 2
Variable	Coef.	z-value	Coef.	t-value	Coef.	t-value
EMPRATIO	1.066***	3.64	0.165***	3.45	0.157**	2.02
	(0.293)		(0.048)		(0.078)	
ETR	-0.809	-1.23	-0.151	-1.09	0.011	0.15
	(0.656)		(0.138)		(0.075)	
EMPRATIO * ETR	0.596	0.55	0.124	0.69	0.263**	2.17
	(1.091)		(0.179)		(0.121)	
GDIVERSITY	-0.366	-1.28	-0.056	-0.91	-0.037	-0.94
	(0.286)		(0.062)		(0.039)	
GDIVERSITY * ETR	1.309	0.79	0.226	0.63	-0.175	-0.78
	(1.661)		(0.361)		(0.224)	
CSR COMMITTEE	0.127**	2.06	0.032**	2.16	0.028*	1.89
	(0.062)		(0.015)		(0.015)	
CSR COMMITTEE * ETR	0.064	0.18	0.017	0.19	-0.049	-0.78
	(0.363)		(0.093)		(0.063)	
BSIZE	-0.186	-1.55	-0.039*	-1.67	-0.037	-1.93
	(0.120)		(0.024)		(0.018)	
BINDEP	0.122	0.86	0.012	0.48	-0.029	-0.74
	(0.141)		(0.026)		(0.028)	
DUALITY	0.196***	2.77	0.036***	2.73	-0.004	-0.67
	(0.071)		(0.013)		(0.016)	
FOWN	-0.571**	-1.98	-0.079*	-1.72	0.023	0.54
	(0.288)		(0.046)		(0.064)	
GEOGR COMPL	-0.109	-0.80	-0.019	-0.64		
	(0.136)		(0.030)			
SIZE	0.123***	3.61	0.026***	3.49	0.014	0.96
	(0.034)		(0.008)		(0.015)	
ROA	0.941*	1.76	0.206*	1.81	-0.039	-0.74
	(0.535)		(0.114)		(0.062)	
LEV	-0.083*	-1.73	-0.019*	-1.91	0.004	0.37
	(0.048)		(0.010)		(0.008)	
MTB	0.007	0.15	-0.001	-0.13	0.011	1.39
	(0.043)		(0.009)		(0.007)	
ANALYST	-0.001	-0.01	-0.002	-0.14	0.046	3.05
	(0.076)		(0.017)		(0.015)	
HAVEN	-0.031*	-0.35	-0.012	-0.69		
	(0.086)		(0.018)			

US CROSSLIST	-0.118*	-1.74	-0.023*	-1.69	
	(0.067)		(0.014)		
FIXED EFFECTS					
Country FE	YES		YES		NO
Industry FE	YES		YES		NO
Year FE	YES		YES		YES
Firm FE	NO		NO		YES
Constant	-1.354**	-2.19	-0.430***	-3.13	
	(0.618)		(0.137)		
R^2 adjusted	0.145		0.364		0.299
N	1,603		1,603		1,582

Note: This table reports results (Poisson and OLS). All accounting variables have been winsorized at the 5% and 95% percentiles. Standard errors are clustered at the firm level and reported between parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Chapter 4 Shapley Value for Tax Audit Data Valuation

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Abstract: Tax authorities have access to unprecedented levels of information on taxpayers. However, these vast amounts of data lead to new challenges, with tax authorities running the risk of being overwhelmed by the enormous amount of incoming data. We present and apply a valuation technique to quantify the value of features to predict successful tax audits. Our approach, rooted in the game-theoretical Shapley value, effectively assigns importance to features derived from various Directives on Administrative Cooperation within the European Union and the Organization for Economic Co-operation and Development's automatic exchange of information. We show that our results can be used for global explanations of the predictive model, feature selection and determining which data should be acquired or cleaned with priority, similar to active feature acquisition. Our results can assist tax authorities in managing the large amounts of data they receive under different disclosure regulations.

Keywords: OR in Government; Decision Support Systems; Data Valuation; Shapley Value; Digital Transformation of Tax Administrations[13]

[13] Abbreviations: Directive on Administrative Cooperation (DAC), Exchange of Tax Rulings (ETR)

4.1 Introduction

Over the last decades, many different regulations and agreements concerning tax disclosures and the exchange of information for tax purposes have emerged. The exchange of information has been increasingly important in the fight against tax avoidance and evasion since its introduction in the Organization for Economic Co-operation and Development's (OECD) Model Tax Convention in 1963. Milestone initiatives like the Global Forum on Transparency and Exchange of Information for Tax Purposes in 2000 promoted the exchange of information on request and the automated exchange of information. In light of this, the European Union (EU) adopted Directive 2011/16/EU of 15 February 2011, which established the legal basis for administrative cooperation in the field of direct taxation in the EU. The scope of the original directive has been expanded multiple times with new types of data, to strengthen the administrative cooperation among tax authorities of EU Member States. The series of directives are commonly known as the Directives on Administrative Cooperation (DACs).

Agreements on the exchange of information go well beyond the EU directives, however. Many countries support bilateral agreements with one another to establish similar information flows. The OECD also supports the exchange of information between tax authorities, with the automatic exchange of information as one of the main pillars. As a direct consequence, however, tax authorities have witnessed an explosion in the amount of information they receive from taxpayers. Tax authorities do not only receive data from taxpayers in their jurisdiction, but they also receive related information from other jurisdictions under the exchange of information provisions.

The growth in information poses a challenge for tax authorities, who run the risk of being overwhelmed by the enormous quantities of data received. The public sector is under pressure to adapt its institutional structures to new forms and large quantities of data (Janssen, Konopnicki, Snowdon, & Ojo, 2017). Past literature documented that the public sector might lag behind the private sector when it comes to being ready for big data (Klievink, Romijn, Cunningham, & de Bruijn, 2017). While the public sector may technically be capable of using big data, they might not fully capture the potential and added value that the use of big data could bring to their organization (Klievink et al., 2017). Beyond individual skills, public institutions need the capacity to process information by employing additional staff and building up standard operating procedures (Dunleavy, 2006). This leads to capacity bottlenecks, which are prevalent in various domains of the public sector (Giest, 2017). Indeed, a key finding from the European Commission in report COM/2017/0781 is that tax authorities' capacity to handle data has not increased at the same rate as the amount of data they receive. This could imply that tax authorities become less effective in exploiting and verifying this information, causing costs for tax authorities and taxpayers who are confronted with less efficient tax authorities.

Knowing which data is valuable could help tax authorities identify and filter out relevant information, and allow them to make informed decisions on which data sources they should invest in.

To tackle these issues, our research aims to develop a valuation technique to determine the value of tax disclosures. More specifically, we try to value data received under the automated exchange of information by tax authorities to see which data is the most valuable to predict successful tax audits. We define a successful tax audit as an audit that resulted in an amendment in a taxpayer's declaration resulting in additional revenue collections by the tax authorities. Our valuation method is based on the theoretically sound Shapley value. Shapley values are a concept borrowed from cooperative game theory and are widely applied in machine learning given their interesting properties for valuing data (Lundberg & Lee, 2017; Strumbelj & Kononenko, 2010). Shapley values measure the marginal contribution each variable of each observation makes to the performance or prediction of the machine learning model. From this point on, we will refer to 'variables' as 'features' and to 'observations' as 'instances' to be in line with the literature on data science, machine learning and AI.

Implementing the Shapley value to value features is not straightforward. The calculation of the Shapley value is computationally expensive, meaning that a large amount of computational power and time is needed to come to a solution. This is because, as the number of features to be valued increases, the number of necessary calculations to come to the Shapley value increases exponentially. Therefore, we adapt existing sampling-based approaches from Castro et al. (2009) and Castro et al. (2017) to calculate Shapley values and apply these approaches to the feature valuation context to make our methods computationally tractable. Our paper was developed in parallel with Wu, Jia, Lin, Huang, and Chang (2023), who apply a similar stratified sampling valuation method to instances. Our research is different in that we aim to determine the value of features, not of instances. We also put more focus on the practical applicability of our method by benchmarking our selection and sample experiments against existing methods.

Our methods can be used to value tax disclosures and tax data, especially when features are correlated. Past research has ignored this issue when examining tax disclosures (Guenther et al., 2023). The specific results of our analysis can assist tax authorities in managing large quantities of data and increase efficiency in selecting audits with a higher chance of generating additional revenue. Our results show which features contribute to the performance of the predictive models the tax authorities use, show which data should be acquired or quality-checked with priority, show which data should get priority in the data cleaning process and show which data should be disseminated to other departments of the tax authorities. To the best of our knowledge, we are the first study to attribute value to data tax authorities receive under the automatic exchange of information regulations of the

EU and OECD. We use the information generated by the algorithm to provide evidence about exactly which features can predict successful tax audits. Furthermore, our paper contributes to the literature by showing the valid application of the algorithms described in Castro et al. (2009) and Castro et al. (2017) in a real-world setting, and shows that these methods can be used for a variety of purposes. Our paper also contributes to the broader literature on data science-based assistance tools for increasing the efficiency of tax authorities (e.g. Höglund, 2017; Savić, Atanasijević, Jakovetić, & Krejić, 2022; Wu, Ou, Lin, Chang, & Yen, 2012). While the data and specific results are confidential, our results can help tax authorities inform regulatory authorities and governments on the relevance of certain tax disclosures for successful tax audit prediction. This paper describes the result of a collaboration between the University of Antwerp and the department "Large Enterprises" of the Federal Tax Authorities of Belgium.

