Mutual Relationships in Taxation Procedure: A Survey of Family Firms' Tax Compliance, Tax Auditors' Negotiation Strategy and Time Consumption

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Referent:	Prof. Dr. Kay Blaufus
Korreferent:	Prof. Dr. Jost H. Heckemeyer
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Summary

This doctoral thesis combines two papers and a monograph in order to contribute to the research on taxation procedure that focuses on the interdependent relationship between taxpayers and tax authorities. Based on survey data from German revenue agents, these individual investigations take as their starting point selected parameters that underlie the characteristics of one or both involved parties.

The first paper empirically investigates the effect of family ownership and family management as determinants of tax planning aggressiveness. The results provide evidence that family firms are not generally less tax aggressive as suggested in previous research.

The second paper examines which negotiation strategies used by tax auditors, how these strategies affect audit outcome, and which factors determine the use of different negotiation strategies by tax auditor. The results indicate that tax auditors use predominately competitive negotiation tactics and make their choices depending on the perceived strategies of their opponents.

The monograph analyzes possible factors influencing revenue agents' working time consumption during tax audits. The results show a strong dependence of time-on-task on characteristics of the audit itself and of the executing agent, but only to a limited extent on characteristics of the audited taxpayer.

Zusammenfassung

Diese Dissertation umfasst zwei Beiträge und eine Monografie zum Forschungsbereich des Besteuerungsverfahrens. Im Fokus stehen dabei die interdependenten Beziehungen zwischen Steuerpflichtigen und Steuerverwaltung. Die einzelnen Untersuchungen betrachten ausgesuchte Parameter einer oder beider Parteien und basieren auf Befragungsdaten deutscher Betriebsprüferinnen und Betriebsprüfer.

Der erste Beitrag untersucht empirisch, inwieweit die Aggressivität der Steuerplanung von Unternehmen dadurch beeinflusst wird, dass die Mehrheit der Anteile und die Führung des Unternehmens in einer Familie vereint sind. Die Ergebnisse belegen, dass solche Familienunternehmen nicht – wie die bisherige Forschung aufzeigt – grundsätzlich weniger aggressive Steuerplanung betreiben.

Der zweite Beitrag widmet sich den Verhandlungsstrategien von Betriebsprüferinnen und Betriebsprüfern. In ihm wird beleuchtet, wie diese das Ergebnis der Prüfung beeinflussen können und welche Faktoren wiederum die Auswahl aus den verschiedenen Strategien determinieren. Die Ergebnisse deuten darauf hin, dass Betriebsprüferinnen und Betriebsprüfer überwiegend kompetitive Verhandlungstaktiken anwenden und dass sie ihre Auswahl in Abhängigkeit der wahrgenommenen Taktik des Verhandlungspartners treffen.

Die Monografie analysiert mögliche Einflussgrößen auf den Zeitverbrauch der Prüfenden während der Prüfung. Die Ergebnisse zeigen, dass der Zeitaufwand in einem starken Maße von den Eigenschaften der ausführenden Prüferin bzw. des ausführenden Prüfers und von der Betriebsprüfung selbst, jedoch nur beschränkt von den Eigenschaften des geprüften Steuerpflichtigen abhängt.

To Anja, Julius, and Clara

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List of Abbreviations

AFT	accelerated failure time
AIC	Akaike information criterion
BIC	Bayesian information criterion
PH	proportional hazard
PO	proportional odds
RP	Royston/Parmar
SMEs	small and medium-sized enterprises

I Introduction

1 Research Incentive

Tax administrations face the challenge of rebuilding, maintaining or expanding the efficiency of tax enforcement and tax collection. In Germany, e.g., *Engels* (2006) has drawn attention to considerable shortcomings in relation to tax enforcement. The causes are manifold and appear not only in Germany. Particular highlights were and are the limited institutional capacities and the changeover or adaptation to predominately digital processes. Furthermore, the traditional "enforcement" paradigm has begun to crumble. Strategies to improve taxpayers' compliance should not be restricted to extension of tax audits and threats of punishment. Instead, it is just as advisable to reflect the various motivations that lie behind taxpayers' compliance decisions (Alm et al. 2010; OECD 2015: 123). However, taxpayers do not make such decisions in a vacuum. It is conceivable, on the one hand, that their actions can arise from a perceived or expected treatment on the part of the tax authority, and taxpayers' behavior can be triggered by a specific reaction from the other side. In short, the relationship between both parties is interdependent even if they have not had significant personal contact (see also Smith 1992).

In order to provide evidence of this multidimensional nature, it is clearly important to investigate real tax audit cases. The reasons for this are twofold, firstly because tax audits still constitute the main direct and indirect measure within the framework of tax enforcement (for an overview on effects of audits see Kirchler et al. 2008; Ratto et al. 2013), and secondly since the involved parties interact during the audit directly and over a longer period. Therefore, tax auditors[1] are the "public face" of the tax authority (OECD 2006) and, in the first instance, the sole decision maker. As a result, it can be assumed that their actions are governed by instructions and rules but also by individually applied tactics. The latter can chiefly stem from the perceived behavior of the auditee which the auditor experiences beforehand or during the audit. The consequence is that the auditor realizes a particular outcome at first glance. Moreover, audited taxpayers will consider their own behavior patterns on the basis of experience during the audit. In so doing, they take into account not only the detected adjustment, but also the way in which the auditor detects and enforces the

[1] According to German tax law no distinction is made between the different names *tax auditor* and *revenue agent* so that both are used interchangeably.

breaches or fails to detect them, respectively (see e.g., Andreoni et al. 1998; DeBacker et al. 2015b). Furthermore, audited taxpayers affect non-audited taxpayers due to “unofficial” reported personal experience (Alm et al. 2009).

My doctoral thesis aims to gain a greater understanding of these complex interactions. In detail, the first part deals with the tax compliance behavior of family firms and extends prior research. The second and the third parts scrutinize tax auditors’ negotiation strategies and their time consumption during tax audits, respectively. These studies reveal novel research results in both areas.

2 Objects of Investigation and Main Findings

This thesis comprises three separate research projects focusing on closer inspections within the taxation procedure. All projects are based on a survey of experienced German tax auditors, but the emphases relate to different specific determinants of the interdependent relationship between taxpayers and tax authorities.

2.1 Tax Planning Strategies of Family and Non-Family Firms

The second chapter[2] empirically investigates the effect of family ownership and family management as determinants of tax planning aggressiveness. Family-controlled businesses represent the majority of firms in many countries (e.g., Faccio/Lang 2002) and previous research shows the impact of firm characteristics on tax aggressiveness (for an overview see Hanlon/Heitzman 2010). However, up to now only *Chen et al.* (2010) have studied the tax aggressiveness of family firms. *Chen et al.* (2010) have found that the different cost-benefit structure leads to a lower tax aggressiveness among family firms. But, their study is restricted because the data are based on financial accounting data from listed firms only. As a result, the researchers did not have the opportunity to investigate tax avoidance activities that reduce financial and taxable income equally (“conforming avoidance”), and to examine whether their findings were also applicable to private firms. Our study deals with both shortcomings. Moreover, we explicitly consider the auditor’s ability and effort expended in detecting aggressive tax planning activities. Hence, our study contributes to research into tax aggressiveness and into family firm and fleshes out the findings of previous research.

[2] Chapters II is based on a research paper co-authored with Prof. Dr. Kay Blaufus, Leibniz University of Hanover, and Prof. Dr. Daniela Lorenz, Free University of Berlin.

Our results provide evidence that family firms are not generally less tax aggressive as suggested in prior research (Chen et al. 2010). Only in cases of tax avoidance activities that are treated differently in financial and tax accounting ("non-conforming avoidance") do family firms indeed behave less aggressively. However, where conforming tax avoidance is concerned, we find family firms are even more tax aggressive than non-family firms. Taken together, a significant (negative) overall effect of family firms on tax aggressiveness is only prevalent if a firm is not only controlled but also managed by a family. Finally, our results provide evidence that family-managed firms that are required to publish information about tax expenses, and are thus more easily revealed as tax planners, apply fewer non-conforming tax planning strategies. We conclude that these firms fear potential reputational risks resulting from tax avoidance more strongly, and this finding is consistent with the lines of argument put forward in past research.

Our results should be a valuable tool for investors and researchers relying on financial statement data to study a firm's tax policy. As we have shown for family firms, investors who focus solely on effective tax rates may come to misleading conclusions due to the disregard of conforming tax avoidance. Yet further research is advisable, as legal tax avoidance activities that are accepted by tax authorities and do not result in tax adjustments are not captured in our data set. Moreover, the tax audit outcome on which our study is based refers only to income taxes even though applied aggressive tax planning strategies may also relate to other taxes, e.g., value added tax (for an overview of tax gap estimations from the perspective of tax authorities see TGPG 2016).

2.2 Negotiating with the Tax Auditor: The Effect of Tax Auditors' Negotiation Strategy on Firms' Tax Adjustments

In the third chapter[3], we examine the negotiation strategies tax auditors use, how these strategies affect audit outcome, and which factors determine the use of different tax auditor negotiation strategies. Observations from tax audit practice suggest the important role played by negotiations in the assessment of a firm's final tax burden. However, whereas negotiation between involved parties is widely accepted in financial accounting research (Antle/Nalebuff 1991), prior tax research is almost silent with respect to tax audit

[3] Chapters III is based on a research paper co-authored with Prof. Dr. Kay Blaufus, Leibniz University of Hanover, Prof. Dr. Daniela Lorenz, Free University of Berlin, and Alexander N. Schwäbe, Leibniz University of Hanover.

negotiations. This chapter provides a first attempt toward an understanding of tax audit negotiations. While doing so we take into account that tax adjustments do not only depend on the chosen negotiation strategies, but also on characteristics of firms and auditors. However, several questions remain open for future research. Nevertheless, our results pose a challenge for governments that aim at introducing enhanced relationship programs.

Our results show that on average about 40 % of the detected pre-negotiation audit differences are assessed after tax audit negotiations. Thereby the negotiation outcome depends significantly on the auditor's choice of negotiation strategy. Our results indicate that the majority of tax auditors prefer competitive negotiation tactics, either purely or mixed with cooperative elements, whereas purely cooperative or neutral negotiation strategies are rarely used. The use of a competitive negotiation strategy increases auditors' negotiation rate by ten percentage points. Our results further indicate that the effect of negotiation strategy depends on the time frame of the respective adjustments. The choice of strategy is most important if the negotiated issue results in permanent tax revenue (tax burden) for the auditor (taxpayer). Finally, our results reveal that the choice of strategy is not greatly affected by firm or auditor characteristics, but is rather determined by the opponents' negotiation strategy as perceived by the tax auditor.

2.3 Determining Factors of Tax Auditors' Time Consumption

In the fourth chapter, the focus is on tax auditors' time consumption before, during and after the audit insofar as it relates to the preparation, conducting and completion of an audit. Tax authorities need such information for proactive staff planning and for performance evaluations of fielded agents. Due to the latter, it can be assumed that auditors are affected to a greater or lesser extent so that they adapt their working methods to the exigencies of various situations as necessary. This implies that taxpayers are exposed to audit intensities which are difficult to calculate and compare. In turn, it can be assumed that auditors also adapt their working methods depending on characteristics of the audited taxpayer and of the audit itself. Furthermore, it seems obvious that the expended time also depends on personal qualities of the auditors themselves. Thus it appears that these influencing factors affect the time-on-task in total and with no specified tendency in each case. As a result, it can be stated that the time consumption is interdependent from the point of view of each of the involved parties.

However, research into tax audit time has so far been relatively sparse. The few studies that exist on the subject investigated audit time as a benchmark for audit quality and auditor's effort (e.g., Alissa et al. 2014; Sinha 2007, 2010), but they failed to identify the main drivers of audit time themselves. In order to fill this gap, I have studied a large number of possible factors, emphasized the main findings, and addressed further research topics. It must be strongly stressed that time consumption, considered as differentiated according to time spent on auditing and on reporting, depends on the task complexity, basic conditions during the audit, and on auditors' experience.

Task complexity is measured by a scale of legal requirements for book-tax conformity, group affiliation, industry, and the legal form of the undertaking. In summary, the results largely confirm the expected increase in time spent in the event of increasing complexity and, moreover, reveal that auditors adapt their working methods depending on the constituted legal forms of auditees. This, in turn, leads to a large extent to auditors' tendency to compensate for increased report time in the case of partnerships due to lower effort during the audit when time pressure is a factor.

The results of several examined factors which determine the audit itself show, at least in part, an influence on the time used if basic audit conditions differ from common practice. This applies in the event of auditors' suspicion of tax evasion, diverse places of audit, auditing of more or less than three concluded fiscal years, follow-up audits, or short and long audit duration, respectively, whereas an additional involvement of specialized auditors and an achievement of consensus on auditor's findings do not influence auditors' time consumption. Furthermore, the outcome of audits affects only the report time.

Auditors' experience consists of life and work experience. The results show only a limited positive effect of experience on time, particularly rarely in the case of highly experienced auditors. The latter do not seem to be capable of or willing to adapt their working methods in the event of audits with lesser task complexity than usual. Finally, concerning gender, my study reveals that female and male auditors use the same information processing in the presence of time pressure so that their time consumption does not differ. However, as soon as time pressure is lessened, female auditors spent less time on complex tasks. This concurs with recent research and confirms laboratory findings (Breesch/Branson 2009; Chung/Monroe 2001; O'Donnell/Johnson 2001).

II Tax Planning Strategies of Family and Non-Family Firms

1 Introduction

Taxes present a significant cost to firms and, therefore, one might expect that reducing taxes should always increase firm value. Previous research finds, however, that aggressive tax planning strategies may lead to significant non-tax costs that can outweigh the tax saving benefits. Thus, aggressive tax planning could also negatively affect firm value (Desai et al. 2007; Hanlon/Slemrod 2009; Mironov 2013) or even increase stock price crash risk (Kim et al. 2011). Moreover, firms' tax planning activity may reduce the debt ratio and the cost of debt (Graham/Tucker 2006; Lim 2011). Knowledge about the determinants of a firm's tax planning strategy is, therefore, important for shareholders and other stakeholders of a firm as well as for potential investors.

Previous research shows the impact of firm characteristics such as size, profitability, and corporate governance structure on tax aggressiveness (for a review see Hanlon/Heitzman 2010). Surprisingly, however, up to now there is only the study of *Chen et al.* (2010) who investigate the tax aggressiveness of family firms. This is surprising because in many countries family-controlled firms present the majority of firms (e.g., Faccio/Lang 2002), and family firms differ with respect to benefits and costs of tax planning from their non-family counterparts (Chen et al. 2010). *Chen et al.* (2010) find that the different cost-benefit structure leads to a lower tax aggressiveness of family firms indicating that, in particular, family firms take into account agency costs resulting from potential conflicts between majority and minority shareholders and place a higher weight on pecuniary and reputational costs resulting from an IRS penalty.

However, due to their data the study of *Chen et al.* (2010) is restricted in two ways. First, as many others (e.g., Chyz et al. 2013) *Chen et al.* (2010) must rely on financial accounting data to measure tax aggressiveness due to tax privacy laws. One important drawback is that financial accounting measures do not capture tax avoidance activities that reduce both, financial and taxable income (so-called "conforming avoidance"). If, however, family firms make more use of conforming tax avoidance which is reasonable because of their lower financial accounting constraints compared to their non-family counterparts, then the overall level of family firms' tax aggressiveness is still an open issue. Similarly, *Hanlon* and *Heitzman* (2010) conclude that despite a remarkable number of tax aggressiveness studies, "*the field cannot explain the variation in tax avoidance very well*" (Hanlon/Heitzman 2010: 145). In order to avoid this shortcoming, our analysis is based on tax audit data raised in a survey of German tax auditors. We measure tax aggressiveness as the magnitude of tax audit adjustment required by tax authorities (DeBacker et al. 2015a) and are thus able to capture conforming as well as non-conforming tax avoidance activities.

A second limitation of Chen et al. (2010) is that they study listed firms only. Research shows, however, that private and listed firms differ in their economic decisions, in general, as well as in the context of tax avoidance (e.g., Mills 1998: 347; Mills/Newberry 2001; Slemrod 2007). In particular, private and public family firms may differ with respect to non-tax costs of tax avoidance such as reputational risk, and agency costs because majority-minority shareholder conflicts are usually more pronounced in public family firms than in private family firms. In the present study, our data includes mainly private firms enabling us to investigate if the results of *Chen et al.* (2010) are generalizable to private family firms.

Using tax audit adjustments as proxy for firms' tax aggressiveness level has the obvious advantage that we do not have to rely on measures that are also influenced by non-tax planning objectives such as earnings management. Moreover, as we have mentioned above tax audit adjustments cover both, conforming and non-conforming tax avoidance. However, relying on tax audit data has the disadvantage that audit adjustments are also influenced by the abilities of auditors to detect and correct extensively aggressive tax planning strategies. Although, it is obvious that auditors differ in their abilities and effort (Feinstein 1990, 1991), this aspect has been neglected in most previous studies using tax audit data. To address this objection, we use experiential questionnaires, i.e., auditors were asked to report information about their last two cases. This technique has already been used successfully in accounting research (e.g., Gibbins/Trotman 2002) and allows us to elicitate not only firm characteristics and audit results but also auditor characteristics. Thus, we are able to control for heterogeneous auditor abilities in the detection process. Applying a (fractional) detection controlled estimation technique (Feinstein 1991), we are able to study, for the first time, which specific auditor characteristics affect audit adjustments and show that not controlling for these characteristics would lead to misleading results with respect to the determinants of firm's tax aggressiveness.

We find that family firms, i.e., those firms that are controlled by a family owning more than 50 % of all shares, are not less tax aggressive in general if one studies the overall tax planning activity. Only if one considers non-conforming tax planning solely,—as *Chen et al.* (2010) do—family firms behave less aggressive. In contrast, regarding conforming tax avoidance family firms are significantly more tax aggressive than non-family firms suggesting that lower financial accounting constraints of family firms play an important role. These opposing effects explain why we find no difference between family and non-family firms regarding overall aggressiveness. However, an increasing family impact on management decisions decreases overall aggressiveness. In particular, we find that family-managed firms are less aggressive. In addition, we provide evidence that larger and listed family firms that have to publish information about current tax expense in their financial accounts are less tax aggressive than their non-family counterparts. This indicates that family firms indeed place a higher weight on reputational risks than their non-family counterparts.

Our results show the relevance of non-tax costs such as reputational risks, agency costs, and financial accounting constraints. We thereby contribute not only to the strand of tax aggressiveness literature that argues that a firm's tax planning decision results from a trade-off between tax benefits and non-tax costs (e.g., Desai/Dharmapala 2006; Desai et al. 2007; Guedhami/Pittman 2008) but also to the emerging body of family firm research that so far has almost neglected the impact of taxes (e.g., Siebels/Knyphausen-Aufseß 2012 review family research and do not even mention the potential effect of taxes on family firms).

The remainder of this paper is organized as follows. In the next section, we briefly describe the institutional background of tax audits in Germany. In section II 3, we derive our hypotheses. In section II 4, we explain the econometric strategy of the detection controlled estimation. The dataset is described in section II 5. The results are provided and discussed in section II 6, and section II 7 concludes.

2 Institutional Background: Tax Audits in Germany

Germany has a relatively strong tax enforcement (Atwood et al. 2012). All tax returns are subject to a preliminary audit by internal revenue officers. Similar to other countries, the German revenue service conducts also field audits to detect and prevent noncompliance. The ratio between tax auditors and taxpayers is particularly high in Germany compared to other countries, e.g., the United States. Despite a remarkably higher number of US firms the number of tax auditors is almost the same in Germany and the US. In the year 2010, 13,210 employees of the German revenue service (full-time-equivalent positions) work as tax auditors compared to 13,879 in the US.[4] This leads to a higher audit risk for German firms compared to their US counterparts.

In the year 2010, 8,571,515 German firms were registered for tax purposes with 203,903 among them being subject to a field tax audit. The resulting additional tax burden (including interest charges) amounts to € 16.8 billion. Concerning the selection procedure of the revenue service all registered firms are first classified into six classes according to their size. Size is measured using industry-specific annual profit and sales thresholds. An overview of the thresholds is given in Appendix H. In contrast to other countries like the US, all firms that belong to the first largest, second largest and third largest class are subject to a field audit for every tax year. For these firms the audit probability equals one. The other firms are either computer-selected for tax audits according to a mixture of random choice and firm characteristics or selected due to the result of the preliminary audit of the internal revenue officer.[5] In addition, information gained from previous audits of the taxpayer or other taxpayers can lead to a tax audit. Whether the pre-selected firms are actually audited depends on the evaluation of the assigned auditor who decides if the firm is worth of examination.

Field audits are usually conducted in the firm's office and will last from three to five days for small firms up to several months for large firms. As in the US, typically one audit encompasses three tax years. The auditor examines the firms' books and records in order to investigate if tax law has been correctly applied. The audit ends with a report of all audit adjustments. The audit report contains each individual adjustment, the amount of adjustment proposed, reasons for the adjustment, and the effect of the adjustment on taxable income. According to the report the firm receives a new tax assessment notice which is legally binding unless the taxpayer appeals within one month.

Comparable to the US, German tax auditors are required to conduct three year studies of tax law and accounting. After graduation they usually start working as an internal revenue officer for a few years. Depending on their performance they can apply for a job as tax

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4 In the present study we use the expression "tax auditors" for all employees of the revenue service that conduct field (face-to-face) examinations at the taxpayer's place of business or in the office. This definition corresponds to the US revenue agents as wells as the US tax compliance officers.

5 In order to avoid selection bias in the empirical analysis we weight our sample according to the taxpayers' characteristics in the total population. The corresponding information was provided by the revenue service. See section II 5.1.

auditor. All new tax auditors receive both, classroom and on-the-job training lasting altogether five years.

It is important to note that audit adjustments do not solely result from illegal tax evasion. Adjustments may also reflect legal tax avoidance or unintentional misreporting. Because tax law leaves room for discretionary decisions the auditor's assessment may differ from the firm's calculation of taxable income. Therefore, the auditor might demand adjustments, even though legal limitations have not been exceeded. German law distinguishes between legal tax avoidance and illegal tax evasion that have in common the taxpayers' attempt to reduce their tax liabilities. Tax avoidance as such is neither prohibited nor punishable as long as the taxpayer does not provide any inaccurate or incomplete information to the revenue service (Brown 2012: 165). Tax avoidance includes, e.g., income shifting between related parties, between different tax years or between different income categories, the exploitation of ambiguities in tax law and the inherent leeway in accounting rules. In contrast, if the taxpayer provides intentionally inaccurate or incomplete information to the tax authorities in order to reduce his tax burden, this behavior will be punished as tax evasion. If the taxpayer does not intentionally misreport, but disregards due care in a particularly high degree, tax authorities set an administrative fine.

3 Hypotheses Development

Previous research confirms the impact of firm characteristics on tax aggressiveness (for a review see Hanlon/Heitzman 2010). Firms vary in their tax avoidance activities because they

- differ in *avoidance opportunities* (e.g., only if a firm belongs to a multinational, it may use international transfer pricing to shift profits in low-tax countries),
- have different *benefits of tax avoidance* (e.g., tax savings differ due to different marginal tax rates),
- differ in *tax awareness* (e.g., large firms have their own tax department and/or purchase professional tax advise while 20 % of the micro firms have neither own tax professionals nor hire advice), or

- differ in *costs* that are associated with tax avoidance (e.g., reputational losses, planning costs and potential penalty or interest payments if the revenue service does not accept the avoidance activity).[6]

In particular, the above-mentioned opportunities, benefits, awareness and costs of tax avoidance may differ substantially between family and non-family firms (Chen et al. 2010). To distinguish between both firm types, we define family firms as firms where one family holds more than 50 % of the shares.[7]

The greater control of family owners could imply better *opportunities* to avoid taxes, e.g., through related party transactions. Moreover, *Desai* and *Dharmapala* (2006) and *Desai et al.* (2007) argue that tax avoidance strategies are not only applied in order to save taxes but also in order to use the tax induced complexity to conceal real performance and to extract rents, e.g., through earnings management. This opportunity is more pronounced in firms with dominant shareholders, such as family firms. In our analyses, we will control for opportunities (measured by size, multinationality, controlling company) to avoid that our results are driven just by different tax avoidance opportunities.

In addition, due to its high ownership the family receives a large part of the tax savings. According to *Chen et al.* (2010) family firms thus *benefit* more from tax savings. Moreover, *Anderson* and *Reeb* (2003) find that family firms have better profitability than non-family firms (and likely less loss carry forward). Thus, the marginal tax rate and, therefore, the benefit of tax avoidance should be higher in family firms. To ensure that our results are not driven by these differences in profitability we will control for profitability in our analyses.

On the other hand, family firms might engage in less tax planning due to a lack of *awareness*, e.g., when family firms reserve powerful working positions for family members instead of choosing employees based on competency and skills only. Consequently, knowledge heterogeneity and consciousness of tax planning opportunities might be reduced. As we find significant differences in the awareness of tax avoidance between family firms and non-family firms, we will control for this effect in our analyses.

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6 See e.g., Alstadsæter/Jacob 2013a.

