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What Turns the Taxman on? Tax Aggressiveness, Financial Statement Audits, and Tax Return Adjustments in Small Private Companies

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This study examines the effect of tax aggressiveness and voluntary audit of financial statements on the likelihood of tax adjustments in small private companies. We provide evidence that (a) tax aggressiveness increases the likelihood of the tax authority not accepting taxable income as reported, whereas (b) voluntary audit decreases it. To derive our hypotheses, we built a theoretical stochastic model explaining tax authority's reactions to bias and noise in tax returns and how these two relate to tax aggressiveness and voluntary audit. In our empirical tests of the hypotheses, we used a large proprietary data set comprising internal records of the Finnish Tax Administration for the fiscal year 2010 combined with data on the taxable income reported by approximately 19,500 small, private companies. Our results show that while the findings on tax aggressiveness are significant when measured with the book-tax difference using proprietary tax return data from the

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Tax Administration, they are insignificant when based on the conventional tax aggressiveness measure of book-tax difference derived from publicly available financial statement data. Our paper contributes to the literature by being the first to document the effects of tax aggressiveness and voluntary audit on tax return adjustments of small private companies.

Keywords: Audit opinion; small private companies; tax adjustments; tax aggressiveness; voluntary audit.

JEL Classifications: M410, M420, F38

1. Introduction

This study examines the factors related to the financial statements that influence the tax authority's adjustments of taxable income reported by a small private company. In particular, we address the following research question: What is the effect of tax aggressiveness and voluntary audit of the financial statements on the likelihood of tax adjustments in small private limited liability companies in Finland? We first developed a theoretical stochastic model and derived the hypotheses on how the tax authority reacts to (a) tax aggressiveness and (b) whether financial statements are audited or not. We then tested these two hypotheses empirically using a large proprietary archival data set.

Our study had three motivations. First, to understand the financial reporting behavior of small private companies, it is essential to study financial reporting to the tax authority. Because of the taxpayer's accountability to the tax authority, it can be argued that the latter is a quasishareholder of companies of all sizes (Desai *et al.*, 2007, p. 592). However, the relative importance of the tax authority as a stakeholder is heightened for small private companies compared with their larger counterparts as the former are less likely to have external owners or external funding (Berger & Udell, 1998), and they typically have few, if any, employees. Nevertheless, they still need to prepare financial statements for the tax authority so that the latter can determine the taxable income generated by the business. Because of the interest in accurate reporting of taxable income, the credibility of financial statements is of importance to the tax authority (Hanlon *et al.*, 2014). The credibility of the financial statements is also important to the reporting entity due to the adverse consequences associated with the tax authority's distrust of the financial information reported.

A second motivation for this study arises from the public debate in the European Union (EU) on deregulation of financial reporting for small and

micro-entities with a view to reducing administrative burdens[1] that led to a new Accounting Directive (EC, 2013). The costs and benefits of the directive are not trivial. Small and micro-entities account for 99% of businesses in the EU and provide 49% of jobs (EC, 2018 Table 2, p. 4). They are considered the key to ensuring economic growth, innovation, job creation, and social integration (EC, 2016). In Finland, small firms also play an important role in the economy, as they contribute 48% of employment and 35% of turnover (Federation of Finnish Enterprises, 2015).

Third, our study was further motivated by the lack of empirical evidence on the costs and benefits of regulating financial reporting by small companies (ICAEW, 2015) and a dearth of evidence on the benefits in particular. More specifically, there is a gap in the literature on the effect of tax aggressiveness and financial statement audit on the likelihood of tax adjustments by the tax authority. Closely related to our study are Downing and Langli (2019), who examined the credibility of financial reporting and auditing from the tax authority's perspective focusing on private companies in the Nordic setting.[2] In addition, Mills (1998) and Cho *et al.* (2006) studied tax authorities' responses to firms' tax reporting behavior.[3] Similarly, our study is based on a proprietary data set obtained directly from the tax authority, but unlike both of these studies, we focused on small private companies where key factors, such as financial statement audit being nonmandatory, are distinctly different. This allowed us to investigate whether voluntary audit has an effect on the tax authority's response in terms of tax adjustments.

We based our analysis on a unique confidential data set from the tax returns of the population of approximately 19,500 small, private, limited liability companies in Finland that reported a positive net income for 2010, together with any adjustments to taxable income subsequently made by the Finnish Tax Authority. The companies included those where the directors had taken up the option to provide unaudited financial statements as well as

[1]So far, the proposed main solutions to reduce administrative burdens for small companies are to (1) simplify their financial statements and (2) exempt them from statutory financial statement audits.

[2]While Hanlon and Heitzman's (2010) extensive review of the literature identifies four broad areas of relevant tax research, we are not aware of any study that has examined the credibility of financial reporting and auditing from the tax authority's perspective, despite its inherent importance. The areas of tax research identified by Hanlon and Heitzman (2010) are: (1) the informational role of income tax expense reported for financial accounting, (2) corporate tax avoidance, (3) corporate decision-making including investment, capital structure, and organizational form, and (4) taxes and asset pricing.

[3]It is likely that the main reason for the dearth of research in this area is that data is not readily available.

those that had opted for a voluntary audit that had been completed by the time they submitted their tax returns. This proprietary data set allowed us to measure tax aggressiveness more accurately than if we had to rely on publicly available data. In addition, we were able to control for other relevant factors not examined in previous studies, such as the use of paper or electronic format when filing the tax return with the tax authority.

Consistent with the expectations based on our theoretical stochastic model and prior empirical literature, we find that the likelihood of tax adjustments made by the tax authority is higher in companies that are tax aggressive and lower in companies that opt for voluntary audit and receive an unqualified audit report. We also provide evidence for our hypothesis that voluntary audit moderates the likelihood of the tax authority's response to tax aggressiveness. In addition, we document that filing tax returns on paper rather than in electronic format, the amount of petty cash on hand (i.e., not in bank), the company being new, and the size of the company increase the likelihood of attracting attention from the tax authority. The results regarding the effect of tax aggressiveness and having a voluntary audit are insensitive to whether the full sample or a balanced sample based on propensity score pairing of tax-adjusted companies with their nonadjusted counterparts is used.

Our main contribution is that, to the best of our knowledge, our paper is the first to document the effects of tax aggressiveness and voluntary audit on tax return adjustments, adding to the scarce but emerging literature on the financial reporting and voluntary audit of small companies in the context of taxation. We also contribute to policy-making. Our finding that having the financial statements audited reduces the likelihood of tax adjustments addresses calls for empirical evidence on the benefits of the regulation of small companies or allowing them a choice. These findings have implications not only for regulators, but also for the accounting and auditing profession and the directors of small companies who are considering the benefits of opting for a voluntary audit. Finally, we contribute to the literature on tax aggressiveness by showing the limitations of publicly available financial statement data on the measurement of tax aggressiveness in the context of small companies. Contrary to conventional measures of tax aggressiveness used in previous studies, which are based on publicly available data (i.e., effective tax rates or book-tax differences), our measure of tax aggressiveness is free from measurement error because it is based directly on the difference between nontaxable revenues and nontax deductible expenses, as claimed by the company in its tax return. This is a key advantage of using tax return

data, as it is difficult, if not impossible, to estimate the components of our direct measure from publicly available financial statement data (Graham & Mills, 2008).

The remainder of this paper is organized as follows. In Section 2, we describe our institutional setting (Finland). In Section 3, we develop our theoretical stochastic model and our hypotheses. The data and empirical model are explained in Section 4, and we report our results in Section 5. In the final section, we draw conclusions.

2. Institutional Setting

There are three features that when combined support the institutional setting of Finland for this study. First, the effect of voluntary audit on tax adjustments, if any, should be stronger in a high financial-tax alignment country like Finland than in countries with a low alignment. According to Eberhartinger (1999), there are two different approaches to the link between tax accounts and financial accounts: (a) accounting rules and tax rules are independent of one another, and (b) taxation depends on financial reporting, and therefore all entries in the books are relevant for taxation. As a country with a high book-tax alignment (Kasanen *et al.*, 1996; Eberhartinger, 1999),[4] Finland falls into to the latter group.[5]

Second, the difference between audited and unaudited financial statements is conceptually clearer in Finland than in countries where companies may choose between assurance services providing different levels of assurance (for example, in the US, between a full financial statement audit and a review).

Third, the Finnish setting enables a large-scale archival study (of the whole population) on tax authority's reaction to tax aggressiveness and

[4]Eberhartinger (1999) notes that while the former approach can be found mainly in Anglo-American countries, the latter approach prevails in most European jurisdictions, including Finland. However, as Atwood *et al.* (2010: note 22) point out, the close tie between tax and book numbers in Germany applies only to single-entity company accounts, not to group accounts. The same applies also to Finland and for that reason our sample comprises single-entity companies only.

[5]In Finland, taxable income is derived starting from the after-tax net income reported in the official financial statements. Any deductibility of expenses in tax returns requires prior recognition in the financial statements because the Finnish Business Tax Law (EVL 1968/360) §54 (1976/1094) states that for all expenditures incurred, expensing in financial statements is a prerequisite for tax deductibility. For example, depreciation in tax return cannot exceed that reported in financial statements. However, due to timing differences in expense (revenue) recognition between financial reports and tax returns, taxable income in the two reports differs from one another.

voluntary audit in small private companies. All limited liability companies, regardless of size, must prepare detailed and comparable financial statements complying with the requirements of the Companies Act and file them at the public register, the Finnish Patent and Registration Office (PRH). The company is also required to file its articles of association with the PRH, where they are placed in the public record. In the case of a company that qualifies for exemption from the statutory audit (see Table 1 for audit exemption thresholds in Finland and in the EU), the articles of association must state whether the company has opted to have a voluntary audit. The annual report and accounts must be sent to the Finnish Tax Administration within four months of the company's reporting year-end and the tax authority then forwards them to the PRH, where they are made available to the public. The majority of Finnish companies (79% in our study) submit their tax return by the end of April because their reporting year-end coincides with the calendar year-end. Any tax adjustments by the tax authority are made when the final taxable income for the fiscal year is confirmed, which takes place within 10 months of the company filing its tax return.

Even if none of the three features of our institutional setting (high book-tax alignment linking financial statements to tax returns; a clear-cut difference between audited [complying with ISAs] and nonaudited financial statements; and the availability of high quality large-scale archival data), are by themselves unique to Finland, when combined, they provide a setting that enables a high-quality empirical investigation on the topic. Unlike many other jurisdictions, even the smallest companies are required to file full financial statements—irrespective of whether they have been audited—with the tax authority when submitting their tax returns.[6]

In its response to the Finnish government's proposal to raise the size thresholds for exemption from mandatory audit (Ministry of Employment and the Economy, 2016), the Tax Administration reaffirmed its view that accounting and taxation errors (misappropriations) are created intentionally due to the entrepreneur's judgment. Therefore, if the thresholds for audit exemption are raised, the likelihood of intentional as well as unintentional accounting and taxation errors will increase (Finnish Tax Administration, 2018).

[6]However, information in the financial statements placed on the public record in Finland excludes the breakdown of taxable and nontaxable revenues as well as the tax deductible and non-tax-deductible expenses. This information is only for the Tax Administration. To the best of our knowledge, the current study is the only one for which this information was confidentially available.

Table 1. Audit Exemption Thresholds in Finland and EU Size Thresholds

	Finnish Maxima for Audit Exemption	EU Maxima for Defining a Small Company
Turnover	€0.2 m	€8.0 m
Balance sheet total	€0.1 m	€4.0 m
Average employees	3	50

Reviews of tax returns and adjustments of taxable income reported by companies are usually made at the tax office on the basis of information available in the financial statements and tax returns (LTT Research, 2006, pp. 96–97). These reviews are accomplished without conducting a full tax audit. Thus, compared with a full tax audit, adjusting taxable income as reported by a company in its tax return provides the tax authority with a convenient and cost-effective way of correcting the final taxable income and thereby the income tax payable by the company. Before making a tax adjustment, the tax authority often asks for clarifications of the submitted tax return or other relevant documents verifying the financial statements.

Understandably, any information concerning the frequency or targeting of tax adjustments are not made public by the tax authority.

Regarding timing of tax adjustments, the difference between tax adjustments based on tax returns and full tax audits by tax authorities is that the former are timely (by the end of next fiscal year) and concern the fiscal year in question only. Full tax audits cover the last five fiscal years and the tax authority can make adjustments to any of those five years.