4.2 Related Work

The data mining literature on tax audits and value attribution is relatively scarce. We therefore also refer to research from the field of tax fraud, and other fields unrelated to tax but following similar approaches to ours. The notion of value is central to our research. We define value as the impact a feature has on model performance. "Impact" should be understood broadly, both in terms of the magnitude of a feature's predictive power and the presence of the feature in the dataset. It could namely be that a feature exhibits very high predictive power, but appears only a handful of times in the entire dataset. To illustrate why this might be an issue, consider the following fictitious example: a niche industry only appears three times in the entire dataset, yet membership in this industry is very indicative of the need for a tax audit. The feature containing information on membership to this industry would exhibit high predictive power. Because the feature appears only three times in the dataset, it can rarely be used to classify an instance in the right category, however. Its impact is thus rather limited. A good valuation method should consider both predictive power and appearance, as a feature with high predictive power and high occurrence should be marked as more valuable than a feature with equal predictive power but lower occurrence (Moeyersoms, d'Alessandro, Provost, & Martens, 2017). In our research, features are evaluated on their impact on the performance metrics of a predictive model. This impact can be positive as well as negative.

The general use of value attribution methods in machine learning is widespread. Feature selection, data valuation and providing explanations for black-box models all rely on some form of value attribution. In the explanations of black-box models, a distinction can be made between global and local explanation methods. In this research, we will focus on the former.

4.2.1 Global Feature Explanations

The goal of global explanation methods is to provide users of predictive models with an overview of the predictive power of each individual feature in the predictive model. The relevance of global explanations originates from the need to trust model predictions and the need to gain insight into the problem domain. Knowledge extracted from data is often only useful when people understand and trust the model applied (Van Assche & Blockeel, 2007). Global feature explanation methods can help a user understand the role of the features across the entire model and dataset (De Bock et al., 2023). Features can thus be ranked on their importance and contribution towards the final predictions of the model. Global explanations convey information about the features' general impact in the model but do not explain why an individual instance received a certain classification as local importance methods do. Several studies in the tax fraud domain rely on global explanations and feature importance rankings for fraud detection (e.g. Basta et al., 2009; González & Velásquez, 2013; Gupta & Nagadevara, 2007). For example, González and Velásquez (2013) show by using global explanation methods on a neural network for false invoice detection that the main predictive power of the network stems from variables associated with the payment of VAT and to a lesser extent variables associated with income. Similarly, Vanhoeyveld, Martens, and Peeters (2020) calculated ratios based on VAT declaration information and were able to rank these ratios based on their predictive power for fraud detection for each company.

4.2.2 Feature Selection

Related to global feature explanations is feature selection. Feature selection attributes importance scores to features based on the feature's performance in the model. These importance scores can then be used to evaluate the features' impact on the model. This way, low-impact features can be removed to make large-scale problems computationally efficient. Feature selection can also be used to improve classification accuracy or to reduce the amount of training data needed to achieve a desired level of performance (Forman, 2003). Feature selection can thus be regarded as a way to value features according to their importance to the predictive model (Forman, 2003). In a tax setting, Hsu, Pathak, Srivastava, Tschida, and Bjorklund (2015) present a case study to examine the use of data mining techniques in audit selection for tax authorities. They use feature selection techniques to determine the predictive power of feature subsets, and subsequent consultations with tax domain experts were held to discuss whether low-scoring features should be kept or discarded. It is unclear however how the feature subsets were determined, and they provide little theoretical reasoning for the feature selection technique used. Matos et al. (2020) developed a new feature selection algorithm specifically for a tax fraud detection context. After applying feature selection, they show significantly improved performance of fraud prediction algorithms.

4.2.3 Active Feature Acquisition

Another setting in which determining the value of data can be useful, is active feature acquisition. The idea behind active feature acquisition is based on active learning, where the goal is to obtain new data that will improve model performance the most with a limited budget. In the context of active feature acquisition, modelers are confronted with missing data on features. As such, the feature itself is present in the dataset, but has missing values for several instances. These missing values can be acquired at a cost. Given that data acquisition can be costly, only acquiring the most valuable data will reduce the amount of resources needed to come to a well-performing model. Whereas feature selection focuses on which features should be kept or discarded altogether in the model, active feature acquisition focuses on determining for which instances it is most interesting to acquire 'complete' feature information (Melville, Saar-Tsechansky, Provost, & Mooney, 2004; Saar-Tsechansky, Melville, & Provost, 2009; Zheng & Padmanabhan, 2002). Active feature acquisition can be of importance for both model building as well as model usage (Provost, Melville, & Saar-Tsechansky, 2007). In the building phase, data on missing features can be acquired to improve model performance. For example, acquiring new feature data on misclassified instances can allow the model to learn new patterns to avoid such misclassification in the future (Melville et al., 2004; Saar-Tsechansky et al., 2009). In the model usage phase, active feature acquisition techniques have been successfully implemented to determine which missing feature data of a test case should be acquired, and in which order they should be acquired to minimize the cumulative cost of misclassifications and acquisition costs (Sheng & Ling, 2006).

4.3 Data and Methods

The Belgian tax authorities provided us with a unique and fully anonymized dataset containing reports that certain large companies must provide under different reporting regulations. The first data source is the local file and forms part of transfer pricing documentation. The local file contains detailed information relating to specific material intercompany transactions.[14] The second data source is the information received under BEPS 5 and directive 2015/2376/EU, better known as DAC 3. Under these regulations, tax rulings and advanced pricing agreements are exchanged between different tax authorities. As a simplification for the sake of readability, we refer to the data received under both DAC 3 and BEPS 5 as TRE (Tax Rulings Exchange). The third data source is the information received under directive 2018/822/EU, better known as DAC 6. Under this directive, intermediaries and/or

[14] Art. 321/5, § 4 Belgian Income Tax Code and Royal Decree of 28.10.2016

taxpayers must report certain cross-border arrangements when they satisfy certain characteristics. Even though the data itself is private, the contents of all types of reports are public knowledge as XML schemes to file these reports are available on the website of the Belgian Tax authorities. We will therefore briefly discuss the content, shape and characteristics of this data.

Table 4.1 Fictitious Example of the Different Types of Data Occurring in this Study for the Local File

Identity	Continuous	Discrete (<100 categories)					Discrete (>100 categories)	Label
Taxpayer pseudo-ID	Turnover cross-border goods	Country cross border goods 1	Country cross border goods 2	Country cross border goods x	Activity	Transfer pricing method	Industry (NACEBEL code)	
ID_1	9,876,543	BE	CZ	NL	Limited risk distributor	CUP	64200	1
ID_2	1,000	BE	/	/	Fully Fledged	TNMM	46699	0
ID_3	/	/	/	/	Contract distributor	Cost plus	70100	1
⋮	⋮	⋮	⋮		⋮	⋮		⋮
ID	65,812	BE	IE	CA	Fully fledged	TNMM	14140	0

For each taxpayer in a Local file report, the data is characterized by the type of cross-border transaction, as well as several discrete attributes (e.g. the country of the relevant taxpayer and the country or countries involved parties, the transfer pricing method used, the activity of the taxpayer, …). For a subset of taxpayers, we know the label as they were audited by the tax authorities. The label indicates whether the tax audit was successful (1) or not (0)

4.3.1 Local File

The local file is part of transfer pricing documentation that companies who are part of multinational enterprises must provide to tax authorities. Transfer pricing can roughly be understood as the prices divisions within a (multinational) company charge when selling goods or services to other divisions of the same company. It is easy to see that when no restrictions on the pricing are imposed, multinational companies can let divisions in low-tax jurisdictions charge high prices to divisions in high-tax jurisdictions, reducing the profits in the high-tax jurisdiction and increasing profits in the low-tax jurisdiction. The multinational would gain an advantage by letting the profits be taxed at lower rates, increasing the total profits after tax. To constrain such practices, transfer prices must adhere to the arm's length principle written in Article 9 of the OECD model convention. The arm's length principle roughly states that the transfer prices should be set as if the divisions involved are not part of the same company, but rather are independent parties. The goal of the local file is thus to identify and

report relevant related party transactions, the amounts involved in those transactions and the transfer pricing determinations made by the taxpayer about those transactions for each country (OECD, 2014).