7 In additional analyses we also apply an alternative definition of family firms, i.e., firms that are not only controlled but also managed by one family.

In addition, family firms might also be less tax aggressive than non-family firms due to higher *non-tax costs* of tax avoidance: Family owners are often underdiversified and have their wealth tied disproportionally to their firms (Chen et al. 2010). This implies that they should behave more risk-averse (Anderson et al. 2012; Strebulaev/Yang 2013) and hence, act less tax aggressive, e.g., because of greater fear of being audited or publicly "named and shamed" as being too tax aggressive. In addition, family owners have on average a longer investment horizon. In contrast to short-term investors, they cannot avoid the consequences of a tax audit and the possible detection (Chen et al. 2010). This makes family owners similar to labor unions as important long-term stakeholders for whom *Chyz et al.* (2013) show that they decrease firms' tax aggressiveness. Previous research confirms that family firms also differ in their agency costs (Ang et al. 2000). If minority shareholders anticipate the above-mentioned rent extraction opportunities of dominant family owners, they might impose costs for controlling and monitoring systems, or, a price discount on the firms' stock in case of publicly traded companies.

All in all, family firms have better opportunities and higher benefits of tax avoidance but at the same time they might be less aware of tax planning opportunities and face higher non-tax costs of tax avoidance. However, as we control for differences in opportunities, benefits, and awareness, our family firm variable should mainly capture different non-tax costs. In line with the results of *Chen et al.* (2010) we expect that these costs (agency costs due to the conflict between majority and minority shareholders or other stakeholders) and the higher weighting of risks associated with tax planning result in lower non-conforming tax avoidance in family firms.

> ***H1****: With respect to non-conforming tax avoidance family firms are less tax aggressive than non-family firms.*

Besides non-conforming tax avoidance strategies firms might also engage in tax planning activities that affect both, financial as well as tax accounting. The aggressiveness measures used by *Chen et al.* (2010) do not capture such conforming tax avoidance. However, particularly in countries with a high conformity level between financial and tax accounting, the disregard of conforming tax avoidance may lead to misleading results.

In addition to the above-mentioned reasons for and against tax planning there exist additional arguments which are applicable to conforming avoidance only and thus require a reevaluation of the cost-benefit trade-off. First, conforming avoidance mainly results from temporary income-shifts and the benefits are thus not permanent, i.e., they are generally smaller. Second, audits are more likely to be conducted if tax avoidance is obvious. *Mills* (1998) finds IRS audit adjustments are positively related to large book-tax-differences. If, however, a firm applies a conforming tax avoidance activity no differences between financial and tax accounting arise. Thus, there is a lower potential audit risk associated with conforming tax avoidance. However, both arguments are equally applicable to all firms and cannot explain differences in conforming tax avoidance between family firms and non-family firms whereas the following arguments do: prior research argues that family firms also perceive noneconomic goals such as maintaining (financial) independence and control over the firm (Gómez-Mejía et al. 2007). Thus, they use less external financing, are less dependent on creditors' and investors' evaluation of the financial accounts. Moreover, private family firms are able to use alternative pay-out channels other than dividends in order to satisfy consumption needs (Alstadsæter/Jacob 2013b) and are thus less dependent from dividend payouts which are often limited to profits in financial accounts. Both arguments point towards lower financial accounting constraints because such firms do not have to report high profits in their financial accounts. Hence, costs of conforming avoidance should be lower compared to non-family firms. Therefore, the negative effect of family ownership on tax aggressiveness obtained by *Chen et al.* (2010) might only be prevalent with regard to non-conforming avoidance strategies. Instead we expect family firms to have a positive effect on conforming tax avoidance due to family firms' lower financial accounting constraints.

> ***H2**: With respect to conforming tax avoidance family firms are more tax aggressive than non-family firms.*

In sum, we expect family firms to behave less tax aggressive with respect to non-conforming tax avoidance and more tax aggressive as far as conforming tax avoidance is concerned. It is thus an empirical question whether or not family control has a significant impact on firms' overall tax aggressiveness. Therefore, our third hypothesis to be tested is:

> ***H3**: With respect to overall tax avoidance, the degree of tax aggressiveness differs between family firms and non-family firms.*

Finally, prior research argues that family firms may be more concerned with potential reputational losses of being claimed as tax aggressive (Chen et al. 2010). Hence, they want to protect the family reputation or the "family name" by avoiding the risk that the public becomes aware of, e.g., a very low effective tax rate and, hence, that the firm is "named and shamed" as tax aggressive. Obviously, this argumentation refers to non-conforming tax avoidance solely and applies only if a firm is obliged to publish tax information such as tax expenses from which the effective tax rate can be derived. Due to particularities of German reporting obligations we are able to identify these firms for which non-conforming tax planning is publicly revealed more easily. Besides listed firms also large corporations that exceed certain size thresholds have to disclose such tax information, and are thus exposed to reputation risk. As family firms are more risk-averse, we formulate our fourth hypothesis as follows.

> ***H4****: With respect to non-conforming tax avoidance, family firms that have to publish tax information are less tax aggressive than their non-family counterparts.*

4 Estimation Strategy

To measure tax aggressiveness we use audit adjustments that can arise in the course of legal tax avoidance activities as well as illegal tax evasion.[8] However, these adjustments also depend on auditor's ability and effort to detect aggressive tax planning activities. To control for this effect, our econometric methodology is built on earlier models developed by *Feinstein* (1990, 1991) who introduced a maximum-likelihood-estimation that accounts for the impact of decisions made during different stages of the tax audit process on its outcome. We implement a two-stage detection controlled estimation (DCE) framework which is visualized in Figure 1. First, a firm can either choose to conduct no tax planning ($N=0$) or to avoid taxes to some extent ($N>0$). However, the resulting tax planning amount is not directly observable, since the tax auditor might fail to uncover all tax planning activities. We assume the auditor assignment to be exogenous and random.[9] Depending on the auditors' abilities either all, some or no tax planning can be identified during the tax audit. Therefore, in the second stage we model the auditors' detection rate, $D \in [0,1]$. Only the detected tax planning

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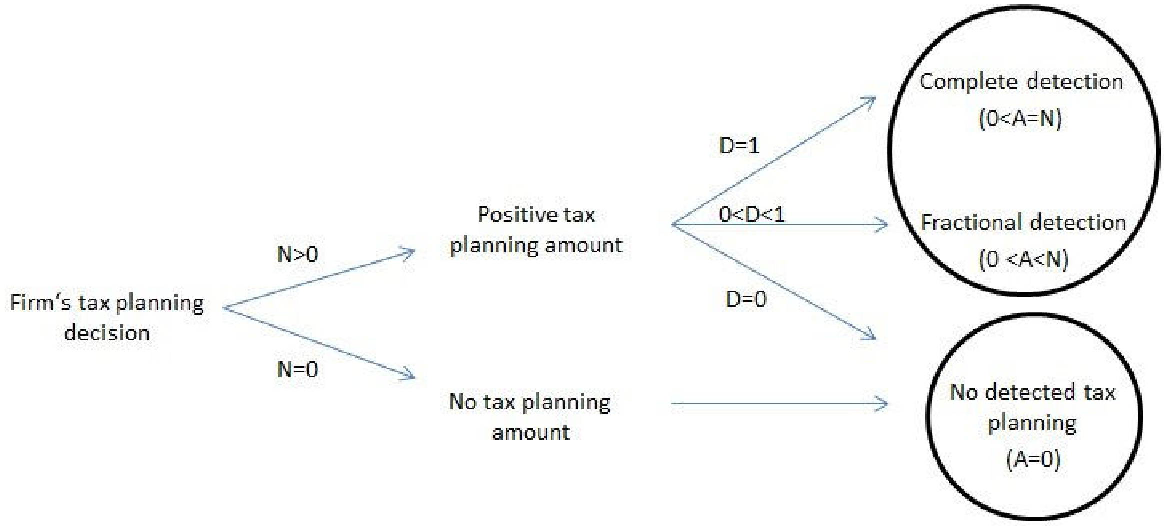
8 Our data allows us to clearly identify cases where evasion is suspected. Therefore, we also separated illegal and legal tax planning activities in additional sub-sample analyses, see robustness checks in section II 6.

9 Our data supports this assumption as there is no high correlation between auditor and firm characteristics.

amount, i.e., the tax adjustments A that equal the tax planning amount times the rate of detection, $A = N \cdot D$, is observed.

Figure 1: Stages during Tax Audit Process



In order to derive estimates for both stages of the tax audit process we have to distinguish between cases with positive adjustments and those with zero adjustments according to Figure 1. The latter one can either result from perfectly compliant companies, when no tax avoidance takes place at all, or from undetected noncompliance, whenever an auditor was incapable to detect any portion of an existing tax planning amount *N*. Analogously, we observe nonzero adjustments, when the company takes actions of tax planning and the auditor was able to uncover these in total or at least to some positive extent. The likelihood for the occurrence of both cases equals the product of each path's likelihood. Therefore, the maximum likelihood estimation maximizes the following log likelihood function by selecting appropriate parameters of the underlying distributions of *N* and *D*.

$$\begin{aligned} \ln L = \quad & \textstyle\sum_{A=0} \ln[\ P(N=0) + P(N>0) \cdot P(D=0)\ ] \\ & + \textstyle\sum_{A>0} \ln[\ P(N>0) \cdot P(D=1) + P(N>0) \cdot P(0<D<1)\ ] \end{aligned} \tag{1}$$

In order to model the extent of tax planning at the first stage we formulate a tobit specification with N* being a latent variable measuring the firm's propensity to plan taxes.

$$N^* = \beta_N{}' x_N + \epsilon_N \tag{2}$$

The vector x_N contains all firm characteristics that might have an influence on the tax planning decision. The random disturbance ϵ_N is assumed to be normally distributed with zero means and standard deviation σ_N. β_N and σ_N are the parameters to be estimated. The resulting tax planning amount is denoted by N, with

$$N = \begin{cases} N^* & \text{if } N^* > 0 \text{ (positive tax planning amount)} \\ 0 & \text{otherwise (zero tax planning amount).} \end{cases} \tag{3}$$

Under the distributional assumptions on ϵ_N the corresponding likelihoods for the occurrence of tax planning in amount of N is

$$P(\epsilon_N = N - \beta_N{}' x_N) = \frac{1}{\sigma_N} \phi \left(\frac{\mathrm{N} - \beta_N{}' x_N}{\sigma_N} \right) \tag{4}$$

and for a zero tax planning amount

$$P(\epsilon_N \leq -\beta_N{}' x_N) = 1 - \Phi \left(\frac{\beta_N{}' x_N}{\sigma_N} \right). \tag{5}$$

ϕ and Φ are the standard normal density function and standard normal cumulative distribution, respectively.

If the auditors were always able to fully uncover tax planning activities this model could be estimated directly. However, what is often neglected is the fact that detection abilities of the auditors can be imperfect. Instead of the true extent of tax planning amount *N*, only the detected tax planning amount *A* is observable. Therefore, we have to model the detection rate *D* of noncompliance in a second step. Since detection is usually not "all-or-nothing" we also take into account the possibility of partial detection, whenever an auditor uncovers some fraction of true tax planning, by adopting the fractional detection specification of Feinstein (1991). Denote by *D* the detection rate and let D^* be the underlying latent variable measuring the propensity to detect, then

$$D^* = \beta_D{}' x_D + \epsilon_D \tag{6}$$

and

$$D = \begin{cases} 1 & \text{if } D^* \geq 1 \text{ (complete detection)} \\ D^* & \text{if } 0 < D^* < 1 \text{ (fractional detection)} \\ 0 & \text{if } D^* \leq 0 \text{ (no detection).} \end{cases} \tag{7}$$

The vector x_D is a set of variables associated with the auditors' detection abilities, e.g., expertise or intelligent effort. Again, β_D is the parameter vector that is to be estimated and ϵ_D is the unsystematic disturbance assumed to be normally distributed with $N(0, \sigma_D^2)$.

Moreover, we assume ϵ_D and ϵ_N to be independent.[10] This allows us to derive the likelihoods for the occurrence of complete detection

$$P(\epsilon_D \geq 1 - \beta_D{}'x_D) = \Phi\left(\frac{\beta_D{}'x_D - 1}{\sigma_D}\right), \tag{8}$$

detection of a fraction *D*

$$P(\epsilon_D = D - \beta_D{}'x_D) = \frac{1}{\sigma_D}\phi\left(\frac{D - \beta_D{}'x_D}{\sigma_D}\right) \tag{9}$$

and no detection

$$P(\epsilon_D \leq -\beta_D{}'x_D) = 1 - \Phi\left(\frac{\beta_D{}'x_D}{\sigma_D}\right). \tag{10}$$

Note that neither the true level of tax avoidance *N* nor the detection rate *D* is directly observable in the data. Only tax adjustments, $A = N \cdot D$, are observed. However, our model allows us to extract information about each stage separately. To illustrate our point, consider two equally competent auditors reviewing two companies, then differences in tax adjustments can only result from different levels of the (unobservable) tax planning amount. Analogously, companies with resembling covariates x_N should have a similar amount of (unobserved) tax planning. If, however, their observable adjustments turn out to be very different this can only result from differences in the auditor's ability to detect noncompliance.

According to the above specified probabilities (4), (5) and (10) the likelihood of observing zero adjustments amounts to

$$P(\mathrm{N} = 0) \ + \ P(\mathrm{N} > 0) \ \cdot \ P(\mathrm{D} = 0)$$

$$= \ 1 - \Phi\left(\frac{\beta_N{}'x_N}{\sigma_N}\right) + \int_0^\infty \frac{1}{\sigma_N}\phi\left(\frac{N - \beta_N{}'x_N}{\sigma_N}\right) \cdot \left[1 - \Phi\left(\frac{\beta_D{}'x_D}{\sigma_D}\right)\right] dN. \tag{11}$$

Analogously, the likelihood for the occurrence of positive adjustments consists of the following components.

[10] *Feinstein* (1991) and *Li* (2013) also estimated a model with an arbitrary correlation between the errors of the noncompliance and detection equation. However, the estimation results were similar to those without correlation between the two stages.

$$P(\mathrm{N} > 0) \cdot P(\mathrm{D} = 1) + P(N > 0) \cdot P(0 < D < 1)$$

$$= \frac{1}{\sigma_N} \phi\left(\frac{\mathrm{A} - \beta_N{}' x_N}{\sigma_N}\right) \cdot \Phi\left(\frac{\beta_D{}' x_D - 1}{\sigma_D}\right) + \int_0^1 \frac{1}{D\,\sigma_N} \phi\left(\frac{\frac{A}{D} - \beta_N{}' x_N}{\sigma_N}\right) \cdot \frac{1}{\sigma_D} \phi\left(\frac{D - \beta_D{}' x_D}{\sigma_D}\right) dD \tag{12}$$

Note that we replaced the true evasion N by $\frac{A}{D}$. Consequently, the integral runs over D instead of true tax planning N and thus, it has finite bounds (0, 1) which is computational preferable. The factor $\frac{1}{\mathrm{D}}$ represents the determinant of the Jacobian matrix that is necessary when making such changes of variables within integral calculations.[11]

Combining both cases in the log likelihood function (1) and rearranging[12] finally leads to

$$\ln L = \sum_{A=0} \ln\left[1 - \Phi\left(\frac{\beta_N' x_N}{\sigma_N}\right) \cdot \Phi\left(\frac{\beta_D{}' x_D}{\sigma_D}\right)\right] + \sum_{A>0} \ln\left[\frac{1}{\sigma_N} \phi\left(\frac{\mathrm{A} - \beta_N{}' x_N}{\sigma_N}\right) \cdot \Phi\left(\frac{\beta_D{}' x_D - 1}{\sigma_D}\right) + \int_0^1 \frac{1}{D\,\sigma_N} \phi\left(\frac{\frac{A}{D} - \beta_N{}' x_N}{\sigma_N}\right) \cdot \frac{1}{\sigma_D} \phi\left(\frac{D - \beta_D{}' x_D}{\sigma_D}\right) dD\right] \tag{13}$$

Besides the estimation parameters β_N, β_D, σ_N and σ_D the log likelihood function contains the observable covariates x_N and x_D as well as the observable tax audit outcome, i.e., the tax adjustments A. The unobserved level of tax avoidance N is replaced by A/D and it is integrated over the unobserved detection rate in order to capture all possible values of D. This allows us to base our maximum likelihood estimation on this equation.

However, before describing the data in the next section, we want to address important issues associated with the above model specification. First, according to Figure 1 we rule out false detection, i.e., in our specification auditors never falsely uncover some noncompliance when no tax planning activities actually took place. Second, our data contains very few cases with

[11] This Jacobian term was wrongfully missing in *Feinstein* (1991). We thank Jonathan Feinstein for advising us of the correction.

[12] A detailed derivation of the log likelihood function is shown in Appendix B.

negative adjustments. Since our model distinguishes between zero and positive audit outcomes only we treat such cases like cases with zero adjustments. This shows that some noncompliance might also result from unintentional errors instead of deliberate tax planning activities. In order to control for unintentional misreporting in our estimation model we will include a variable measuring the professional competence of the company. Another important statistical issue in detection controlled estimations is the identification problem which arises whenever the explanatory variables in both, equation (2) and (6) vary identically. In this case the decomposition of observable tax adjustments $A = N \cdot D$ into the two components N and D is not unique and thus, identification fails.[13] However, this is not a problem in our data set, because x_N and x_D contain disjoint variables which allows unique identification of the parameters.

5 Data

5.1 Sample Selection

Due to German tax privacy laws researchers do not have access to tax audit data. Even the German revenue service itself is not allowed to match tax audit data with individual information about the auditor. Therefore, the only opportunity to raise audit as well as auditor data is to conduct a survey among auditors. With the official approval of the local Berlin government we surveyed tax auditors working in Berlin. Berlin is one out of 16 German states as well as the capitol and largest city in Germany. We used an advanced tax law training course which was obligatory for tax auditors to conduct our survey. One of the authors taught this course and handed out the questionnaires to participants at the end of the first day of the two days lasting course. The course took place between October 2010 and February 2011. In sum, 646 tax auditors attended the course from which 610 participated in our survey. Thus, we achieved a high response rate of 94 %.

To gain relevant information about audit cases, we use so-called "experiential questionnaires" that are already used successfully in accounting research (e.g., Gibbins/Trotman 2002). We ask auditors to report about their last two cases they have experienced and are able to describe in detail. Before developing the questionnaire, we conducted several pre-survey interviews to gain information about firm characteristics

[13] See *Feinstein* (1990) for a formal proof.

auditors are usually aware of after having completed a case. Thereby, it turns out that auditors generally remember central key characteristics of a case, e.g., the audit result (additional tax burden), the firm's size (profit and sales), audited tax years, and industry. One reason why the audit result and the mentioned firm characteristics are in general well remembered is simply that auditors have to fill out several forms after completing a case in which they have to report this data to the revenue agency. Another reason is that audit results may (at least indirectly) affect the personal performance evaluation of the auditor. In particular, the last point makes it important that we assure auditors' anonymity. Therefore, we did not collect any identifying information and committed us officially to not hand over non-aggregated data to the revenue service.

Our questionnaire consists of two parts. In the first part auditors report on their last two audit cases, in the second part they have to answer several socio-demographic questions. The survey questionnaire is attached in Appendix I. The questionnaire was pre-tested by two auditors who did not participate in the final survey and one head of a local tax audit department to ensure that all questions are understandable and the questionnaire is feasible. On average, participants needed about thirty minutes to complete the questionnaire.

Altogether, we receive information about 1,244 unique audit cases, i.e., the data set is free of duplicate entries.[14] From these cases we eliminate those that differ in their tax treatment from "normal" business income (e.g., nonprofit associations, charitable trust, agriculture and non-business income). Thus, we obtain 1,104 cases. Furthermore, due to some outliers in the dependent variable we truncated our data set at 98 % in each size category which results in a final sample size of 1,078. In Berlin, auditors completed 8,681 tax audits during the year 2010. Thus, our sample represents 12 % of all completed cases. The revenue service provided us with data containing the average audit results of all cases completed in 2010. As Appendix A Table 10 shows, the average audit result (additional tax burden) per size category is similar in the sample and the population of all audit cases.

To conduct multivariate analyses, we need complete information regarding independent and control variables. The number of observations with complete covariates amounts to 804. Out of these only 728 observations additionally contained information about the kind of tax

[14] Some auditors voluntarily reported information about further cases in an additional questionnaire which was provided on request by the author who taught the training course. Thus, we received slightly more than the expected 1,220 (= 610 × 2) cases.

planning activities (conforming/non-conforming) that led to tax adjustments. Table 1 shows the sample selection for our analyses.

Table 1: Sample Selection (Chapter II)

Sample selection step	Remaining number of cases
Original sample	1244
Less "non-business-cases"	1104
Less outliers (98 % truncation)	1078
Less cases with incomplete covariates	804
Less cases without information on adjustments' origin (conforming/non-conforming tax planning activities)	728

One further issue is that our sample of audited firms is not representative for the whole population of companies in Berlin because firms are not randomly selected for audits. However, the revenue service provided us with a data set regarding all 401,411 Berlin firms that contains information about industries, legal forms and firm size categories. In order to derive unbiased estimates, we weight the observations according to the relative frequency of the taxpayers' characteristics in the population. To this end, we first cross tabulate the companies contained in our data set as well as all 401,411 companies of the total population in Berlin with respect to twelve industries, two legal forms and five firm size categories and calculate the corresponding relative frequencies. The weights for our analysis are then calculated as the ratio of the relative frequency in the total population to that in our sample. Thus, the weighting leads to the exact same proportions of industries, legal forms and size categories as observed in the total population. Unless otherwise stated the descriptive statistics as well as estimation results will be based on the weighted data set.

5.2 Descriptive Statistics

5.2.1 Magnitude of Adjustments

According to our model specification the survey contained questions on three categories. The first set of questions provides information about firm characteristics that might influence the tax planning decision, hence x_N. Next we obtained information about the tax auditor himself in order to derive variables x_D that can explain variations in detection rates. Finally, the survey also contained questions on the tax audit outcome, i.e., the extent of additional tax burden or the change in financial loss. The tax adjustments were then calculated by dividing this tax audit outcome by a tax rate being dependent on the legal form of the companies.[15] Moreover, the auditors also reported the fraction of total tax audit outcome resulting from tax avoidance strategies that are treated differently in financial and tax accounting. This allows us to decompose total tax adjustments into conforming and non-conforming avoidance activities.

According to the summary statistics in Table 2 the average total adjustments amount to € 37.3 k from which € 12.9 k result from conforming tax planning activities and the remaining € 24.3 k from non-conforming activities. However, the median indicates that total adjustments of 50 % of the firms did not exceed € 7.9 k. The table also shows that out of 728 firms 453 companies are controlled by a family, i.e., a family holds more than 50 % of shares. On average, family firms have lower total adjustments amounting to € 20.3 k, whereas mean adjustments of non-family firms are € 88.7 k. However, this difference is statistically not significant. Most of the family firms' adjustments result from conforming tax avoidance strategies which are significantly higher compared to non-family firms. In addition, Table 2 shows that on average non-conforming tax planning activities yield in only € 6.1 k for family firms and for non-family firms € 79.7 k.

In order to control for size effects we scale adjustments with sales. This leads to a ratio of 15.6 % for total adjustments. There is no significant difference in mean ratios of total adjustments to sales between family firms (15.5 %) and non-family firms (15.8 %). However, the ratio of adjustments resulting from conforming (non-conforming) tax planning activities to sales is significantly higher (lower) for family firms than for non-family firm.

All the numbers are based on the weighted data set. Table 12 (Panel A) in the Appendix C shows the statistics for the unweighted sample which includes disproportionately many large companies with a high degree of noncompliance. Accordingly, the mean tax adjustments without weighting amount to almost € 179.0 k.

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[15] The applied tax rate for corporations includes corporate income tax, local trade tax, and solidarity surcharge. Partnerships are not subject to German income tax, only the partners are. However, we can use a uniform tax rate of 35 % for partnerships because the revenue service requires all auditors to use this tax rate to calculate the tax burden in the case of partnerships. For sole proprietorships the individual marginal income tax rate applies. A proxy for the latter one was obtained from the German income tax statistics with respect to income category and industry classification.

Table 2: Descriptive Statistics of Adjustments

The table shows mean, median (p50) and standard deviation (sd) of total adjustments and their decomposition in adjustments due to conforming and non-conforming tax avoidance activities (total and in % of sales) by family and non-family firms. The last column reports the two-sided p-values for the mean difference between family firms and non-family firms based on T-tests. Detailed descriptions of the variables definitions are presented in Table 11 (Panel A) in the Appendix C. All numbers are based on the weighted data set.