3. Hypothesis Development

3.1. *Theoretical background: A stochastic model for the tax authority's reaction*

We are aware of two prior theoretical papers that examined the likelihood of the tax authority reacting to the taxpayer's reporting behavior. In their seminal paper, Allingham and Sandmo (1972) developed a theoretical model for an individual's optimal decision regarding taxable income to be reported to the tax authority. The model was based on a setting where the aim of the taxpaying individual is to evade taxes by reporting less than the true income, and the individual was subjected to a monetary penalty (or imprisonment) if the tax evasion is detected by the tax authorities. Subsequently, Chen and Chu (2005) generalized this decision problem to a more complex

setting where the taxpayer was a corporation rather than an individual, thereby introducing principal-agent problems relating to manager's compensation scheme.

Our theoretical stochastic model (developed in more detail in Appendix A) has two distinct features that make it fundamentally different from these prior theoretical models. First, instead of being a normative decision model giving an optimal solution for the taxpaying individual or company, our model is basically explanatory as its aim is to yield a theoretical likelihood function for the tax authority's reaction. Second, unlike Allingham and Sandmo (1972) and Chen and Chu (2005), who did not consider the quality of information reported to the tax authority, our model explicitly accounts for it by incorporating the effect of financial statement audit into the model.[7]

Our model builds on the concepts of BIAS and NOISE, which are the two main components of measurement error in statistical theory. Applied to our context, these components link the taxable income reported by the company in its tax return for a given fiscal year to its "true" taxable income in that year as follows:

$$\text{'True' taxable net income} - \text{Taxable net income reported in tax return} = \text{BIAS} + \text{NOISE}, \quad (1)$$

where

BIAS is a nonnegative constant representing the degree of the company's intentional and consistent tax aggressiveness in the fiscal year. While determined by the company, BIAS is likely observable to the tax authority and the auditor due to their professional expertise.[8]

NOISE is a random variable following normal distribution with zero mean and constant variance representing an unintentional random error in the financial statements or the tax return for the fiscal year. While NOISE is

[7] As proposed by Merkl-Davies and Brennan (2017) in their review of theories in external accounting communication, the so-called "functionalist-behavioral transmission perspective" includes three main research traditions: (a) mathematical tradition, (b) socio-psychological tradition, and (c) cybernetic/systems-oriented tradition. While Allingham and Sandmo (1972) and Chen and Chu (2005) clearly represent examples of the first tradition, the theoretical model developed in this paper includes elements not only from the first tradition but also from the third. It is characterized by interactive dialogical communication between the company and its stakeholders, such as the tax authority in our case.

[8] Note that our theoretical model concerns a given company in a given fiscal year. Thus, while the degree of tax aggressiveness, and hence BIAS, determined by a company is likely to vary across companies and/or over time, it is considered a constant (and hence with zero variance) for the particular company in the year in question.

unobservable to the company by definition, it may be detectable by the auditor and the tax authority, especially when NOISE is large.

To account for the impact of potential voluntary audit, we define BIAS and Var(NOISE) or variance of NOISE as functions of VOLAUDIT as follows:

$$\text{BIAS} = \text{TAXAGGR} * (1 - k_1 \text{VOLAUDIT}), \tag{2}$$

$$\text{Var(NOISE)} = \text{Var(ERROR)} * (1 - k_2 \text{VOLAUDIT}), \tag{3}$$

where

TAXAGGR is the degree of tax aggressiveness,

VOLAUDIT is a dichotomous indicator variable equal to 1 if the company chooses a voluntary audit, and 0 otherwise,

k_1 is a nonnegative constant with $0 < k_1 < 1$ describing the restrictive impact of voluntary audit on tax aggressiveness,

Var (ERROR) is the variance of a normally distributed random error with zero mean in taxable net income reported in the tax return,

k_2 is a nonnegative constant with $0 < k_2 < 1$ describing the impact of voluntary audit on Var (NOISE) in the tax return through detecting and eliminating large random errors in financial statements and/or tax return information.

Further, defining TOLERANCE as a nonnegative constant representing the threshold set by the tax authority for the difference between the "true" and the reported taxable net income (or the sum of BIAS and NOISE) triggering its corrective action, we end up with the following stochastic model for the likelihood of tax adjustment (for more details of the derivation of Eq. (4), see Appendix A):

$$\text{Prob(TAXADJ)} = 1 - \text{Prob}\left\{ Z \leq \frac{\text{TOLERANCE} - \text{TAXAGGR} * (1 - k_1 \text{VOLAUDIT})}{\sqrt{\text{Var(ERROR)} * (1 - k_2 \text{VOLAUDIT})}} \right\}, \tag{4}$$

where

Z is the standard normal variate of the normal distribution with zero mean and standard deviation of one.

The theoretical model given in Eq. (4) has the following important implications: First, the likelihood of tax adjustment is a positive function of tax aggressiveness (TAXAGGR). This is because, other things being equal, the nominator on the right-hand side of (4) decreases with tax

aggressiveness. Second, the likelihood of tax adjustment is a negative function of Voluntary audit. This is because, other things being equal, the nominator on the right-hand side of (4) increases while the denominator decreases due to a voluntary audit. Third, while the likelihood of tax adjustment is a nonlinear function of TAXAGGR and the variance of ERROR, the negative impact of voluntary audit on the likelihood of tax adjustment is more pronounced when the degree of tax aggressiveness is higher. These implications of the model are illustrated by the numerical examples given at the end of Appendix A.

In the following subsection, we develop our hypotheses by discussing the outcomes of our model in the light of prior empirical evidence and perceptions of the tax authority itself.

3.2. *Hypotheses*

In our model, the likelihood of tax adjustment increases with the company's tax aggressiveness[9] because the bias resulting from tax aggressiveness is observable to the tax authority. Empirically, in our setting, the bias arising from tax aggressiveness increases when, in order to avoid taxes, a company increases the amount of nontaxable revenues and decreases the amount of non-tax-deductible expenses claimed in its tax return. More generally, as both book income and tax income are based on the same underlying economic transactions, the more book income exceeds taxable income, the more evidence the tax authority has that the firm has been aggressive (Mills, 1998). The results of Lennox *et al.* (2013, pp. 747–748) and Hoopes *et al.* (2012, p. 1607) are consistent with this view as they noted that companies cannot manage book and taxable income in opposite directions without arousing attention from the tax authority. Moreover, two prior studies showed that tax authorities not only observe the bias, but also react to it by making adjustments in taxable income. Using confidential data from tax returns and tax audit results of both private and public US firms, Mills (1998) found that adjustments made by the Internal Revenue Service increase when the excess of book income over taxable income increases. Cho *et al.* (2006) found similar results based on confidential data from the New Zealand Inland Revenue.

[9] A tax-aggressive company takes actions to lower the reported taxable income, while keeping book income unchanged (Hanlon & Heitzman, 2010, p. 131). A motivation for a company to avoid taxes is straightforward: a dollar saved in taxes through aggressive tax practices is an extra dollar for shareholders because tax aggressiveness leads to tax savings in the current period (Khurana & Moser, 2009, p. 7).

Consistently, Khurana and Moser (2009) concluded that being more tax aggressive increases the probability of additional taxes in the long-term.

In summary, based on our model, supported by prior empirical studies, we hypothesize the following:

H1: *The tax aggressiveness of a small company increases the likelihood of the tax authority adjusting the taxable income reported by the company in its tax return.*

In our theoretical model, having financial statements audited by an external auditor decreases the likelihood of tax adjustment because the audit reduces both the bias arising from tax aggressiveness and the noise from random unintentional errors. This is due to the direct link between financial statements and tax returns (Dhaliwal *et al.*, 2004; Frank & Rego, 2006; Badertscher *et al.*, 2009). More specifically, the bias arising from tax aggressiveness manifests itself as earnings management when tax-related financial statements (e.g., tax accruals) are used to manage earnings (Graham *et al.*, 2012), creating information asymmetries between managers, users of financial statements, and auditors (Dhaliwal *et al.*, 2004; Balakrishnan *et al.*, 2019). Consistently high levels of tax aggressiveness are associated with restatements (Badertscher *et al.*, 2009) or even fraudulent financial reporting (Lennox *et al.*, 2013). In essence, tax aggressiveness reflects bias in tax-related items in the financial statements, exposing the auditor to the audit risk. In their survey, Heltzer and Shelton (2015) found that auditors perceive large book-tax differences to be related to an increased audit risk. To manage the audit risk, auditors must be well-informed about their clients' tax positions (Donohoe & Knechel, 2014). Studies on audit pricing provide evidence supporting the view that auditors are concerned about tax aggressiveness (Hanlon *et al.*, 2012; Donohoe & Knechel, 2014). Hanlon *et al.* (2012) found that large book-tax differences are associated with higher audit fees and conclude that tax aggressiveness affects auditors' decisions. Donohoe and Knechel (2014) documented a similar association between tax aggressiveness and audit fees. More generally, Erickson *et al.* (2016) found that changes in accounting for income taxes are reflected in increased audit fees in the subsequent year.

Even if small companies have fewer ways in which to avoid taxes compared with their larger counterparts, the link between financial statements and tax returns also applies to them: Income tax and other tax-related items reported in financial statements are calculated in the tax return, and the numbers used in those tax calculations are based on the financial statements.

Therefore, to assess whether the amount of tax and other tax-related items reported in the financial statements are correct, the auditor needs to audit the tax return. Consistent with this, Downing and Langli (2019) found that small companies that have their financial statements audited have better compliance with tax and accounting regulations than those that do not.

To conclude, findings from previous studies support the outcome of our theoretical model that a financial statement audit decreases the likelihood of tax adjustments by reducing both the bias arising from tax aggressiveness and the noise from random unintentional errors. Based on our model and prior empirical evidence, we formulate our second hypothesis as follows:

H2a: *Compared with nonaudit, a financial statement audit of a small company decreases the likelihood of tax adjustments by the tax authority (direct effect).*

A third outcome of our model is that the negative effect of voluntary audit on the likelihood of tax adjustment is more pronounced when the degree of the company's tax aggressiveness is higher. In other words, an audit has also an indirect effect on tax adjustments through tax aggressiveness. Consistent with this, Donohoe and Knechel (2014) found an interaction effect of tax uncertainty and tax aggressiveness.

In our setting of voluntary audits, having an audit may moderate the positive effect of tax aggressiveness on the likelihood of tax adjustments. In other words, for a given level of tax aggressiveness, the likelihood of tax adjustments may be lower because the company's tax accounting is within the scope of the audit, restricting tax aggressiveness when justifiable grounds for it do not exist. Consistent with this, in their cross-country study Kanagaretnam *et al.* (2016) documented a negative correlation between auditor quality and tax aggressiveness.

The Finnish Tax Administration has long maintained that to be reliable, financial statements should be audited by an external auditor. In the report of the Task Force preparing the 2007 reform of the Auditing Act, the Finnish Tax Administration stated:

Exemption from mandatory financial statement audits of small companies would especially concern those companies that have problems in meeting their obligations to the Tax Administration. Its view is that the amount of unintentional negligences would be smaller under mandatory financial statement audits by certified auditors. The Tax Authority also believes that mandatory audits of financial statements would improve the overall quality

of financial statements and the information submitted by the companies to the Authority (Ministry of Trade and Industry of Finland, 2004, p. 16).

The tax authority's resistance to audit exemption was confirmed in its response in 2018 to the government's proposal to raise the threshold for audit exemption. They argued that if the thresholds are raised, the likelihood of intentional as well as unintentional accounting and taxation errors will increase (Tax Administration, 2018). Accordingly, findings from interviews (Lepistö *et al.*, 2018) showed that the tax authority is of the opinion that financial statement audits improve the reliability of these statements as well as the tax-related information reported by firms to the tax authority.

In summary, based on our model, prior empirical evidence and views expressed by the Finnish Tax Authority, we hypothesize that having financial statements audited moderates the positive impact of tax aggressiveness on tax adjustments:

H2b: *A financial statement audit moderates the positive impact of tax aggressiveness of a small company on the likelihood of tax adjustments by the tax authority (indirect effect).*

4. Data and Empirical Model

4.1. *Sample selection*

We obtained proprietary data from the tax returns of all limited liability companies in Finland that had filed their tax returns with the Finnish Tax Administration in 2011 for fiscal year 2010 and had sales revenue not exceeding 10 million euros. The data included financial statement information, tax return details, audit status, and any adjustment to taxable income made by the tax authority. This confidential information was obtained under the Real Time Economy Program, the aim of which is to improve the flow of financial information between Finnish companies, their stakeholders and other interest groups through the adoption of XBRL (Eierle *et al.*, 2014).[10]

[10]The Real Time Economy Program is a national program in Finland with a track record of successful development projects in the field of financial reporting and administration. The XBRL project was supervised by the Real Time Economy advisory board, which comprised representatives of the Bank of Finland, the Finnish Tax Administration, the Ministry of Employment and the Economy, the Federation of Finnish Enterprises and other national institutions. The advisory board also benefitted from the participation of system integrators, the Association of Accountants, and representatives of the Aalto University School of Business.