Table 4.2 Fictitious Example of the Different Types of Data Occurring in this Study for TRE

Identity	Continuous	Discrete (<100 categories)					Label
Taxpayer pseudo-ID	Transaction amount	Ruling type	Taxpayer country	Affected entity country 1	Affected entity country 2	Affected entity country x	
ID_1	1,234,567	TRE602	BE	BE	NL	…	1
ID_2	9,876	TRE601	GB	BE	/	…	0
ID_3	/	TRE606	CZ	AU	BE	…	1
⋮	⋮	⋮	⋮	⋮	⋮		⋮
ID	65,812	TRE609	IE	GB	IT	BE	0

For each taxpayer in a TRE report, the data is characterized by the amount of the ruling (if applicable), as well as several discrete attributes (e.g. the ruling type, the country of the relevant taxpayer and the country or countries of the affected entities). For a subset of taxpayers, we know the label as they were audited by the tax authorities. The label indicates whether the tax audit was successful (1) or not (0)

The local file is used to ensure taxpayers' compliance with the arm's length principle in its material transfer pricing positions within a specific jurisdiction (OECD, 2014).

The local file describes the management and shareholder structure of the local entity in the jurisdiction, as well as the activities and principal competitors of the local entity. Additionally, summaries of the material controlled transactions (e.g. procurement of manufacturing services, purchase of goods, provision of services, loans, …) and the context in which such transactions take place must be reported. The method used to determine the transfer price must also be communicated. All material controlled transactions must be broken down by the tax jurisdictions involved (OECD, 2014). The full requirements and details of the local file can be found in Annex II to Chapter V of the Guidance on Transfer Pricing Documentation and Country-by-Country Reporting (OECD, 2014). A fictitious example of selected data from the local file can be found in Table 4.1.

4.3.2 TRE

DAC 3 and BEPS 5, taken together as "TRE" concern the exchange of cross-border tax rulings and advance pricing agreements. A cross-border tax ruling is a confirmation or assurance that tax authorities give to taxpayers on how their tax will be calculated in a cross-border situation. This cross-border situation can involve more than two jurisdictions. Importantly, the confirmation must be given before the action on which the taxpayer wants assurance takes place. Similarly, an advance pricing arrangement determines the appropriate set of criteria between group companies for the

determination of transfer prices upfront. The most important information that needs to be exchanged under TRE is a summary of the transactions, start date and period of validity of the tax ruling and the identification of all other involved jurisdiction(s) or persons in the other jurisdiction(s), other than natural persons, likely to be affected by the tax ruling. Full information can be found in Directive 2015/2376/EU and BEPS Action 5. A fictitious example of selected data from the TRE can be found in Table 4.2.

4.3.3 DAC 6

DAC 6 originates from a call from the European Parliament for tougher measures against intermediaries, such as lawyers and accountants who assist taxpayers in setting up arrangements that may lead to tax avoidance and evasion[15]. Under DAC 6, intermediaries and taxpayers must report details of cross-border arrangements that contain at least one of the hallmarks set out in Annex IV of Directive 2018/822/EU. These hallmarks can be understood as certain characteristics of the arrangement that present an indication of a potential risk of tax avoidance. The goal is thus to gather and exchange information on arrangements made by taxpayers that have a high perceived risk of tax avoidance. The main information that needs to be reported is the amount of the arrangement, the hallmark(s) it satisfies and the parties involved in the arrangement. Full information can be found in Directive 2018/822/EU. A fictitious example of selected data from DAC 6 can be found in Table 4.3.

4.3.4 Class Labels

The Belgian tax authorities also provided us with a dataset on which tax audits led to an amendment in the taxpayers' declarations, and thus resulted in additional revenues for the tax authorities. We attach a label to each taxpayer that indicates whether the tax audit they underwent was successful (1) or not (0). Note that this does not mean that the taxpayer committed fraud. Any amendment made after a tax audit is included in our data, and no distinction can be made between an error correction or fraud. In addition, we only have data on companies that have been audited. This could introduce a possible selection bias in the data. The results of the analyses must thus be interpreted in this light.

Local file and TRE data are observed as of 2017, and DAC 6 data is observed as of 2018. Data on both successful and unsuccessful tax audits is observed for 2021 and 2022. We only use data available preceding a tax audit, as data received past the audit should naturally not be predictive of the audit itself. In this research, the goal is to quantify the predictive value of the features used in the predictive model to predict successful tax audits for each data source. The features in our models consist of the

[15] See the preamble of Council Directive 2018/822/EU

data taxpayers have to provide the tax authorities under the TRE, DAC 6 and local file regulations, and the instances are the taxpayers themselves. The data consists of discrete features and continuous features, as well as high-cardinality features[16]. As the main focus of our research is the attribution of value, we assume that the predictive model is given for the different data sources and that this is the best possible model the data science team could find. We thus do not focus on model building itself. Instead, we use off-the-shelf methods to create predictive models for each data source with satisfactory performance.

Table 4.3 Fictitious Example of the Different Types of Data Occurring in this Study for DAC 6

Identity	Continuous	Discrete (<100 categories)			Label
Taxpayer pseudo-ID	Hallmark amount	Hallmark type	Associated taxpayer country	Relevant taxpayer country	
ID_1	191,523	DAC6C1c	US	CH	1
ID_2	52,002,540	DAC6A3	NL	GB	0
ID_3	0	DAC6E3	/	CZ	0
⋮	⋮	⋮	⋮	⋮	⋮
ID	2,415,091	DAC6C1bii	AE	MT	1

For each taxpayer in a DAC 6 report, the data is characterized by the amount of the arrangement, as well as several discrete attributes (e.g. the type of hallmark, the country of the relevant taxpayer and the country of the associated taxpayer if one is present in the arrangement). For a subset of taxpayers, we know the label as they were audited by the tax authorities. The label indicates whether the tax audit was successful (1) or not (0)

4.3.5 Shapley Value for Value Distribution

A popular way to attribute importance to features or data points is to use the Shapley value from cooperative game theory (Cohen, Dror, & Ruppin, 2007; Covert, Lundberg, & Lee, 2020). As described in this section, the Shapley value exhibits many desirable properties in a valuation setting. Originally, the goal of the Shapley value was to distribute the value of a cooperative game to all players of this game fairly (Shapley, 1953). Linking game theory to machine learning, many machine learning problems can be understood as cooperative games: A set of features or data points cooperates in a learning algorithm to achieve a certain outcome. This outcome can be overall model performance or an individual prediction, depending on the goal of the modeler. In our research setting, the outcome is overall model performance. The Shapley value can thus be applied to attribute the performance of

[16] Following Moeyersoms and Martens (2015), we deem a feature to be of high-cardinality when it has more than 100 different categories.

the predictive model back to the features or data points used in the predictive model. To understand the Shapley value and its properties, we follow the extant literature (e.g. Castro et al., 2009; Hsu et al., 2015; Moeyersoms et al., 2017) by defining some core concepts, before we present the definition of the Shapley value:

1. N is the complete set of players or grand coalition, with cardinality $\|N\| = n$
2. S is a subset of players, with $\|S\| = s$ and $S \subset N$
3. $v(S)$ is a value function that represents the total utility (= predictive power) set S generates when playing the game
4. $v(S \cup \{i\}) - v(S)$ is the marginal utility of adding player i to a set S.

The definition of the Shapley value for player i is the following (Shapley, 1953):

$$\varphi_i = \sum_{S \subset N\ i \notin S} \frac{(n-s-1)!\,s!}{n!}\big(v(S \cup \{i\}) - v(S)\big), i = 1, \dots, n.$$

The Shapley value can thus be understood as the average marginal utility a player contributes to every possible subset of players of the grand coalition N. In our setting, Shapley values can be calculated by starting with a particular permutation of the full model with all features and successively removing features one by one. As each feature is removed, the change in model performance represents that feature's marginal contribution to that permutation. All permutations are considered equally probable, making the Shapley value equal to the feature's average marginal contribution over all permutations of the model (Belnap, Hoopes, & Wilde, 2024). As stated before, the Shapley value can be used to allocate the total model performance back to each feature in a "fair" and unique manner. "Fair" is defined as the satisfaction of several axioms that are desirable in a valuation setting, three of which are necessary to come to a unique solution (Shapley, 1953). These are the symmetry property (1), the efficiency property (2) and the additivity property (3). Let's again consider the complete set of players N and a subset of these players $S \subset N$. The Shapley value is denoted by φ:

1. Symmetry property: If the contribution of adding player i to a subset S is always the same as adding player j to the same subset S, then i and j should receive the same value. If $v(S \cup i) = v(S \cup j)$ for every $S \subset N$ then $\varphi_i(v) = \varphi_j(v)$.
2. Efficiency property: The Shapley value represents a complete distribution of the total value of the game $\sum_{i \in N} \varphi_i(v) = v(N)$. All value of the game is distributed back to the players.
3. Additivity property: When two independent games are combined, the values must be added player by player $\varphi_i(v) + \varphi_i(w) = \varphi_i(v + w)$

A fourth useful property but one which is not required to come to a unique solution is the dummy property:

4. Dummy property: A player who does not contribute to any coalition should get a score of zero. If $v(S \cup i) - v(S) = 0$ for every S ⊂ N then $\varphi_i(v) = 0$

Due to these properties, the Shapley value tends to outperform importance scores based on a single element like leave-one-out scores in correctly valuing data (Cohen et al., 2007; Keinan, Sandbank, Hilgetag, Meilijson, & Ruppin, 2006). Additionally, since one examines the marginal contribution of a feature to every possible subset of features, the Shapley value takes interactions between features into account when attributing importance scores. This gives the Shapley value another edge over single element-based scores (Strumbelj & Kononenko, 2010).