	Total (N=728)			Family-Controlled Firms (N=453)			Non-Family Firms (N=275)			Mean Comparison
Variable	Mean	p50	SD	Mean	p50	SD	Mean	p50	SD	p-value
Adjustments in € k	37.252	7.899	207.607	20.343	7.996	54.950	88.709	7.384	493.747	0.199
Conforming in € k	12.910	3.654	69.812	14.205	5.013	48.904	8.972	0.000	128.913	0.076
Non-Conforming in € k	24.342	0.000	183.301	6.138	0.000	20.367	79.737	3.692	445.986	0.166
Adjustments/Sales	0.156	0.049	0.410	0.155	0.062	0.392	0.158	0.027	0.416	0.945
Conforming/Sales	0.108	0.013	0.383	0.130	0.033	0.389	0.042	0.000	0.219	0.001
Non-Conforming/Sales	0.048	0.000	0.168	0.025	0.000	0.088	0.116	0.012	0.347	0.016

5.2.2 Variables in Tax Planning Equation

Our questionnaire also reveals information about specific firm characteristics of interest that might influence the amount of true (detected and undetected) tax planning. As shown in Table 3 75.3 % of the companies have majority shareholdings of one family and we want to test empirically whether or not those family firms differ in their degree of tax aggressiveness compared to non-family firms as proposed in prior literature. In order to ensure that results are not driven by systematic differences between family firms and non-family firms we add the following control variables to the tax planning equation that might be able to explain tax aggressive behavior.

In particular, firms that are obliged to publicly report information on tax expenses, from which the effective tax rate can be derived, might differ in their degree of tax planning. On the one hand these firms might be more engaged in tax avoidance if their shareholders reward such behavior as part of the shareholder value maximization. On the other hand they might refrain from aggressive tax avoidance because of reputation risks. Due to German particularities of reporting obligations for listed and large companies it is possible to identify such firms for which we expect tax planning to be publicly revealed more easily. The corresponding percentage of such tax publishing firms amounts to 2.5 % in the total sample and 0.2 % (9.5 %) for family (non-family) firms. Since we expect family firms to place more weight on the reputation risk argument, we will use this variable to test *H4*.

Since opportunities for tax planning and audit probability increases with firm size we additionally control for *SALES*. The average sales amount to € 409 k, ranging from € 77.5 k to € 48 M. Family firms with € 281 k mean sales are significantly smaller than non-family firms with € 798 k mean sales. Furthermore, the opportunities for tax planning are also increased when business structures are highly complex. Thus, the dummy variables *CONTROLLING COMPANY* (controlling company within the whole group) and *MULTINATIONALITY* (involvement in foreign affairs) might be associated with higher tax adjustments. However, no significant differences between family firms and non-family firms exist. In order to control for the fact that some tax adjustments might result from unintentional errors instead of deliberate tax planning activities we construct the variable *NO-AWARENESS* which equals 1 if the firm neither incorporates a separate tax department nor engages professional advisors for tax-related issues. The corresponding percentage of firms amounts to 18.7 % for family firms and 5.4 % for non-family firms, with the difference being highly significant.

Furthermore, if a company experiences loss it is likely that they do not have to pay taxes. Therefore, the benefits from aggressive tax planning behavior are expected to decrease whenever loss occurs. On the other hand the loss variables might not only measure the tax rate effect but also financial constraints. E.g., *Chan* and *Mo* (2002) find a positive effect of losses on tax adjustments and argue that "*loss-making companies experienced greater financial stress and were motivated to reduce present or future cash outflows through misstatements*". According to Table 3 16.9 % of companies in our data set have recently experienced losses during the audit period whereas 12.3 % have losses carried forward from previous periods. Compared to non-family firms, losses and losses carried forward are significantly less likely to occur in family firms. Since prior research (e.g., Anderson/Reeb 2003) also finds family firms to perform better we also control for *RETURN ON SALES.* According to the descriptive statistics family firms indeed have significantly higher *RETURNS ON SALES* than non-family firms. Finally, we add *CORPORATION* to control for differences in tax compliance between different organizational forms (Tedds 2010) as well as several industry dummies in order to control for differences among industries.

Table 12 (Panel B) in the Appendix C compares the descriptive statistics of the above-mentioned variables in the unweighted and weighted data set. Particularly, the unweighted observations include an augmented proportion of large companies with high sales which stresses the need to weight the sample according to the relative frequency of the taxpayers' characteristics in the population.

Table 3: Descriptive Statistics of Firm Data

The table shows mean, median (p50), and standard deviation (sd) of firm characteristics in the total sample and by family and non-family firms. The last column reports the two-sided p-values for the mean difference between family firms and non-family firms based on T-tests. Detailed descriptions of the variables definitions are presented in Table 11 (Panel B) in the Appendix C. All numbers are based on the weighted data set.

	Total Firms (N=728)			Family Firms (N=453)			Non-Family Firms (N=275)			Mean Comparison
Variable	Mean	p50	SD	Mean	p50	SD	Mean	p50	SD	p-value
Family-Control	0.753	1	0.432	1.000	1.000	0	0.000	0	0	-
Tax Publication	0.025	0	0.156	0.002	0	0.039	0.095	0	0.363	0.033
Controlling Company	0.008	0	0.087	0.009	0	0.085	0.004	0	0.076	0.509
Sales in € k	408.860	77.500	1,722.343	281.046	77.500	1,011.334	797.811	302.500	3,501.477	0.000
No-Awareness	0.154	0	0.361	0.187	0	0.355	0.054	0	0.278	0.003
Multinationality	0.028	0	0.166	0.025	0	0.143	0.038	0	0.236	0.645
Loss	0.169	0	0.375	0.100	0	0.273	0.377	0	0.599	0.002
Loss Carry Forward	0.123	0	0.329	0.072	0	0.236	0.278	0	0.554	0.004
Return on Sales	0.233	0.206	0.284	0.269	0.206	0.277	0.122	0.053	0.209	0.000
Corporation	0.116	0	0.320	0.039	0	0.175	0.351	0	0.590	0.000
Ind_Construction	0.061	0	0.239	0.058	0	0.213	0.070	0	0.315	0.661
Ind_Banking/Insurance	0.032	0	0.177	0.023	0	0.136	0.061	0	0.296	0.365
Ind_Accommodation/Food Service	0.038	0	0.192	0.039	0	0.177	0.035	0	0.226	0.707
Ind_Retail	0.074	0	0.262	0.089	0	0.258	0.029	0	0.208	0.000
Ind_Wholesale	0.020	0	0.140	0.024	0	0.138	0.009	0	0.114	0.330
Ind_other Services	0.362	0	0.481	0.336	0	0.430	0.438	0	0.614	0.260
Ind_Manufactoring	0.022	0	0.147	0.018	0	0.120	0.035	0	0.227	0.399
Ind_Information/Communication	0.059	0	0.237	0.005	0	0.065	0.225	0	0.516	0.039
Ind_Transport/Food/Beverages/Utility	0.022	0	0.148	0.029	0	0.152	0.003	0	0.065	0.003
Ind_Freelance	0.309	0	0.463	0.380	0	0.442	0.096	0	0.364	0.000

5.2.3 Variables in Detection Equation

Besides the firm characteristics we also obtained information about the tax auditor. We condense this information to several variables measuring the auditors' effort and professional abilities which serve to explain the variation in individual detection rate of the auditors. A possibility to measure the auditors' effort refers to the "de minimis rule" which prevails in German tax authorities. Depending on the firm size this rule defines the amount of taxes that should at least result from an audit in order to not be considered as a so-called "bagatelle case"[16]. The "bagatelle ratio" is used by the tax authority as one criterion to evaluate auditor's performance. Another criterion is the number of cases the auditor completed in one year. Due to this statistical pressure, it is likely that some auditors discontinue the tax audit after reaching the given "bagatelle" threshold. Only very diligent and ambitious tax auditors continue auditing beyond de minimis limit. The variable *EFFORT* is a dummy variable that equals 1 if the auditor strongly disagrees (on a 5 point Likert scale) that he automatically fulfills his audit goal when reaching the de minimis threshold. Therefore, we expect *EFFORT* to be associated with higher detection rates. As shown in Table 4, the corresponding percentage of auditors amounts to 41.5 %.

Besides the proportion of male auditors (44.5 %) Table 4 additionally informs about the dummy variable *CAREER* which amounts to 0.035 on average. *CAREER* is designed as a proxy for an auditor's past performance. The dummy variable takes on the value of one if the auditor is not older than 40 years and works less than 20 years in the tax administration, but already receives an above average salary wage. We expect *CAREER* to be positively related with the auditor's detection rate. Moreover, the auditors' abilities to detect tax avoidance might be positively linked to the number of training courses an auditor attends. The average number of trainings per year amounts to 2.38, ranging from 0 to 10.

Table 4: Descriptive Summary of Auditor Data

The table shows mean, median (p50) and standard deviation (sd) of auditor characteristics. Detailed descriptions of the variables definitions are presented in Table 11 (Panel C) in the Appendix C. All numbers are based on the weighted data set. Sample size is N=728.

Variable	Mean	p50	SD
Effort	0.415	0	0.493
Male	0.445	0	0.497
Career	0.035	0	0.185
Trainings	2.378	2	1.156

[16] According to the administration's "de minimis rule", „bagatelle cases" are audits that lead to low additional taxes. For the definition of the size categories see Table 72 in Appendix H.

6 Results

Table 5 presents the estimation results based on the log likelihood function (13) for the weighted sample. Six different model specifications are reported in order to test our four hypotheses: First, we distinguish between estimations with total adjustments as dependent variable (specification (1)) and those based on adjustments resulting from only conforming or non-conforming tax planning activities (specifications (2) and (3)). Specifications (4) to (6) additionally incorporate interaction terms between the family firm dummy and the variable *TAX PUBLICATION* in order to test *H4*. Note that collinearity problems are ruled out in our study as the pairwise Pearson correlation coefficients and variance inflation factors in Table 13 and Table 14 in the Appendix C show. Since prior research (e.g., Hanlon et al. 2007) finds a non-linear effect of firm size on tax aggressiveness, we control for sales and squared sales. As far as the industry dummies are concerned we use the freelance industry as reference category.

Our first hypothesis to be tested suggests that family firms are less tax aggressive as far as non-conforming tax planning activities are concerned due to higher costs of tax avoidance. In particular, family firms might be more risk averse than non-family firms and are thus less likely to engage in tax planning. According to model specification (3) we indeed find the expected negative coefficient of family firms which confirms *H1*. This result is in line with *Chen et al.* (2010) who use effective tax rates as measure of tax aggressiveness which capture non-conforming tax avoidance only. However, this is only half of the story as firms can also apply tax avoidance strategies that are treated equally in financial and tax accounting and are thus not captured by effective tax rates. Accordingly, our second hypothesis focuses on such conforming tax avoidance. Because family firms are generally less dependent on external financing in order to maintain financial independence they do not need to report high profits and thus face less financial accounting constraints. We therefore expect family firms to be more tax aggressive than non-family firms with respect to conforming tax avoidance. Specification (2) shows a significantly positive effect of family control on adjustments resulting from conforming tax avoidance. Consequently, we can confirm *H2*, too. This result highlights the importance to consider both conforming as well as non-conforming tax avoidance (Hanlon/Heitzman 2010).

The third hypothesis focuses on the overall effect. We find family firms to be less tax aggressive with respect to non-conforming tax avoidance and more tax aggressive as far as conforming tax planning is concerned. It is thus an empirical question which effect dominates. Specification (1) uses total adjustments as dependent variable and shows that family firms do not significantly differ from non-family firms in their degree of tax aggressiveness which rejects *H3*. Apparently, the insignificance results from an offset of both afore-mentioned effects.

The last hypothesis to be tested, *H4*, considers an additional determinant of tax aggressiveness. For firms that have to publish information on tax expenses (*TAX PUBLICATION*=1), tax planning is publicly revealed more easily. According to prior research (e.g., Chen et al. 2010) family firms that are in the focus of public attention are more concerned about potential reputation damage resulting from tax avoidance than non-family firms and are thus less likely to engage in extensive tax planning. In order to test this expectation we separate the effect of family firms with such expanded reporting obligations by incorporating an interaction term between the family firm dummy and the variable *TAX PUBLICATION*. Model specification (6) is based on adjustments from non-conforming tax planning only. As expected it shows a significantly negative interaction term which indicates that the negative main effect of family firms becomes even stronger for family firms that are obliged to publish information on tax expenses. Compared to non-family firms with such enhanced reporting obligations they are less tax aggressive which supports the argument of different weighting of reputation risk. Consequently, we find evidence for *H4*. In contrast, specification (5) is based on adjustments due to conforming tax planning and reports an insignificant interaction term. This is the case because the reputation risk argument does only apply to non-conforming tax avoidance because conforming tax planning is generally not observable anyways. Also, the effect of tax publishing family firms on total adjustments is insignificant as reported in specification (4).

Finally, the results are largely in line with our above considerations with respect to the control variables. All model specifications show that tax publishing firms are more tax aggressive with respect to total, conforming and non-conforming tax avoidance as the main effect of *TAX PUBLICATION* is significant and positive. This effect stems from a shareholder-value approach which applies to firms in the focus of public attention and also requires optimizing the effective tax rate, e.g., by means of tax planning. The variables *CONTROLLING COMPANY* and *MULTINATIONALITY* might positively affect the true tax planning amount. This results from increased complexity which offers better opportunities for tax avoidance. However, we find positive coefficients only for non-conforming and total tax avoidance. The variables *SALES* and *SALES^2* are naturally collinear and thus have to be interpreted with caution. However, as we find positive coefficients for one variable and negative effects of the other, the effect of firm size on tax aggressiveness does not seem to be linear which confirms prior research (Hanlon et al. 2007). Moreover, the variable *loss* has a negative significant sign in specifications (2) and (5) indicating that a lower tax rate leads to less conforming tax avoidance. However, there is are positive significant effects in models (3) and (6) which may result from financial constraints, i.e., loss companies might be more eager to improve the financial situation of the firms, e.g., by applying more aggressive tax avoidance strategies (Chan/Mo 2002). In specifications (1) and (4) it may be that both opposing effects – the lower tax rate incentive on the one hand and the higher incentive to reduce cash outflows – compensate each other which results in insignificant effects. Also the sign of the variable *NO-AWARENESS* differs with the underlying model specification. Firms without tax planning expertise are on the one hand more likely to undeliberately misreport, and on the other hand they might not be able to identify and exploit tax reducing strategies. Finally, Table 5 also shows that particularly firms operating in the construction, accommodation, transport and food services industries are more tax aggressive.

Concerning the detection equation the following results hold: Auditors that show strong effort (*EFFORT*=1) and attend more trainings are able to detect a significantly larger fraction of both, total and conforming tax planning. Moreover, we identify significant gender effects. Detection rates of total and non-conforming tax avoidance activities significantly increase when audits are conducted by male auditors and by auditors with above-average past performance (*CAREER*=1).

Table 5: Estimation Results – Family-Control

The table presents the coefficients of the estimation. Standard errors are in parentheses. Significance at the 10%, 5% and 1% levels are indicated by *. ** and ***. Detailed descriptions of the variables definitions are presented in Table 11 in the Appendix C.

Dependent Variable	(1) Total Adjustments	(2) Conforming	(3) Non-Conforming	(4) Total Adjustm. with Interaction	(5) Conforming with Interaction	(6) Non-Conforming with Interaction
Independent variables in evasion equation x_N						
Const	0.714***	0.947***	-0.399***	0.598***	0.962***	-0.422***
	(0.147)	(0.141)	(0.04)	(0.143)	(0.191)	(0.071)
Family-Control	-0.03	0.632***	-0.132***	0.043	0.629***	-0.12***
	(0.121)	(0.136)	(0.048)	(0.117)	(0.146)	(0.035)
Family-Control*Tax Publication				0.029	-2.271	-0.86**
				(0.299)	(1.993)	(0.426)
Tax Publication	2.651***	6.054***	1.303***	2.978***	6.234***	1.208***
	(0.392)	(0.604)	(0.253)	(0.337)	(0.671)	(0.168)
Controlling Company	2.566***	-1.312**	0.732***	2.663***	-1.152*	0.739***
	(0.631)	(0.627)	(0.218)	(0.788)	(0.663)	(0.114)
Sales	-0.717***	-1.935***	0.11***	-0.514***	-1.698***	0.177***
	(0.077)	(0.243)	(0.029)	(0.134)	(0.137)	(0.021)
Sales^2	0.451***	1.13***	-0.002***	0.39***	0.787***	-0.002***
	(0.002)	(0.076)	(0.001)	(0.018)	(0.004)	(0.001)
No-Awareness	0.196	0.301***	-0.083**	0.213*	0.313**	-0.077*
	(0.122)	(0.104)	(0.039)	(0.121)	(0.133)	(0.041)
Multinationality	4.502***	-1.769***	0.362***	4.146***	-2.01***	0.364***
	(0.408)	(0.338)	(0.104)	(0.387)	(0.511)	(0.104)
Loss	-0.102	-0.743***	0.111**	-0.036	-0.774***	0.116**
	(0.142)	(0.145)	(0.054)	(0.157)	(0.154)	(0.047)
Loss Carry Forward	0.311**	-0.214	0.092	0.267	-0.219	0.087*
	(0.155)	(0.174)	(0.058)	(0.171)	(0.185)	(0.049)
Return on Sales	0.098	-0.93***	0.265***	0.122	-0.98***	0.276***
	(0.157)	(0.173)	(0.042)	(0.15)	(0.198)	(0.063)
Corporation	-0.035	-0.874***	0.149***	-0.051	-0.83***	0.143***
	(0.161)	(0.194)	(0.036)	(0.158)	(0.207)	(0.054)
Ind_Construction	0.763***	1.092***	0.361***	0.775***	1.217***	0.346***
	(0.218)	(0.248)	(0.061)	(0.219)	(0.335)	(0.072)
Ind_Banking/Insurance	0.161	-0.307**	0.448***	0.154	-0.312	0.414***
	(0.259)	(0.147)	(0.114)	(0.227)	(0.296)	(0.103)
Ind_Accommodation/Food Service	1.413***	1.387***	0.327***	1.422***	1.419***	0.323***
	(0.253)	(0.265)	(0.068)	(0.248)	(0.243)	(0.08)

Ind_Retail	0.673***	0.025	0.39***	0.663***	0.033	0.387***
	(0.185)	(0.187)	(0.066)	(0.169)	(0.201)	(0.077)
Ind_Wholesale	-2.729***	2.856***	-0.091	-2.284***	3.062***	-0.105
	(0.37)	(0.501)	(0.089)	(0.323)	(0.529)	(0.127)
Ind_other Services	0.403***	-0.126	0.417***	0.4***	-0.168	0.406***
	(0.1)	(0.108)	(0.053)	(0.104)	(0.12)	(0.07)
Ind_Manufactoring	0.767**	-1.148***	0.66***	0.832**	-1.056***	0.655***
	(0.325)	(0.246)	(0.104)	(0.329)	(0.311)	(0.109)
Ind_Information/Communication	-0.056	-0.191	0.441***	0.026	-0.253	0.427***
	(0.196)	(0.205)	(0.079)	(0.208)	(0.238)	(0.088)
Ind_Transport/Food/Beverages/Utility	0.998***	1.537***	0.207**	0.768*	1.558***	0.205**
	(0.183)	(0.319)	(0.089)	(0.398)	(0.289)	(0.098)
Independent variables in detection equation x_D						
Const	0.007***	0.006***	0.017	0.007***	0.005***	0.022
	(0.002)	(0.002)	(0.023)	(0.002)	(0.002)	(0.021)
Effort	0.005***	0.005***	-0.003	0.005***	0.005***	-0.005
	(0.001)	(0.001)	(0.015)	(0.001)	(0.001)	(0.013)
Male	0.005***	-0.002	0.048***	0.004***	-0.002	0.046***
	(0.001)	(0.001)	(0.015)	(0.001)	(0.001)	(0.013)
Career	0.387***	-0.002	1.369***	0.349***	-0.002	1.485***
	(0.003)	(0.003)	(0.037)	(0.003)	(0.003)	(0.037)
Trainings	0.002***	0.001*	0.007	0.002***	0.001*	0.006
	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.006)
σ_N	0.882	0.824	0.277	0.888	0.849	0.27
σ_D	0.012	0.012	0.07	0.011	0.012	0.069
LogLikelihood	1.738	1.333	0.426	1.743	1.321	1.338
Sample Size	728	728	728	728	728	728

6.1 Alternative Definition of Family Firms

All results concerning the family effect on tax aggressiveness are so far based on the variable *FAMILY-CONTROL* which takes a value of one if a family holds more than 50 % of the shares. However, different family firm definitions are possible. In particular, we construct the variable *FAMILY-MANAGEMENT* which equals one if a family not only holds the majority of shares but also manages the firm. This is true for 72.3 % of the sample (418 out of 728 cases). In these cases owner-manager conflicts do not exist and the family is in a better position to enforce its interests. Concerning the decision making of family firms previous research confirms this assumption as it shows that family impact is mostly driven through management involvement (Ampenberger et al. 2013). Moreover, we have argued that family firms behave more risk-averse, e.g., due to an underdiversification of wealth. If a family member serves as firm manager, not only financial but also human resources are tied to the firm, and the family firm might thus behave even more risk-averse. This points towards a lower degree of tax aggressiveness for family-managed firms. The results based on this family firm definition are presented in Table 6.

Compared to the before-applied definition the results concerning *H1* and *H2* remain qualitatively unchanged (see specifications (3) and (2)). Accordingly, family firms are less tax aggressive with respect to non-conforming tax avoidance (e.g., due to stronger risk aversion of family firms) and more tax aggressive as far as adjustments from solely conforming tax planning are concerned (due to fewer financial accounting constraints of family firms). The increased absolute size of the coefficients indicates that the effect on tax aggressiveness is indeed stronger when the variable *FAMILY-MANAGEMENT* is used instead of *FAMILY-CONTROL*. Again, we can confirm *H1* and *H2*. The third hypothesis focuses on total adjustments. In contrast to Table 5, specification (1) now shows a significantly negative family effect on the degree of tax aggressiveness which confirms *H3*. This result reveals that family firms are less tax aggressive with respect to overall tax avoidance only if the controlling family members manage the firm.

H4 is tested in specification (6). Family firms that have to publish information on tax expenses place stronger weight on reputation risk of being tax aggressive. Therefore, they are less engaged in non-conforming tax planning compared to tax publishing non-family firms, as the negative significant interaction term confirms. Again, as expected we do not find such differences when conforming tax planning are concerned. However, in contrast to the former less strict family firm definition, we now find evidence for tax publishing family firms being less tax aggressive with respect to total adjustments. We thus conclude that they fear reputation risk more heavily than non-family firms but are able to enforce a lower degree of total tax planning only if the family member serves as CEO. All other control variables remain qualitatively unchanged.

Table 6: Estimation Results – Family-Management

The table presents the coefficients of the estimation. Standard errors are in parentheses. Significance at the 10%, 5% and 1% levels are indicated by *. ** and ***. Detailed descriptions of the variables definitions are presented in Table 11 in the Appendix C.