The initial list comprised the whole population of 100,803 limited liability companies in Finland, the net sales of which in 2010 did not exceed 10 million euros.[11] After removing companies exceeding the size thresholds for audit exemption (i.e., companies for which financial statement audit was mandatory rather than voluntary) and companies with negative after-tax net income or missing data for the variables in the analysis, our final sample was 19,527 companies (see Table 2). Having access to public financial statement data allows us to compare tax aggressiveness measures based on public data with corresponding measures based on proprietary data from tax returns. In the final sample, a total of 258 companies had their tax returns for 2010 adjusted by the Tax Administration.[12] It is important to note that although the number of companies with adjusted tax returns is only 1.3 % (258 out of 19,527) in our sample, it does not detract from the overall economic significance of the phenomenon. This is because our sample covers only the smallest companies in Finland (i.e., those exempt from mandatory financial statement audits), and it is likely that the proportion is much larger in bigger entities. This is because tax authorities generally allocate more resources to reviewing the tax returns submitted by medium and large companies.

In addition to using our full sample with 19,527 observations, we also employed a balanced matched-pairs sample in the empirical tests, as our sample is highly asymmetric with respect to the treatment (tax adjusted) and control (non-tax-adjusted) companies. We applied the propensity score matching (PSM) procedure to identify a non-tax-adjusted counterpart for each of the companies for which the tax authority adjusted the taxable income. In building the PSM sample, we employed nearest-neighbor matching of each tax-adjusted observation company to a nonadjusted matched pair. To identify the one-to-one pairs, we used our control variables (explained in what follows) as criteria in the propensity score matching.

[11] The proportion of small limited liability companies of all small companies in Finland was approximately 38% in 2010 and in addition to sole proprietorships, they constituted the most significant proportion of all companies in the country. We exclude other legal forms of small businesses than limited liability companies, such as sole proprietorships and partnerships, because the rules on accounting and financial reporting are different and less detailed for these companies. Moreover, their financial statements are not available from public sources.

[12] Our unique data set confidentially obtained from the Finnish Tax Administration is restricted to one single fiscal year (2010). Therefore, all tests performed in this study and the results therefrom are purely cross-sectional. However, we do not have any grounds to suspect that the main findings documented and conclusions drawn from them would be specific to the sample year in question.

Table 2. Sample Companies

	Number of Companies
Initial data confidentially obtained from the tax authority (population of all Finnish limited liability companies with net sales revenues below 10 million euros in 2011)	100,803
Companies with mandatory auditing removed	56,969
Companies with missing data for variables used in hypothesis testing removed	1,548
Companies with negative net income for the sample year removed	17,484
Companies declaring a forthcoming audit in their tax return removed	5,275
Final sample	19,527
Of which:	
Companies with no voluntary audit	13,889
Companies with unqualified audit opinion from voluntary audit	5,502
Companies with qualified audit opinion from voluntary audit	136
And	
Companies with tax adjustments by the tax authority	258
Companies with no adjustments by the tax authority	19,269

We applied matching with replacement because this "produces matches of higher quality than matching without replacement by increasing the set of possible matches" (Abadie & Imbens, 2006, p. 140). The procedure estimates the selection model with common support and satisfies the balancing property. The results from our full and PSM samples are reported in Section 5.

4.2. *Regression models*

To control for the effects of potential endogeneity[13] between audit choice and tax aggressiveness on our results, we applied the Heckman two-stage modeling approach to test our hypotheses. We started by estimating the following first-stage probit model for audit choice[14]:

$$\text{Prob(AUDIT} = 1) = \frac{1}{\sqrt{2}} \int_{-\infty}^{Z'} e^{\frac{-t^2}{2}} dt, \tag{5}$$

[13]For endogeneity and possible solutions for it in accounting research, see Larcker and Rusticus (2010) and Lennox *et al.* (2012).

[14]Heckman (1979) suggests that a probit model is more appropriate than a logit model for this purpose.

where

$$Z' = \alpha_0 + \alpha_1 \text{LNASSETS} + \alpha_2 \text{LNSALES} + \alpha_3 \text{ASSETURN} + \alpha_4 \text{LEVERAGE} + \alpha_5 \text{CURRENTRATIO} + \alpha_6 \text{ROA} + \alpha_7 \text{NEWISSUE} + \alpha_8 \text{RECASSETS} + \alpha_9 \text{INVASSETS} + \alpha_{10} \text{NEWFIRM} + \alpha_{11} \text{STICKYNESS} + \alpha_{12} \text{GROWTH} + \alpha_{13} \text{GROUPCO} + \alpha_{14} \text{TAXAGGRTR} + \sum_{k=15}^{23} \alpha_k \text{INDUSTRY}_{16-k}.$$

The dependent variable in this first stage model is AUDIT, which was coded 1 if the company choose to have a voluntary financial statement audit in the year 2011 for fiscal year 2010, and 0 otherwise. The independent variables in the model were derived from the determinants of audit choice (voluntary audit or exemption) documented in prior literature (Chaney *et al.*, 2004; Lennox & Pittman, 2011; Niemi *et al.*, 2012; Dedman *et al.*, 2014; Ojala *et al.*, 2016). Based on that evidence, we used the following variables on the right-hand side of Eq. (5) (all variables except STICKINESS refer to fiscal year 2010): logarithm of total assets (LNASSETS); logarithm of net sales (LNSALES); asset turnover (ASSETURN); total liabilities divided by total assets (LEVERAGE); current ratio (CURRENTRATIO); return on assets (ROA); an indicator variable (NEWISSUE), which was coded 1 if there was a share-issue or the amount of long-term debt had increased by 5% or more, and 0 otherwise; accounts receivable divided by total assets (RECASSETS); inventories divided by total assets (INVASSETS); an indicator variable (NEWFIRM), which was coded 1 if the company was established after 2009, and 0 otherwise; an indicator variable (STICKYNESS), which was coded 1 if the company has opted for voluntary audit for fiscal year 2009, and 0 otherwise; net sales in year 2010 divided by net sales in 2009 (GROWTH); and an indicator variable (GROUPCO), which was coded 1 if the company is a parent company or a subsidiary in a group, and 0 otherwise.

Based on prior literature mentioned above (Chaney *et al.*, 2004 and Dedman *et al.*, 2014, among others), we expected positive signs on the coefficients of all variables apart from ASSETTURN and ROA, where we expected negative coefficients. We augmented the model with a measure of the company's tax aggressiveness (TAXAGGTR) that we define in Eq. (7). The inclusion of this variable allowed us to control for the possibility that the choice of having an audit and the level of tax aggressiveness are endogenous and will be correlated if they are both determined by the company. On one hand, a positive sign for the coefficient of TAXAGGTR could be expected

when tax aggressiveness creates demand for the auditor's tax expertise.[15] On the other hand, as Kanagaretnam *et al.* (2016) suggested, a higher quality audit may restrict tax aggressiveness, thereby leading to a negative correlation between tax aggressiveness and the choice of a voluntary audit. In addition, our theoretical model was based on the assumption that a voluntary audit may restrict the degree of tax aggressiveness (see Eq. (2)). Considering these conflicting views, we did not have any specific expectation for the sign of the coefficient of TAXAGGTR in our first stage regression (5). Finally, we controlled for industry fixed effects by including binary industry indicators INDUSTRY j ($j = 1, \ldots, 9$) for nine of the 10 main industries in our sample.[16]

After estimating Eq. (5), we proceeded to estimate Eq. (6) as our main (second stage) logit model:

$$\text{Prob}(\text{TAXADJ} = 1) = \frac{1}{1 + e^{-Z}}, \tag{6}$$

where

$$\begin{aligned} Z = {} & \beta_0 + \beta_1 \text{TAXAGGTR} + \beta_2 \text{AUDITUN} + \beta_3 (\text{TAXAGGTR} \times \text{AUDITUN}) \\ & + \beta_4 \text{AUDITQU} + \beta_5 \text{PAPERFILING} + \beta_6 \text{PETTYCASH} \\ & + \beta_7 \text{EARNMGT} + \beta_8 \text{NEWFIRM} + \beta_9 \text{ROA} + \beta_{10} \text{LEVERAGE} \\ & + \beta_{11} \text{LNSALES} + \beta_{12} \text{INVMILLS} + \sum_{k=13}^{21} \beta_k \text{INDUSTRY}_{14-k}. \end{aligned}$$

Table 3 shows the variables in the analysis. In Model (6), TAXADJ is the dependent variable and was coded 1 if the tax authority has made an adjustment to the taxable income reported for fiscal year 2010, and 0 otherwise.

Test Variables. To test the impact of tax aggressiveness on tax adjustments, we used tax return data confidentially obtained from the tax authority to construct the following measure that captured tax aggressiveness of small

[15] Cf. Hanlon *et al.* (2014) who suggest that tax aggressiveness could be positively associated with having a voluntary audit. See also Ojala *et al.* (2016) for empirical evidence of the need for tax expertise as a driver of audit choice in our small company context.

[16] As the companies in our sample are quite small with a turnover below 200,000 euros and have no more than 3 employees, they are likely to be very homogeneous in terms of ownership structure, i.e., they are almost fully owned by the person or the family running the business. At the same time, companies of this sort are not likely to have foreign operations to any significant extent. Thus, we see no need to include control variables for these characteristics.

Table 3. Variables in the Main Logit Model (Eq. (6))

Variable	Definition
TAXADJ	Indicator variable coded 1 if the tax authority has made an adjustment to the taxable income reported by the firm in its tax return filed in 2011 for fiscal year 2010, and 0 otherwise.
AUDITUN	Indicator variable coded 1 if the firm has had a voluntary audit accompanied by an unqualified audit opinion in 2011 for fiscal year 2010, and 0 otherwise.
AUDITQU	Indicator variable coded 1 if the firm has had a voluntary audit accompanied by a qualified audit opinion in 2011 for fiscal year 2010, and 0 otherwise.
TAXAGGTR	Tax aggressiveness of the firm measured by the book-tax difference based on proprietary tax return data: (Non-taxable revenues − Non-tax deductible expenses as reported in the tax return)/Total revenues in 2010.
TAXAGGFS	Tax aggressiveness of the firm measured by the book-tax difference based on publicly available financial statement data: (Pre-tax net income − Tax expense/Statutory tax rate)/Total revenues in 2010.
PAPERFILING	Indicator variable coded 1 if the firm has opted for the submission of its tax return for 2010 in a paper format (instead of an electronic format), and 0 otherwise.
PETTYCASH	Indicator variable coded 1 if the firm has cash on hand at the end of 2010 (rather than cash in bank), and 0 otherwise.
EARNMGT	Earnings management in 2010 measured by the DeFond–Park (2001) model.
NEWFIRM	Indicator variable coded 1 if the firm was established after 2009, and 0 otherwise.
ROA	Return on assets defined by the sum of earnings before interest and taxes and salaries, divided by the total assets in 2010.
LEVERAGE	Total liabilities of the firm divided by its total assets in 2010.
LNSALES	Natural logarithm of sales revenue in 2010.
INVMILLS	Inverse Mills ratio from the first stage probit model for voluntary audit choice for fiscal year 2010 (Eq. (5)).

companies in our institutional setting without bias and noise,

$$\text{TAXAGGTR} = \frac{\text{Non-taxable revenues} - \text{Non-tax deductible expenses}}{\text{Total revenues}}. \quad (7)$$

where nontaxable revenues and non-tax-deductible expenses are as claimed by the company in its tax return submitted for fiscal year 2010.[17]

Unlike prior studies that measured the tax aggressiveness of large multinationals from publicly available data, our study of small private companies uses a measure that is based on proprietary data and provides a direct and less noisy measure of tax aggressiveness. In essence, our measure

[17]For details of our measure of tax aggressiveness, see Appendix B.

describes the book-tax difference that the company reports in its tax return to the tax authority. The idea behind our measure is that a tax aggressive company trying to minimize its tax burden seeks ways to maximize non-taxable revenues (for example, by classifying revenues nontaxable rather than taxable) and minimize non-tax-deductible expenses (for example, by classifying expenses tax deductible rather than nondeductible) in its tax return. To account for size differences, we used total revenue (the sum of net sales and other revenue) as the size deflator rather than total assets. We did this for two reasons: (a) income tax is based on the company's revenues (and expenses), not on its assets, and (b) in the case of small private companies, total revenue is likely to be a less biased indicator of the company's size and level of activity. For example, it is not uncommon that some very small private companies with assets are relatively inactive and, therefore, generate very little, if any, taxable income. Using total assets as the size deflator would have yielded a biased measure of tax aggressiveness for these companies.