It can be mathematically proven that the Shapley value is the only value that contains all these properties (see Shapley (1953) for more details). Interestingly, many distribution schemes based on the Shapley value are model-agnostic and can thus be applied to every model type. While the Shapley value offers very interesting properties for valuation purposes, the major drawback is its computational complexity. To calculate the Shapley value exactly, it is necessary to calculate 2^n possibilities, which leads to computationally intractable solutions quickly when the number of features in N increases. Therefore, approximation methods are proposed.

4.3.6 Monte Carlo Sampling

One way to approximate the Shapley value is to obtain an unbiased estimate of its value through Monte Carlo sampling (Castro et al., 2009). To see how this works, it is useful to rewrite the Shapley value as the sum of adding feature i to every possible order O of magnitude n:

$$\sum_{O \in \pi(N)} \frac{1}{n!} \left(v\left(Pre^i(O) \cup \{i\}\right) - v(Pre^i(O)) \right), i = 1, \dots, n.$$

Where π is the set of all possible orders O of n features. The Shapley value can thus be obtained by listing all possible orders in which the features can enter the coalition and calculating the marginal contribution of adding the feature of interest to the preceding features in all those orders. This formulation of the Shapley value lends itself well to a sampling-based approach. One can sample from a uniform distribution of orders in which the features participate in the coalition, and calculate the marginal contributions of the features in those orders to obtain unbiased estimates of the Shapley value (Castro et al., 2009).

We adapt the Monte Carlo sampling approach to a new context: valuing features. Specifically, we can train a predictive model on each sampled order and evaluate the model's performance. Then, we can add the feature of interest i to this order. Subsequently, we can retrain the model with feature i included, allowing us to calculate its marginal contribution to the model's performance in this order.

As the number of sampled orders approaches infinity, this estimation technique converges to the exact Shapley value.

This Monte Carlo sampling approach can further be optimized by bounding the sampling error based on the theoretical variance (Maleki, Tran-Thanh, Hines, Rahwan, & Rogers, 2013) and by stratified sampling based on the position of the feature in the orders (Castro et al., 2017; Maleki et al., 2013). We follow both the original sampling algorithm (Castro et al., 2009)[17] as well as the two-step approach presented by Castro et al. (2017). In this two-step approach, samples are taken with each feature appearing on every ordinal position in a random order, i.e. a stratum. When two or more samples per stratum are taken, variances of the estimation in the stratum can be calculated. The second step takes additional samples of the stratum based on the variance of the stratum determined in the previous step. The larger the variance in a stratum, the more sampling will be done for that stratum to reduce the variance, and thus come to a more precise estimate of the Shapley value. The original sampling algorithm and the two-step sampling approach are represented in Algorithm 1 and Algorithm 2 respectively.

Monte Carlo estimations can be calculated in polynomial time, assuming that the marginal contribution can be calculated in polynomial time as well (Castro et al., 2009). While Monte Carlo sampling can greatly reduce the computational burden, some problems are still too large to be computed efficiently. One solution is parallel processing, as the sampling procedure can easily be done on multiple cpu's. In addition, logically grouping features into higher-level meta-features to reduce the number of features could also provide a solution (Chen, Zhang, Zhang, & Duan, 2016; Ghorbani & Zou, 2019; Kim et al., 2018). When groups are chosen logically and/or based on domain knowledge, calculations become feasible without sacrificing the interpretability of the results. For example, dummies belonging to a single categorical variable can be grouped and added to the model all at once, which leads to a valuation of the entire categorical variable instead of a single dummy. In settings where determining the value of each single dummy is not required or even undesirable, such an approach can be preferable.

Several other approaches to estimating Shapley values also exist, such as Shapley Additive Global Explanations (SAGE) (Covert et al., 2020), which is a method based on Shapley Additive Explanations (SHAP) (Lundberg & Lee, 2017). Both SAGE and SHAP methods do not rely on retraining the model but

[17] Note that we implement the efficiency improvements made by Song, Nelson, and Staum (2016) to the original algorithm in Algorithm 1.

treat missing features as random variables to approximate the different orders in which features could appear in the model. Specifically, these features are sampled from a 'background' dataset, which usually corresponds to the training dataset (Molnar et al., 2022). As a consequence, the interpretation of the results from the SAGE method differs slightly from the classic Shapley value interpretation that we use in our estimation technique. SAGE results should be interpreted as each feature's average contribution to the overall model's predictions across an entire dataset in relation to sampled data points. The SAGE method is computationally even more efficient than Monte Carlo sampling, however, it rests on the assumption that all features are independent. In practice, this assumption is often violated. Variations of this technique taking into account feature dependence can solve this issue by sampling from the conditional distribution of the features, however rests on the assumption that a feature's conditional distribution can be approached reasonably well. These techniques are known to violate for example sensitivity (i.e. attributing value to features that should not have received value) (Molnar et al., 2022)

Algorithm 1: ApproShapley (Castro et al., 2009)

Inputs:

m = desired sample size

$\varphi_i \coloneqq 0, \forall\, i \in N$

Tracker:=0

While *Tracker*<m:

Take $O \in \pi(N)$ with probability $1/n!$

$v\left(Pre^i(O)\right)$:= base performance classifier

For all $i \in N$

Calculate $v\left(Pre^i(O) \cup \{i\}\right) \coloneqq performance\ of\ model\ with\ features\ 0, \dots i$

Calculate $x(O)_i = v\left(Pre^i(O) \cup \{i\}\right) - v\left(Pre^i(O)\right)$

$\varphi_i \coloneqq \varphi_i + x(O)_i$

$v\left(Pre^i(O)\right) \coloneqq x(O)_i$

Tracker := *Tracker* + 1

$\varphi_i \coloneqq \frac{\varphi_i}{m}, \forall\, i \in N$

Algorithm 2: Two-step ApproShapley (Castro et al., 2017)

Inputs:

m = desired sample size

$\varphi_i \coloneqq 0, \forall\, i \in N$

$P_l^i = stratum\ of\ feature\ i\ appearing\ on\ place\ l$

For all $l = 1, \dots, n$ and $i = 1, \dots, n$

$m_{il}^{exp} \coloneqq \frac{m}{2n^2}$

$Tracker\_l \coloneqq 0$

$Sum\_quad\_l \coloneqq 0$

While $Tracker\_l < m_{il}^{exp}$:

Take $O \in P_l^i$ with probability $1/(n-1)!$

Calculate $v\big(Pre^i(O)\big) \coloneqq performance\ of\ model\ with\ features\ 0, \dots i-1$

Calculate $v\big(Pre^i(O) \cup \{i\}\big) \coloneqq performance\ of\ model\ with\ features\ 0, \dots i$

Calculate $x(O)_i = v\big(Pre^i(O) \cup \{i\}\big) - v\big(Pre^i(O)\big)$

$\varphi_i^l \coloneqq \varphi_i^l + x(O)_i$

$Sum\_quad\_l \coloneqq Sum\_quad\_l + {x(O)_i}^2$

$Tracker\_l \coloneqq Tracker\_l + 1$

$s_{il}^2 \coloneqq \frac{1}{({m_{il}}^{exp} - 1)} (Sum_{quad_l} - \frac{(\varphi_l^i)^2}{{m_{il}}^{exp}})$

Calculate $m_{il}^{st} = m_{il} - m_{il}^{exp}$ with $m_{il} = m \frac{s_{il}^2}{\sum_{i=1}^n \sum_{k=1}^n s_{ik}^2}$

For all $l = 1, \dots, n$ and $i = 1, \dots, n$

$Tracker\_l \coloneqq 0$

While $Tracker\_l < m_{il}^{st}$:

Take $O \in P_l^i$ with probability $1/(n-1)!$

Calculate $v\big(Pre^i(O)\big) \coloneqq performance\ of\ model\ with\ features\ 0, \dots i-1$

Calculate $v\big(Pre^i(O) \cup \{i\}\big) \coloneqq performance\ of\ model\ with\ features\ 0, \dots i$