Dependent Variable	(1) Total Adjustments	(2) Conforming	(3) Non-Conforming	(4) Total Adjustm. with Interaction	(5) Conforming with Interaction	(6) Non-Conforming with Interaction
Independent variables in evasion equation x_N						
Const	0.97***	0.87***	-0.365***	0.973***	0.877***	-0.215***
	(0.117)	(0.157)	(0.084)	(0.173)	(0.173)	(0.048)
Family-management	-0.306***	0.715***	-0.261***	-0.324**	0.716***	-0.168***
	(0.11)	(0.115)	(0.061)	(0.151)	(0.132)	(0.043)
Family-management*Tax Publication				-3.997***	-2.262	-0.994***
				(1.341)	(1.989)	(0.274)
Tax Publication	2.415***	5.983***	1.098***	3.576***	6.173***	1.243***
	(0.336)	(0.635)	(0.188)	(0.305)	(0.692)	(0.111)
Controlling Company	2.668***	-1.36***	0.895***	4.527***	-1.359**	0.618***
	(0.427)	(0.243)	(0.148)	(0.527)	(0.672)	(0.167)
Sales	-0.685***	-1.916***	0.18***	-0.406***	-1.949***	0.203***
	(0.076)	(0.261)	(0.038)	(0.078)	(0.156)	(0.018)
Sales^2	0.438***	1.125***	-0.009***	0.127***	1.138***	-0.004***
	(0.004)	(0.081)	(0.002)	(0.003)	(0.006)	(0.001)
No-awareness	0.24*	0.301**	-0.06	0.277**	0.298**	-0.044
	(0.131)	(0.126)	(0.043)	(0.136)	(0.129)	(0.035)
Multinationality	4.566***	-1.753***	0.469***	3.921***	-1.759***	-0.055
	(0.421)	(0.458)	(0.136)	(0.41)	(0.475)	(0.098)
Loss	-0.136	-0.727***	0.114**	-0.163	-0.729***	0.058*
	(0.128)	(0.149)	(0.052)	(0.157)	(0.148)	(0.035)
Loss Carry Forward	0.249	-0.185	0.077	0.289	-0.188	0.038
	(0.163)	(0.177)	(0.048)	(0.211)	(0.169)	(0.027)
Return on Sales	0.113	-0.913***	0.297***	0.085	-0.917***	0.202***
	(0.151)	(0.167)	(0.075)	(0.157)	(0.185)	(0.049)
Corporation	-0.092	-0.822***	0.132**	-0.055	-0.819***	0.044
	(0.123)	(0.197)	(0.054)	(0.178)	(0.194)	(0.037)
Ind_Construction	0.765***	1.063***	0.386***	0.878***	1.063***	0.216***
	(0.212)	(0.34)	(0.092)	(0.226)	(0.36)	(0.058)
Ind_Banking/Insurance	0.109	-0.332**	0.497***	0.329	-0.332	0.255***
	(0.197)	(0.13)	(0.125)	(0.273)	(0.323)	(0.076)

Ind_Accommodation/Food Service	1.443***	1.37***	0.353***	1.487***	1.368***	0.201***
	(0.257)	(0.223)	(0.089)	(0.283)	(0.311)	(0.059)
Ind_Retail	0.692***	0.015	0.434***	0.696***	0.014	0.257***
	(0.144)	(0.168)	(0.101)	(0.171)	(0.193)	(0.063)
Ind_Wholesale	-2.713***	2.794***	-0.142	-2.126***	2.801***	0.156
	(0.369)	(0.571)	(0.109)	(0.425)	(0.592)	(0.097)
Ind_other Services	0.36***	-0.135	0.43***	0.337***	-0.131	0.251***
	(0.077)	(0.088)	(0.088)	(0.091)	(0.113)	(0.056)
Ind_Manufactoring	0.712***	-1.055***	0.658***	0.74**	-1.053***	0.393***
	(0.258)	(0.188)	(0.131)	(0.321)	(0.306)	(0.104)
Ind_Information/Communication	-0.23	-0.129	0.404***	-0.209	-0.143	0.131**
	(0.151)	(0.206)	(0.122)	(0.237)	(0.224)	(0.053)
Ind_Transport/Food/Beverages/Utility	1.017***	1.517***	0.253**	0.819***	1.521***	0.147*
	(0.37)	(0.214)	(0.114)	(0.298)	(0.368)	(0.079)
Independent variables in detection equation x_D						
Const	0.006***	0.006***	0.02	0.006***	0.006***	0.054**
	(0.002)	(0.002)	(0.019)	(0.002)	(0.002)	(0.026)
Effort	0.005***	0.004***	0.004	0.006***	0.004***	0.005
	(0.001)	(0.001)	(0.013)	(0.001)	(0.001)	(0.015)
Male	0.005***	-0.002	0.043***	0.004***	-0.002	0.032**
	(0.001)	(0.001)	(0.012)	(0.001)	(0.002)	(0.015)
Career	0.425***	-0.002	1.44***	0.426***	-0.002	1.493***
	(0.003)	(0.003)	(0.037)	(0.003)	(0.003)	(0.037)
Trainings	0.002***	0.001*	0.005	0.002***	0.001	0.003
	(0.001)	(0.001)	(0.005)	(0.001)	(0.001)	(0.006)
σ_N	0.883	0.826	0.299	0.892	0.824	0.169
σ_D	0.011	0.012	0.06	0.011	0.012	0.077
LogLikelihood	1.838	1.338	0.46	1.749	1.339	0.446
Sample Size	728	728	728	728	728	728

6.2 Subsample Analyses

In this section we perform subsample analyses in order to investigate the robustness of our results in more homogeneous subsamples. In particular, we remove cases of illegal tax evasion (Subsample 1) or cases when the auditor and company did not come to an agreement about the relevant tax adjustments (Subsample 2). In the latter case the firm has appealed to the revenue service and the concrete amount of audit adjustments is, therefore, uncertain depending on the decision of the administrations' office of tax appeals or a tax court decision.

As shown in Table 7 and Table 8 most of our results remain qualitatively unchanged. In particular, in both subsample analyses we find family firms being less tax aggressive with respect to non-conforming tax avoidance (*H1*) and more tax aggressive as far as conforming avoidance strategies are concerned (*H2*). This holds independently from the applied definition of family firms. Moreover, we find evidence for the former effect to dominate as long as a family member manages the firm (*H3*). Accordingly, family management has a significant and negative effect on total tax planning as shown in specification (4). In the subsample with agreement cases only, we can even confirm *H3* when the weaker family definition (family control) is applied. However, in the subsample without cases of illegal tax evasion, we cannot confirm that family firms for which tax planning can publicly be revealed, are less tax aggressive (*H4*) whereas we do find evidence for *H4* in the subsample with agreement cases only (see Table 8, specification (6)).

Table 7: Subsample – without Evasion Cases

The table presents the coefficients of the estimation. Standard errors are in parentheses. Significance at the 10%, 5% and 1% levels are indicated by *. ** and ***. Detailed descriptions of the variables definitions are presented in Table 11 in the Appendix C.

Dependent Variable	(1) Total Adjustments	(2) Conforming	(3) Non-Conforming	(4) Total Adjustm. with Interaction	(5) Conforming with Interaction	(6) Non-Conforming with Interaction
Panel A: Family-Control						
Const	0.432***	0.041***	-0.547*	0.434***	0.047***	-0.524***
	(0.079)	(0.013)	(0.309)	(0.088)	(0.015)	(0.122)
Family-Control	-0.05	0.028***	-0.139*	-0.052	0.032***	-0.127**
	(0.061)	(0.011)	(0.073)	(0.07)	(0.012)	(0.058)
Family-Control*Tax Publication				0.624	-0.095	-1.064
				(1.121)	(0.128)	(0.659)
Tax Publication	1.336***	0.121**	1.057***	1.313***	0.167***	1.104***
	(0.251)	(0.052)	(0.259)	(0.253)	(0.057)	(0.22)
Control Variables+Detection Equation	YES	YES	YES	YES	YES	YES
σ_N	0.458	0.048	0.353	0.456	0.055	0.335
LogLikelihood	1.845	1.588	0.443	1.845	1.588	0.445
Sample Size	665	665	665	665	665	665
Panel B: Family-Management						
Const	0.406***	0.027**	-0.409***	0.404***	0.025*	-0.388***
	(0.074)	(0.013)	(0.1)	(0.067)	(0.013)	(0.101)
Family-Management	-0.130**	0.038***	-0.272***	-0.128**	0.037***	-0.260***
	(0.055)	(0.012)	(0.063)	(0.065)	(0.011)	(0.07)
Family-Management*Tax Publication				-1.153	-0.119	-0.838
				(1.352)	(0.13)	(0.617)
Tax Publication	1.042***	0.107**	1.026***	1.055***	0.111**	1.058***
	(0.170)	(0.046)	(0.206)	(0.2)	(0.053)	(0.225)
Control Variables+Detection Equation	YES	YES	YES	YES	YES	YES
σ_N	0.439	0.049	0.338	0.439	0.046	0.322
LogLikelihood	1.854	1.602	0.456	1.855	1.602	0.457
Sample Size	665	665	665	665	665	665

Table 8: Subsample – only Agreement Cases

The table presents the coefficients of the estimation. Standard errors are in parentheses. Significance at the 10%, 5% and 1% levels are indicated by *. ** and ***. Detailed descriptions of the variables definitions are presented in Table 11 in the Appendix C.

Dependent Variable	(1) Total Adjustments	(2) Conforming	(3) Non-Conforming	(4) Total Adjustm. with Interaction	(5) Conforming with Interaction	(6) Non-Conforming with Interaction
Panel A: Family-Control						
Const	0.583***	0.143***	-0.109*	0.502***	0.091***	-0.098*
	(0.058)	(0.031)	(0.058)	(0.078)	(0.023)	(0.056)
Family-Control	-0.114**	0.054**	-0.092**	-0.117**	0.027*	-0.094**
	(0.049)	(0.024)	(0.038)	(0.056)	(0.014)	(0.037)
Family-Control*Tax Publication				-0.059	-0.03	-0.899**
				(0.693)	(0.145)	(0.456)
Tax Publication	2.372***	0.159***	1.037***	2.469***	0.097**	1.034***
	(0.207)	(0.069)	(0.166)	(0.171)	(0.041)	(0.188)
Control Variables+ Detection Equation	YES	YES	YES	YES	YES	YES
σ_N	0.401	0.110	0.182	0.363	0.063	0.178
LogLikelihood	1.972	1.666	0.481	2.019	1.658	0.485
Sample Size	574	574	574	574	574	574
Panel B: Family-Management						
Const	0.637***	0.109***	-0.027	0.673***	0.109***	-0.027
	(0.062)	(0.026)	(0.055)	(0.084)	(0.028)	(0.053)
Family-Management	-0.196***	0.038**	-0.18***	-0.198***	0.038**	-0.176***
	(0.054)	(0.018)	(0.038)	(0.062)	(0.018)	(0.044)
Family-Management*Tax Publication				0.3	-0.022	-0.858*
				(0.878)	(0.237)	(0.438)
Tax Publication	2.487***	0.131**	0.9***	2.317***	0.132**	1.008***
	(0.174)	(0.06)	(0.228)	(0.203)	(0.065)	(0.266)
Control Variables+ Detection Equation	YES	YES	YES	YES	YES	YES
σ_N	0.391	0.081	0.175	0.383	0.081	0.175
LogLikelihood	1.963	1.633	0.496	1.962	1.633	0.5
Sample Size	574	574	574	574	574	574

6.3 Comparison to Tobit

The above specified detection controlled estimation framework (DCE) offers the opportunity to measure the impact of firm characteristics not only on detected but on total (detected and undetected) tax planning by explicitly taking into account the auditor's detection abilities. This aspect has been neglected in most previous studies due to the fact that tax privacy laws generally prohibit matching of tax audit data with individual information about the auditor. We overcome this problem by conducting a survey of tax auditors which enables us to obtain information about both, tax audits as well as auditors. In order to show that not controlling for auditor characteristics leads to biased results, this section presents estimates based on a model refraining from taking into account the detection process (6) and (7). Accordingly, we specify a single tobit model measuring the impact of firm characteristics on detected tax planning, i.e., tax adjustments.

Concerning the first and second hypothesis Table 9 shows that we obtain similar results: With respect to adjustments from non-conforming tax avoidance activities, the tobit model indicates family-controlled as well as -managed firms being less aggressive (*H1*). The opposite is true with respect to conforming tax avoidance strategies (*H2*). This is what we have hypothesized and already found in the detection controlled estimation. However, in the tobit model we cannot confirm *H3*, with neither family firm definition: No significant difference in the total degree of tax aggressiveness is found between family firms and non-family firms when we do not account for auditors' detection abilities. With respect to *H4* our results are mixed. Family firms that have to make non-conforming tax planning information publicly available are not less tax aggressive if the family-management definition applies. However, as far as family-control is concerned we find weakly significant evidence for less aggressiveness of such firms.[17]

The results of the tobit also differ with respect to the control variables. Particularly, most of the control variables turn insignificant in some specifications which clearly shows the importance of explicitly taking into account the auditors' abilities to detect noncompliance.

[17] The results of the tobit model concerning our hypotheses do not change qualitatively when adding the auditor characteristics variables to the tobit model.

Table 9: Tobit Model

The table presents the coefficients of the estimation. Standard errors are in parentheses. Significance at the 10%, 5% and 1% levels are indicated by *. ** and ***. Detailed descriptions of the variables definitions are presented in Table 11 in the Appendix C.

Dependent Variable	(1) Total Adjustments	(2) Conforming	(3) Non-Conforming	(4) Total Adjustm. with Interaction	(5) Conforming with Interaction	(6) Non-Conforming with Interaction
Panel A: Family-Control						
Const	0.086	-0.021	-0.341***	0.015	-0.023	-0.345***
	(0.356)	(0.015)	(0.097)	(0.33)	(0.015)	(0.097)
Family-Control	-0.199	0.033**	-0.107**	-0.137	0.034**	-0.101**
	(0.296)	(0.013)	(0.053)	(0.272)	(0.013)	(0.051)
Family-Control*Tax Publication				-5.863**	-0.122	-0.419*
				(2.961)	(0.134)	(0.251)
Tax Publication	4.951	0.038	0.368	5.214	0.046	0.389
	(3.127)	(0.055)	(0.305)	(3.241)	(0.053)	(0.316)
Control Variables	YES	YES	YES	YES	YES	YES
Detection Equation	NO	NO	NO	NO	NO	NO
σ_N	1.815	0.084	0.252	1.803	0.084	0.251
Log Pseudo Likelihood	1.972	-1,345.129	372.143	-159.442	-1,340.701	372.818
Sample Size	574	728	728	728	728	728
Panel B: Family-Management						
Const	0.159	-0.027*	-0.304***	0.101	-0.028*	-0.307***
	(0.338)	(0.015)	(0.095)	(0.313)	(0.015)	(0.095)
Family-Management	-0.281	0.039***	-0.157***	-0.227	0.041***	-0.152***
	(0.276)	(0.013)	(0.06)	(0.248)	(0.014)	(0.058)
Family-Management*Tax Publication				-6.592**	-0.201	-0.362
				(2.88)	(0.131)	(0.227)
Tax Publication	4.966	0.036	0.375	5.2	0.046	0.389
	(3.141)	(0.054)	(0.305)	(3.218)	(0.051)	(0.313)
Control Variables	YES	YES	YES	YES	YES	YES
Detection Equation	NO	NO	NO	NO	NO	NO
σ_N	1.814	0.084	0.251	1.802	0.084	0.250
Log Pseudo Likelihood	-1,344.591	374.728	-152.419	-1,340.198	376.160	-151.733
Sample Size	728	728	728	728	728	728

7 Discussion

Compared to non-family firms, family firms differ in their awareness, opportunities, benefits, and costs of tax avoidance and, therefore, they also differ with respect to their tax planning aggressiveness. Using audit adjustments resulting from legal as well as illegal tax planning strategies as measure for tax aggressiveness, we empirically investigate the effect of family ownership and family management as determinants of tax planning aggressiveness.

Compared to prior research our study has two major advantages. First, the data is not limited to financial accounting data which captures only those tax avoidance activities that are treated differently in financial and tax accounting ("non-conforming avoidance"). Instead our survey data accounts for both, conforming and non-conforming tax planning. Since a neglect of conforming tax planning may lead to biased estimates, our study provides more differentiated insights to tax aggressiveness. Second, prior research on family firms' tax aggressiveness is limited to public firms only. Our data contains mainly private companies which allows us to investigate if prior findings are generalizable to private family firms.

Moreover, our study enriches prior research by explicitly taking into account auditor's ability and effort to detect aggressive tax planning activities. In order to control for heterogeneous auditor characteristics we apply a detection controlled estimation technique which allows us to decompose the observed tax adjustments into the (unobserved) true tax planning amount and (unobserved) rate of detection. The advantage of this methodology is twofold: On the one hand this technique avoids distortions which arise when detection is not controlled for. On the other hand our results can be used in order to analyze efficiency of revenue service and in order to identify variables that increase monitoring success.

Regarding our hypotheses we expect that family firms differ from non-family firms with respect to their tax planning behavior due to better opportunities and higher benefits but also higher costs of tax avoidance. Our results provide evidence that family firms are not generally less tax aggressive as proposed in prior research (Chen et al. 2010). Only regarding non-conforming tax planning, family firms indeed behave less aggressive. If, however, conforming tax avoidance is concerned we find family firms are even more tax aggressive than non-family firms. The reason lies in the fact that family firms face fewer financial accounting constraints: They are less dependent from external investors and are thus less concerned about a reduction of their profit shown in financial accounts which results from conforming tax avoidance strategies. Both effects work in opposite direction and a significant (negative) overall effect of family firms on tax aggressiveness is only prevalent if a firm is not only controlled but also managed by a family. Finally, our results provide evidence that family-managed firms that have to publish information about tax expenses and are thus more easily revealed as tax planer, apply fewer non-conforming tax planning strategies. We conclude that these firms fear potential reputation risks resulting from tax avoidance more heavily which is consistent to the argumentation made in prior research.

Our results should be important for investors and researchers relying on financial statement data to study a firm's tax policy. As we have shown for family firms, investors who focus solely on effective tax rates may come to misleading conclusions due to the disregard of conforming tax avoidance.

There are some limitations in the study that we want to address. Due to our survey data we are able to match tax audit data with auditor characteristics which is advantageous in comparison to prior research. However, auditors file and report only those tax planning activities that lead to tax adjustments while legal tax avoidance activities that are accepted by tax authorities and do not result in tax adjustments are not captured in our data set. Moreover, the tax audit outcome on which our study is based refers to income taxes only, but firms may also avoid other taxes, e.g., value added taxes, by applying aggressive tax planning strategies. Our study does not account for other than income taxes. Both effects may lead to an underestimation of the true extent of tax planning behavior.

Furthermore, limitations in our study can also result from restrictive assumptions the estimation model imposes. First, our framework specifies a tax audit process which controls for detection abilities of the auditors being perfect or imperfect. However, we rule out false detection, when an auditor wrongfully uncovers tax planning even though the company was perfectly compliant and did not conduct any tax avoidance strategies. It is possible to incorporate false detection in context of detection controlled estimation, however, we assess this issue as being of minor importance and leave it open for further research. Second, we assume the firms' decision to aggressively plan taxes and the detection rates to be independent. However, prior research suggests that a relaxation of this assumption by explicitly modeling strategic interactions or introducing correlation between tax planning and detection process does not lead to substantially different estimation results (Feinstein 1991; Li 2013).

8 Appendix A

Table 10: Comparison to Total Tax Audits

The table presents a comparison of the additional tax burden in the sample with those of all tax audits completed in Berlin, in the year 2010.

	Additional tax burden due to audit adjustments (€)			
	All Audits		Sample	
	N	Mean	N	Mean
Micro Firms	2,649	13,829	154	12,366
Small Firms	2,315	15,965	252	15,492
Medium Firms	2,415	30,952	356	32,948
Large Firms (L3)	805	96,872	129	119,994
Large Firms (L2)	320	151,637	83	166,380
Large Firms (L1)	177	1,435,133	104	1,407,590

9 Appendix B

Since we assume the evasion equation and the detection equation to be independent we can rearrange equation (11) by placing the term $1 - \Phi\left(\frac{\beta_D{}'x_D}{\sigma_D}\right)$ outside the integral, which yields

$$1 - \Phi\left(\frac{\beta_N{}'x_N}{\sigma_N}\right) + \left[1 - \Phi\left(\frac{\beta_D{}'x_D}{\sigma_D}\right)\right] \int_0^\infty \frac{1}{\sigma_N} \phi\left(\frac{N - \beta_N{}'x_N}{\sigma_N}\right) dN$$

Thus, the integral can be simplified to $\left(\frac{\beta_N^{'}x_N}{\sigma_N}\right)$. Rearranging finally results in

$$\left[1 - \Phi\left(\frac{\beta_N^{'}x_N}{\sigma_N}\right) \cdot \Phi\left(\frac{\beta_D{}'x_D}{\sigma_D}\right)\right],$$

which is the expression shown in equation (13).

10 Appendix C

Table 11: Variable Definitions

Panel A: Dependent Variable	Variable Definition
Adjustments	Additional tax burden in € M divided by tax rate or change in taxable loss. The applied tax rate for corporations includes corporate income tax, local trade tax, and solidarity surcharge. We use a uniform tax rate of 35 % for partnerships. In case of sole proprietorships the individual marginal income tax rate applies for which a proxy was obtained from the German income tax statistics with respect to income category and industry classification.
Conforming Adj.	Adjustments that result from tax planning activities that are treated equally in financial and tax accounting.
Non-Conforming Adj.	Adjustments that result from tax planning activities that are treated differently in financial and tax accounting.

Panel B: Variables in tax planning equation	
Family-Control	Dummy, 1 if one family holds more than 50 % of the shares (majority shareholding).
Family-Management	Dummy, 1 if the company is family-controlled and managed by an individual entrepreneur or by a controlling shareholder. If no such information was available we assumed no agency conflict=0.
Tax Publication	Dummy, 1 if the company is publicly listed on a stock exchange, or is part of a listed group of affiliated companies, or is a corporation/GmbH&Co KG and sales exceed 15 billion Euro. In contrast to other firms, these firms are required to publish a profit and loss account which investors can use to determine the effective tax rate.
Controlling Company	Dummy, 1 if the firm is the controlling company within the whole group. If no such information was available we assumed controlling company=0.
Sales	Mid-value of the sales interval the firm is classified to, in € M.
No-Awareness	Dummy, 1 if the company neither incorporates a separate tax department nor engages tax advisors. If no such information was available we assumed no-awareness=0.
Multinationality	Dummy, 1 if the description of the key issues of audit contains the term “foreign”, or if the firm is part of a foreign group, or if one or more tax auditors are specialized in foreign relations. If no such information was available we assumed multinationality=0.
Loss	Dummy, 1 if the firm experienced financial loss during the audit period.
Loss Carry Forward	Dummy, 1 if the firm has loss carried forward.
Return on Sales	Profit divided by sales.
Corporation	Dummy, 1 if the legal form is corporation.
Ind_Construction	Dummy, 1 if the company operates in the construction industry.
Ind_Banking/Insurance	Dummy, 1 if the company operates in the banking and insurance industry.
Ind_Accomm./Food Service	Dummy, 1 if the company operates in the accommodation and food service industry.
Ind_Retail	Dummy, 1 if the company operates in the retail industry.
Ind_Wholesale	Dummy, 1 if the company operates in the wholesale industry.
Ind_other Services	Dummy, 1 if the company operates in other service industries.
Ind_Manufactoring	Dummy, 1 if the company operates in the manufacturing industry.
Ind_Information/ Communication	Dummy, 1 if the company operates in the information and communication industry.
Ind_Transport/Food/ Beverages/Utility	Dummy, 1 if the company operates in the transportation industry, in the food, beverages and semi-luxury industry or in the public utility industry
Ind_Freelance	Dummy, 1 if the company operates in the freelance industry.

Panel C: Variables in detection equation	
Effort	Dummy, 1 if the auditor strongly disagrees (on a 5 point Likert scale) that he automatically fulfills his audit goal when reaching the de minimis threshold. If no such information was available we assumed effort=0.
Male	Dummy, 1 if the auditor is male, zero otherwise.
Career	Dummy, 1 if the auditor is not older than 40 years and works less than 20 years in the tax administration, but already receives an above average salary wage. If no such information was available we assumed Career = 0.
Trainings	Annual average number of trainings the tax auditor participates in. If no such information was available, we set the number of trainings to the average number.

Table 12: Descriptive Statistics for Different Sample Sizes

The table presents a comparison of the tax adjustments (Panel A), firm characteristics (Panel B) and auditor characteristics (Panel C) between the unweighted and weighted sample containing 728 observations and the weighted sample with complete covariates (804 observations) but incomplete data on the decomposition of adjustments in conforming and non-conforming tax planning. The detailed definitions of the variables are presented in Table 11.

Panel A: Dependent Variable	Unweighted Data Sample Size = 728		Weighted Data Sample Size = 728		Weighted Data Sample Size = 804	
	Mean	SD	Mean	SD	Mean	SD
Adjustments in € k	179.00	1,086.62	37.25	207.61	32.52	185.87
Conforming	77.34	522.12	12.91	69.81	-	-
Non-Conforming	101.66	709.25	24.34	183.30	-	-
Adjustments/Sales	0.14	0.68	0.16	0.41	0.15	0.40
Conforming/Sales	0.10	0.65	0.11	0.38	-	-
Non-Conforming/Sales	0.04	0.16	0.05	0.17	-	-

Panel B: Variables in tax planning equation	Unweighted Data Sample Size = 728		Weighted Data Sample Size = 728		Weighted Data Sample Size = 804	
	Mean	SD	Mean	SD	Mean	SD
Family-Control	0.62	0.49	0.75	0.43	0.75	0.43
Family-Management	0.57	0.49	0.72	0.45	0.72	0.45
Tax Publication	0.14	0.34	0.02	0.16	0.02	0.15
Controlling Company	0.04	0.21	0.01	0.09	0.01	0.09
Sales in € k	5,218.09	12,108.61	408.86	1,722.34	404.14	1,739.54
No-Awareness	0.10	0.30	0.15	0.36	0.17	0.37
Multinationality	0.06	0.24	0.03	0.17	0.03	0.16
Loss	0.13	0.34	0.17	0.37	0.17	0.38
Loss Carry Forward	0.14	0.35	0.12	0.33	0.13	0.33
Return on Sales	0.22	0.45	0.23	0.28	0.23	0.27
Corporation	0.30	0.46	0.12	0.32	0.12	0.32
Ind_Construction	0.09	0.29	0.06	0.24	0.06	0.24
Ind_Banking/Insurance	0.03	0.17	0.03	0.18	0.03	0.18
Ind_Accommodation/Food Service	0.09	0.29	0.04	0.19	0.04	0.19
Ind_Retail	0.15	0.35	0.07	0.26	0.07	0.26
Ind_Wholesale	0.05	0.21	0.02	0.14	0.02	0.14
Ind_other Services	0.28	0.45	0.36	0.48	0.36	0.48
Ind_Manufactoring	0.06	0.24	0.02	0.15	0.02	0.15
Ind_Information/Communication	0.03	0.18	0.06	0.24	0.06	0.24
Ind_Transport/Food/Beverages/ Utility	0.03	0.18	0.02	0.15	0.02	0.15
Ind_Freelance	0.19	0.39	0.31	0.46	0.31	0.46

Panel C: Variables in detection equation	Unweighted Data Sample Size = 728		Weighted Data Sample Size = 728		Weighted Data Sample Size = 804	
	Mean	SD	Mean	SD	Mean	SD
Effort	0.45	0.50	0.41	0.49	0.39	0.49
Male	0.52	0.50	0.44	0.50	0.42	0.49
Career	0.06	0.23	0.04	0.18	0.03	0.17
Trainings	2.55	1.24	2.38	1.16	2.42	1.20

Table 13: Correlation Matrix – Variables in Tax Planning Equation

The table presents the pairwise Pearson correlation coefficients of the weighted firm data based on a sample size of 728 observations. Two-sided p-values are presented in parentheses. Table 11 contains the detailed definitions of variables. The last row shows the variance inflation factors (VIF). A correlation matrix including the industry dummies is available on request. The maximum absolute correlation with or between industry dummies amounts to 0.2125.