In addition, following Mills (1998) and Cho *et al.* (2006), we employed the more conventional book-tax difference as a benchmark to test the impact of tax aggressiveness on tax adjustments.[18] Using publicly available financial statement data, we calculated the book-tax difference as pretax book income as per the income statement less taxable income estimated by grossing up the tax expense in the income statement with the statutory tax rate for the year. Consistent with prior related literature, we used total assets as the size deflator here.[19]

$$\text{TAXAGGFS} = \frac{(\text{Net income} + \text{Tax expense}) - (\text{Tax expense}/\text{Tax rate})}{\text{Total revenues}}. \tag{8}$$

Our hypothesis (H1) predicts positive coefficients for the variables measuring tax aggressiveness (β_1). We tested our hypotheses (H2a and H2b) that a tax return accompanied by an unqualified audit report would be less likely to be tax-adjusted with AUDITUN. This indicator variable was coded 1 if the company had a voluntary audit with unqualified audit opinion, and 0 otherwise. The hypotheses predicted a negative coefficient for it (β_2), as well as for the coefficient of its interaction with tax aggressiveness (β_3).

[18] For a summary of different measures of tax avoidance or tax aggressiveness, see Hanlon and Heitzman (2010, pp. 137–144).

[19] The statutory tax rate in Finland for our sample year is 26%.

Control Variables. To control for the effect of a qualified audit opinion on tax adjustment, we included in the model AUDITQU, an indicator variable that was set at 1 if a company receives a qualified audit opinion from voluntary audit and was set at 0 otherwise. Unlike AUDITUN, a positive coefficient for AUDITQU can be expected (β_4).

Furthermore, we augmented our logit model (6) with a number of other controls. First, PAPERFILING is an indicator variable coded 1 if the company had chosen to file its tax return in traditional paper format, and 0 if it had chosen the digital filing option. Our expectation was that paper tax returns would be more prone to calculation errors and hence tax adjustments compared with digital tax returns, where the calculations are performed by the software.

In addition, most small private companies outsource financial statement preparation and filing to an external professional accountant. Therefore, the likelihood of using digital tax filing can be assumed to increase with the size of the client base and technological competence of the accountant. Small private companies submitting their tax returns in paper format are less likely to be experienced in accounting and less likely to use professional accountants, thus increasing the probability of adjustments by the tax authority due to increased proclivity for errors. Therefore, we expected a positive sign for the coefficient (β_5).

Second, PETTYCASH is an indicator variable coded 1 if the company had petty cash on hand (rather than cash in bank), and 0 otherwise. Very high petty cash balances may indicate weaknesses in the internal control and administration of the company. They may also signal a heightened risk of fraud or misappropriation of the company's assets. We expected a positive sign for the coefficient (β_6).

Third, if tax adjustments are a proxy for lack of financial statement credibility, it is reasonable to expect that tax adjustment is correlated with other quality measures, such as earnings management. We controlled for its effect with EARNMGT, which measure abnormal working capital accruals as defined by DeFond and Park (2001).[20] We expected a positive sign on the coefficient (β_7).

[20]For measuring earnings management, we employed the DeFond and Park (2001) model because of its parsimony (no parameter estimation required) and focus on working capital accruals. The latter are likely to be more relevant than noncurrent accruals for earnings management in small private companies. However, we also employed the modified Jones model (Dechow *et al.*, 1995) and the Kothari *et al.* (2005) model as robustness checks on the sensitivity of our findings to the choice of the earnings management model.

Fourth, it can be assumed that, unless they are serial entrepreneurs, the directors of newly established companies are likely to be less experienced in preparing financial statements and tax returns than directors of older companies. To control for the potential effect of firm age, we added NEWFIRM as defined above (see Table 3). We predicted a positive sign on its coefficient (β_8).

Fifth, we controlled for firm performance using ROA, which is the return on assets, defined as the sum of earnings before interest, taxes, and salaries divided by total assets,[21] and financial leverage with LEVERAGE defined above.[22] Following prior studies, which suggested that earnings quality increases with firm performance and decreases with financial leverage (Dechow *et al.*, 2010), and assuming that tax adjustments made by the tax authority reflect earnings quality, we expected the likelihood of the adjustments to be negatively related to ROA and positively related to LEVERAGE. This implies a negative coefficient (β_9) and a positive coefficient (β_{10}) for these variables, respectively.

Sixth, although company size is likely to capture aspects of agency relationships,[23] it may also have an impact on the likelihood of tax adjustments. The rationale for this is that, all things being equal, the tax authority is likely to allocate its resources to audits of larger rather than smaller companies because of the potential for larger tax collections from larger companies. Size is also an indicator of the company's complexity, potentially giving rise to adjustments by tax authority. To measure company size, we used LNSALES as defined above. We predicted its coefficient (β_{11}) to be positive.

Seventh, to control for potential endogeneity arising from the possibility that tax aggressiveness and the choice of voluntary audit (but not the audit opinion) is jointly determined by the management of the company, we included INVMILLS (the inverse Mills ratio) as a control variable

[21]For measuring ROA, we computed the nominator before salaries to account for the possibility that a director of a small company may pay dividends to him/herself through an abnormally large salary or pay his/her salary through abnormally large dividends, depending on his/her position in personal taxation.

[22]Due to extreme values of LEVERAGE, we winsorized it at the 95% fractiles of the distribution.

[23]For the relationship between organizational structure and the demand for auditing in the small private companies, see Abdel-Khalik (1993). For the importance of agency relationships in a small company context, see Collis (2012), Niemi *et al.* (2012) and Ojala *et al.* (2016).

(Lennox *et al.*, 2012). This ratio is obtained from our first-stage probit model for audit choice (Eq. (5)).[24]

5. Results

5.1. *Descriptive statistics and univariate tests*

Descriptive statistics for the independent variables used to test our hypotheses are shown in Table 4A for the full sample and Table 4B for the PSM (propensity score matched) sample. In both tables, we report the p-values from mean and median tests for differences between companies that were subject to tax adjustments and those that were not (column 1 versus column 2).

Regarding our first test variable, the tables show a significant difference in tax aggressiveness between tax-adjusted and nonadjusted companies when the book-tax difference is measured directly from tax return data (TAXAGGTR). Consistent with H1, the degree of tax aggressiveness is on average significantly higher in tax-adjusted companies (with mean 0.381) than in their nonadjusted counterparts (with mean 0.003), as shown by the mean and median tests for columns (1) versus (1) of Table 4A. The same applies also for the propensity score matched sample of nonadjusted companies in Table 4B. In contrast, the tables show that except for the median test in the full sample (Table 4A), the corresponding differences remain insignificant when tax aggressiveness is measured with book-tax differences based on publicly available financial statement data (TAXAGGFS).

Consistent with H2a, the mean and median tests indicate a significant difference between tax-adjusted and nonadjusted companies in the incidence of the company having an unqualified audit opinion (AUDITUN). For example, while the proportion of companies with an unqualified audit opinion is 0.205 among the sample of tax-adjusted companies shown in Table 4A, the corresponding proportion is significantly larger (0.283) among the nonadjusted companies. The difference is significant in mean and median tests for both total and PSM samples (Tables 4A and 4B). The incidence of having a qualified audit opinion (AUDITQU) is significantly larger in tax-adjusted companies (with mean 0.019) than in nonadjusted companies (mean 0.007) in the full sample with $p = 0.016$ (Table 4A).

[24]None of the other control variables considered in related prior studies (Mills, 1998; Cho *et al.*, 2006) are relevant to our small private companies. These include the firm's listing status, foreign source taxable income, net plant property and equipment measuring intangible assets such as patents, software and R&D.

Table 4A. Descriptive Statistics of the Variables in the Main Logit Model (Eq. 6): Full Sample ($n = 19,527$)

	All Companies			(1) Tax-Adjusted			(2) Non-Adjusted			Difference Between Col (1) Versus (2)	
	$n = 19,527$			$n = 258$			$n = 19,269$			t-Test for Means	Median Test
	Mean	Med	Std. Dev.	Mean	Med	Std. Dev.	Mean	Med	Std. Dev.	p-Value	p-Value
TAXAGGTR	0.008	0.000	0.207	0.381	0.072	1.313	0.003	0.000	0.136	<0.001 ****	<0.001 ****
TAXAGGFS	0.131	0.005	3.230	0.220	0.031	1.290	0.130	0.005	3.248	0.658	0.014 **
AUDITUN	0.282	0.000	0.450	0.205	0.000	0.405	0.283	0.000	0.450	<0.001 ****	0.006 ***
AUDITQU	0.007	0.000	0.083	0.019	0.000	0.138	0.007	0.000	0.082	0.016 **	0.016 **
PAPERFILING	0.423	0.000	0.494	0.535	1.000	0.500	0.422	0.000	0.494	<0.001 ****	<0.001 ****
PETTYCASH	0.300	0.000	0.458	0.341	0.000	0.475	0.299	0.000	0.458	0.161	0.145
EARNMGT	0.498	0.000	0.500	0.500	0.500	0.501	0.498	0.000	0.500	0.961	0.961
NEWFIRM	0.034	0.000	0.182	0.066	0.000	0.249	0.034	0.000	0.181	<0.001 ****	0.005 ***
ROA	0.763	0.425	1.017	0.673	0.350	0.996	0.764	0.426	1.017	0.147	0.088 *
LEVERAGE	0.552	0.377	0.674	0.497	0.373	0.588	0.553	0.377	0.675	0.190	0.113
LNSALES	10.32	10.68	1.378	10.11	10.46	1.477	10.32	10.69	1.376	0.022 **	0.025 **
INVMILLS	0.289	0.402	0.226	0.289	0.382	0.227	0.289	0.402	0.226	0.996	0.774

Notes: For variable definitions, see Table 3. The columns on the right show the p-values from mean and median tests for the difference between tax-adjusted (1) versus non-adjusted firms (2). Before performing the t-tests, we examine the equality of variances and apply either Satterthwaite (unequal variances) or pooled (equal variances) t-tests. In the rightmost column we report p-values from the non-parametric Mann–Whitney–Wilcoxon U-test for the equality of the medians of the two groups for continuous variables. Statistical (two-tailed) significance levels (p-values) better than 0.001, 0.010, 0.050, and 0.100 are indicated by ****, ***, **, and *, respectively.

Table 4B. Descriptive Statistics of the Variables in the Main Logit Model (Eq. (6)): PSM Sample ($n = 516$)

	All PSM Companies			(1) PSM Tax-Adjusted			(2) PSM Non-Adjusted			Difference Between Col (1) Versus (2)	
	$n = 516$			$n = 258$			$n = 258$			t-Test for Means	Median Test
	Mean	Med	Std. Dev.	Mean	Med	Std. Dev.	Mean	Med	Std. Dev.	p-Value	p-Value
TAXAGGTR	0.195	0.000	0.949	0.381	0.072	1.313	0.008	0.000	0.101	<0.001****	<0.001****
TAXAGGFS	0.159	0.012	0.941	0.220	0.031	1.290	0.098	0.002	0.321	0.143	0.133
AUDITUN	0.250	0.000	0.433	0.205	0.000	0.405	0.295	0.000	0.457	0.019**	0.020**
AUDITQU	0.012	0.000	0.107	0.019	0.000	0.138	0.004	0.000	0.062	0.101	0.101
PAPERFILING	0.533	1.000	0.499	0.535	1.000	0.500	0.531	1.000	0.500	0.930	0.930
PETTYCASH	0.345	0.000	0.476	0.341	0.000	0.475	0.349	0.000	0.478	0.853	0.854
EARNMGT	0.500	0.500	0.500	0.500	0.500	0.501	0.500	0.500	0.501	1.000	1.000
NEWFIRM	0.070	0.000	0.255	0.066	0.000	0.249	0.074	0.000	0.262	0.730	0.730
ROA	0.675	0.377	0.911	0.673	0.350	0.996	0.677	0.403	0.819	0.965	0.565
LEVERAGE	0.487	0.336	0.591	0.497	0.373	0.588	0.476	0.275	0.596	0.688	0.827
LNSALES	10.170	10.490	1.534	10.110	10.460	1.477	10.220	10.520	1.590	0.415	0.330
INVMILLS	0.283	0.388	0.227	0.289	0.382	0.227	0.278	0.390	0.227	0.570	0.351

Notes: For variable definitions, see Table 3. The sample examined in this table include all tax-adjusted companies and their PSM (propensity score matched) non-adjusted counterparts. The columns on the right show the p-values from mean and median tests for the difference between tax-adjusted (1) versus non-adjusted firms (2). Before performing the t-tests, we examine the equality of variances and apply either Satterthwaite (unequal variances) or pooled (equal variances) t-tests. In the rightmost column we report p-values from the non-parametric Mann–Whitney–Wilcoxon U-test for the equality of the medians of the two groups for continuous variables. Statistical (two-tailed) significance levels (p-values) better than 0.001, 0.010, 0.050, and 0.100 are indicated by ****, ***, **, and *, respectively.