Calculate $x(O)_i = v\big(Pre^i(O) \cup \{i\}\big) - v\big(Pre^i(O)\big)$

$\varphi_i^l \coloneqq \varphi_i^l + x(O)_i$

$Tracker\_l \coloneqq Tracker\_l + 1$

$\varphi_i^l \coloneqq \frac{\varphi_i^l}{m_{il}^{exp} + m_{il}^{st}}$

$\varphi_i^{st,opt} \coloneqq \frac{1}{n} \sum_{l=1}^n \varphi_i^l$ for all $i = 1, \dots, n$

4.4 Experimental Setup

By applying the techniques described in section 4.3, we aim to determine the predictive value of the different features in the TRE, DAC 6 and local file reports to predict successful tax audits. As stated before, we assume the predictive model is given, so we use off-the-shelf methods from Scikit-learn as predictive models. For the data on the local file, we train a random forest classifier. For the data on TRE, we use a non-linear support vector machine. Hyperparameters are tuned based on a held-out

validation set. The minimum number of samples in a leaf for the random forest is 3, the regularization parameter C for the support vector machine is 32, the gamma parameter for the support vector machine is 1 and the chosen kernel is radial basis function. Other hyperparameters are left at their default values. For the data on DAC 6, we used a decision tree and a logistic model, where no further tuning was done because performance was already satisfactory. We use a logistic model to compare the ranking of the logistic model's coefficients to the Shapley values obtained by the estimation techniques. The DAC 6 data is the only data where this is possible, given that logistic regression requires categorical variables to be split into separate categories, resulting in several hundred or even thousand variables for TRE and the local file. We use an 80%-20% train-test split for all datasets and use 20% of the training set for validation purposes. To avoid obtaining results specific to the train-test split, we average our results over ten different train-test splits.

To evaluate the performance of our model, we choose the Area Under the Curve (AUC) as a performance metric. However, any other performance metric can be used. We divide the difference between the observed AUC of the model compared to the baseline AUC value of 0.5 over the different features. For the TRE and DAC 6 reports, we can benchmark the approximations with the exact Shapley value since the dataset only consists of thirteen features and seven features respectively before splitting up the categorical variables. The local file consists of 100+ features so we will only be able to use approximation techniques. We are able, however, to group the features into logical meta-features based on the XML-categories and domain knowledge, resulting in 82 features. This reduces the dimensionality substantially, and thus also the number of samples needed to achieve accurate estimations. Note that we still use the original features as inputs in the model for the estimation instead of using a combined factor, but the Shapley value is calculated for the meta-feature (i.e. the group). The sampling approaches are based on 10,000 samples for TRE and DAC 6, and 40,000 for the local file.

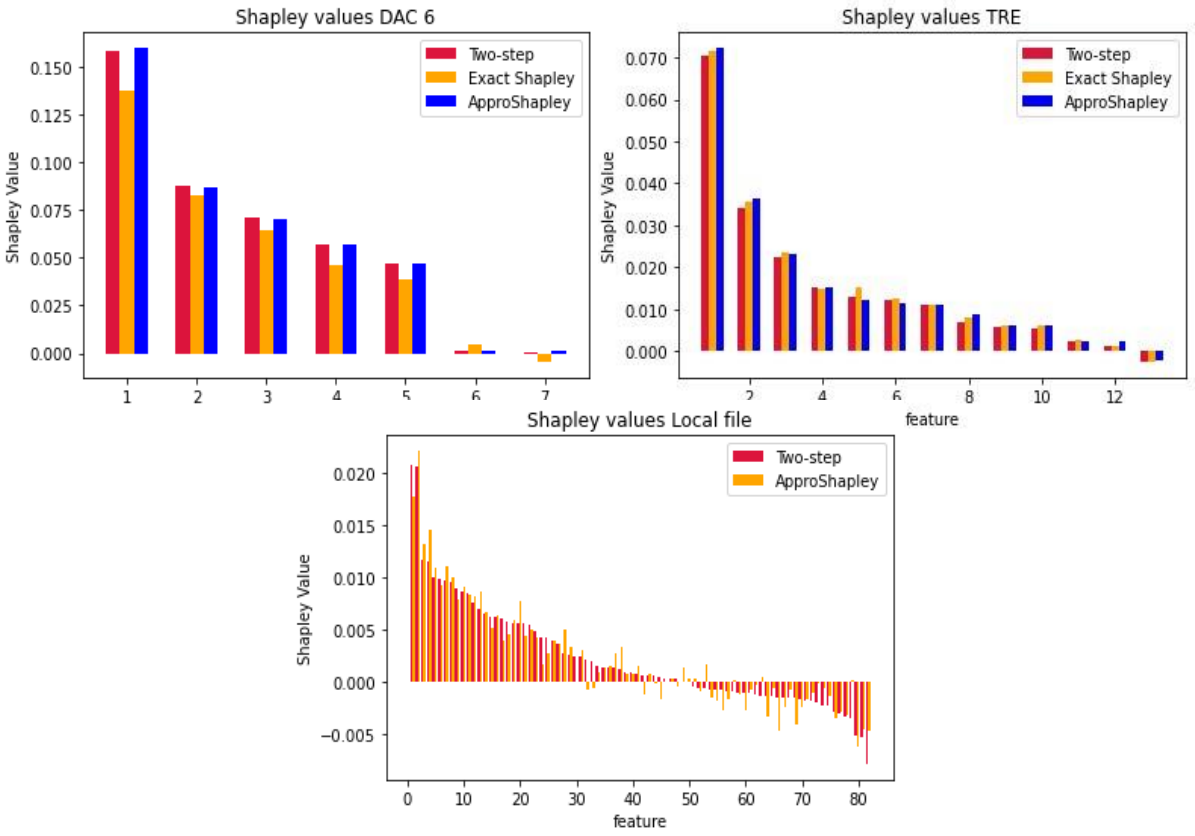
4.5 Results

The results of the analyses are presented in Figure 4.1. For confidentiality reasons, we do not disclose the exact names of the features in this paper, but this information is provided to the tax authorities. For DAC 6, our estimation methods approximate the Shapley value very closely, with the Two-step-ApproShapley method generally yielding a closer approximation to the true Shapley value compared to the original ApproShapley sampling approach. We find that one feature is the dominant contributor to the predictive value of the model, while four other features also significantly enhance model performance. Two additional features have Shapley values close to zero, indicating that they

contribute minimally to the model's predictive performance. These two features do not have any value for most of the observations, which highlights the importance of taking coverage into account.

For the TRE data, the ApproShapley method generally provides a better approximation of Shapley values than the Two-step approach. Notably, one feature has a negative Shapley value, suggesting it hurts the model's performance. In the case of the local file, several features show negative Shapley values using both ApproShapley and Two-step-ApproShapley methods, indicating they generally hurt model performance. Shapley values for the local file are smaller compared to those for DAC 6 and TRE, which is expected due to the larger number of features in the local file. Nevertheless, the applied methods allow us to rank these features based on their relative contribution to the model's predictive performance.

Figure 4.1 Shapley Values per Data Source



To check whether the rankings are consistent between the different methods, we calculate Spearman rank coefficients. The Spearman coefficient indicates how well the relation between two variables can be described as monotonic. A perfect Spearman's value of 1 or -1 implies a perfect monotonic positive or negative relationship. Table 4.4 to Table 4.6 present the Spearman rank correlation coefficients between the different methods for all data sources. The strongly positive correlation coefficients between the Shapley methods mark that all methods come to a very similar ranking of the features.

Table 4.4 Spearman Rank Coefficients Local File

Local file data		
	ApproShapley	Two-step ApproShapley
ApproShapley	/	0.9108
Two-step ApproShapley	0.9108	/

Table 4.5 Spearman Rank Coefficients TRE

TRE data			
	Exact Shapley	ApproShapley	Two-step ApproShapley
Exact Shapley	/	0.9945	0.9890
ApproShapley	0.9945	/	0.9945
Two-step ApproShapley	0.9890	0.9945	/

Table 4.6 Spearman Rank Coefficients DAC 6

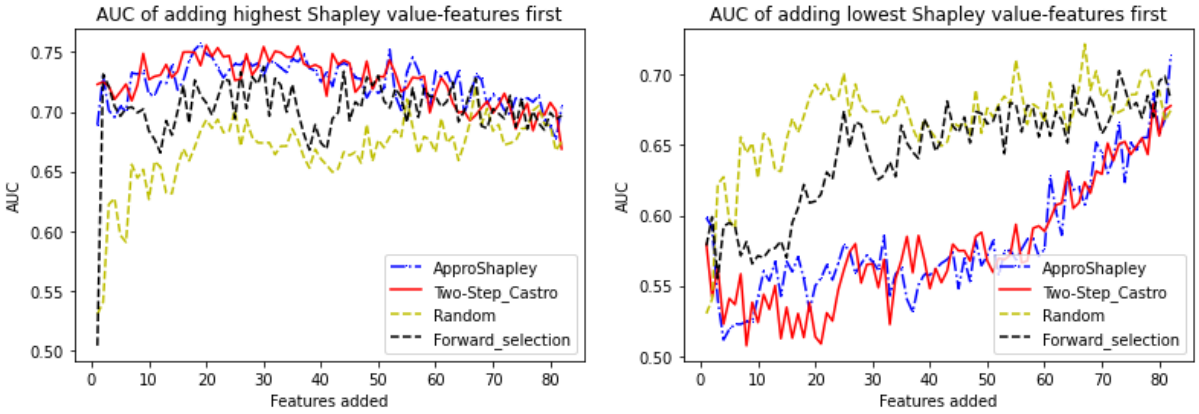
DAC 6 data Decision Tree			
	Exact Shapley	ApproShapley	Two-step ApproShapley
Exact Shapley	/	1.000	1.000
ApproShapley	1.000	/	1.000
Two-step ApproShapley	1.000	1.000	/