	Family-Control	Tax Publi-cation	Controll. Comp.	Sales in € M	No-Awaren	Multi-nat.	Loss	Loss Carry Forw.	Return on Sales	Corp.
Tax Public.	-0.259									
	(0.038)									
Controlling Company	0.025	0.036								
	(0.527)	(0.435)								
Sales in € M	-0.130	0.417	0.097							
	(0.000)	(0.000)	(0.250)							
No-Awareness	0.160	-0.068	-0.030	-0.053						
	(0.007)	(0.035)	(0.333)	(0.000)						
Multinat.	-0.033	-0.009	-0.006	0.044	-0.073					
	(0.663)	(0.438)	(0.563)	(0.214)	(0.030)					
Loss	-0.319	0.244	-0.024	0.017	-0.048	-0.026				
	(0.001)	(0.092)	(0.245)	(0.524)	(0.435)	(0.536)				
Loss Carry Forward	-0.270	0.374	0.198	0.083	-0.064	0.198	0.415			
	(0.005)	(0.029)	(0.266)	(0.044)	(0.273)	(0.250)	(0.000)			
Return on Sales	0.224	-0.106	-0.030	-0.078	0.100	-0.039	-0.359	-0.201		
	(0.001)	(0.099)	(0.259)	(0.001)	(0.338)	(0.136)	(0.002)	(0.004)		
Corporation	-0.421	0.297	0.019	0.196	-0.142	0.064	0.207	0.382	-0.200	
	(0.000)	(0.049)	(0.641)	(0.000)	(0.000)	(0.411)	(0.024)	(0.001)	(0.001)	
VIF	1.660	1.911	1.093	1.294	1.089	1.564	1.529	1.741	1.351	1.464

Table 14: Pearson Correlation Matrix – Variables in Detection Equation

The table presents the pairwise Pearson correlation coefficients of the weighted auditor data based on a sample size of 728 observations. Two-sided p-values are presented in parentheses. Table 11 contains the detailed definitions of variables. The last row shows the variance inflation factors (VIF).

	Effort	Male	Career	Trainings
Male	0.042			
	(0.527)			
Career	0.144	0.022		
	(0.137)	(0.928)		
Trainings	-0.084	-0.124	-0.038	
	(0.134)	(0.173)	(0.872)	
VIF	1.029	1.017	1.022	1.023

III Negotiating with the Tax Auditor: The Effect of Tax Auditors' Negotiation Strategy on Firms' Tax Adjustments

1 Introduction

This study examines which negotiation strategies tax auditors use, how these strategies affect audit outcome, and which factors determine the usage of different tax auditor negotiation strategies. In financial accounting research it is widely accepted that the financial statements are in part a product of negotiations between the auditor and client management (Antle/Nalebuff 1991). Prior tax research, however, is almost silent with respect to tax audit negotiations. This is in strong contrast to observations from tax audit practice. *Hoopes et al.* (2012), e.g., cite a report by *PricewaterhouseCoopers* (2004: 6) on tax risk management stating that "*in a number of countries the final agreement of a tax return often ends in a 'horse trade' between the taxpayer and the relevant revenue authority*". In line with this, tax advisory firms regularly advertise their tax audit support services by highlighting their negotiation experience with the tax administration (e.g., Deloitte 2017; PricewaterhouseCoopers 2017). This suggests that negotiations play an important role in the assessment of a firm's final tax burden. In principal, tax auditors should thus be able to affect tax adjustments by the choice of their negotiation strategy. However, to which extent the tax auditor is in fact able to push through pre-negotiation findings in an audit negotiation, how much this depends on the chosen negotiation strategy, and what drives the auditor's strategy choice is currently unknown.

To investigate these questions, we conduct a survey with 610 experienced tax auditors using experiential questionnaires (e.g., Gibbins/Trotman 2002). We ask auditors to report about their last two cases they have experienced. Using a survey design comes along with advantages as well as disadvantages. In contrast to computer-based experiments, which dominate negotiation research in financial auditing studies, experiential questionnaires use real cases and thus avoid artificial experimental settings. Moreover, a survey enables us to examine more variables than can usually be examined in experiments and allows us to draw quantitative conclusions on the effect size of negotiation strategies. However, whereas with experiments strong causal inferences can be easily made, this is more complicated using a survey study because the observed tax adjustments do not only depend on the chosen negotiation strategies, but also on firms' characteristics that determine the aggressiveness of the used avoidance strategies and auditors' characteristics that determine the auditors' detection ability.

In order to separate the effect of tax auditors' negotiation strategy, we make use of a multi-stage maximum likelihood estimation that extends the detection controlled model of *Feinstein* (1990, 1991). In the first stage, the firm is attributed a propensity for tax planning activities (based on specific observable firm characteristics). At the second stage, we model the detection process during the tax audit depending on observable auditor characteristics such as professional experience. The third stage models the tax auditors' ability to negotiate based on the applied negotiation strategy. The advantage of the used multi-stage model lies in the fact that conclusions can be drawn for each stage separately. In particular, we will be able to estimate the effect of different negotiation strategies on the unobserved negotiation rate as well as the expected negotiation rate for each case described in our data set.

Our findings reveal that on average auditors are able to push through about 40 % of the detected pre-negotiation audit differences during tax audit negotiations. Regarding the usage of negotiation strategies, we rely on prior psychological research (e.g., Pruitt 1981; Carnevale/Isen 1986) and elicitate persuasion tactics that are typical for competitive negotiation and cooperative negotiations strategies, respectively. We find that in almost one third of the sample cases tax auditors use a competitive negotiation strategy. By contrast, in only 14 % of all cases tax auditors choose a cooperative strategy. A combination of competitive and cooperative tactics (mixed strategy) is used in 26 % of all cases. In another 28 % of the cases, a neutral strategy which avoids using competitive as well as cooperative tactics is employed.

The usage of a competitive instead of a neutral strategy increases the negotiation rate on average by ten percentage points. Particularly, if the negotiation behavior of the tax advisor or the advisor/taxpayer team is perceived as competitive, a deviation from a competitive auditor strategy can significantly reduce audit adjustments. Thus, if auditors' objective is simply to maximize audit adjustments, it appears that a competitive negotiation approach dominates other strategies. Moreover, we find that a mixed strategy also dominates a cooperative negotiation strategy. Furthermore, our results indicate that the effect of negotiation strategy depends on the time frame of the respective adjustments. If we restrict our analysis to non-permanent (i.e., temporary) tax adjustments, we do not find any significant effect of auditors' negotiation strategy. This suggests that the strategy choice is most important if the negotiated issue results in permanent tax revenue (tax burden) for the auditor (taxpayer), but may be neglected if additional taxes are only temporary.

In addition, using a multinomial treatment effects regression model, we demonstrate that tax auditors' strategy choice is not particularly affected by firm and auditor characteristics. One exception is that the likelihood of a cooperative strategy increases if the firm is owned by a family or the firm is required to publish tax information. However, the most significant determinants of tax auditors' negotiation strategies are the perceived advisors' strategies. If the advisor is perceived as at least partly competitive, the probability of using a non-neutral auditor strategy (competitive, cooperative, or mixed) increases significantly.

The remainder of this paper is organized as follows. In the next section, we discuss the background, related research and develop our research questions. In section III 3, we present the sample selection, estimation method, and variable measurement. The results are displayed in section III 4. Section III 5 presents additional analyses, and section III 6 concludes.

2 Background and Research Questions

2.1 Tax Law Ambiguity

Financial accounting negotiations occur, when GAAP guidance is ambiguous or non-existent (Perreault/Kida 2011). Similar to financial accounting rules, also the rules that determine a firm's tax income leave much room for discretionary decisions. For example, taxpayers must determine transfer prices for transactions between related companies according to the arms' length principle. This principle states that transactions should be valued as if they had been carried out between unrelated parties that each act in its own best interest. As there is, however, often no comparable market price for intra-group transactions, this definition gives both, auditors and firms, much room for interpretation in line with their own individual objectives. In line with this, *Deloitte* (2010) reports that transfer pricing is the most important issue in tax audits of multinational firms. While the determination of transfer prices is most relevant for multinational firms, comparable rules also apply for national corporations if one has to determine whether a payment to a shareholder classifies as a constructive dividend. Other examples that might illustrate inherent tax law ambiguity include the determination of provisions for uncertain liabilities, asset write-downs to fair value, and the differentiation between private and business expenses for sole proprietorships and partnerships, especially in cases where the expenses are related to both, business and personal purposes. It is the vagueness of tax law that is on the one hand necessary to cover a wide range of cases, but on the other hand makes tax law to some extent always a matter of negotiation.

2.2 Motivation and Incentives of Negotiation Partners

Negotiation is a process by which at least two subjects make a joint decision concerning an issue about which there are initial differences in preference (Carnevale/Isen 1986). In a tax audit negotiation the opponents are the taxpayer, usually represented by his or her tax advisor, and the tax auditor. The tax audit negotiation is a form of a pre-trial negotiation (Antle/Nalebuff 1991). If a firm files a tax return, the tax liability is usually subject to verification by a subsequent tax audit. In Germany, as in many other countries such as the United States or Canada, the most severe type of audit is a field audit. Similar to financial accounting audits by public accountants, in a field audit, the revenue service conducts a detailed examination of the taxpayers' records commonly at the taxpayer's place of business. During the audit process, the auditor usually identifies certain items he or she disagrees with the taxpayers' chosen tax treatment. Items where the respective tax treatment is unclear due to tax law ambiguity are discussed with the taxpayer in a final audit meeting. In case of German tax audits, if the opponents do not find an agreement during this negotiation, the Revenue Agency will issue a tax assessment note based on the auditor's opinion regarding the correct tax treatment. The taxpayer has the right to appeal against this tax assessment by filing an objection letter with the Appeals Department, a separate division of the German Revenue Agency. If the objection is rejected by the Appeals Department, taxpayers must file a lawsuit in Tax Court if they wish to contest the imposition of the additional tax payments.

However, usually both negotiation parties are interested in reaching an agreement to avoid tax court disputes since most tax court disputes tend to be tedious, costly, and the result is often not easy to predict especially if there is no relevant case law on the issue and ambiguity is high (Blaufus et al. 2016a). For taxpayers, the potential advantages of avoiding this litigation risk may be obvious, but this risk also affects tax auditors' behavior as our pre-survey interviews have revealed. The reasons are:

(1) Tax auditors are usually required to conduct a certain number of tax audits in a year. Therefore, auditors are motivated to close their audit cases timely, avoiding additional effort which is needed in case it comes to an appeal process.

(2) In case it comes to litigation and the Revenue Agency loses in Tax Court, the auditor's local tax office is charged with all legal expenses related to the litigation. This may harm the auditors' professional reputation and auditors, thus, fear that it could indirectly affect their professional career.

Therefore, most tax audits close with an agreement between auditors and taxpayers. In the current sample, for instance, the agreement rate amounts to 80 %. While both negotiation opponents may be interested in reaching an agreement, their individual negotiation objectives clearly differ. Taxpayers and their advisors aim at defending their initial tax positions to avoid any additional tax burden. On the other hand, tax auditors are legally required to ensure the 'correct' application of the tax laws irrespective whether this leads to positive or negative tax adjustments. In Germany and most other countries, there is no incentive-pay for auditors as it is used, e.g., in Brazil where auditors receive bonus payments for every dollar of fines collected (Kahn et al. 2001). However, even in the absence of explicit bonus payments, if auditors believe that actions consistent with organizational goals will improve their chances of promotion, they will respond to these implicit incentives (Klassen 2016). In Germany, the local tax offices are evaluated to some extent with respect to additional taxes 'earned' from tax audits since they must report to the German Revenue Agency the ratio of all cases with non-positive tax adjustments and with tax adjustments below a de minimis threshold. Thus, auditors may feel they should help to improve the performance of their own office to increase the likelihood of promotion and, indeed, our pre-survey interviews revealed that auditors perceive their performance evaluation and thus their potential career opportunities to be correlated with assessed additional taxes during their audits. In line with these implicit incentives, the vast majority of audit cases lead to additional tax payments. In our sample, only about 12 % of all cases result in non-positive tax adjustments.

Therefore, we assume that auditors are motivated to assess positive tax adjustments so that tax audit negotiations are in principal so-called distributive negotiations which are described as win-lose or zero-sum games in prior research (e.g., Walton/McKersie 1965; Kersten 2001). A gain for one party (one additional dollar in tax revenues for the auditor) is a loss for the other party (one additional dollar in taxes to pay for the taxpayer). However note that gains and losses must not be valued equivalently by both parties. For example, one can imagine that taxpayers place lower weight on issues that result in temporary than on permanent adjustments. If tax auditors do not differentiate to the same extent between permanent and non-permanent adjustments, because this differentiation is perceived to be less relevant for their performance evaluation, logrolling could increase joint negotiation outcome.

2.3 Negotiation Strategies

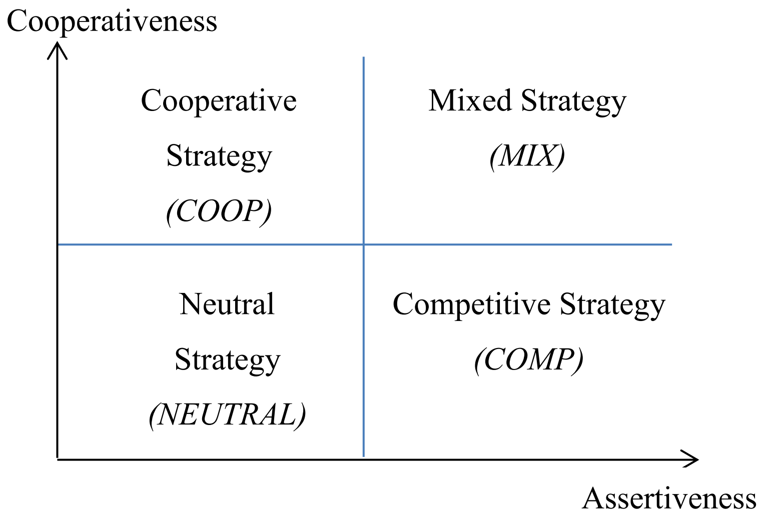
Negotiation strategy is the goal-directed behavior that individuals are using to reach agreement (Brett/Thompson 2016). Negotiation research often differentiates only between two opposing strategies: competitive and cooperative whereby the former is also called distributive and the latter integrative (e.g., Brett/Thompson 2016). However, prior research shows that a unidimensional "cooperative-competitive" strategy classification is insufficient to explain negotiation behavior. Instead, a two-dimensional "dual-concern" model of strategy selection that extends *Blake* and *Mouton's* (1964) Managerial Grid to the analysis of negotiation (Filley 1975; Ruble/Thomas 1976) is regarded as appropriate. The dual-concern model distinguishes between "concern about own outcomes" (*assertiveness*) and concern about the other party's outcomes (*cooperativeness*) as two independent dimensions rather than as opposite ends of the same dimension. Thus, the alternative to cooperation is not necessarily competition. The model differentiates between five different strategies: (i) *competitive* (high assertiveness / low cooperativeness), also called *competing* or *contending* (ii) *collaborating* (high assertiveness / high cooperativeness) which has also been termed "*problem solving*", (iii) *accommodating* (low assertiveness / high cooperativeness) also called "*concession making*" or "*yielding*", (iv) *avoiding* (low assertiveness / low cooperativeness), and (v) *compromising* (intermediate in both assertiveness and cooperativeness). However, as *compromising* is often viewed as a weak form of *collaborating* (Pruitt, 1983; Carnevale/Isen 1986), we do not consider this as a separate strategy in the current paper, but instead differentiate between the following four strategies that are displayed in Figure 2:

- *Competitive Strategy* which corresponds to the "high assertiveness / low cooperativeness" category in the "dual-concern" model.
- *Cooperative Strategy* which corresponds to the "low assertiveness / high cooperativeness" category in the "dual-concern" model.
- *Mixed Strategy* which corresponds to the "high assertiveness / high cooperativeness" category in the "dual-concern" model.

- *Neutral Strategy* which corresponds to the "low assertiveness / low cooperativeness" category in the "dual-concern" model.

The measurement of these strategies will be explained in detail in Section III 3.3.2.

Figure 2: Negotiation Strategies



2.4 Research Questions

As we are not aware of any prior research that examines the usage of tax auditors' negotiation strategies, our first research question refers to the distribution of the different negotiation strategies used by tax auditors in real audit cases. Prior auditing research reveals that auditors of financial accounting statements experience negotiations with their clients about ambiguous accounting issues as a normal part of their practice (Gibbins et al. 2001; Gibbins et al. 2007) and that they use different negotiations strategies to persuade their clients. Therefore, we expect that also tax auditors are experienced negotiators and use a variety of negotiation tactics.

Gibbins et al. (2010) report from an experiment with 140 experienced financial accounting auditors that these auditors generally favor the use of cooperative tactics over competitive ones when entering negotiations. Moreover, *Bame-Aldred* and *Kida* (2007), who surveyed 33 experienced auditors, find that financial accounting auditors are unlikely to use a tactic of threats, e.g., to qualify the opinion or to terminate the relationship. Similarly, *Bennett et al.* (2015), who elicitated data from 49 experienced auditors, report that it is very unlikely that these auditors would use threats to terminate the relationship during discussions regarding the disposition of audit differences.

However, this preference for cooperative negotiation strategies cannot be simply carried over to a tax audit setting. First, *McCracken et al.* (2008) report that financial accounting auditors are held accountable for maintaining good relationships with their clients but not monitored closely for the client's financial accounting quality. This does not hold to the same extent for tax auditors because tax auditors do not bear a risk comparable to the risk of client loss.[18] The high importance of relationship management for financial accounting auditors can affect their choice of negotiation strategies. In a meta-analysis of 34 negotiation studies *Hüffmeier et al.* (2014) find that competitive strategies lead to higher economic outcomes, but cooperative strategies lead to higher socioemotional outcomes, e.g., regarding the perception of the relationship between the negotiating parties. As one of the goals of cooperative strategies is to build or maintain a good relationship to the client, one might expect that financial accounting auditors are motivated to use cooperative strategies more frequently than their tax counterparts. In line with this, *Wang* and *Tuttle* (2009) demonstrate that auditors negotiate less cooperatively if they depend less on client retention when mandatory rotation is imposed. Second, the negotiation frames of the opponents differ between financial accounting audits and tax audits. While a financial accounting auditor is presumed to have a preference for income-decreasing adjustments (Bame-Aldred/Kida 2007), tax auditors should prefer income-increasing adjustments (Section III 2.2). Similarly, the taxpayer is presumed to have a preference for income-increasing adjustments regarding financial accounting purposes, but usually prefers income-decreasing adjustments for tax purposes. Changing the negotiation frame from losses to gains and vice versa, potentially changes the choice of negotiation strategies. Tax auditors (taxpayers) may perceive concessions as decrease in their gains (increase in their losses). Due to loss aversion (Kahneman/Tversky 1979) taxpayers may make less concessions, but tax auditors should make more concessions, i.e., act more cooperatively, compared to a financial accounting audit setting (Neale/Bazerman 1985). However, there are also findings that negotiators are less cooperative when their opponents have a loss rather than a gain frame (De Dreu et al. 2004). This would imply a more competitive tax auditor in comparison to the financial accounting setting. Thus, the overall effect of the change in the negotiation frame is theoretically unclear. Third, whereas financial accounting auditors usually negotiate directly

[18] Tax advisors and auditors, plausibly, have also an interest in maintaining a good relationship with each other, because negotiations between tax professionals and tax auditors aren't one-shot games, but repeated games where reputation-building may be of importance. Still, the degree to which financial accounting auditors depend on a good relationship to their clients is much stronger compared to tax auditors because tax auditors do not have direct monetary disadvantages from a bad relationship. In contrast, bad relationships increase the risk of client loss for financial accounting auditors.

with the firm's CFO, tax auditors mostly negotiate with an expert intermediary, the firm's tax advisor. Prior research finds that the competitiveness of the interaction can differ between direct and representative negotiations (Rubin/Sander 1988; Bazerman et al. 1992). The desire to please their clients may lead advisors to make high demands and less willing to concede. Research finds, e.g., that representatives are usually less cooperative, take longer to reach an agreement, and impasses occur more often (Mosterd/Rutte 2000). This competitive behavior may affect auditors' negotiation style towards either more own competitiveness to mirror the behavior of the opponent according to the reciprocation model (Osgood 1962) or to more concessions, i.e., a more cooperative behavior according to the level of aspiration theory (Siegel/Fouraker 1960). In sum, whether tax auditors use more cooperative or competitive strategies is theoretically ambiguous and, thus, an empirical question. We, therefore, formulate our first research question as follows:

RQ1: *Which negotiation strategies do tax auditors use?*

Prior financial auditing research has also examined the effect of different negotiation strategies and tactics on audit adjustments. In a study of *Hatfield et al.* (2008), 44 audit managers and partners participate in a computer-based experiment in which they negotiate with a competitive client. Auditors were assigned to two treatments: Either they were told that preliminary audit findings include only one significant item or they were told that preliminary audit findings also include three clearly inconsequential items which should be waived at the beginning of the negotiation. The authors find that the reciprocity-based waiving strategy increases the auditors' envisaged amount of adjustments, their minimum required adjustment, and their counteroffers to the client. Similarly, *Sanchez et al.* (2007) find in an experiment with 124 controllers and CFOs, that their willingness to post income increasing adjustments rises if auditors disclose inconsequential audit differences and subsequently waive these adjustments. *Perreault* and *Kida* (2011) report on a computer-based experiment with 147 practicing managers. They find that threatening to qualify the audit opinion or simply informing the client that other companies have handled the accounting issue in a way consistent with the auditor's preference both result in significant client concessions of approximately the same level. *Perreault et al.* (2017) examine the effectiveness of simultaneous and sequential negotiation strategies in multiple-item negotiations. 263 business managers participated in their computer-based experiment. They find that a simultaneous strategy leads to significantly greater total concessions from managers and that presenting the larger issues first increases concessions, too.

Overall, financial auditing research provides convincing evidence that negotiation strategies significantly affect audit adjustments. Thus, we expect that negotiation strategies also affect tax audit adjustments. However, the effectiveness of negotiation strategies may differ between the financial accounting and tax audit setting because the contexts differ in important aspects (see the above discussion relating to RQ1). For example, prior negotiation research demonstrates that the effectiveness of competitive tactics such as the usage of threats depends severely on the credibility of threats and threat capacity (Pruitt 1981: 71, 85). Tax auditors can choose among a variety of different threat instruments (see Section III 3.3.2) and their usage is credible because they do not have to fear negative economic consequences comparable to the risk of client loss. Thus, we expect that competitive strategies could be very effective in a tax audit setting. Moreover, because of the experimental nature of previous financial auditing studies, the size of the effect on real audit adjustments is unknown. This is what we are particularly interested in, in our study. Our second research question is thus as follows:

> ***RQ2***: *To what extent are tax adjustments affected by a tax auditor's negotiation strategy?*

Our last research question concerns the determinants of the negotiation strategy choice by tax auditors. Again, we can draw on a number of financial auditing studies as well as general negotiation research. First, research suggests that negotiation strategies depend on individual characteristics of the opponent. *Hatfield et al.* (2008) find that auditors are more likely using a cooperative strategy when client retention risk is high and *Brown* and *Johnstone* (2009) add that audit engagement risk increases the willingness to make concessions by low-experienced auditors. *Gibbins et al.* (2010) show that auditors who perceive the client to be inflexible in the initial accounting position are more likely to use competitive negotiation strategies. While company characteristics and circumstances (such as firm size, ownership structure, and financial position) are generally considered to be important in theoretical models of audit negotiations (e.g., Beattie et al. 2004), we are not aware of any study that examines empirically the link between firm characteristics and auditors' negotiations strategies in more detail.

Besides firm characteristics, the perceived negotiation strategies of the taxpayers and their advisors may affect the choice of auditors' negotiation strategy. On the one hand, reciprocation theory (Osgood 1962) suggests that a perceived cooperative negotiation strategy of the taxpayer/advisor results in a more cooperative behavior of the auditor. On the other hand, the level of aspiration theory (Siegel/Fouraker 1960) predicts exactly the opposite. According to the level of aspiration theory, negotiators enter a negotiation with a certain level of aspiration. An initial cooperative behavior (i.e., a large concession) of the opponent should increase the negotiator's level of aspiration, so that he or she responds more competitively (Lawler/MacMurray 1980). In an audit context, *Hatfield et al.* (2008) find that auditors are more likely to use a cooperative strategy when the firm's negotiation style is competitive and there is high client retention risk. This would be in line with the level of aspiration theory.