In our full sample, Table 4A also shows significant differences between the tax-adjusted and nonadjusted companies (column 1 versus column 2) in terms of their tendency to file their tax returns in paper format rather than digital filing (PAPERFILING) and in terms of being a newly established company (NEWFIRM). Consistent with our expectation, the means of both of these variables are larger in tax-adjusted companies than in non-adjusted companies. Moreover, it turns out from Table 4A that tax-adjusted companies tend to be somewhat smaller (when measured by LNSALES) than their nonadjusted peers. Finally, it can be seen in the PSM sample (Table 4B) that these statistically significant differences disappear, as expected.[25]

5.2. *Correlation analyses*

Tables 5A and 5B show correlation matrices for the variables estimated from the full and matched-paired samples, respectively. These tables present Pearson correlations below the diagonal and Spearman correlations above the diagonal. From Table 5A (the full sample), we can see that a tax adjustment by the tax authority (TAXADJ) has a significant Pearson correlation with the following variables: TAXAGGTR ($p < 0.001$), AUDITUN ($p = 0.006$), AUDITQU ($p = 0.016$), PAPERFILING ($p < 0.001$), NEWFIRM ($p = 0.005$) and LNSALES ($p = 0.013$). Except for LNSALES, all these variables have expected signs. The Spearman correlations yield similar results. With regard to book-tax difference measured from financial statements (TAXAGGFS), Table 5A shows that its Spearman correlation with tax adjustments is positive ($p = 0.014$), while the Pearson correlation is far from being significant ($p = 0.658$). Finally, the corresponding results for correlations estimated from the matched-paired sample reported in Table 5B show that once again TAXAGGTR is positively correlated ($p < 0.001$) and AUDITUN is negatively correlated ($p = 0.019$) with tax adjustments. In contrast, the correlation of AUDITQU with tax adjustments remains insignificant in the PSM sample as shown in Table 5B. The same also applies to TAXAGGFS irrespective of whether Pearson or Spearman correlation is considered.

[25]The comparison of these variables between tax-adjusted and nonadjusted companies in our PSM sample could be expected to show insignificant differences because they were used as criterion variables in the propensity score matching of nonadjusted companies with their tax-adjusted counterparts.

Table 5A. Correlation Matrix of the Variables in the Main Logit Model (Eq. (6)): Full Sample ($n = 19,527$)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. TAXADJ	1.000	0.165	0.018	−0.020	0.017	0.026	0.010	0.000	0.020	−0.012	−0.011	−0.016	0.002
		<0.001	0.014	0.006	0.016	0.000	0.145	0.961	0.005	0.088	0.113	0.025	0.774
2. TAXAGGTR	0.209	1.000	0.223	0.043	−0.009	0.092	0.021	0.022	−0.018	−0.216	−0.097	−0.269	0.008
	<0.001		<0.001	<0.001	0.207	<0.001	0.003	0.002	0.011	<0.000	<0.000	<0.001	0.256
3. TAXAGGFS	0.003	0.031	1.000	0.012	0.037	0.067	0.001	−0.002	−0.072	−0.061	0.076	−0.267	−0.108
	0.658	<0.001		0.094	<0.001	<0.001	0.860	0.793	<0.001	<0.001	<0.001	<0.001	<0.001
4. AUDITUN	−0.020	0.004	<0.001	1.000	−0.052	0.038	−0.020	0.010	0.013	−0.083	−0.090	0.055	0.479
	0.006	0.540	0.861		<0.001	<0.001	0.005	0.178	0.072	<0.000	<0.001	<0.001	<0.001
5. AUDITQU	0.017	−0.002	0.001	−0.052	1.000	0.005	−0.004	−0.003	0.018	0.024	0.057	0.018	0.034
	0.016	0.789	0.843	<0.001		0.443	0.603	0.631	0.012	0.001	<0.000	0.011	<0.001
6. PAPERFILING	0.026	−0.010	0.012	0.038	0.005	1.000	0.064	0.020	−0.020	−0.105	−0.090	−0.114	0.022
	<0.001	0.177	0.086	<0.001	0.443		<0.001	0.005	0.006	<0.001	<0.001	<0.001	0.002
7. PETTYCASH	0.010	−0.005	−0.003	−0.020	−0.004	0.064	1.000	−0.010	−0.003	0.002	0.026	0.046	−0.028
	0.145	0.482	0.646	0.005	0.603	<0.001		0.149	0.640	0.766	0.000	<0.001	<0.001
8.EARNMGT	<0.001	−0.003	0.002	0.010	−0.003	0.020	−0.010	1.000	0.189	−0.034	0.034	0.000	−0.003
	0.961	0.683	0.824	0.178	0.631	0.005	0.149		<0.001	<0.001	<0.001	0.948	0.656
9. NEWFIRM	0.020	−0.001	−0.005	0.013	0.018	−0.020	−0.003	0.189	1.000	0.048	0.064	0.106	−0.031
	0.005	0.916	0.501	0.072	0.012	0.006	0.640	<0.001		<0.001	<0.001	<0.001	<0.001
10. ROA	−0.010	−0.008	0.049	−0.072	0.032	−0.069	−0.007	−0.041	0.038	1.000	0.143	0.491	−0.156
	0.155	0.288	<0.001	<0.001	<0.001	<0.001	0.307	<0.001	<0.001		<0.001	<0.001	<0.001
11. LEVERAGE	−0.009	−0.010	0.017	−0.082	0.090	−0.049	0.019	0.013	0.026	0.242	1.000	0.194	−0.186
	0.190	0.176	0.018	<0.000	<0.001	<0.001	0.009	0.077	0.000	<0.001		<0.001	<0.001
12. LNSALES	−0.018	−0.058	−0.054	0.052	0.020	−0.122	0.036	−0.003	0.131	0.274	0.021	1.000	0.217
	0.013	<0.001	<0.001	<0.001	0.005	<0.001	<0.001	0.696	<0.001	<0.001	0.003		<0.001
13. INVMILLS	<0.001	0.010	−0.004	0.499	0.047	0.025	−0.014	0.007	0.041	−0.123	−0.125	0.114	1.000
	0.996	0.181	0.604	<0.001	<0.001	0.000	0.055	0.304	<0.001	<0.001	<0.001	<0.001	

Note: For variable definitions, see Table 3. Pearson (Spearman) correlations are shown below (above) the diagonal.

Table 5B. Correlation Matrix of the Variables in the Main Logit Model (Eq. (6)): PSM Sample ($n = 516$)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. TAXADJ	1.000	0.667	0.066	−0.103	0.072	0.004	−0.008	0.000	−0.015	−0.025	0.010	−0.043	0.041
		<0.001	0.133	0.019	0.101	0.930	0.853	1.000	0.730	0.565	0.827	0.330	0.352
2. TAXAGGTR	0.197	1.000	0.231	−0.004	0.010	−0.016	0.008	−0.027	−0.051	−0.074	−0.016	−0.223	0.013
	<0.001		<0.001	0.920	0.826	0.720	0.856	0.534	0.251	0.095	0.718	<0.0010	0.772
3. TAXAGGFS	0.065	0.563	1.000	0.053	0.063	0.027	0.019	−0.107	−0.106	−0.026	0.062	−0.218	−0.022
	0.143	<0.001		0.228	0.154	0.541	0.659	0.015	0.016	0.548	0.162	<0.001	0.614
4. AUDITUN	−0.103	0.005	0.060	1.000	−0.063	0.110	−0.024	−0.013	−0.018	−0.030	−0.044	0.075	0.467
	0.019	0.904	0.174		0.156	0.013	0.594	0.761	0.691	0.497	0.316	0.087	<0.001
5. AUDITQU	0.072	−0.016	0.011	−0.063	1.000	0.065	−0.041	0.108	0.041	0.081	0.047	0.049	0.049
	0.101	0.724	0.806	0.156		0.139	0.356	0.014	0.350	0.065	0.285	0.264	0.269
6.PAPERFILING	0.004	−0.088	−0.068	0.110	0.065	1.000	0.034	0.051	−0.018	−0.071	−0.103	−0.060	0.074
	0.930	0.045	0.126	0.013	0.139		0.444	0.252	0.682	0.106	0.019	0.176	0.092
7. PETTYCASH	−0.008	−0.012	−0.049	−0.024	−0.041	0.034	1.000	−0.024	−0.023	0.050	−0.023	0.103	−0.024
	0.853	0.781	0.265	0.594	0.356	0.444		0.579	0.607	0.255	0.603	0.019	0.585
8.EARNMGT	0.000	0.004	−0.006	−0.013	0.108	0.051	−0.024	1.000	0.274	0.010	0.030	0.107	0.061
	1.000	0.927	0.900	0.761	0.014	0.252	0.579		<0.001	0.813	0.492	0.015	0.164
9. NEWFIRM	−0.015	−0.020	−0.022	−0.018	0.041	−0.018	−0.023	0.274	1.000	0.094	0.072	0.202	−0.014
	0.730	0.648	0.617	0.691	0.350	0.682	0.607	<0.001		0.033	0.101	<0.0010	0.756
10. ROA	−0.002	0.040	0.005	−0.024	0.042	−0.062	0.061	−0.026	0.149	1.000	0.050	0.481	−0.048
	0.965	0.367	0.903	0.590	0.340	0.157	0.168	0.552	0.001		0.256	<0.0010	0.280
11. LEVERAGE	0.018	0.022	0.033	−0.088	0.031	−0.057	−0.009	0.025	0.080	0.140	1.000	0.238	−0.125
	0.688	0.619	0.460	0.047	0.477	0.194	0.839	0.577	0.069	0.001		<0.001	0.004
12. LNSALES	−0.036	−0.207	−0.204	0.088	0.048	−0.055	0.094	0.100	0.215	0.302	0.067	1.000	0.236
	0.415	<0.001	<0.000	0.045	0.279	0.215	0.033	0.024	<0.001	<0.001	0.129		<0.001
13. INVMILLS	0.025	0.054	0.070	0.462	0.068	0.067	−0.017	0.076	0.090	−0.048	−0.153	0.146	1.000
	0.570	0.221	0.113	<0.001	0.123	0.130	0.699	0.085	0.042	0.275	0.001	0.001	

Note: For variable definitions, see Table 3. Pearson (Spearman) correlations are shown below (above) the diagonal.

Table 6A. Estimation Results of the Main Logit Model (Eq. (6)): Full Sample ($n = 19,527$)

Independent Variables:	Exp. Sign	(1) Coeff.	*p*-Value		(2) Coeff.	*p*-Value		(3) Coeff.	*p*-Value		(4) Coeff.	*p*-Value	
INTERCEPT	+/−	−4.473	<0.001	****	−6.543	<0.001	****	−4.211	<0.001	****	−3.413	<0.001	****
Test variables:													
TAXAGGTR	+	5.896	<0.001	****	6.465	<0.001	****						
AUDITUN	−	−0.417	0.018	**	−0.536	0.006	***	−0.428	0.006	***	−0.525	0.002	***
AUDITUN*TAXAGGTR	−	−1.722	0.010	***	−1.650	0.016	**						
TAXAGGFS	+							0.002	0.880		0.003	0.844	
AUDITUN*TAXAGGFS	−							0.024	0.436		0.018	0.574	
Control variables:													
AUDITQU	+				1.056	0.028	**				0.958	0.043	**
PAPERFILING	+				0.653	<0.001	****				0.425	0.001	***
PETTYCASH	+				0.249	0.084	*				0.240	0.074	*
EARNMGT	+				−0.121	0.387					−0.092	0.482	
NEWFIRM	+				0.712	0.015	**				0.843	0.002	***
ROA	−				−0.132	0.111					−0.052	0.492	
LEVERAGE	+				−0.029	0.805					−0.110	0.303	
LNSALES	+				0.195	<0.001	****				−0.081	0.078	*
INVMILLS	+/−				0.108	0.748					0.395	0.216	

Table 6A. (*Continued*)

Independent Variables:	Exp. Sign	(1) Coeff.	*p*-Value		(2) Coeff.	*p*-Value		(3) Coeff.	*p*-Value		(4) Coeff.	*p*-Value	
Main industry 1	+/−				−0.890	0.144					−0.906	0.125	
Main industry 2	+/−				0.230	0.486					0.113	0.727	
Main industry 3	+/−				−2.131	0.036	**				−2.345	0.020	**
Main industry 4	+/−				−0.559	0.002	***				−0.428	0.010	***
Main industry 5	+/−				0.075	0.788					0.000	0.999	
Main industry 6	+/−				−0.007	0.970					−0.035	0.842	
Main industry 8	+/−				−0.539	0.068	*				−0.637	0.024	**
Main industry 9	+/−				−1.167	0.027	**				−1.258	0.015	**
Wald Chi-Square		321.6	<0.001	****	369.0	<0.001	****	8.2	0.043	**	69.2	<0.001	****
-2Loglikelihood		2 364.4			2 287.6			2 736.6			2 670.8		
Pseudo R^2		0.147			0.177			0.003			0.029		
Concordance index		0.825			0.824			0.540			0.641		

Notes: See Table 3 for definitions of the variables. Statistical (two-tail) significance levels (*p*-values) better than 0.001, 0.010, 0.050, and 0.100 are indicated by ****, ***, **, and *, respectively.