DAC 6 data Logistic Regression			
	Beta coefficients	ApproShapley	Two-step ApproShapley
Beta coefficients	/	0.5047	0.4828
ApproShapley	0.5047	/	0.9741
Two-step ApproShapley	0.4828	0.9741	/

When comparing the coefficients of a linear model to the Shapley values, we see that lower levels of correlation exist. A possible explanation for this lower level of correlation can be the fact that a simple beta coefficient does not take into account the frequency of occurrence of a certain feature in the dataset, referring back to the fictitious example we provided in section 2. It is only a measure of the

predictive value of the feature. It attributes great importance to features with good predictive power, but possibly a low occurrence in the dataset, which is exactly why we prefer the Shapley value to value the features.

Figure 4.2 Local File Shapley Values



4.5.1 Feature Selection

An alternative way to evaluate the methods is by plotting how the model's performance changes as we add features based on their rankings. In Figure 4.2, Pane 1 shows the change in performance for the local file predictive model when features are added in order of highest to lowest Shapley values, while Pane 2 shows the change when features are added from lowest to highest Shapley values. The X-axis represents the number of features added, and the Y-axis represents the model's performance with the corresponding number of features.

We benchmark our methods against two approaches: random input selection and a greedy forward feature selection algorithm. The forward feature selection algorithm adds features based on the largest (or smallest) improvement in predictive performance at each step. In contrast, the random input selection algorithm adds features randomly. Results for the random and forward feature selection methods, like those for the Shapley value estimation methods, are based on the same ten train-test splits.

For the local file data, adding features with high Shapley values to the model initially improves performance for the first 30 to 35 features. This improvement begins to decline as additional features are added. This decline is expected because the features with negative Shapley values are added towards the end. The Shapley value method outperforms both random feature selection and forward feature selection approaches.

When adding low Shapley value features first, model performance initially stagnates while only these low-ranked features are included. Model performance starts to improve gradually once higher Shapley

value features are added. A noticeable improvement occurs after including the 60 lowest-ranked features. In contrast, random and forward feature selection methods achieve a quicker rise in performance, as they add more valuable features to the model sooner compared to the Shapley value approaches. This indicates that the Shapley value method is effective at ranking features according to their value.

Figure 4.3 TRE Shapley Values

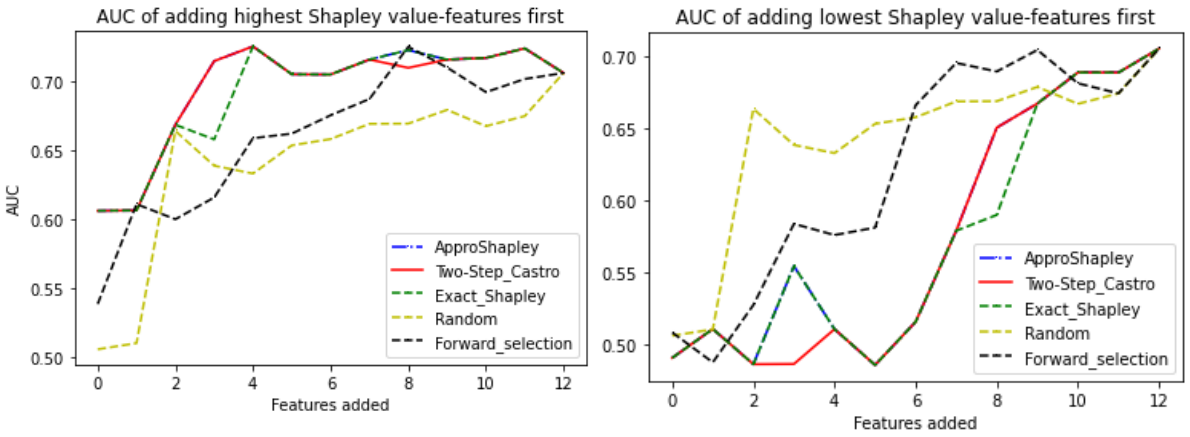


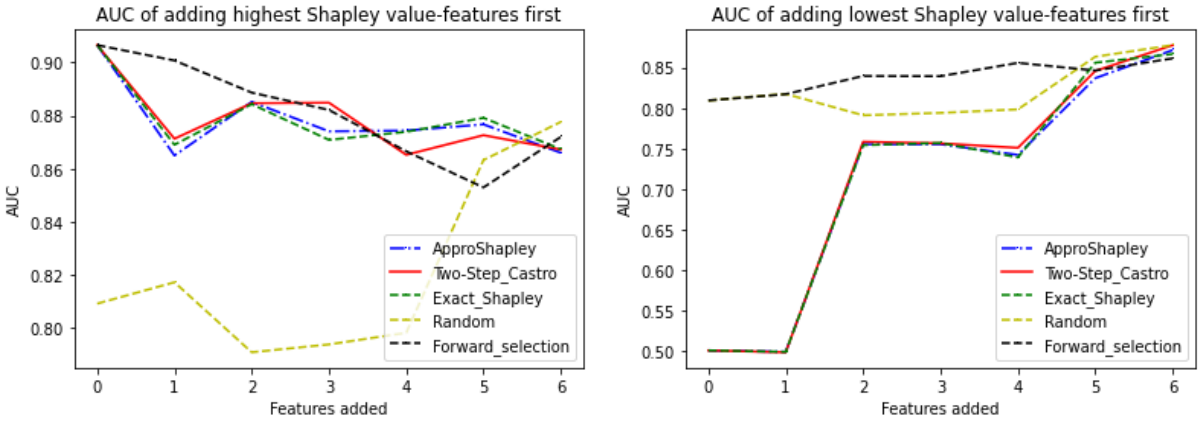
Figure 4.3 shows the results for the TRE dataset. When adding features with high Shapley values first, we observe an initial improvement in model performance with the first five features. Performance then stabilizes at this higher level. The Shapley value method outperforms both random and forward feature selection approaches. In contrast, adding features with the lowest Shapley values first starts with model performance slightly below the base rate of 0.5, due to the strong negative Shapley value of the lowest-ranked feature. Performance improves significantly after adding features in addition to the five lowest-ranked features.

Both random and forward feature selection methods lead to a quicker rise in performance, as more valuable features are incorporated into the model sooner. This confirms that the Shapley value method is most effective at ranking features according to their contribution to the predictive model's performance.

Figure 4.4 presents the results for the DAC 6 dataset. The findings are less pronounced due to the limited number of features available. Notably, the AUC for the DAC 6 data is very high when only the feature with the largest Shapley value is used. Consequently, adding additional features with high Shapley values leads to a decrease in model performance, as no model outperforms the model based solely on this single feature. The forward feature selection method also highlights this feature as the most valuable, resulting in a performance trend similar to that of the Shapley value ranking methods. When features with the lowest Shapley values are added first, performance starts at a low level and

improves as higher Shapley value features are included. In this case, the Shapley value proves to be more effective than both random and forward feature selection methods in identifying the least valuable features.

Figure 4.4 DAC 6 Shapley Values



4.5.2 Prioritizing Important Features

As a second experiment, we use the Shapley value to determine which features should be acquired or cleaned with priority. Quite often, users of data can acquire more data at a certain cost, or users need to invest considerable resources to clean large sets of data before they can be useful. It is therefore important to know which data should be collected or cleaned first to allocate resources efficiently. To achieve this purpose, we run a simulation experiment similar to active feature acquisition to see whether the Shapley value can successfully determine for which features it is most interesting to acquire more observations. Unlike many previous active feature acquisition techniques, we do not consider which features we need to acquire for specific instances but rather determine whether the feature itself should be considered for acquisition or cleaning for all instances with missing data on this feature.

Specifically, we obtain a 'sample' of observations to perform the simulation. We delete approximately two-thirds of our training data and impute the deleted values based on the remaining third of data points to come to a new dataset. As such, we artificially construct a dataset with missing feature information. We chose to delete two-thirds of our data to ensure that the impact of newly added data will be large enough to make a noticeable difference while ensuring that the remaining training dataset still contains enough useful information to train a predictive model. Subsequently, we recalculate the Shapley values of the features with ten different test-training splits for each data source. It is more useful to examine how new acquisitions affect the distribution of estimations induced from different but equally likely variations of the training set instead of examining the

performance changes for a model based on a single training set (Saar-Tsechansky et al., 2009). An obvious reason for this is that, in a real-world setting the training dataset could constantly change due to the acquisition of new information (Saar-Tsechansky et al., 2009). We thus want to reduce the risk that peculiarities in our test and/or training sets influence our results.