Regarding own individual characteristics of the negotiator, two studies demonstrate that audit experience is related to less concession making behavior (Brown/Johnstone 2009; Trotman et al. 2009). In addition, general negotiation research suggests that gender (Walters et al. 1998) and personality traits (Antonioni 1998) may affect the choice of negotiation strategy. However, according to our knowledge, there is no previous accounting study investigating empirically these effects of individual auditor characteristics on negotiation outcomes.

Based on the discussion above, tax auditors' negotiation strategy could be affected by the auditor's gender, professional experience, their attitude towards taxpayers' tax morale, the perceived negotiation strategy of the taxpayer/advisor, and firm size (as proxy for compliance risk). We, therefore, investigate:

> ***RQ3***: *Does the tax auditor's used negotiation strategy depend on firm characteristics, auditor characteristics, and the perceived negotiation strategies of the opponent?*

3 Sample Selection, Estimation Method, and Variable Measurement

3.1 Sample Selection

We used an advanced tax law training course for tax auditors to conduct our survey. The course was obligatory for all tax auditors working in Berlin, which is the capital and largest city in Germany. One of the authors taught this course and handed out the questionnaires to participants. The course took place between October 2010 and February 2011. In sum, 646 tax auditors attended the course from which 610 participated in our survey. Thus, we achieved a high response rate of 94%.

To gain relevant information about audit cases, we use "experiential questionnaires" (e.g., Gibbins/Trotman 2002). We ask auditors to report about their last two cases they have experienced and are able to describe in detail. Before developing the questionnaire, we conducted several pre-survey interviews to gain information about firm characteristics auditors are usually aware of after having completed a case. Thereby, it turns out that auditors generally remember central key characteristics of a case, e.g., the audit result (additional tax burden), the firm's size (profit and sales), audited tax years, and industry. One reason why the audit result and the mentioned firm characteristics are in general well remembered is simply that auditors have to fill out several forms after completing a case in which they have to report this data to the revenue agency. Another reason is that audit results may (at least indirectly) affect the personal performance evaluation of the auditor. In particular, the last point makes it important that we assure auditors' anonymity. Therefore, we did not collect any identifying information and committed us officially to not hand over non-aggregated data to the revenue service.

Our questionnaire consists of two parts. In the first part auditors report on their last two audit cases, in the second part they have to answer several socio-demographic questions. In Berlin, each audit case is assigned to only one tax auditor. Thus, our sample should be free off double reported cases. The survey questionnaire is attached in Appendix I. The questionnaire was pre-tested by two auditors who did not participate in the final survey and one head of a local tax audit department to ensure that all questions are understandable and the questionnaire is feasible. On average, participants needed about thirty minutes to complete the questionnaire.

Altogether, we receive information about 1,244 unique audit cases, i.e., the data set is free of duplicate entries.[19] From these cases we eliminate those that differ in their tax treatment from "normal" business income (e.g., nonprofit associations, charitable trust, agriculture and non-business income). Thus, we obtain 1,059 cases. We drop 128 cases with missing data in all negotiation variables, 52 cases without information about adjustments, and 278 cases without final audit meetings (meetings in which the examination report is negotiated face-to-face). Moreover, due to some outliers in the dependent variable we truncated our data set

[19] Some auditors voluntarily reported information about further cases in an additional questionnaire which was provided on request by the author who taught the training course. Thus, we received slightly more than the expected 1,220 (= 610 × 2) cases.

at 98 % in each size category. The final sample amounts to 575. Table 15 displays the sample selection for our analyses.

Table 15: Sample Selection (Chapter III)

Sample Selection Step	Remaining Number of Cases
Original sample	1244
Less “non-business-cases”	1059
Less cases with missing data in all negotiation variables	931
Less cases without information on adjustments	879
Less cases without audit meeting	590
Less outliers (98 % truncation)	575

3.2 Detection and Negotiation Controlled Estimation

The observed tax audit adjustments (*ADJUSTMENTS*) can be expressed as the product of a firm’s tax planning amount *T*, the auditor’s detection rate *D*, and the auditor’s negotiation rate *N*:

$$\begin{aligned}&ADJUSTMENTS = \\ &TAX\ PLANNING\ AMOUNT \times DETECTION\ RATE \times NEGOTIATION\ RATE.\end{aligned} \tag{1}$$

In order to separate the effect of tax auditors’ negotiation strategy on the unobserved negotiation rate *N,* we make use of a multi-stage maximum likelihood estimation (see Feinstein 1990, 1991).

Figure 3: Multi-Stage Model

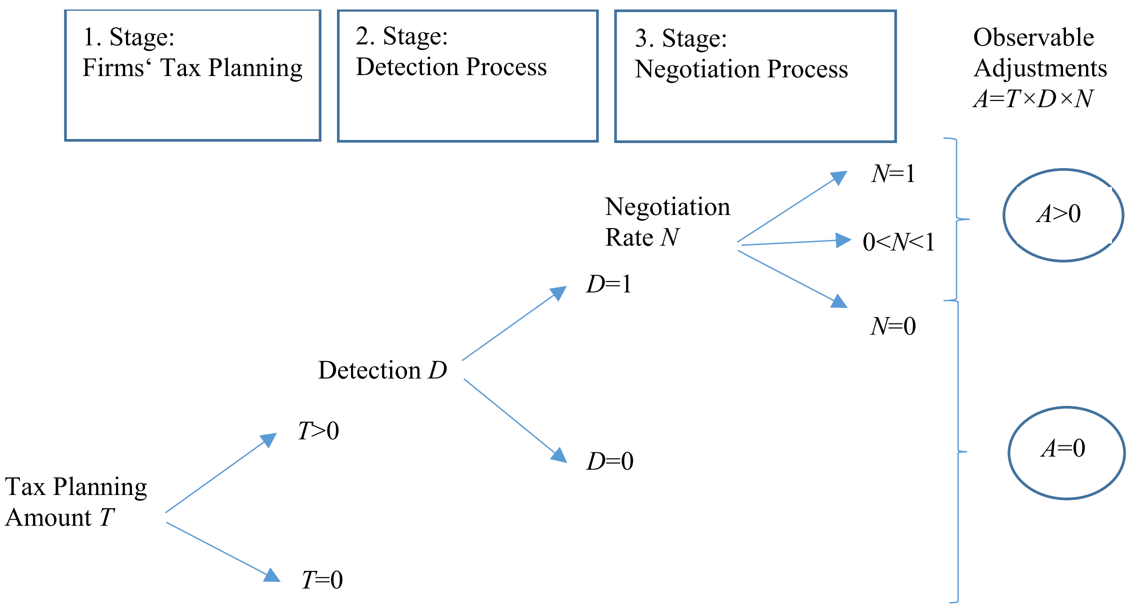


Figure 3 illustrates the estimation strategy. In the first stage, based on its characteristics X_T the firm is attributed a propensity for tax planning activities T^* that results in a positive or zero tax planning amount T which we model as a Tobit specification as follows[20]:

$$ln(T^* + h) = X_T \beta_T + \varepsilon_T, \quad \text{with} \quad \varepsilon_T \sim N(0, \sigma^2_T). \tag{2}$$

$$T = \begin{cases} T^* & \text{if } T^* \geq 0 \quad \text{with } P(T = T^*) = \frac{1}{\sigma_T(T+h)} \phi\left(\frac{\ln(T+h) - X_T\beta_T}{\sigma_N}\right) \\ 0 & \text{if } T^* < 0 \quad \text{with } P(T = 0) = 1 - \Phi\left(\frac{X_T\beta_T - \ln(h)}{\sigma_N}\right). \end{cases} \tag{3}$$

ϕ and Φ are the standard normal density function and standard normal cumulative distribution, respectively. The modeled log-normal specification allows skewed distribution that "capture the empirical fact that there is small proportion of taxpayers with very high levels of non-compliance" (Erard/Feinstein 2010: 8).

Next, at stage two, we model the detection process during the tax audit. We assume the auditor assignment to be exogenous and random.[21] Based on their abilities and effort X_D tax auditors are either able to detect (D=1) or fail to uncover (D=0) firms' tax planning behavior.[22] Therefore, based on tax auditors' propensity to detect D^* a Probit model is specified.

$$D^* = X_D \beta_D + \varepsilon_D \quad \text{with} \quad \varepsilon_D \sim N(0,1) \tag{4}$$

$$D = \begin{cases} 1 & \text{if } D^* \geq 0 \quad \text{with } P(D = 1) = \Phi(X_D\beta_D) \\ 0 & \text{if } D^* < 0 \quad \text{with } P(D = 0) = 1 - \Phi(X_D\beta_D) \end{cases} \tag{5}$$

Finally, the third stage models the tax auditors' ability to negotiate N^*. Based on the applied negotiation strategy X_N tax auditors might be able to assert their objections to the firms' tax accounts in full (N=1), to some extent ($0<N<1$) or they fail to do so (N=0). Thus, $N \in [0,1]$ represents the percentage of detected tax planning amount that the tax auditor is able to push through in the negotiation process between the firm's tax advisor and the tax auditor. In line

20 In order to extend the distribution of T^* below zero we use h as a displacement parameter, see *Erard* and *Feinstein* (2010: 9). In context of our estimation h=1 applies which prevents cases with zero tax planning propensity to be dropped when logarithmising.

21 Our data supports this assumption as there is no high correlation between auditor and firm characteristics. Most bivariate correlations do not exceed 0.25. The two exceptions concern a correlation between auditor's *SALARY* and firm size (correlation with Log(*SALES*): 0.43 and *GROUP*: 0.3). We, therefore, repeated our analyses excluding *SALARY*. Results reported in this paper remain unchanged.

22 Note, that we do not allow for fractional detection as modeled in *Feinstein* (1991). This simplification is needed for the convergence of our estimation method. Thus, tax auditors are assumed to detect either all of nothing.

with *Maddala* (1999: 160) we use the following two-limit Tobit specification to model this stage.

$$N^{*}=X_N\,\beta_N+\varepsilon_N \quad with\ \ \varepsilon_N\sim N(0,\sigma^2_N) \tag{6}$$

$$N=\begin{cases} 1 \quad \text{if} \quad N^{*}\geq 1 & \text{with} \;\; P(N=1)= \quad \Phi(\frac{X_N\beta_{N-1}}{\sigma_N}) \\ N^{*} \;\; \text{if} \quad 0<N^{*}<1 & \text{with} \;\; P(N=N^{*})= \frac{1}{\sigma_N}\phi(\frac{N-X_N\beta_N}{\sigma_N}) \\ 0 \quad \text{if} \quad N^{*}\leq 0 & \text{with} \;\; P(N=0)= \quad 1-\Phi(\frac{X_N\beta_N}{\sigma_N}) \end{cases} \tag{7}$$

Note, that we are able to measure the variables X_T, X_D, X_N that might have an impact on the outcome of each stage (see section III 3.3), however we observe neither the latent variables T^{*}, D^{*}, N^{*}, nor the variables *T, D, N*. What we observe is the detected tax planning amount that the tax auditor is able to assert, namely the tax adjustments *A* that can mathematically be expressed as the product $T\times D\times N$ according to equation (1). The advantage of our multi-stage maximum likelihood estimation lies in the fact that conclusions can nevertheless be drawn for each stage separately. In particular, we will be able to estimate the effect of different negotiation strategies on the unobserved negotiation rate *N* as well as the expected negotiation rate for each case described in our data set. To illustrate how disentanglement of observed tax adjustments $A=T\times D\times N$ to information on unobserved *T, D, N* is possible, consider two firms with resembling firm characteristics and equally competent auditors with respect to the detection of firms' tax planning, then differences in tax adjustments can only result from different negotiation strategies applied by the two tax auditors.

According to Figure 3, the log likelihood function consists of cases with positive adjustments and those with zero adjustments. Positive adjustments occur whenever the company takes actions of tax planning that are detected during the tax audit and that the tax auditor is able to assert in the negotiation process, either fully or partly. In contrast, we observe zero adjustments when either the firm is fully compliant, or the tax auditor fails to detect non-compliance, or she is unable to push through her objections in the subsequent negotiation process.

$$LL=\sum_{A>0} log[P(T>0)\cdot P(D=1)\cdot P(N=1)+(T>0)\cdot P(D\ =1) \\ \cdot\ P(0<N<1)] \tag{8}$$

$$+ \quad \sum_{A=0} log[P(T=0) + P(T>0) \cdot P(D=0) + P(T>0) \cdot P(D=1) \cdot P(N=0)\,]$$

Under the assumption that the three stages are independent from each other, i.e., the error terms do not correlate,[23] plugging in the path likelihoods yields the following log likelihood function that allows estimation of the parameters β_T, β_D , β_N as well as σ_T and σ_N.

$$LL = \sum_{A>0} \log\left[\frac{1}{\sigma_T(A+h)} \phi\left(\frac{\ln(A+h) - x_T\beta_T}{\sigma_T}\right) \cdot \Phi(X_D\beta_D) \cdot \Phi\left(\frac{X_N\beta_N - 1}{\sigma_N}\right)\right.$$
$$+ \int_0^1 \frac{1}{N} \frac{1}{\sigma_T\left(\frac{A}{N} + h\right)} \phi\left(\frac{\ln\left(\frac{A}{N} + h\right) - x_T\beta_T}{\sigma_T}\right) \cdot \Phi(X_D\beta_D) \cdot \frac{1}{\sigma_N} \phi\left(\frac{V - X_N\beta_N}{\sigma_N}\right) dN] \qquad (9)$$
$$+ \sum_{A=0} \log\left[1 - \Phi\left(\frac{x_T\beta_T - \ln(h)}{\sigma_T}\right) \cdot \Phi(X_D\beta_D) \cdot \Phi\left(\frac{X_N\beta_N}{\sigma_N}\right)\right]$$

However, before describing the data in the next section, we want to address important issues associated with the above model specification. First, according to Figure 3 we rule out false detection, i.e., in our specification auditors never falsely uncover some noncompliance when no ambiguous tax planning activities actually took place. Second, another important statistical issue is the identification problem which arises whenever the explanatory variables in three stages vary identically. In this case the decomposition of observable tax adjustments $A=T \times D \times N$ into the components T, D and N is not unique and thus, identification fails.[24] However, this is not a problem in our data set, because X_T, X_D and X_N contain disjoint variables which allows unique identification of the parameters.

3.3 Variable Measurement

3.3.1 Dependent Variable: Audit Adjustments

As dependent variable we use log(*ADJUSTMENTS)* which is the logarithm of the tax base adjustments assessed in the audit. For bivariate analyses (Section III 4.1), we alternatively use scaled adjustments, i.e., tax base adjustments divided by a firm's sales (*ADJUSTMENTS/SALES)*. From our pre-tests, we know that auditors do better memorize the additional tax burden than the adjustments to the tax base because after closing each

23 *Feinstein* (1991) and *Li* (2013) also estimated similar models with an arbitrary correlation in a two stage setting. However, the estimation results were similar to those without correlation.

24 See *Feinstein* (1990) for a formal proof.

audit case auditors are required to separately document the additional tax burden for statistical analyses of the tax administration. Thus, we elicitated the additional tax burden (in Euro) and, in case of loss firms, the adjustments to the taxable loss. Tax base adjustments are calculated as the sum of the change in taxable loss and the quotient of the additional tax burden and the tax rate.[25]

3.3.2 Independent Variables: Tax Auditor Negotiation Strategies

To measure auditors' negotiation strategies, we decided not to ask for any self-assessments regarding their negotiation strategy. Rather, we assume that negotiators choose their tactics consistent with their overall negotiation strategy and asked whether they have used specific persuasion tactics. This method should reduce distortions linked with subjective self-assessments.

Persuasion tactics rely on the use of psychological effects in order to convince or to compel someone to accept the negotiator's position (Perreault/Kida 2011). In line with psychological research (e.g., Pruitt 1981; Carnevale/Isen 1986), the following tactics are characteristic of competitive negotiation strategies: imposing time pressure on the other negotiator (e.g., by setting deadlines), making it seem that negotiation is likely to break down without agreement, minimizing concessions to the other negotiator to appear "tough", and using threats. In a negotiation setting, a threat means a communication of intent to punish the other if the other does not concede (Pruitt 1981: 77; Sinaceur et al. 2011). Sanctions are a key component of threat (Sinaceur/Neale 2005). Within the context of a tax auditor/taxpayer negotiation, an auditor can use different sanctions. Most countries differentiate between administrative fines, coercive penalties, and other sanctions (van der Hel 2011). In Germany, auditors can use their coercive power to compel action by threatening taxpayers to impose *coercive fines* or other coercive measures (substitutive execution, direct enforcement) according to sections 328-335 GFC[26] if taxpayers do not comply within a specific deadline. Moreover, auditors can impose penalties if taxpayers do not comply with information and documentation requests during tax audits in due time (*fine for delay,* section 146(2b) GFC). In addition, if taxpayers do not cooperate, auditors are allowed to estimate the basis of taxation (section 162 GFC) and the estimated tax base may exceed the declared income.

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[25] In Germany, the applied tax rate for corporations includes corporate income tax, local trade tax, and solidarity surcharge. We use a uniform tax rate of 35% for partnerships which mirrors tax auditors' practice. In case of sole proprietorships, the individual marginal income tax rate applies for which a proxy was obtained from the German income tax statistics with respect to income category and industry classification.

[26] The GFC is the German Fiscal Code.

Finally, tax auditors can threat to break off negotiations. If the negotiation discontinues without agreement, the tax administration would issue a tax assessment notice on the basis of the auditor's tax adjustments which implies the risk of litigation for both parties. Other instruments the auditor may use to increase the time pressure on the taxpayer include imposing short deadlines or raising the frequency of reminders and requests.

To elicitate the usage of competitive tactics, we ask auditors, whether they have carried out one of the following actions to speed up the audit process (multiple answers possible):

- Imposing short deadlines,
- Threat of imposing a *fine for delay*,
- Threat of coercive measures (coercive fine, substitutive execution, direct enforcement),
- Threat of discontinuing negotiations without agreement,
- Other actions:___________.

In contrast to the above described tactics which aim at forcing one's own will on the other party, in a cooperative negotiation strategy the effects on the welfare of the other party is also considered. A cooperative negotiation strategy includes tactics such as the exchange of truthful information about needs and priorities, seeking the other's reaction to each offer and making larger concessions on items of lower priority (e.g., Carnevale/Isen 1986; Carnevale/Pruitt 1992). Within the context of a tax auditor/taxpayer negotiation, the tax auditor may, e.g., offer to waive small audit adjustments or adjustments with high litigation risk in order to promote a cooperative environment that encourages the taxpayer to accept a larger audit adjustment. Such a concession tactic is based on the assumption of reciprocity as a general societal norm (Sanchez et al. 2007; Hatfield et al. 2008). Moreover, tax auditors could consider the taxpayer's welfare and waive adjustments that would result in an excessive additional tax burden on the firm. Alternatively, auditors could concede that the taxpayers' legal argumentation is superior to their own arguments and waive the corresponding adjustments.

To elicitate the usage of cooperative tactics, we ask subjects how they found an agreement on the proposed audit adjustments. Possible answers were given as follows (multiple answers possible):

- I waived small adjustments in favor of one large adjustment,
- I waived adjustments because the firm's "pain threshold" was reached,

- I waived uncertain adjustments to avoid the risk of litigation,
- I waived adjustments because the other side has convinced me.

As explained in Section III 2.3, we differentiate between the following four strategies that are displayed in Figure 2.

- *Competitive Strategy* measured by the binary variable *COMP*, which is one if the auditor uses at least one of the above mentioned competitive tactics and does not use any cooperative tactic.
- *Cooperative Strategy* measured by the binary variable *COOP*, which is one if the auditor uses at least one of the above mentioned cooperative tactics and does not use any competitive tactic.
- *Mixed Strategy* measured by the binary variable *MIX*, which is one if the auditor uses at least one of the above mentioned cooperative tactics and does also use at least one competitive tactic.

Neutral Strategy measured by the binary variable *NEUTRAL*, which is one if the auditor avoids using cooperative as well as competitive tactics.

3.3.3 Control Variables

3.3.3.1 Tax Planning Stage

Prior research shows a large cross-sectional variation in firms' tax avoidance (Hanlon/Heitzman 2010). Thus, our first set of control variables consists of firm characteristics which may explain the extent of a firm's tax planning activity. Firms differ in their tax planning opportunities, tax planning benefits, and costs of tax planning which include tax- and non-tax costs. Regarding non-tax costs, public firms may place more emphasis on financial reporting outcomes than do private firms and thus have higher non-tax costs which should lead to less conforming tax avoidance, i.e., avoidance which reduces tax as well as book income (Mills 1998; Mills/Newberry 2001). Therefore, we include a control variable *PUBLIC* which equals one, if the firm is required to publish a profit and loss account. We also control for family firms, because there is evidence that family firms engage in less non-conforming tax avoidance (reduction of tax, but not book income) due to higher reputation costs which could result from aggressive tax strategies (Chen et al. 2010). The variable *FAMILY* takes on the value of one if a family holds more than 50 % of the shares, otherwise it is zero. Tax planning opportunities should increase and average tax planning costs should decrease with increasing firm size. Thus, we included log(*SALES*) as further control variable which is the natural logarithm of a firm's sales. Tax planning opportunities also rise with increasing foreign operations, because multinational firms can engage in cross-country profit shifting. The variable *FOREIGN* equals one if the key audit areas include the term "foreign", the firm is a member of a foreign group, or the involved tax auditor is specialized in foreign relations, otherwise it is zero. Furthermore, there is some evidence that tax avoidance opportunities and benefits vary with the legal form (Tedds 2010). Hence, we include an indicator variable for corporations (*CORPORATION*). In addition, we include an indicator variable *GROUP* because tax planning opportunities should also increase if the firm belongs to a group. Tax planning benefits may vary across firms due to differences in profitability. We, therefore, control for a firm's financial status (*LOSS*), which is one for firms that suffered losses during the audit period. Finally, we include an indicator variable *EVASION* which is one for firms that are suspected of tax evasion, since we assume that firms engage in more aggressive tax planning if they use legal and illegal tax minimization to decrease the tax burden.[27]

3.3.3.2 Detection Stage

In the second stage of our estimation model, we aim at explaining the auditor's ability of successfully detecting necessary tax base adjustments. First, we control for auditor's expertise by including auditor's wage (*SALARY*), years of experience (*EXPERIENCE*), i.e., auditor years at the tax administration, academic degree (*SCHOOL*), and the number of advanced training courses the auditor has attended on average per year (*TRAINING*). Second, to take into account that auditors differ in their attitude towards taxpayers and their intrinsic motivation, we include the variables *ATTITUDE* and *MOTIVATION*. To measure *ATTITUDE*, tax auditors were asked if they agree or disagree to the following question on a five-point scale: "Taxpayers seek to minimize their tax burden by all permitted means." *ATTITUDE* equals one if the auditor fully agrees (5 out of 5), otherwise it is zero. To elicitate *MOTIVATION* auditors were asked if they agree or disagree to the following question on a five-point scale: "Due to the statistical pressure I consider the audit objective to be achieved by reaching the de minimis treshold." *MOTIVATION* is one for auditors who fully disagree (1 out of 5), otherwise it is 0. Finally, we control for audits in which a section head participated actively in the final audit meeting (*HEAD*).

[27] We checked the variables for collinearity problems for each stage by means of Variance Inflation Factors and could not detect any problems. All VIFs are below 2.5, which is far below the threshold of 10 suggested by *Hair et al.* (2013).

3.3.3.3 Negotiation Stage

Our main interest is directed to the negotiation stage of our estimation model. Besides our independent variables that measure the tax auditors' negotiation strategies, we include variables that control for the perceived negotiation strategy of the tax advisor and (in additional tests) the taxpayer.

Similar to our measurement of auditors' negotiation strategy, we do not directly ask for the used strategy, but asked for specific tactics, the advisors and taxpayers have used. Our questionnaire contains items, which characterize competitive or cooperative negotiation tactics and could be answered with "yes", "no", or left unanswered. To determine the perceived tax advisors' negotiation strategies, we use a binary full-information factor analysis (Reckase 2009).

We use a factor analysis for advisor strategies for two reasons. First, items used for tax advisors' strategies are in contrast to those used for auditors' strategies determination not mutually exclusive; hence the computation of common factors is feasible. Second, we are not interested in the distribution of tax advisor strategies. Thus, we can simply use a median split of factor scores to divide advisors into the four negotiation styles.

We observe factor loadings that are at least .5 for one factor and not higher than .25 for the other. Furthermore, the items load as expected on a competitive and a cooperative factor, e.g., "Information was withheld/filtered" or "Threatened with Tax court, disciplinary complaint, etc." load on the competitive factor, whereas "Offered agreement on major assessments" is loading on the cooperate factor (see Table 16 for results).

Based on these factor loadings, we use an oblimin rotation to obtain factor scores. To distinguish between high and low assertiveness as well as high and low cooperativeness, we use median splits for both factor scores. Corresponding to the differentiation of the four auditor negotiation strategies, a competitive strategy means high assertiveness but low cooperativeness. Thus, the indicator variable *ADV.COMP* equals one if the competitive factor score is above the sample median value and the cooperative factor is below sample median value. Cooperative strategies (*ADV.COMP*) are defined vice versa (i.e., high cooperative factor scores and low competitive factors scores). Mixed strategies (*ADV.MIX*) have factors scores above the sample median value for both factors, while neutral strategies' (*ADV.NEUTRAL*) factors scores are below the sample median for both factors.