Table 6B. Estimation Results of the Main Logit Model (Eq. (6)). PSM Sample ($n = 516$)

Independent Variables:	Exp. Sign	(1) Coeff.	*p*-Value		(2) Coeff.	*p*-Value		(3) Coeff.	*p*-Value		(4) Coeff.	*p*-Value	
INTERCEPT	+/−	−0.590	<0.001	****	−3.348	<0.001	****	0.089	0.397		0.098	0.886	
Test variables:													
TAXAGGTR	+	24.581	<0.001	****	28.552	<0.001	****						
AUDITUN	−	−0.338	0.192		−0.659	0.028	**	−0.486	0.021	**	−0.626	0.010	**
AUDITUN*TAXAGGTR	−	−18.288	<0.001	****	−20.966	<0.001	****						
TAXAGGFS	+							0.265	0.240		0.243	0.283	
AUDITUN*TAXAGGFS	−							−0.108	0.709		−0.107	0.713	
Control variables:													
AUDITQU	+				1.311	0.265					1.327	0.236	
PAPERFILING	+				0.302	0.177					0.059	0.752	
PETTYCASH	+				−0.032	0.892					0.020	0.917	
EARNMGT	+				−0.136	0.557					−0.074	0.699	
NEWFIRM	+				−0.309	0.492					−0.190	0.617	
ROA	−				−0.145	0.305					−0.001	0.993	
LEVERAGE	+				0.160	0.421					0.096	0.547	

Table 6B. (*Continued*)

Independent Variables:	Exp. Sign	(1) Coeff.	*p*-Value		(2) Coeff.	*p*-Value		(3) Coeff.	*p*-Value		(4) Coeff.	*p*-Value	
LNSALES	+				0.263	0.005	***				−0.012	0.856	
INVMILLS	+/−				0.894	0.115					0.752	0.110	
Main industry 1					−4.869	0.004	***				−0.295	0.733	
Main industry 2					−0.068	0.896					−0.201	0.667	
Main industry 3					−1.040	0.689					−0.227	0.876	
Main industry 4					−0.512	0.080	*				−0.152	0.528	
Main industry 5					0.456	0.365					0.224	0.588	
Main industry 6					−0.123	0.699					0.079	0.765	
Main industry 8					−0.584	0.193					−0.469	0.206	
Main industry 9					−1.284	0.057	*				−1.367	0.021	*
Wald Chi-Square		48.6	<0.001	****	66.8	<0.001	****	7.6	0.05	*	20.2	0.445	
-2Loglikelihood		537.8			505.4			586.0			691.5		
Pseudo R^2		0.388			0.446			0.022			0.060		
Concordance index		0.863			0.859			0.566			0.606		

Notes: See Table 3 for definitions of the variables. Statistical (two-tailed) significance levels (*p*-values) better than 0.001, 0.010, 0.050, and 0.100 are indicated by ****, ***, **, and *, respectively.

5.3. *Regression results*

The results from estimating our first stage probit model for voluntary audit choice (Eq. (5)) are shown in Appendix C. For 8 of the 14 independent variables included in the model (in addition to industry-fixed effects), the estimated coefficients are significant at the 5% level or better. The results show, however, that one of the variables not obtaining a significant coefficient is TAXAGGTR. This result is consistent with the view that, after all, the choice of a voluntary audit and tax aggressiveness may not be jointly determined by the company, or that the relationship between the two is not unidirectional, as explained in Section 4.2. Nevertheless, we include INVMILLS (the inverse Mills ratio) obtained from this first-stage probit model in our second-stage logit model to control for the effect of potential endogeneity. Regarding the overall fit of our audit choice model, the concordance index of 0.804 shows that the model has a fairly good explanatory power for voluntary audit choice in our full sample of nearly 20,000 observations.

Our main test results from estimating the second-stage binary logit model (Eq. (6)) are reported in Tables 6A and 6B for the full and matched-paired (PSM) samples, respectively. In both tables, we report results from estimating two models with and without relevant control variables: first, using TAXAGGTR as the measure of tax aggressiveness employing our proprietary tax return data (models 1 and 2), and second, using TAXAGGFS measuring tax aggressiveness from publicly available financial statement data (models 3 and 4).

Table 6A (the full sample with 19,527 observations) shows, consistent with our hypotheses (H1, H2a and H2b), that tax aggressiveness of the company when measured from its tax return (TAXAGGTR), a voluntary audit accompanied by an unqualified audit opinion (AUDITUN), as well as the interaction of these two (AUDITUN*TAXAGGTR) have significant effects on the likelihood of the tax authority's adjustment. This result holds irrespective of whether the effects of other relevant factors are controlled for (see models 1 and 2 in Table 6A). The signs of the estimated coefficients are as expected with high levels of significance (see the p-values). In addition, a qualified audit opinion has a significant positive effect (coefficient 1.056 with $p = 0.028$) on the likelihood of tax adjustment. In contrast, we do not find evidence that tax aggressiveness measured with the traditional book-tax difference (TAXAGGFS) has a significant effect on the likelihood of tax adjustment (see models 3 and 4 in Table 6A). The plausible reason for this

result is attributable to measurement errors inherent in book-tax differences based on publicly available financial statement data.

The results in Table 6A further show that some of the control variables have a significant impact on the likelihood of adjustments by the tax authority. In addition to AUDITQU, these include PAPERFILING, PETTYCASH, NEWFIRM and LNSALES. In model 2, all of these variables have significant positive coefficients as expected. It is also notable that the coefficient of INVMILLS, which controls for the potential effect of endogeneity, remains insignificant.

The overall statistics reported in Table 6A for the full second-stage logit regression (models 1 and 2) with significant Wald Chi-Squares and pseudo R^2 0.147 and 0.177 indicate that the models are able to explain the tax authority's behavior to a significant extent. This is supported by the concordance index, which indicates that the models predict the tax authority's responses (adjustment versus no adjustment) correctly in approximately eight out of 10 cases.

The main findings from the matched-paired sample in Table 6B are consistent with those from the full sample in Table 6A. First, the estimation results for tax aggressiveness (TAXAGGTR) from the matched-paired sample in Table 6B indicate a significant positive effect in models 1 and 2. In addition, a voluntary audit with an unqualified audit opinion (AUDITUN) has a significant negative effect on the likelihood of triggering attention from the tax authority (see model 2). Consistent with the full sample in Table 6A, the coefficients of the interaction variable (AUDITUN*TAXAGGTR) in models 1 and 2 of Table 6B are significant. Moreover, as was the case in the full sample reported in Table 6A, the coefficients of book-tax differences measured from financial statement data (TAXAGGFS) are insignificant as well.

Table 6B also shows that, with the exception of LNSALES and some industry controls, the coefficients of most of the control variables included in the full model (1) are insignificant. This is expected because these control variables were used as criteria in the propensity score matching of non-adjusted companies with their tax-adjusted counterparts. This suggests that the matching procedure has been effective.

Finally, it can be seen that the overall fit of the main model (2) in terms of its pseudo R^2 (0.446) is higher than when estimated from our full sample (0.177). This is also reflected in the concordance index (0.859), which indicates that the model fit, in terms of its ability to predict the observations in our PSM sample, is slightly higher than in the full sample (0.824).

5.4. *Robustness checks*

We performed several additional tests to check the sensitivity of our main results. First, instead of using our proprietary tax return data for measuring tax aggressiveness, we computed the traditional book-tax difference from the sample companies' publicly available financial statement data. However, instead of using total revenues as the size deflator (see the TAXAGGFS variable analyzed above), we followed prior studies and employed total assets to account for size differences.[26] The purpose of this analysis is to check that the insignificant results reported above for the traditional book-tax difference are not attributable to our choice of the size deflator.

Second, we excluded all companies with a noncalendar fiscal year-end from the sample. The purpose of this test is to show any effect that the year-end rush, which both financial statement auditors and tax authorities experience soon after December 31, may have on our results. As the majority of companies use the calendar year as their financial reporting year, this could have an adverse effect on the quality of the auditors' and tax authority's work and thus affect our results.

Third, we checked whether our main results were affected by the inclusion of companies making a loss in the sample. It is reasonable to suspect that unprofitable companies are less motivated to show tax aggressiveness with the aim of avoiding taxes. This is so because usually a loss-making company does not have to pay income tax for the year in question (assuming that its final taxable income is also negative). However, under the loss carry-forward system where losses are tax deductible in subsequent years, loss-making companies may still have an incentive to show tax aggressiveness. Nevertheless, we would expect this incentive to be moderated for two reasons: first, because the tax effect is not immediate and second, because the tax savings are conditional on the company being profitable in subsequent years. Overall, we have sufficient grounds to expect that when loss-making companies are included in the sample, they are likely to detract from the significance of our main results.

For each of these tests, we reestimated our logit model from the full sample with all control variables but, for simplicity reasons, excluded the interaction of the audit variable with tax aggressiveness. The number of observations available in model estimations varied across the tests, as noncalendar year companies were excluded in the second test and

[26] For a review of the different measures of tax aggressiveness (tax avoidance), see Hanlon and Heitzman (2010).

loss-making companies were included in the third test. The (untabulated) results of these three logit regressions follow.

First, when our tax aggressiveness measure was replaced with the book-tax difference computed from publicly available income statement data with total assets as the size deflator, the coefficient of TAXAGGFS was still far from being significant. Nevertheless, consistent with Table 6A, the coefficient of AUDITUN was significant. Moreover, as the Wald Chi-Square, Pseudo R^2, and Concordance index statistics measuring the overall fit were very close to those reported for Model 4 in Table 6A, it can be concluded that the results were not sensitive to our choice of the size deflator (total revenues versus total assets).

Second, the overall model fit in terms of pseudo R^2 and concordance index was not much affected by excluding approximately 8,000 companies with noncalendar fiscal years from the sample. The negative coefficient of AUDITUN remained significant. In addition, excluding companies with noncalendar fiscal years did not detract from the significance of the effect of tax aggressiveness. Overall, it can be concluded that the year-end rush effect that both financial statement auditors and tax authorities experience soon after the end of the calendar year does not provide grounds to change our main conclusions.

Finally, when loss-making companies were included in the sample, we found that this did not affect our main conclusions. While the statistics indicating the overall fit of the model (Wald Chi-Square, Pseudo R^2, and Concordance index) were now somewhat lower compared to those reported for model 2 in Table 6A, the main effects of tax aggressiveness and voluntary audits remained significant.

In addition to the robustness tests discussed above, we reestimated our main logit model with all control variables (Eq. (6)) from our full sample using the method suggested by Firth (1993). The purpose of this additional test was to control for the possibility that a separation would be present in our data, which might have caused problems in fitting the model.[27] The (untabulated) results from this Firth logit estimation were close to those reported in Table 6A, with only minor differences in relevant statistics. For example, the concordance index of the estimated model was 0.823 and the

[27]Firth logit (see Heinze & Schemper, 2002) is based on a penalized likelihood method that is appropriate in samples where a separation may occur. This may be the case when the dependent (response) variable may have low response prevalence and/or when the model includes several categorical interaction variables, thereby leading to some combination of predictors having the same event status.

pseudo R^2 had the value of 0.180. These were similar to the original estimations reported in Table 6A (0.824 and 0.177, respectively). Additionally, the estimated regression coefficients of the model were virtually the same, with an almost identical significance level to those shown in Table 6A. Thus, it can be concluded that our results are insensitive to whether the original maximum likelihood estimation or the Firth logit estimation controlling for potential separation in the data is used.

Following Lo (2014), we further complemented our logit model with a linear probability model (untabulated). We did so to examine potential issues with the inference. Again, we found no indication of data separation. The signs and statistical significance of the hypothesis variables remained similar to the logit model.