We then add back the real data points to the dataset in a stepwise approach based on their Shapley values. We present both the case where we add the highest Shapley value features first, as well as the case where we add the lowest Shapley value features first. We benchmark against the random acquisition of features.

Figure 4.5 Simulation Experiment Missing Data DAC 6

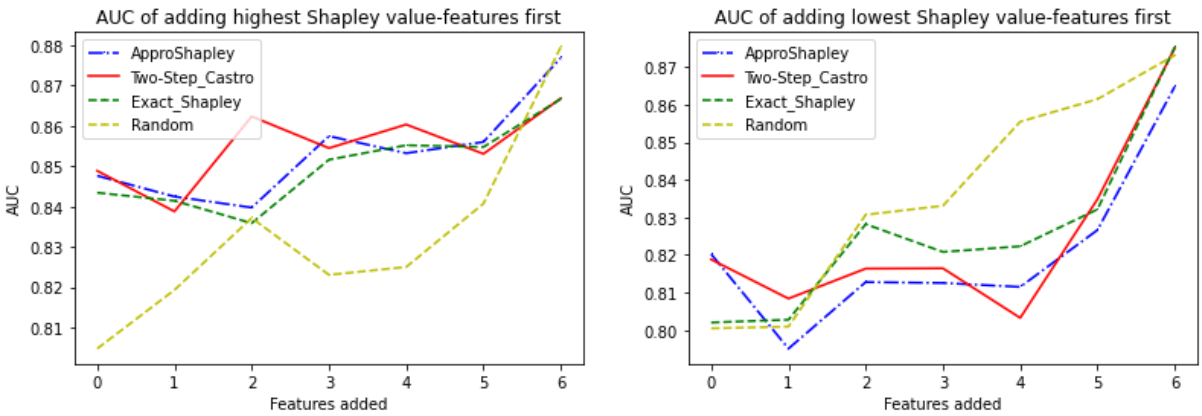
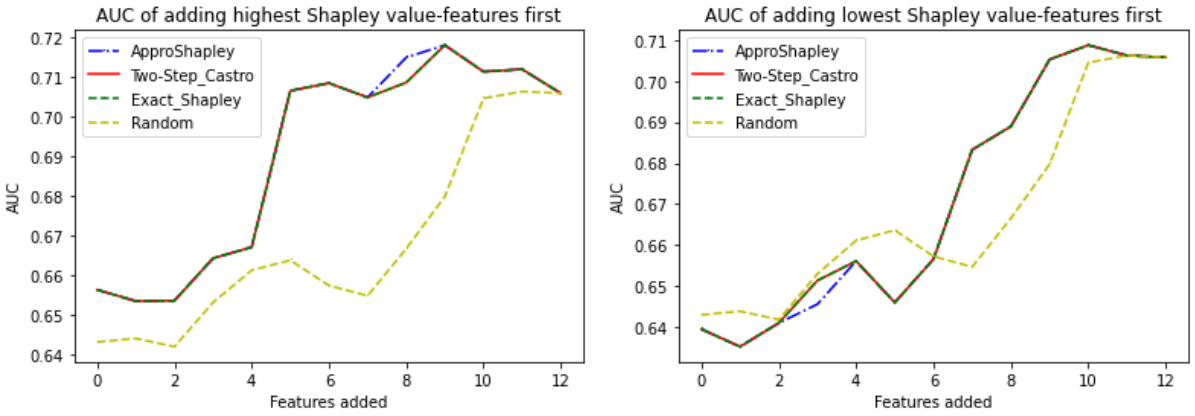


Figure 4.5 presents the results for the DAC 6 data. The performance of the predictive model improves much more rapidly when we prioritize adding the real values of the features with the highest Shapley values to the dataset, compared to adding the values of the lowest-ranked features first. To reach a performance level close to that of the full model, we only need to include the real values of the top three to four most valuable features.

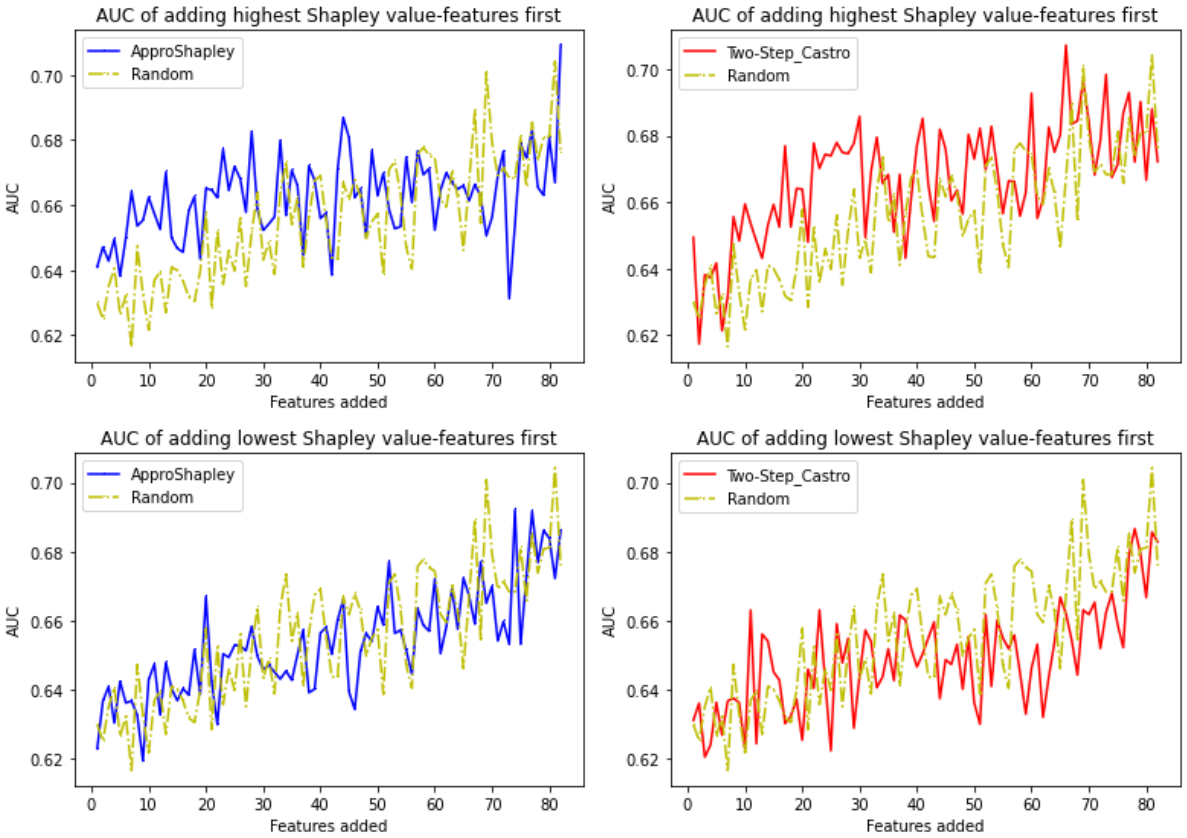
In contrast, when we start by adding the real values of the least valuable features, nearly all the features need to be added back to the dataset to achieve a similar level of performance. Additionally, we observe that adding the real values of the most (least) valuable features leads to faster (slower) performance improvements than adding random features.

Figure 4.6 Simulation Experiment Missing Data TRE



The results for TRE data are presented in Figure 4.6. The Shapley values effectively indicate which features should be prioritized for cleaning or acquiring data. When we assess the performance of the predictive model using datasets where the real values of the most important features are added first, we observe a much faster improvement in performance compared to adding the real values of the features with the lowest Shapley values first. Specifically, by prioritizing the top features with the highest Shapley values, we achieve a performance level similar to the complete model after adding just six features. In contrast, when starting with the lowest-ranked features, achieving the same level of performance requires adding the real values of ten or more features, depending on the ranking method.

Figure 4.7 Simulation Experiment Missing Data Local File



Finally, the results for the local file are presented in Figure 4.7. For readability, we benchmark the results of both sampling algorithms against random acquisition in separate plots. While the results for this data source are less pronounced, likely due to the large number of features and the small test set causing an uneven course in the curve, we still observe that adding the real values of the most important features—identified by both Shapley value sampling methods—tends to yield better performance than adding random features. Using approximately 40 to 45 of the most valuable features results in model performance similar to that of a model trained on the full dataset. In contrast, when we begin by adding the least valuable features, we must include data for almost all features before noticing a significant performance increase. Additionally, when the lowest-ranked features are added first, models that rely on random feature acquisition tend to outperform those based on Shapley value acquisition after the first 30 features are added. This suggests that Shapley value is particularly effective at identifying the least valuable features.