Similarly, we obtain the auditor's perception of taxpayers' negotiation strategies. Again we identify four different strategies. Table 29 in the Appendix displays the results of the factor analysis regarding taxpayers' negotiation strategy; all items load as expected.

Table 16: Results of Binary Factor Analysis

Type	Statement	*F.ADV.COOP*	*F.ADV.COMP*
Comp	Set deadlines, but did not adhere to them.	-0.082	0.598
Comp	Threatened with Tax court, disciplinary complaint, etc.	-0.241	0.503
Comp	Kept you waiting or disrupted meetings	-0.055	0.726
Comp	Imposed time pressure	0.119	0.599
Comp	Was authoritarian	0.100	0.694
Comp	Information was withheld/filtered	-0.030	0.889
Comp	Information was manipulated/extenuated	-0.006	0.787
Comp	Permanently interrupted you	0.076	0.738
Coop	Offered agreement on minor assessments	0.593	0.115
Coop	Offered agreement on major assessments	0.983	-0.022

Note: Factor loadings on cooperative factor (*F.ADV.COOP)* and competitive factor (*F.ADV.COMP)*.

4 Results

4.1 Tax Auditors' Negotiation Strategies

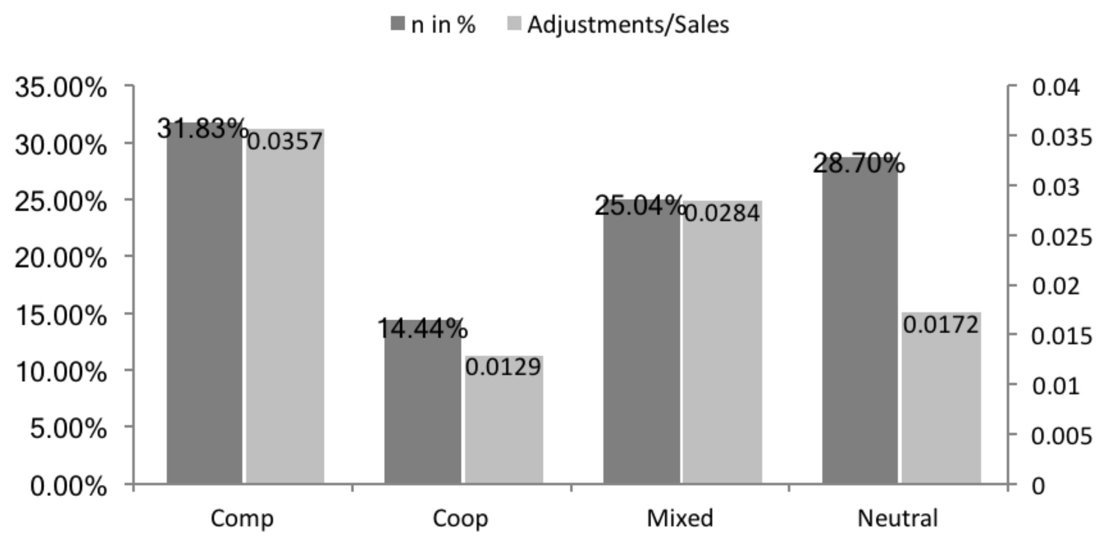
In Table 17, the used auditor negotiation tactics are displayed. The most used tactic is to impose time pressure, e.g., by setting short deadlines. In 40 % of all audit cases, the tax auditor imposed time pressure on the taxpayer. The second most used tactic (20 % of all cases) consists of concession making such that the auditor waved immaterial adjustment in order to agree on one large adjustment. Moreover, in about 12 % of all cases auditors threatened taxpayers with breaking up negotiations and in another 12% auditors waived uncertain adjustments to avoid the risk of litigation. As explained in section III 3.3.2, we use these tactics to measure auditors' negotiations strategies. The distribution of negotiation strategies and realized adjustments are displayed in Figure 4.

We find that in almost one third of all audit cases tax auditors use a competitive negotiation strategy. By contrast, in only 14 % of all cases tax auditors preferred a cooperative strategy. A combination of competitive and cooperative tactics (mixed strategy) is used in 25 % of all cases. In another 29 % of the cases, a neutral strategy which avoids using competitive as well as cooperative tactics is employed. Thus, the most preferred strategy is negotiating in a competitive manner and a pure cooperative concession-making approach to negotiation is seldomly used. This is partly in contrast to the results obtained for financial accounting audits. *Gibbins et al.* (2010) find that competitive strategies and more cooperative problem-solving approaches are equally likely to be used by financial accounting auditors. Moreover, *Bame-Aldred* and *Kida* (2007) and *Bennett et al.* (2015) report that financial accounting auditors would not likely use a tactic of threats, e.g., to qualify the opinion or to terminate the relationship. One potential reason for the observed difference between financial accounting and tax might be that maintaining good relationships with the firm might be more important to financial accounting auditors than to tax auditors. For example, *McCracken et al.* (2008) report that financial accounting auditors are always 'relationship managers' whose task it is to ensure that clients remain happy.

Table 17: Negotiation Tactics

Competitive	Percentage (N)
Imposing time pressure	40.06% (276)
Threat of discontinuing negotiations without agreement	12.48% (86)
Imposing sanctions / Threatening with sanctions	5.95% (41)
Cooperative	
I waived small adjustments in favor of one large adjustment	19.88% (137)
I waived adjustments because the firm's "pain threshold" was reached	4.79% (33)
I waived uncertain adjustments to avoid the risk of litigation	12.48% (86)
I waived adjustments because the other side has convinced me	4.35% (30)

Figure 4: Tax Auditors' Usage of Negotiation Strategies (in Percent) and Median Scaled Adjustments by Strategy



4.2 The Effect of Tax Auditors' Negotiation Strategies on Tax Adjustments

4.2.1 Descriptive Statistics and Bivariate Analysis

Table 18 gives an overview of descriptive sample statistics. The median audit adjustments amount to € 20,061. About 72 % of the audited firms are family firms, 16.7 % of firms have to publish profit and loss accounts such that tax information is observable to the public, and about 7 % have foreign activities. 36 % of firms are corporations and 25 % are members of a group. 11 % of firms are suspected of tax evasion. The median sales amount to € 625.000 and 12.87 % of firms have losses. Thus, the audit sample is dominated by small and median family firms.

Table 18: Descriptive Statistics

	n=575				**Percentiles**	
	Variable	**Mean**	**SD**	**25^{th}**	**50^{th}**	**75^{th}**
	Log(ADJUSTMENTS)	9.9092	2.2940	8.9980	9.9066	11.0061
TAX PLANNING STAGE	*PUBLIC*	0.1670	0.3733	0	0	0
	FAMILY	0.7115	0.4312	0.0000	1.0000	1.0000
	LN(SALES)	13.7665	1.9392	12.6115	13.3455	14.8271
	CORPORATION	0.3617	0.4809	0	0	1
	GROUP	0.2487	0.4326	0	0	0
	FOREIGN	0.0748	0.2633	0	0	0
	LOSS	0.1287	0.3352	0	0	0
	EVASION	0.1057	0.3032	0.0000	0.0000	0.0000
DETECTION STAGE	*TRAINING*	2.6228	1.2246	2.0000	2.6228	3.0000
	SCHOOL	0.7792	0.4053	0.7792	1.0000	1.0000
	SALARY	5.7748	1.4772	5.7748	5.7748	6.0000
	EXPERIENCE	18.370	4.3670	17.500	18.370	22.500
	MOTIVATION	0.5029	0.4763	0.0000	0.5029	1.0000
	ATTITUDE	0.4833	0.4838	0.0000	0.4833	1.0000
	HEAD	0.2570	0.4362	0.0000	0.0000	1.0000
NEGOTIATION STAGE	*COMP*	0.3183	0.4662	0	0	1
	COOP	0.1443	0.3517	0	0	0
	MIX	0.2504	0.4336	0	0	0.5
	NEUTRAL	0.2870	0.4527	0	0	1
	ADV.COMP	0.2661	0.4423	0	0	1
	ADV.COOP	0.2643	0.4414	0	0	1
	ADV.MIX	0.2330	0.4231	0	0	0
	ADV.NEUTRAL	0.2365	0.4253	0	0	0

Note: For variable definitions see Table 28 of Appendix D.

Regarding auditor characteristics, the median auditor has a university degree, takes 2.6228 advanced training courses a year and has 18.37 years of experience at the tax administration. 50 % of auditors are intrinsically motivated, and 48 % of auditors fully agree that taxpayers are trying to minimize their tax burden by all permitted means.

The percentage of negotiation strategies chosen by tax auditors is already discussed in the previous subsection. With respect to the perceived tax advisors' strategies, auditors observe neither competitive nor cooperative advisor tactics (classified as NEUTRAL) in 23 % of all cases, in another 23 % of cases auditors' perception is that advisors mix competitive and cooperative tactics (classified as MIXED). In the remaining cases, auditors perceive the advisor as negotiating either competitively or cooperatively (each 27 %). Thus, the percentage of "pure" strategies (high cooperativeness and high competitiveness / low cooperativeness and low competitiveness) is slightly higher than the percentage of strategies that combine high with low values of competitiveness and cooperativeness.[28]

Table 19: Scaled Adjustments (*ADJUSTMENTS/SALES*) by Negotiation Strategy

Panel A:	**Auditor**		**Advisor**	
Descriptive statistics	N	Median	N	Median
COMP	183	0.0357	153	0.0298
COOP	83	0.0129	152	0.0303
MIX	144	0.0284	134	0.0244
NEUTRAL	165	0.0172	136	0.0156

Panel B:	**Auditor**	**Advisor**
Statistical tests	Wilcoxon	Wilcoxon
COMP vs. NEUTRAL	0.0001	0.0010
COMP vs. COOP	0.0000	0.8192
COMP vs. MIX	0.2892	0.4019
COOP vs. NEUTRAL	0.2833	0.0026
COOP vs. MIX	0.0006	0.6440
MIX vs. NEUTRAL	0.0039	0.0095

The table presents the number of negotiation strategies and means in scaled adjustments (Panel A). Differences in means are tested (non-)parametrically (Panel B). We report the corresponding p-values for the significance test. In an unreported robustness check, we use a t-test as statistical test. The results remain qualitatively unchanged.

Regarding the effect of auditors' negotiation strategies on firms' tax adjustment, a bivariate analysis provides first evidence. Since *ADJUSTMENTS/SALES* are not normally distributed, we use a non-parametric test to test for differences between groups and report median values by strategy. Figure 4 and Table 19 display the results. We find that competitive or mixed

[28] From the median split of the two factors used in defining the perceived advisor strategies (see section III 3.3.3.3), it follows that the percentage of competitive and cooperative (mixed and neutral) must be identical. Thus, we abstain from further interpreting the distribution of perceived advisor strategies.

strategies yield statistically higher scaled adjustments than neutral or cooperative strategies. The effect is economically significant: scaled adjustments are doubled if auditors use competitive tactics only or mix them with cooperative tactics. Table 19 additionally reveals that scaled adjustments are significantly lower if auditors perceive the advisor's strategy as neutral. Thus, whereas competitive auditor tactics increase tax audit adjustments, the same does not apply for advisors.

4.2.2 Detection and Negotiation Controlled Estimation

4.2.2.1 Baseline Estimation

The above bivariate analysis neither controls for firm nor for auditor characteristics which presumably also affect observed tax adjustments. In this section, we address this limitation by using a detection and negotiation-controlled estimation. Table 20 presents the results.

The results demonstrate that considering a separate negotiate stage is economically important. On average only 41.18 % of the detected pre-negotiation audit differences are assessed after tax audit negotiation.[29] Regarding the effect of auditors' competitive negotiation behavior, the finding of the bivariate analysis is confirmed. Auditors that use a competitive strategy instead of a neutral strategy achieve significantly higher audit adjustments. The average marginal effect amounts to 0.1035, i.e., using a competitive instead of a neutral strategy increases the negotiation rate by 10.35 percentage points.[30] In line with bivariate analyses, we find that mixed strategies obtain significantly higher adjustments than neutral strategies. For further insights, we conduct Wald tests between negotiation style regression coefficients. We find that competitive (mixed) strategies significantly dominate cooperative strategies with a Wald test p-value of 0.001 (0.016). Moreover, we find that competitive strategies do not dominate mixed strategies (Wald test p-value: 0.3491).

In line with our expectations, the control variables in stage 1 reveal significant positive effects of firms' size, foreign activities, and membership of a group on firms' tax planning. We do not find a significant difference between family and non-family firms. A potential reason is that we measure overall tax avoidance whereas prior research (Chen et al. 2010) relies on financial accounting proxies that measure non-conforming avoidance activities

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[29] In order to obtain this number, we average over all cases' unconditional expected detection rate $E(N) = P(N=0) \times 0 + P(0 < N^* < 1) \times E(N|0 < N^* < 1) + P(N=1) \times 1$. For details, see *Maddala* (1999: 160).

[30] This average marginal effect is the difference in expected detection rates E(N| COMP=1) - E(N| COMP=0) with all other dummy variables in the negotiation equation being zero.

only (Hanlon/Heitzman 2010). If non-conforming and conforming avoidance are partly substitutive strategies, it could be that there is no overall difference in tax avoidance. For example, if family firms place less emphasis on financial accounting outcomes, they may use more conforming avoidance strategies while at the same time they reduce non-conforming strategies to decrease reputational risks. In contrast to our expectation, loss firms avoid more taxes although they have a lower tax benefit from avoidance. One potential explanation is that the loss variable also measures financial constraints. Prior research finds that increasing financial constraints increase tax aggressiveness (e.g., Edwards et al. 2015; Law/Mills 2015). Moreover, although we expected that firms with an obligation to publish a profit and loss account have higher non-tax costs and thus conduct less conforming tax avoidance, our results indicate that these firms avoid more taxes. Again, this could be due to a substitutive relation between conforming and non-conforming avoidance. Finally, firms that are suspected of tax evasion (corporations) are more (less) tax aggressive.

Table 20: Detection and Negotiation Controlled Estimation - Regression Results

1st stage		2nd stage		3rd stage	
Constant	5.9950*** (0.5225)	*Constant*	0.1507*** (0.0144)	*Constant*	0.2680*** (0.0327)
FAMILY	-0.0069 (0.1206)	*EXPERIENCE*	0.6218*** (0.022)	*AUD.COMP*	0.1091*** (0.0372)
PUBLIC	0.6242*** (0.1716)	*SALARAY*	0.4205*** (0.0237)	*AUD.COOP*	-0.0317 (0.0411)
LOG(SALES)	0.3543*** (0.0393)	*TRAINING*	0.4408*** (0.0275)	*AUD.MIX*	0.0726* (0.04)
LOSS	0.7459*** (0.1496)	*SCHOOL*	0.1229*** (0.0136)	*ADV.COMP*	0.1247*** (0.0389)
FOREIGN	0.8141*** (0.2129)	*ATTITUDE*	0.0812*** (0.0128)	*ADV.COOP*	0.1212*** (0.0361)
GROUP	0.6147*** (0.0808)	*MOTIVATION*	0.0459*** (0.0119)	*ADV.MIX*	0.1402*** (0.0426)
CORPORATION	-0.5916*** (0.1219)	*HEAD*	0.0727*** (0.0125)		
EVASION	0.9722*** (0.1545)				
N *MEAN.LOG*	575 -11.6263	*SIG1*	1.0929*** (0.0444)	*SIG3*	0.1951*** (0.0146)

Note: Dependent variable is log(*ADJUSTMENTS*). For control variable definitions see Table 28 in Appendix D. Variables' standard errors in brackets. *, **, *** Indicate significance at 10, 5, and 1 percent, respectively.

The detection stage takes into account different auditor abilities, motivation, and attitudes which could have an impact on the detection probability. We find that detection probability increases with an auditor's experience, salary and number of training courses. In addition, tax planning is more likely to be detected if a section head participates (*HEAD*), the auditor is intrinsically motivated (*MOTIVATION)* and is convinced that a taxpayer does everything to reduce his or her tax burden (*ATTITUDE*). These results underline the importance of detection controlled estimation (Feinstein 1990) in tax compliance research and highlight potential variables that governments can use to improve tax enforcement.

4.2.2.2 Auditor/Advisor Negotiation Pairs

In the baseline model, we observe a significant positive effect of the auditor's competitive strategy, which means that this strategy yields *on average* a higher return than a neutral strategy. In this section, we examine if an auditor's competitive strategy is always the best choice. To this aim, we define variables in form of auditor/advisor negotiation pairs. Considering the four negotiation strategies for each party leads to 16 possible strategy combinations. Table 21 displays the distribution of the strategy combinations in the sample.

Table 21: Combinations of Tax Auditors and Advisors Negotiation Strategies

	Auditor's Strategy				
	COMP (Reference)	*COOP*	*MIX*	*NEUTRAL*	∑
ADV.COMP	*COMP/COMP* *n=67* *(11.65%)*	*COMP/COOP* *n=21* *(3.65%)*	*COMP/MIX* *n=42* *(7.3%)*	*COMP/NEUTRAL* *n=23* *(4%)*	153
ADV.COOP	*COOP/COMP* *n=40* *(6.96%)*	*COOP/COOP* *n=29* *(5.04%)*	*COOP/MIX* *n=35* *(6.09%)*	*COOP/NEUTRAL* *n=48* *(8.35%)*	152
ADV.MIX	*MIX/COMP* *n= 41* *(7.13%)*	*MIX/COOP* *n=18* *(3.13%)*	*MIX/MIX* *n=5* *(8.87%)*	*MIX/NEUTRAL* *n=2* *(4.17%)*	134
ADV.NEUTRAL	*NEUTRAL/ COMP* *n=35* *(6.09%)*	*NEUTRAL/ COOP* *n=15* *(2.61%)*	*NEUTRAL/ MIX* *n=16* *(2.78%)*	*NEUTRAL/ NEUTRAL* *n=70* *(12.17%)*	136
∑	183	83	144	165	575

We use the competitive auditor strategy (*COMP*) as reference category and examine if a deviation of an auditor's strategy affects the outcome. For example, consider the first case, when an auditor deviates from a competitive strategy given that an advisor employs a competitive strategy (first row in Table 21). In this case, *ADV.COMP/COMP* is our reference category. We include *ADV.COMP/COOP*, *ADV.COMP/MIX,* and *ADV.COMP/NEUTRAL* as dummy variables and measure the effect when an auditor is using a cooperative, a mixed or a neutral strategy compared to a competitive strategy. *ADV.COOP*, *ADV.MIX* and *ADV.NEUTRAL* are included as control variables to set our reference category to *ADV.COMP/COMP*. This allows us to measure the deviation effect when the tax advisor is choosing a competitive negotiation strategy. This procedure is done for the remaining three advisor strategies in the same manner.

Table 22 displays the regression results. In model (1), (2), (3), and (4), we study a deviation from the competitive strategy given that the advisor uses a competitive, cooperative, mixed, and neutral strategy. If the tax advisor negotiates in a competitive manner, model (1) demonstrates that deviating from competitive to cooperative or neutral behavior reduces tax adjustments (because the coefficients of *ADV.COMP/COOP*, and *ADV.COMP/NEUTRAL* are significantly negative). Hence, a competitive auditor strategy is superior with respect to adjustments if the tax advisor negotiates competitively. In addition, model (4) reveals that a deviation from a competitive to a neutral negotiation strategy also reduces adjustments if the tax advisor employs a neutral strategy. For models (2) and (3) we get a different picture. Deviations from a competitive negotiation style do not significantly affect the adjustments, when advisors use cooperative or mixed strategies.[31]

Summing up, if auditors' objective is simply to maximize audit adjustments, it appears that a competitive negotiation approach dominates other strategies. Moreover, a mixed strategy also dominates a cooperative strategy, when the tax advisor deploys a competitive strategy (Wald test p-value: 0.088).

[31] Note that *ADV.NEUTRAL, ADV.COMP, ADV.COOP* and *ADV.MIX* cannot be interpreted in the same manner as in the baseline model, since the reference group is no longer *ADV.NEUTRAL*. The reference group change for model (1) to *ADV.COMP/COMP*, for model (2) to *ADV.COOP/COMP*, for model (3) to *ADV.MIX/COMP* and for model (4) to *ADV.NEUTRAL/COMP* respectively.

Table 22: Regression Results on Auditor's Strategy Deviation

	(1)	*(2)*	*(3)*	*(4)*
ADV.STRAT =	*ADV.COMP*	*ADV.COOP*	*ADV.MIX*	*ADV.NEUTRAL*
ADV.STRAT/COOP	-0.3242***	-0.0690	0.0019	-0.1067
	(0.0797)	(0.0708)	(0.0863)	(0.0755)
ADV.STRAT/MIX	-0.1898**	-0.0124	0.0375	0.1264
	(0.077)	(0.074)	(0.0677)	(0.103)
ADV.STRAT/NEUTRAL	-0.2336***	-0.0565	0.0460	-0.0999*
	(0.083)	(0.0643)	(0.0786)	(0.0534)
ADV.COMP		-0.0088	0.0089	0.0917*
		(0.0549)	(0.0428)	(0.0518)
ADV.COOP	-0.1920***		-0.0184	0.0644
	(0.0599)		(0.0408)	(0.0506)
ADV.MIX	-0.1567**	0.0032		0.1026*
	(0.0655)	(0.0584)		(0.0558)
ADV.NEUTRAL	-0.3145***	-0.1604***	-0.1428***	
	(0.0609)	(0.0524)	(0.0401)	
Constant	0.5989***	0.4541***	0.4379***	0.3539***
	(0.0596)	(0.0662)	(0.051)	(0.0552)
SIG1	1.0902***	1.1068***	1.1065***	1.1039***
	(0.0473)	(0.046)	(0.0464)	(0.0475)
SIG3	0.1877***	0.1955***	0.1965***	0.1946***
	(0.0163)	(0.0226)	(0.0188)	(0.0191)
N	575	575	575	575
MEAN.LOG	-11.6239	-11.6357	-11.6362	-11.6305

Note: For reasons of clarity, we do not report first and second stage results which remain qualitatively unchanged. Dependent variable is log(*ADJUSTMENTS*). For control variable definitions see Table 28 in Appendix D. Variables' standard errors in brackets. *, **, *** Indicate significance at 10, 5, and 1 percent, respectively.

4.2.2.3 Taxpayer/Advisor Team Strategies

So far, we studied the effect of auditors' negotiation strategy without considering the negotiation behavior of the taxpayer because we assumed that it is the tax advisor as the expert who actively negotiates with the auditor. However, prior negotiation research suggests, that negotiation teams may influence negotiation outcomes because unlike solo negotiators, team members can strategically choose to play different roles during the negotiation (e.g., Hilty/Carnevale 1993; Brodt/Tuchinsky 2000).

Table 23 presents the distribution of the different team strategies (as perceived by the auditor).[32] It becomes obvious that strategical differentiation is not the prevalent choice, because in 57 % of the 495 team observations, the team strategy is perceived as homogenous.

[32] Due to missing data regarding taxpayers' negotiation tactics, the sample size decreases to 495 observations.

Moreover, a "good cop/bad cop" strategy where one team member uses a cooperative and the other a competitive strategy is used only in 4.5 % of all team observations.

Table 23: Descriptive Statistics - Negotiation Teams

	ADV.COMP	*ADV.COOP*	*ADV.MIX*	*ADV.NEUTRAL*	∑
TAX.COMP	72 *(COMP.TEAM)*	9	24	27	132
TAX.COOP	13	81 *(COOP.TEAM)*	20	19	133
TAX.MIX	26	19	63 *(MIX.TEAM)*	6	114
TAX.NEUTRAL	18	20	11	67 *(NEUTRAL.TEAM)*	116
∑	129	129	118	119	495

To test whether the competitive auditor strategy remains the dominant choice with respect to achieved adjustments if we consider taxpayer/advisor team strategies, we include variables in the baseline model that control for the combinations of competitive auditor strategy and the four homogenous strategies[33] of the taxpayer/advisor team. Table 24 displays the results. In model (1), the variable *COMP.TEAM/AUD.COMP* measures the effect of the combination of a competitive auditor and a competitive taxpayer/advisor team compared to all other auditor negotiation strategies facing a competitive taxpayer/advisor team. The effect is significantly positive and large. Given that the taxpayer/advisor team is competitive, the usage of a competitive auditor strategy increases the negotiation rate by 32.28 percentage points. From model (3), one also learns that the auditor's competitive strategy increases negotiation rate (and thus audit adjustments) if the taxpayer/advisor team uses a mixed strategy. However, if the taxpayer/advisor team employs a cooperative or neutral strategy (see models (2) and (4)), a competitive auditor strategy does not rise adjustments. Thus, in line with the results obtained in subsection 4.2.2.2, the positive effect of the auditor's competitive negotiation strategy stems from constellations in which the taxpayer/advisor team uses competitive negotiation tactics only. Furthermore, we find a significant positive effect of competitive auditor strategies, when the auditor is facing a team with mixed strategies.

[33] We only investigate homogenous teams, because the sample size of other teams is too small for a proper analysis.