We also checked the robustness of our findings with regard to our definition of earnings management. Instead of using the model suggested by DeFond and Park (2001) for measuring abnormal current accruals, we estimated the residuals for total accruals using the modified Jones model as suggested by Dechow *et al.* (1995) and Kothari *et al.* (2005). The results (not tabulated) showed that our findings and conclusions were insensitive to this choice of earnings management measure.

We further considered using the amount of receivables (RECASSETS) and inventories (INVASSETS) as additional control variables in our main logit regression (6). The reason for their inclusion was similar to that of petty cash (PETTYCASH), i.e., high balances of receivables or inventories may be an indication of weaknesses in internal control and management of the company, thereby triggering attention from the tax authority. However, the (untabulated) results showed that augmenting our model with these two additional controls did not give any reasons to change our main conclusions concerning the effects of tax aggressiveness and voluntary audits.

Finally, as an additional test, we tried to gain some insight into whether owner-managers penalize auditors by opting out of a financial statement audit if the tax authority has adjusted company taxes. We analyzed this by focusing on companies in the most tax aggressive decile of TAXAGGTR because those companies are likely to need more tax advice from their auditors. We first filtered out those companies that opted out of an audit of financial year 2009. From the remaining sample, we then estimated a logit model where the dependent variable Prob(AUDIT 2011 = 1) was regressed on an indicator variable coded as 1 if a tax adjustment by the tax authority had taken place either in 2009 or 2010 and 0 otherwise, and on the inverse Mills ratio (measuring the likelihood of opting for audit) to control for

endogeneity. The (untabulated) results using a subset of 1,952 observations provided some support to the view that auditors were penalized by an increased likelihood to opt out of audit after tax adjustments had occurred. This is indicated by a negative coefficient of −0.422 (with $p = 0.077$) that was estimated for the indicator variable measuring tax authority's adjustments on the right-hand side of the regression.

6. Conclusion

Using a large proprietary data set from the confidential records of the Finnish tax authority for the fiscal year 2010, we examine the effect of tax aggressiveness and financial statement audits on tax authority's adjustments to the taxable income reported by approximately 20,000 small private companies in their tax returns. Our hypotheses on the effects of these factors are based on a theoretical stochastic model developed in this paper as well as on relevant prior empirical literature on the relationships between tax aggressiveness, financial statement audits, and quality of financial reporting. The present study thereby contributes to the literature by documenting for the first time how and why tax aggressiveness and financial statement audit affect the tax authority's response to the information reported by small private companies in their tax returns. Our main findings are as follows: First, we find as hypothesized that the likelihood of tax adjustments made by the tax authority is higher in companies that are tax aggressive. Second, as hypothesized, we find that the likelihood is lower in companies that opt for a voluntary audit and receive an unqualified audit opinion. Third, we find evidence for our hypothesis that a voluntary audit, when accompanied by an unqualified audit opinion, interacts with tax aggressiveness moderating its positive effect on the likelihood of tax adjustments. This study is the first to provide such evidence, as prior studies examining adjustments made by tax authorities in other jurisdictions have not considered the effect of audit or audit opinions. Therefore, our paper develops a new perspective on the importance of voluntary audit in small private companies.

In addition, the proprietary tax return data available for this study highlights the importance of measuring tax aggressiveness with book-tax differences directly from tax returns. Thus, we are able to avoid the noise inherent in book-tax differences measured with publicly available data, such as loss carry-forwards and other adjustments to the final taxable income for the period. Our robustness tests confirm that our results are indeed sensitive

to measuring tax aggressiveness directly from confidential tax return data rather than publicly available financial statements.

The main results concerning the effects of tax aggressiveness and voluntary audits are qualitatively insensitive to whether the full sample is used or a balanced sample based on propensity score pairing of tax-adjusted companies with their nonadjusted counterparts. Robustness tests also suggest that the main findings are qualitatively unaffected by the use of different size deflators for tax aggressiveness, excluding companies with noncalendar fiscal year-ends, or including companies reporting book losses in their financial statements.

Finally, this paper documents for the first time the positive effects of some context-specific factors on the likelihood of the tax authority making tax adjustments, such as filing the tax return in paper format rather than online, and whether there is cash on hand rather than in the bank. The use of these variables is new to the literature and may be useful to future studies examining the financial reporting quality of small companies.

We use a two-stage model to control for the effects of potential endogeneity arising from the possibility that tax aggressiveness and the choice of voluntary audit (but not the audit opinion) is jointly determined by the management of the company. However, the results of our first-stage regression model show in our small private company setting that the choice of audit is not positively related to tax aggressiveness. This result suggests that tax aggressiveness and the choice of voluntary audit are not jointly determined in our sample of small private companies.

The findings of this study have implications that will be of interest not only to tax authorities and the auditing profession, but also to the directors of small private companies. To take an example, consider a newly established small company with average tax aggressiveness, submitting its tax return in paper format, having petty cash on hand, and being of average size in our sample. The empirical results reported in this paper suggest that the likelihood of the tax authority making tax adjustment for such a company is about 5.4%, assuming the company does not opt for voluntary audit.[28] On the other hand, if the company shows a high level of tax aggressiveness in its tax return, for example, by claiming that one half of its revenues are

[28]See model 2 in Table 6A. When TAXAGGTR = 0.008, and LNSALES = 10.32 (see the mean values for the sample companies shown in the first column of Table 4A), and assuming $AUDITUN = 0$, PAPERFILING = 1, PETTYCASH = 1 and NEWFIRM = 1, the model yields the following likelihood for tax adjustment: $\text{Prob(TAXADJ} = 1) = 1/(1+ e^{-(-6.543+6.465*0.008-0.536*0-1.650*0+0.653*1+0.249*1+0.712*1+0.195*10.32)}) = 0.0539$.

nontaxable dividend income from domestic companies while all its expenses are tax deductible, the likelihood of tax adjustment increases to 57.8%.[29] However, by opting for a voluntary audit, and assuming that the audit opinion is unqualified (which has a likelihood of approximately 98% in our sample), the company can decrease the likelihood of tax adjustment to 26.0%.[30] The decrease of 31.8% (57.8–26.0%) in the likelihood of tax adjustment reflects the probability of receiving economic benefits from an audit in the form of tax savings. If the company considers this probability to be large enough, it may conclude that a voluntary audit is worth the cost and therefore choose this option.

Whether the economic implications of audits on taxation of small private companies found in our study can be extended to other countries with different thresholds for audit exemption is an avenue for future research, provided that the researchers get access to proprietary data from their tax authorities. In addition to our study, many examples in the literature show that gaining access to proprietary data from tax authorities is possible (e.g., Mills, 1998; Plesko, 2004; Cho *et al.*, 2006; Lisowsky, 2010; Beck & Lisowsky, 2014). These studies would shed light on whether tax aggressiveness and audits have similar effects on tax authorities' reactions in other countries. Thus, the results of this study contribute to the debate on the benefit to small private companies of having a financial statement audit and should be of interest to tax authorities and policymakers in other jurisdictions as well.

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[29] $\text{Prob(TAXADJ} = 1) = 1/(1 + e^{-(-6.543+6.465*0.500-0.536*0-1.650*0+0.653*1+0.249*1+0.712*1+0.195*10.32)}) = 0.5783$.

[30] $\text{Prob(TAXADJ} = 1) = 1/(1 + e^{-(-6.543+6.465*0.500-0.536*1-1.650*0.500+0.653*1+0.249*1+0.712*1+0.195*10.32)}) = 0.2601$.

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Appendix A. A Theoretical Stochastic Model of Tax Authority's Tax Adjustments

To start, we apply the concepts of BIAS and NOISE, which are the basic components of measurement errors in statistical estimation, to the book-tax difference reported by a company in its tax return for a given fiscal year to the tax authority (see Appendix B)[31]:

1. Net income as per income statement
2. + Tax expense, as per income statement
3. = Net income before taxes, as per income statement
4. + / − Adjustments for non-taxable revenues and non-deductible expenses reported in tax return
5. = Taxable net income reported in tax return
6. + BIAS
7. + NOISE
8. = 'True' taxable net income (A.1)

Here BIAS, the additive inverse of which is included in items 3 and/or 4, is a nonnegative constant. It represents an intentional and consistent attempt by the company to minimize its tax burden for the fiscal year in question.[32] In addition, while BIAS is determined and thereby known by the company, it may be observable to the tax authority and the auditor (if any) because of their professional skill and knowledge of tax rules. We further assume that while BIAS depends on TAXAGGR (the degree of tax aggressiveness), it is a negative function of VOLAUDIT (the use of a voluntary audit) because it may restrict the degree of tax aggressiveness. More formally:

$$\text{BIAS} \geq 0, \text{ and}$$
$$\text{BIAS} = f(\text{TAXAGGR, VOLAUDIT}), \text{so that} \quad \text{(A.2)}$$

$$\frac{\delta \text{BIAS}}{\delta \text{TAXAGGR}} > 0, \quad \text{(A.3)}$$

[31] For a discussion of these concepts in an accounting context, see, e.g., Wallace (1980).

[32] While the degree of tax aggressiveness, and hence BIAS, is likely to vary across firms and/or over time, it is here defined as a constant because our theoretical model describes the case of a given firm in a given fiscal year, not a cross-section of firms nor a time series of a firm.

$$\frac{\delta \text{BIAS}}{\delta \text{VOLAUDIT}} < 0. \tag{A.4}$$

NOISE, the additive inverse of which is included in items 3 and/or 4, is a random variable following normal distribution with zero expectation and constant variance. Unlike BIAS, which is a nonnegative constant, NOISE represents an unintentional random error in the financial statements or in the tax return for the fiscal year. While NOISE is unobservable to the company by definition, it may be detectable by the auditor and possibly also by the tax authority especially when NOISE is large. It is two-directional (either income increasing or decreasing) and, if not detected by the company's auditor or the tax authority, leads to tax increases or decreases. However, as the occurrence of large random errors are likely to be detected (and corrected) by the auditor, it follows that the variance of NOISE decreases with VOLAUDIT. To summarize

$$\text{E(NOISE)} = 0, \quad \text{and} \tag{A.5}$$

$$\text{Var(NOISE)} > 0 \quad \text{with} \tag{A.6}$$

$$\text{Var(NOISE)} = g(\text{VOLAUDIT}), \quad \text{so that} \quad \frac{\delta \text{Var(NOISE)}}{\delta \text{VOLAUDIT}} < 0. \tag{A.7}$$

Next, we define the following quantities:

SHORTFALL is the amount of taxable net income reported in the tax return that falls short of the "true" taxable net income. Thus, SHORTFALL is determined by the difference between "true" taxable net income and taxable net income reported in tax return, or the sum of BIAS and NOISE.

TOLERANCE is a nonnegative constant representing the tolerance or threshold set by the tax authority for SHORTFALL before taking corrective actions by adjusting taxable income. While TOLERANCE is unobservable to all outsiders (including the company's auditor), a positive difference between SHORTFALL and TOLERANCE triggers tax authority's corrective action through tax adjustment.

Assuming normality, we can now write the likelihood of tax adjustment for the fiscal year in question as follows:

$$\begin{aligned}\text{Prob(TAXADJ)} &= \text{Prob(SHORTFALL} > \text{TOLERANCE)} \\ &= 1 - \text{Prob(SHORTFALL} \leq \text{TOLERANCE)}\end{aligned}$$

$$= 1 - \text{Prob}\left\{ Z \leq \frac{\text{TOLERANCE} - E(\text{SHORTFALL})}{\sqrt{\text{Var}(\text{SHORTFALL})}} \right\}, \tag{A.8}$$

where Z is the standard normal variate of the normal distribution with zero mean and standard deviation of one.

In addition, given our definitions and standard statistical rules, we have the following expressions[33]:

$$\begin{aligned} \text{E}(\text{SHORTFALL}) &= \text{E}(\text{BIAS} + \text{NOISE}) \\ &= \text{E}(\text{BIAS}) + \text{E}(\text{NOISE}) \\ &= \text{BIAS}, \end{aligned} \tag{A.9}$$

$$\begin{aligned} \text{Var}(\text{SHORTFALL}) &= \text{Var}(\text{BIAS} + \text{NOISE}) \\ &= \text{Var}(\text{BIAS}) + \text{Var}(\text{NOISE}) + 2\text{Cov}(\text{BIAS; NOISE}) \\ &= \text{Var}(\text{NOISE}), \end{aligned} \tag{A.10}$$

Now, inserting expressions (A.9) and (A.10) in (A.8) yields the following equation for the likelihood of tax adjustment:

$$\text{Prob}(\text{TAXADJ}) = 1 - \text{Prob}\left\{ Z \leq \frac{\text{TOLERANCE} - \text{BIAS}}{\sqrt{\text{Var}(\text{NOISE})}} \right\}. \tag{A.11}$$

Finally, in accordance with expressions (A.3) and (A.4), we redefine BIAS as a function of TAXAGGR and VOLAUDIT as follows:

$$\text{BIAS} = \text{TAXAGGR} * (1 - k_1 \text{VOLAUDIT}), \tag{A.12}$$

where

VOLAUDIT is a dichotomous indicator variable equal to 1 if the company chooses a voluntary audit, and 0 otherwise.

k is a nonnegative constant with $0 < k_1 < 1$ describing the restrictive impact of voluntary audit on tax aggressiveness.