4.6 Discussion and Conclusion

In this work, we examined how to attribute value to features to predict successful tax audits. Our research is motivated by the need for tax authorities to keep enormous quantities of data manageable,

as a result of recent disclosure regulations. We adapt two different methods for calculating the theoretically sound Shapley value to a new context: attributing value to the features of a predictive model. Our results show that the applied value estimation techniques effectively rank features by their importance for predictive modeling. These findings can be used for global model interpretability, feature selection, and prioritizing which data should be collected or cleaned to improve performance. The specific results of our analysis can assist tax authorities in managing large quantities of data and increase efficiency in selecting audits with a higher chance of generating additional revenue. To our knowledge, this is the first study to apply value attribution to confidential data received by tax authorities under the EU and OECD's automatic exchange of information regulations.

The main benefit of our methods is that they do not rely on the assumption that all features are independent, which is highly unlikely given that features representing tax information reported by the same firm are probably correlated. A violation of the independence assumption causes the allocation of too much weight to unlikely data points and is undesirable in our setting as it undermines the practical applicability of our methods. This theoretical consideration gives our methods the advantage over other model-agnostic methods that approximate the Shapley value like SHAP (Lundberg & Lee, 2017), SAGE (Covert et al., 2020) and group SHAP (Lin & Gao, 2022), but increases computational time. A limitation of the study is that we assume the predictive model is given because we do not know which predictive model the tax authorities use. Even though both approximation methods are model-agnostic and can be applied to any model, they involve model retraining. The need for model retraining can cause long computational times when the predictive model is very complex and when a large number of samples is needed to come to an accurate approximation of the exact Shapley value. When the type of predictive model used by the tax authorities is known, model-specific applications of the Shapley value can be developed and used to increase estimation efficiency. Another important limitation is possible selection bias. As mentioned before, we only have data on taxpayers who have been audited already in the first place. We do not have information on the exact reason these taxpayers were selected for audit. This bias could influence the importance of features in the sample, so caution is needed when generalizing these findings to the population.

Another limitation is the amount of available data. We perform supervised learning tasks and thus need labeled instances. Obtaining class labels for instances in our context means that the tax authorities need to audit this instance, which makes labeling very costly. The limited availability of labeled instances in our datasets has implications especially for our sample experiment to prioritize certain features. Our valuation techniques are based on the value a feature currently has in a dataset. For smaller datasets like ours, it could be that a feature is valuable in truth, but that the information

in our dataset is too limited to discover underlying predictive patterns. Expanding the dataset should relieve this problem.

4.6.1 Future Research

As is the case in almost all applications of the Shapley value, calculations get challenging when datasets become larger. Future research could make use of ways to improve the efficiency of the estimation techniques further, such as only estimating the Shapley values of features in coalitions up until the intrinsic noise in the performance of the model (Ghorbani & Zou, 2019) or using model-specific approaches when available. Future research could also try to integrate a forward-looking component in the estimation algorithm based on the expected improvement in the predictive performance of a feature, in line with Saar-Tsechansky et al. (2009). This way, the valuation would not only be based on the current value of the feature in the dataset but would also contain an expectation of the value of newly acquired data.

In addition, several of the data sources used in this research have only been available for the few last years, which leads to a limited amount of labeled instances. Over the next few years, more labeled instances will become available which will improve the validity of our results. Another possible option is to combine data from different national tax authorities, as all data sources used in this research are exchanged internationally. This would not only greatly increase the size of the dataset, but will also provide opportunities to research the data valuation problem in an international setting.

Chapter 5 Conclusion

Tax disclosures are increasingly included in reporting frameworks and provide interested parties with valuable insights into a firm's tax affairs. In this thesis, we first focused on the relationship between firm governance and tax disclosure. Disclosing tax information informs shareholders, stakeholders and the public on a firm's tax management and can lead to better and more efficient tax collections by tax authorities. Understanding how family involvement in the firm and the board of directors relates to tax disclosure practices can provide insights into the pitfalls and effectiveness of governance mechanisms in overseeing tax-related matters. Next, we examined the usefulness of tax disclosures for tax authorities, as receiving tax data does not automatically translate to having useful, actionable information. This concluding chapter summarizes the primary empirical and methodological contributions of this thesis and outlines avenues for future research.

5.1 Concluding Remarks on the Empirical Chapters

In Chapter 2 of this thesis, we find robust results illustrating that increasing family ownership in a firm is significantly negatively associated with the level of tax disclosures and the voluntary adoption of GRI 207. We find that these effects are especially strong when the family holds large blocks of voting rights. It is likely that these families have private information channels, and want to avoid disclosing costly proprietary information in the form of public tax disclosures. We do not find robust evidence of a relationship between family involvement in management and tax disclosures, or between family involvement in the board of directors and tax disclosures.

In Chapter 3, we find robust results of a positive relationship between employee representation on corporate boards and a firm's level of tax disclosure. Past literature demonstrated that employees are attentive to CSR issues, and are especially concerned with matters close to their interests, such as wages and job security. Tax disclosures inform these employees about a company's financial health and the location of its resources, giving employees information on their position in wage negotiations. We do not find evidence of a relationship between gender diversity and a firm's level of tax disclosure. A key takeaway from this chapter is that board diversity is a multifaceted concept, and different forms of diversity (being task-related board diversity and non-task-related board diversity) are different antecedents for firm-level outcomes. Furthermore, we find a positive relationship between the existence of a CSR committee and a firm's level of tax disclosure, demonstrating that firms are increasingly putting public tax disclosures on the agenda, which was not the case a decade ago (Ylönen

& Laine, 2015). We also show that the consequences of governance mechanisms are influenced by a country's formal and informal institutions.

In general, the findings in Chapter 2 and Chapter 3 inform regulators and stakeholders of the pitfalls and effectiveness of governance mechanisms in monitoring a firm's tax management. Our findings can be used by stakeholders who might be concerned about potential agency conflicts influencing a firm's tax management and tax disclosure decisions, such as tax authorities assessing whether agency problems might endanger the trust in the relationship with the firm in cooperative compliance programs. In addition, if regulators wish to mitigate the influence of agency conflicts on the firm's tax disclosure practices, they should consider making voluntary tax disclosures mandatory.

In Chapter 4, we develop and apply a valuation technique based on the theoretically sound Shapley value to assist the Belgian Federal Tax Authorities in managing large quantities of data received under various exchange of information agreements. Our valuation technique is model-agnostic and can thus be applied to any kind of predictive model. The benefit of our valuation approach over other methods to calculate the Shapley value is that our method does not rely on the assumption that all features are independent. Past research has ignored this issue when examining tax disclosures (Guenther et al., 2023). This assumption is highly unlikely in our context since features representing tax data reported by the same firm are probably correlated. A violation of the independence assumption causes the allocation of too much weight to unlikely data points and is undesirable as it undermines the practical applicability of our methods in a real-world setting. The downside of our method is that our approach can be computationally expensive when the number of features is high. Overall, we contribute to the data valuation literature by presenting and applying this valuation technique in a real-world setting.

5.2 Future Research

A conclusion summarizes the main findings and provides avenues for future research. In what follows, we highlight possibilities for future research on both determinants of tax disclosure and valuing tax disclosures for predicting successful tax audits.

A limitation of both Chapter 2 and Chapter 3 is the specific setting in which we examine our research objectives. We use the six countries in Europe with the highest number of company groups meeting a threshold of 750 million euros in consolidated revenue so that they must comply with private CbCR. Europe is often at the forefront of sustainability reporting, meaning that one needs to be cautious in applying our findings outside our study's context. Future research could expand the sample to include also other continents, and verify whether our findings hold. In addition, future research could also

explore whether our findings hold in a sample where company groups with less than 750 million euros in consolidated revenue are included.

A limitation specific to Chapter 2 is the possibility of establishing causal relationships. A quasi-experimental approach such as a difference-in-differences design can be applied. However, exogenous shocks in family ownership or involvement are difficult to find. In Chapter 3, the lack of employees on CSR Committees prevents an in-depth analysis of the effect of the configuration of the CSR Committee on tax disclosure. Future research could explore whether different individuals on the CSR committee influence tax disclosures.

A follow-up study to Chapter 4 could use the specific predictive model used by the Belgian Federal Tax Authorities to predict tax audits to improve upon our results. While our model-agnostic approach should also work with this model, knowing the exact model makes it possible to tailor model-specific approaches which would decrease the estimation time of the valuation algorithm, providing faster and potentially more accurate estimations. Another constraint arises from the lack of available data. Since we perform supervised learning tasks, our approach requires labeled instances. However, acquiring class labels for instances within our context means that the tax authorities must audit this instance. Labeling is thus highly expensive. For smaller datasets like ours, it could be that the information in our dataset is too limited to discover underlying predictive patterns, even though the feature could be valuable when more data is available. Expanding the dataset should relieve this problem, and will come naturally as tax authorities audit more taxpayers.

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