Correspondingly, following expression (A.7), we redefine Var(NOISE) as a function of VOLAUDIT:

$$\text{Var}(\text{NOISE}) = \text{Var}(\text{ERROR}) * (1 - k_2 \text{VOLAUDIT}), \tag{A.13}$$

where

Var(ERROR) is the variance of a normally distributed random error with zero expectation in taxable net income reported in the tax return.

[33] As BIAS is constant with zero variance by definition, the covariance between BIAS and NOISE must also be zero, thereby leading to expression (A.10).

k_2 is a nonnegative constant with $0 < k_2 < 1$ describing the impact of voluntary audit on the variance of NOISE in the tax return by detecting and eliminating large random errors in tax return and/or financial statement information.

Inserting (A.12) and (A.13) in (A.11) we can re-write the likelihood of tax adjustment in the following form:

$$\text{Prob(TAXADJ)} = 1 - \text{Prob}\left\{ Z \leq \frac{\text{TOLERANCE} - \text{TAXAGGR} * (1 - k_1 \text{VOLAUDIT})}{\sqrt{\text{Var(ERROR)} * (1 - k_2 \text{VOLAUDIT})}} \right\}. \tag{A.14}$$

From expression (A.14), we draw the following important conclusions.

First, tax aggressiveness has a positive impact on the likelihood of tax adjustment.[34] This is because the higher TAXAGGR (in the numerator on the right-hand side of (A.14)) is, the smaller is the probability on the right-hand side of (A.14), which thereby leads to larger likelihood of tax adjustment.

Second, a voluntary audit has a *negative* impact on the likelihood of tax adjustment. This impact is attributable firstly to the negative impact of voluntary audit on TAXAGGR through restricting the degree of tax aggressiveness (see expression (A.12)). In addition, as voluntary audit is expected to decrease Var (NOISE) as defined in expression (A.13), then, other things being equal and assuming that the nominator on the right-hand side of (A.11) is positive,[35] the increase in the nominator coupled with the decrease in the denominator due to a voluntary audit leads to an increase in the probability on the right-hand side of (A.11), and hence to a smaller likelihood of tax adjustment.

Third, according to expression (A.14) the likelihood of tax adjustment is clearly a nonlinear function of TAXAGGR and Var(ERROR). In particular, the negative impact of voluntary audit on the likelihood of tax adjustment is not constant, but it is dependent on the level of the fundamental factors in the model. For example, it may be that the impact of voluntary audit on the likelihood of tax adjustment is more pronounced when the degree of tax aggressiveness is higher.

[34]This conclusion is consistent with the "more natural hypothesis" suggested by Allingham and Sandmo (1972, p. 331) in their classical paper.

[35]This assumption is plausible in view of the negative effect of voluntary audit on BIAS (see (A.12)).

Table A.1. Illustrative Examples of the Theoretical Model.

Variables and Parameters in the Model	Base Case	Case 1	Case 2	Case 3
TOLERANCE	100	100	100	100
TAXAGGR	20	120	120	120
VOLAUDIT	0	0	1	1
Var(ERROR)	2500	2500	2500	2500
k_1			0.25	0.25
k_2				0.90
BIAS = TAXAGGR * (1−k_1 VOLAUDIT)	20	120	90	90
Var(NOISE) = Var(ERROR) (1−k_2 VOLAUDIT)	2500	2500	2500	250
(TOLERANCE-BIAS)/Stdev(NOISE)	1.600	−0.400	0.200	0.632
Prob(TAXADJ)	**0.055**	**0.655**	**0.421**	**0.264**

In Table A.1, we illustrate these conclusions with numerical examples. The Base case represents an example of a company which shows moderate tax aggressiveness with TAXAGGR = 20 and has Var (ERROR) = 2500 in reported taxable net income when the company does not opt for a voluntary audit. Assuming that the TOLERANCE of the tax authority for SHORTFALL (i.e., the difference between "true" taxable net income and the net income reported in the tax return) is 100, expression (A.14) yields the likelihood of 0.055 for tax authority's adjustment.

Case 1 shows what happens when tax aggressiveness is high with TAXAGGR of 120 instead of 20, other things staying the same as in the Base case with no voluntary audit. The likelihood of tax adjustment is now as high as 0.655 due to the high degree of tax aggressiveness. This likelihood is illustrated graphically in Fig. A.1 by the area under the solid probability curve to the right from the vertical line representing tax authority's TOLERANCE (100).

Cases 2 and 3 demonstrate the impacts of a voluntary audit firstly through restricting the degree of tax aggressiveness by 25%, thereby lowering the likelihood of tax adjustment to 0.421 (Case 2), and secondly through eliminating large random errors in tax return and financial statement information, thereby decreasing the variance of NOISE by 90% and lowering the likelihood further down to 0.264 (Case 3). This is shown graphically in Fig. A.1 by the tail under the dashed probability curve to the right from TOLERANCE.

Finally, the numerical examples (not tabulated) also suggest that the negative impact of voluntary audit is larger, or more negative, when the degree of tax aggressiveness is higher. As an indication of this, consider Case 1 where BIAS is 120. When the company opts for voluntary audit, this

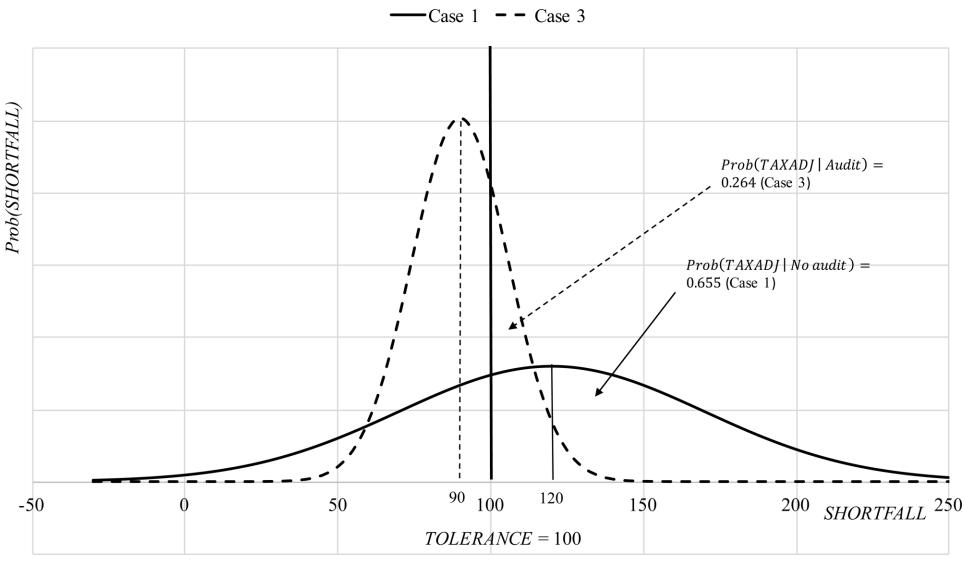

Fig. A.1. The impact of voluntary audit on the likelihood of tax adjustment.

decreases the likelihood of tax adjustment by 39.1%-points from 0.655 to 0.264 (Case 3). In contrast, if BIAS were, say, 80 instead of 120 in Case 1, then the corresponding decrease in the likelihood attributable to voluntary audit would be less, only 33.9%-points (from 0.345 to 0.006) assuming that the effects of the audit stayed the same (i.e., it would decrease BIAS by 25% and Var(NOISE) by 90%). These numerical results illustrate the nonlinear nature of the impact of voluntary audit on the likelihood of tax adjustment.

In sum, the above theoretical stochastic model and the numerical examples illustrating it demonstrate why and how tax aggressiveness and voluntary financial statement audits have an effect on the likelihood of tax adjustments by tax authority. While tax aggressiveness has a direct positive effect on the likelihood of tax adjustments, the effect of voluntary audit is more complex, having negative effects on the likelihood of tax adjustments via two channels, i.e., through restricting the degree of tax aggressiveness and through reducing the variance of noise in tax return information by eliminating large random errors.

Appendix B. Book-Tax Difference Based on the Tax Return Submitted to the Finnish Tax Administration

The following calculation derives from the basic structure of the tax return form used in Finland by all companies subject to income tax.

A. Net income, as per income statement for the year
+ Tax expense, as per income statement for the year

B. Net income before taxes, as per income statement for the year
+ Non-tax-deductible expenses in the income statement, as claimed in the tax return (1)
− Nontaxable revenues in the income statement, as claimed in the tax return (2)

C. Taxable net income, as reported by the company in the tax return
+/− Adjustments made by the tax authority to non-tax-deductible expenses and nontaxable revenues reported in the tax return
−/+ Other adjustments made by the tax authority (3)

D. Final taxable income for the year
× Statutory tax rate

E. Final income tax

We define our measure of company's tax aggressiveness as the book-tax difference (B – C) reported by the company in the tax return:

B − C = B − (B + Non-tax-deductible expenses in the income statement, as claimed in the tax return = Non-taxable revenues in the income statement, as claimed in the tax return) = Non-taxable revenues in the income statement, as claimed in the tax return – Non-tax-deductible expenses in the income statement, as claimed in the tax return.

To account for size differences, we use company's total revenues (net sales + other revenues) as the size deflator.

Legend:

(1) Mandatory reserves for future expenditure, depreciation of shares in fixed assets, losses from mergers, entertainment expenses, fines and penalties paid, etc.
(2) Dividend income from domestic companies, gains from disposals of shares in fixed assets (under certain conditions), reversals of tax-deductible

write-downs and reserves, etc. (3) For example, carry-forwards of losses confirmed in previous years, deducted by the tax authority *ex office*.

Appendix C. Estimation Results of the Probit Model for Voluntary Audit Choice (Eq. (5)): Full Sample ($n = 19{,}527$)

Dependent Variable: Prob (AUDIT = 1) Independ.	Exp. Sign	Coefficient	Chi-square	p-Value	
INTERCEPT	+/−	−3.088	518.97	<0.001	****
LNASSETS	+	0.044	36.78	<0.001	****
LNSALES	+	0.068	51.89	<0.001	****
ASSETTURN	−	0.000	0.01	0.904	
LEVERAGE	+	−0.092	22.61	<0.001	****
CURRENTRATIO	+	0.005	4.39	0.036	**
ROA	−	−0.073	26.57	<0.001	****
NEWISSUE	+	−0.044	0.44	0.505	
RECASSETS	+	−0.023	0.77	0.379	
INVASSETS	+	−0.075	1.53	0.216	
NEWFIRM	+	0.208	4.68	<0.001	****
STICKINESS	+	1.950	2832.57	<0.001	****
GROWTH	+	0.000	0.11	0.743	
GROUPCO	+	0.793	90.09	<0.001	****
TAXAGGTR	?	0.010	0.04	0.842	
INDUSTRY FIXED		Included	Included	Included	
Wald Chi-Square		3,369.8		<0.001	****
-2Loglikelihood		17,495.5			
Pseudo R^2		0.377			
Concordance index		0.804			

Notes: The independent variables in this probit regression are the following: LNASSETS is logarithm of total assets; LNSALES is logarithm of net sales; ASSETTURN is net sales divided by total assets; LEVERAGE is total liabilities divided by total assets; CURRENTRATIO is current ratio; ROA is return on assets; NEWISSUE is an indicator variable coded 1 if there has been a share-issue or the amount of long-term debt has increased 5% or more, and 0 otherwise; RECASSETS is accounts receivable divided by total assets; INVASSETS is inventories divided by total assets; NEWFIRM is an indicator variable which is 1 if the company has been established after 2009, and 0 otherwise; STICKINESS is an indicator variable coded 1 if the company has opted for voluntary audit in year $t-2$, and 0 otherwise; GROWTH is net sales in year $t-1$ divided by net sales in year $t-2$; GROUPCO is an indicator variable coded 1 if the company is a parent company or a subsidiary, and 0 otherwise; TAXAGGTR is as defined in Eq. (7). Statistical (two-tail) significance levels (p-values) better than 0.001, 0.010, 0.050, and 0.100 are indicated by ****, ***, **, and *, respectively.

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