Table 24: Regression Results on Auditor's Strategy Deviation - Negotiation Teams

Variables	(1)	(2)	(3)	(4)
COMP.TEAM/AUD.COMP	0.3308***			
	(0.1117)			
COOP.TEAM/AUD.COMP		0.0801		
		(0.0916)		
MIX.TEAM/AUD.COMP			0.3345***	
			(0.1152)	
NEUTRAL.TEAM/AUD.COMP				0.0612
				(0.0767)
SIG1	1.0863***	1.0944***	1.0644***	1.0926***
	(0.0483)	(0.0506)	(0.0524)	(0.0508)
SIG3	0.1768***	0.2031***	0.1849***	0.2029***
	(0.0229)	(0.0203)	(0.0204)	(0.0178)
N	495	495	495	495
MEAN.LOG	-11.6205	-11.6316	-11.6235	-11.6292

Note: The table displays only the coefficients for the relevant team variables. Dependent variable is log(*ADJUSTMENTS*). For control variable definitions see Table 28 in Appendix D. Variables' standard errors in brackets. *, **, *** Indicate significance at 10, 5, and 1 percent, respectively.

4.2.2.4 Permanent and Temporary Adjustments

To test whether the effect of auditors' negotiation strategy depends on the kind of audit adjustments, we differentiate between temporary and permanent audit adjustment. To this aim, auditors were asked to estimate the share of the audit adjustments that merely result in temporary income shifting. Over all cases, the average percentage of temporary adjustments amounts to only 15.73 % indicating that tax auditors focus on permanent rather than on temporary adjustments. We present baseline regression results for permanent adjustments in Table 25 and for temporary adjustments in Table 26. For permanent adjustments we get similar results as before and cannot observe any qualitative differences to our baseline model. Note that because of incomplete information with respect to the percentage of temporary adjustments, our sample drops to 503 observations.

Table 25: Regression Results - Permanent Adjustments

1st stage		2nd stage		3rd stage	
Constant	6.5732***	*Constant*	0.1704***	*Constant*	0.2652***
	(0.5619)		(0.0134)		(0.0346)
FAMILY	0.0145	*EXPERIENCE*	0.5650***	*AUD.COMP*	0.1050***
	(0.1113)		(0.014)		(0.0379)
PUBLIC	0.6306***	*SALARAY*	0.4306***	*AUD.COOP*	0.0178
	(0.1477)		(0.0137)		(0.0445)
LOG(SALES)	0.2998***	*TRAINING*	0.5226***	*AUD.MIX*	0.0765*
	(0.0411)		(0.0138)		(0.0417)
LOSS	0.8336***	*SCHOOL*	0.0582***	*ADV.COMP*	0.1242***
	(0.1162)		(0.0134)		(0.0429)
FOREIGN	0.8827***	*ATTITUDE*	0.0841***	*ADV.COOP*	0.0819**
	(0.2228)		(0.0134)		(0.0385)
GROUP	0.6223***	*MOTIVATION*	0.0790***	*ADV.MIX*	0.1079**
	(0.1399)		(0.0133)		(0.0433)
CORPORATION	-0.7494***	*HEAD*	0.1941***		
	(0.114)		(0.0134)		
EVASION	1.2075***				
	(0.146)				
N	503	*SIG1*	1.0235***	*SIG3*	0.2124***
MEAN.LOG	-11.3184		(0.0435)		(0.0161)

Note: Dependent variable is log($ADJUSTMENTS_{permanent}$). For control variable definitions see Table 28 in Appendix D. Variables' standard errors in brackets. *, **, *** Indicate significance at 10, 5, and 1 percent, respectively.

For temporary adjustments, however, results differ. In particular, we do not find any significant effect of auditors' negotiation strategy. This suggests that our prior results are especially driven by the permanent proportion of adjustments. Note, however, that adjustments in our sample are mostly of permanent nature with only 207 cases with positive temporary adjustments. Thus, the results regarding temporary adjustments should be interpreted cautiously. Nevertheless, we would like to mention some differences with respect to the effect of firm and auditor characteristics. The impact of first stage variables remains similar, except for *PUBLIC* which is no longer significant. For the second stage, we find mostly insignificant results except for positive effects of *SALARY* and *TRAINING.*

Table 26: Regression Results - Temporary Adjustments

1st stage		2nd stage		3rd stage	
Constant	5.6682***	*Constant*	-1.7361*	*Constant*	-0.0007
	(1.1544)		(0.984)		(0.0013)
FAMILY	-0.2412	*EXPERIENCE*	-0.0466	*AUD.COMP*	-0.0014
	(0.2459)		(0.0442)		(0.0012)
PUBLIC	-0.0388	*SALARAY*	0.4316***	*AUD.COOP*	0.0000
	(0.3009)		(0.1412)		(0.0014)
LOG(SALES)	0.6267***	*TRAINING*	0.4679*	*AUD.MIX*	-0.0004
	(0.0739)		(0.2798)		(0.0012)
LOSS	1.0323***	*SCHOOL*	-0.1883	*ADV.COMP*	0.0025
	(0.3136)		(0.3926)		(0.0016)
FOREIGN	1.1118***	*ATTITUDE*	0.1453	*ADV.COOP*	0.0022
	(0.2896)		(0.3503)		(0.0014)
GROUP	0.6314**	*NOSTOP*	-0.3480	*ADV.MIX*	0.0024
	(0.2635)		(0.3551)		(0.0015)
CORPORATION	-0.3689*	*HEAD*	0.1105		
	(0.2121)		(0.3985)		
EVASION	0.6762*				
	(0.409)				
N	503	*SIG1*	1.1846***	*SIG3*	0.0061***
MEAN.LOG	-5.25803		(0.0865)		(0.002)

Note: Dependent variable is log(*ADJUSTMENTS*$_{temporary}$). For control variable definitions see Table 28 in Appendix D. Variables' standard errors in brackets. *, **, *** Indicate significance at 10, 5, and 1 percent, respectively.

4.3 Determinants of Tax Auditors' Negotiation Strategies

In this section, we address out third research question and examine whether firm and auditor characteristics as well as the perceived strategy of the tax advisor, affect the choice of auditors' negotiation strategy. Moreover, we test whether an endogeneity of auditor negotiation strategies affects our previously presented results. To this aim, we conduct the following multinomial treatment effects regression:

Selection Equation:

$$\begin{aligned} AUD.Strat_i = {} & \alpha_0 + \alpha_1 FAMILY_i + \alpha_2 PUBLIC_i + \alpha_3 log(SALES_i) \\ & + \alpha_4 LOSS_i + \alpha_5 FOREIGN_i + \alpha_6 GROUP_i \\ & + \alpha_7 CORPORATION_i + \alpha_8 EVASION_i \\ & + \alpha_9 EXPERIENCE_i + \alpha_{10} SALARAY_i + \alpha_{11} TRAINING_i \\ & + \alpha_{12} SCHOOL_i + \alpha_{13} ATTITUDE_i + \alpha_{14} MOTIVATION_i \\ & + \alpha_{15} HEAD_i + \alpha_{16} ADV.COMP_i + \alpha_{17} ADV.COOP_i \\ & + \alpha_{18} ADV.MIX_i + \epsilon_i, \end{aligned} \tag{10}$$

where $AUD.Strat_i$ is the tax auditor's strategy choice with *AUD.COMP*, *AUD.COOP*, *AUD.MIX* and *AUD.NEUTRAL* as baseline category respectively. The selection equation is estimated by a mixed multinomial logit model.

Outcome Equation:

$$\begin{aligned} & \ln(\text{Adjustments}_i) \\ & = \beta_0 + \beta_1 AUD.COMP_i + \beta_2 AUD.COOP_i + \beta_3 AUD.MIX_i \\ & + \beta_4 FAMILY_i + \beta_5 PUBLIC_i + \beta_6 \text{og}(SALES_i) + \beta_7 LOSS_i \\ & + \beta_8 FOREIGN + \beta_9 GROUP + \beta_{10} CORPORATION_i \\ & + \beta_{11} EVASION_i + \beta_{12} EXPERIENCE_i + \beta_{13} SALARAY_i \\ & + \beta_{14} TRAINING_i + \beta_{15} SCHOOL_i + \beta_{16} ATTITUDE_i \\ & + \beta_{17} MOTIVATION_i + \beta_{18} HEAD_i + \beta_{19} ADV.COMP_i \\ & + \beta_{20} ADV.COOP_i + \beta_{21} ADV.MIX_i + \mu_i \end{aligned} \tag{11}$$

Table 27 displays the results. We find that tax auditors' strategies are not very much affected by firm characteristics. One exception is that the likelihood of a cooperative strategy increases if the firm is owned by a family or the firm is required to publish tax information. Regarding auditor characteristics, we observe that auditors who perceive taxpayers as subjects who seek to save taxes by all permitted means (*ATTITUDE*), are more likely to use a competitive instead of a neutral negotiation strategy. Moreover, the participation in advanced training courses (high intrinsic motivation) increases (decreases) the probability of a mixed negotiation strategy. However, the most significant determinants of tax auditors' negotiation strategies are the perceived strategies of their opponents. Whenever the advisor is perceived as competitive or at least partly competitive (mixed strategy), this significantly decreases the usage of a neutral auditor strategy. Note that the results are neither clear in favor of reciprocity theory nor in favor of level-of aspiration theory. On the one hand, we observe that a perceived competitive (cooperative, mixed) advisor behavior increases the probability of a competitive (cooperative, mixed) auditor strategy which is in line with the predictions of reciprocity theory. On the other hand, we find that a perceived competitive advisor strategy also increases the probability of a cooperative auditor negotiation strategy which would be predicted by the level-of-aspiration theory.

Finally, the results on the outcome equation presented in Table 27 demonstrate that the endogeneity of auditors' negotiation strategies does not affect our result from the previous sections. Again we find that only a competitive auditor strategy leads on average to higher audit adjustments.

5 Subsample Analyses

We subject our analyses to several robustness tests by conducting the following subsample analyses:

- First, to investigate if the effect of negotiation strategies is affected by the legality of firms' tax planning activities, we exclude observations of firms that are suspected of tax evasion.
- Second, the impact of auditor strategies could differ between cases without and with a final agreement of both parties. Thus, in another subsample analysis, we excluded all cases without final agreement.
- Third, the auditor strategies' influence on audit adjustments could differ between small and large firms because only in large firms each tax year is subject to a field audit. We thus repeat all estimations for two subsamples of firms: (i) firms that the tax administration has assigned to the largest size category and (ii) all other firms.
- Fourth, our final sample includes 575 cases from 399 unique auditors. To test whether our results are affected by auditors with more than a single case, we use a random subsample of 399 unique auditor-cases observations.

In all these subsample analyses, we find no significant changes to the previously reported results. Moreover, in our analyses we excluded all cases without final audit meeting (see Section III 3.1) to ensure that face-to-face negotiations between tax auditors and taxpayers/advisors actually occurred. In an additional test, we repeat our analysis with an extended sample including the cases without final audit meeting. We obtain qualitatively unchanged results.

Table 27: Multinomial Treatment Effects Regression

Variables	Selection equation			Outcome equation
	AUD.COMP	*AUD.COOP*	*AUD.MIX*	*log(Adjustments)*
AUD.COMP				1.2427***
				(0.3219)
AUD.COOP				0.2129
				(0.3345)
AUD.MIX				-0.0614
				(0.4158)
FAMILY	0.4255	1.0107**	0.3669	0.3779*
	(0.3369)	(0.4243)	(0.3613)	(0.2256)
PUBLIC	0.5986	1.2871**	0.3224	-0.0422
	(0.5371)	(0.5922)	(0.5516)	(0.3351)
log(SALES)	-0.0741	0.1114	-0.0974	0.3495***
	(0.1083)	(0.1300)	(0.1135)	(0.0695)
LOSS	-0.4028	-0.8370	-0.8687**	0.2969
	(0.3892)	(0.5284)	(0.4275)	(0.2592)
FOREIGN	0.0930	-0.2336	-0.1460	1.2380***
	(0.5915)	(0.6441)	(0.6015)	(0.3643)
GROUP	-0.8021*	-0.6941	-0.0466	0.7471***
	(0.4301)	(0.4973)	(0.4328)	(0.2704)
CORPORATION	-0.7134**	-0.1494	-0.2862	-0.6499***
	(0.3515)	(0.4071)	(0.3613)	(0.2220)
EVASION	0.5465	-1.0076	0.4467	0.5921**
	(0.4752)	(0.7604)	(0.5018)	(0.2959)
EXPERIENCE	-0.0659*	-0.0312	-0.0369	-0.0276
	(0.0370)	(0.0462)	(0.0387)	(0.0234)
SALARAY	0.1030	0.1553	0.0471	0.1648**
	(0.1138)	(0.1465)	(0.1185)	(0.0738)
TRAINING	0.0778	0.1448	0.3216***	0.1303*
	(0.1201)	(0.1376)	(0.1192)	(0.0728)
SCHOOL	-0.1858	0.2186	-0.4564	-0.5773**
	(0.3583)	(0.4517)	(0.3739)	(0.2306)
ATTITUDE	0.5418**	0.1164	0.1481	-0.0508
	(0.2731)	(0.3313)	(0.2922)	(0.1770)
MOTIVATION	0.2064	-0.2079	-0.5772*	0.3281*
	(0.2877)	(0.3454)	(0.3090)	(0.1881)
HEAD	-0.0448	-0.7037	0.0279	0.6329***
	(0.3329)	(0.4286)	(0.3446)	(0.2101)
ADV.COMP	2.0062***	1.7737***	2.3777***	0.4493*
	(0.3939)	(0.4952)	(0.4505)	(0.2653)
ADV.COOP	0.4233	1.1787***	1.4054***	0.7496***
	(0.3575)	(0.4319)	(0.4143)	(0.2461)
ADV.MIX	1.4567***	1.6137***	2.7278***	0.6584**
	(0.4087)	(0.5028)	(0.4487)	(0.2709)
Constant	0.3459	-4.8245**	-0.5833	3.1703***
	(1.5218)	(1.8627)	(1.6121)	(1.0076)
n	575			
Log likelihood	-1900.0112			

Note: Dependent variables are displayed in the 2nd row. For control variable definitions see Table 28 in Appendix D. Variables' standard errors in brackets. *, **, *** Indicate significance at 10, 5, and 1 percent, respectively.

6 Discussion and Conclusion

Similar to financial accounting, income tax law is often vague and ambiguous in order to cover a wide range of cases. This, however, makes tax law to some extent always a matter of negotiation between taxpayers and revenue agents. In this paper, we focus on this negotiation process and empirically investigate three related research questions based on data raised in a survey among 610 tax auditors.

First, we examine which negotiation strategies tax auditors usually apply. Our results indicate that the majority of tax auditors prefer competitive negotiation tactics, either purely or mixed with cooperative elements, whereas pure cooperative or neutral negotiation strategies are rarely used. Second, we assess if and to what extent the chosen negotiation strategy affects tax adjustments. We are able to demonstrate that the negotiation outcome and thus the resulting tax liability for firms depend significantly on the auditor's choice of a negotiation strategy. In particular, we find that a competitive negotiation strategy dominates other strategies and increases auditors' negotiation rate by ten percentage points. Third, we investigate which factors drive the tax auditors' choice of negotiation strategy. Our analyses reveal that this choice is not very much affected by firm or auditor characteristics, but is rather determined by the opponents' negotiation strategy as perceived by the tax auditor. If the opponent is perceived as (at least partly) competitive, the probability of using a neutral auditor strategy decreases.

The effectiveness of the competitive strategy on adjustments is in line with general negotiation research (Hüffmeier et al. 2014). However, the frequent usage and effectiveness of the competitive strategy contrasts previous results of financial auditing research which shows a preference for cooperative tactics among auditors (Gibbins et al. 2010). This points towards an important difference between tax and financial accounting audits. Due to risk of client loss, financial accounting auditors are always 'relationship managers' (McCracken et al. 2008). One objective of cooperative strategies is to build or maintain a good relationship between the negotiating parties. Thus, it seems reasonable that financial accounting auditors rely more on cooperative negotiations than tax auditors. While on the one hand, this may question the independency of financial accounting auditors, on the other hand, our results pose a challenge for governments that aim at introducing enhanced relationship programs. Enhanced relationship programs are based on the idea that trustful, cooperative relationships between taxpayers and revenue agencies help increase tax compliance (De Simone et al. 2013; OECD 2013). Prior research demonstrates that socioemotional outcomes can have a stronger impact on future relationships among negotiators than economic results (Curhan et al., 2006; Curhan et al., 2010). Thus, our study reveals that an effective implementation of enhanced relationship programs would also require changing the implicit negotiation incentives of tax auditors towards more cooperative negotiation behavior.

Our study provides a first attempt towards an understanding of tax audit negotiations. There remain several open questions for future research. We would like to name some examples: First, one could extent the number of possible auditor negotiation tactics. The study of *Perreault et al.* (2017), for instance, suggests that a simultaneous negotiation strategy may be more effective than a sequential strategy. Second, also the effects of communication style (Perreault/Kida 2011) and emotions (Van Kleef et al. 2004) may affect tax audit negotiations. Third, one could examine the effects of taxpayers' negotiation strategies on audit outcome. Fourth, countries differ in their tax audit environment (Van der Hel 2011). Future cross-country studies that examine the effect of audit environment on tax audit negotiations may thus shed light on the effect of different incentives on tax audit negotiations.

7 Appendix D

Table 28: Variable Definitions

Dependent Variable	
ADJUSTMENTS	Additional tax burden in € divided by tax rate or in case of loss firms change in taxable loss. The tax rate is taking into account income taxes, local trade taxes and solidarity surcharge. We use a uniform tax rate of 35% for partnerships which mirrors tax auditors' practice. For sole proprietorships we use a marginal tax rate with respect to an individual's income class and category, the information is obtained from German income tax statistics.
Control Variables: Tax Planning Stage	
PUBLIC	Equals one if the firm is required to publish a profit and loss account, i.e., tax information.
FAMILY	Equals one for firms that are held by at least 50 % by one family, otherwise zero.
SALES	mid-value of the interval a firm was classified to, in €. The value for the last (open interval) is 48 € M.
Log(SALES)	The natural logarithm of *SALES*.
FOREIGN	Equals one if at least one of the following items applies: 1. the key issues' description of audit entails the term „foreign“ 2. the firm is a member of a foreign group,

	3. At least one tax auditor is specialized in foreign relations. Otherwise zero.
CORPORATION	Equals one for corporations, otherwise zero.
GROUP	Equals one if the company is member of a group, otherwise zero.
LOSS	Equals one if the firm suffers financial losses in the audit period, otherwise zero.
EVASION	Equals one for firms which are suspected of tax evasion, otherwise zero.
Control Variables: Detection Stage	
SALARY	Number of pay bracket.
EXPERIENCE	Auditor years at the revenue agency. Values are set to mid-values of intervals. Last (open) interval is set to 22.5 years.
SCHOOL	Equals one for auditors with a university degree, otherwise zero.
TRAINING	Number of advanced training courses per year.
ATTITUDE	Tax auditors were asked if they agree or disagree to the following question on a five-point scale: “Taxpayers seek to minimize their tax burden by all permitted means.” *ATTITUDE* equals one if the auditor fully agrees (5 out of 5), otherwise zero.
MOTIVATION	Tax auditors were asked if they agree or disagree to the following question on a five-point scale: “Due to the statistical pressure I consider the audit objective to be achieved by reaching the de minimis treshold.” *MOTIVATION* is one for auditors who fully disagree (1 out of 5), otherwise zero.
HEAD	Equals one if a section head of the revenue agency participated in the final audit meeting, otherwise zero.
Control Variables: Negotiation Stage	
F.ADV.COMP	Tax advisors factor score of the competitive component.
F.ADV.COOP	Tax advisors factor score of the cooperative component.
ADV.COMP	Equals one if *F.ADV.COMP* exceeds/equals sample median value and *F.ADV.COOP* is below sample median value, otherwise zero.
ADV.COOP	Equals one if *F.ADV.COMP* is below sample median value and *F.ADV.COOP* exceeds/equals sample median value, otherwise zero.
ADV.MIX	Equals one if *F.ADV.COMP* and *F.ADV.COOP* each exceeds/equals the sample median value, otherwise zero.
ADV.NEUTRAL	Equals one if *F.ADV.COMP* and *F.ADV.COOP* each is below the sample median value, otherwise zero.
S.AUD.COMP	Equals one if the auditor carried out one of the following actions (multiple answers possible): • Imposing short deadlines,

	• Threat of imposing a *fine for delay*, • Threat of coercive measures (coercive fine, substitutive execution, direct enforcement), • Threat of discontinuing negotiations without agreement, • Other actions:___________, otherwise zero.
S.AUD.COOP	Equals one if they found an agreement on the proposed audit adjustments. Possible answers were given as follows (multiple answers possible): • I waived small adjustments in favor of one large adjustment, • I waived adjustments because the firm's "pain threshold" was reached, • I waived uncertain adjustments to avoid the risk of litigation, • I waived adjustments because the other side has convinced me, otherwise zero.
AUD.COMP	Equals one if *S.AUD.COMP* equals one and *S.AUD.COOP* equals zero, otherwise zero.
AUD.COOP	Equals one if *S.AUD.COMP* equals zero and *S.AUD.COOP* equals one, otherwise zero.
AUD.MIX	Equals one if *S.AUD.COMP* equals one and *S.AUD.COOP* equals one, otherwise zero.
AUD.NEUTRAL	Equals one if *S.AUD.COMP* equals zero and *S.AUD.COOP* equals zero, otherwise zero.
Pairwise Analysis	
ADV.COMP/COOP	Is the product of *AUD.COMP* and *ADV.COOP*.
ADV.COMP/MIX	Is the product of *AUD.COMP* and *ADV.MIX*.
ADV.COMP/NEUTRAL	Is the product of *AUD.COMP* and *ADV.NEUTRAL*.
ADV.COOP/COOP	Is the product of *AUD.COOP* and *ADV.COOP*.
ADV.COOP/MIX	Is the product of *AUD.COOP* and *ADV.MIX*.
ADV.COOP/NEUTRAL	Is the product of *AUD.COOP* and *ADV.NEUTRAL*.
ADV.MIX/COOP	Is the product of *AUD.MIX* and *ADV.COOP*.
ADV.MIX/MIX	Is the product of *AUD.MIX* and *ADV.MIX*.
ADV.MIX/NEUTRAL	Is the product of *AUD.MIX* and *ADV.NEUTRAL*.
ADV.NEUTRAL/COOP	Is the product of *AUD.NEUTRAL* and *ADV.COOP*.
ADV.NEUTRAL/MIX	Is the product of *AUD.NEUTRAL* and *ADV.MIX*.
ADV.NEUTRAL/NEUTRAL	Is the product of *AUD.NEUTRAL* and *ADV.NEUTRAL*.
Negotiation Teams	
F.TAX.COMP	Taxpayers factor score of the competitive component.
F.TAX.COOP	Taxpayers factor score of the cooperative component.
TAX.COMP	Equals one if *F.TAX.COMP* exceeds/equals sample median value and *F.TAX.COOP* is below sample median value, otherwise zero.

TAX.COOP	Equals one if *F.TAX.COMP* is below sample median value and *F.TAX.COOP* exceeds/equals sample median value, otherwise zero.
TAX.MIX	Equals one if *F.TAX.COMP* and *F.TAX.COOP* each exceeds/equals the sample median value, otherwise zero.
ADV.NEUTRAL	Equals one if *F.TAX.COMP* and *F.TAX.COOP* each is below the sample median value, otherwise zero.
COMP.TEAM/AUD.COMP	Is the product of *ADV.COMP, TAX.COMP* and *AUD.COMP*.
COOP.TEAM/AUD.COMP	Is the product of *ADV.COOP, TAX.COOP* and *AUD.COMP*.
MIX.TEAM/AUD.COMP	Is the product of *ADV.MIX, TAX.MIX* and *AUD.COMP*.
NEUTRAL.TEAM/AUD.COMP	Is the product of *ADV.NEUTRAL, TAX.NEUTRAL* and *AUD.NEUTRAL*.
Permant and Temporary Adjustments	
$ADJUSTMENTS_{permanent}$	*ADJUSTMENTS* * (1 – percentage of temporary Adjustments)
$ADJUSTMENTS_{temporary}$	*ADJUSTMENTS* * (percentage of temporary Adjustments)

Table 29: Factor Analysis for Taxpayers

Type	Statement	*F.PAY.COOP*	*F.PAY.COMP*
Comp	Did not adhere to deadlines.	0.211	0.699
Comp	Announce consequences (Finance court process, Disciplinary complaint, etc.)	-0.196	0.598
Comp	Kept you waiting or disrupted meetings	0.067	0.698
Comp	Applied time pressure	-0.011	0.446
Comp	Was authoritarian	-0.150	0.683
Comp	Information were withheld/filtered	0.084	0.916
Comp	Information were manipulated/beautified	0.049	0.779
Comp	Permanently interrupted you	-0.327	0.681
Coop	Offered agreement on minor assessments	0.778	0.084
Coop	Offered agreement on major assessments	0.991	-0.029

Note: Factor loadings on cooperative factor (*F.PAY.COOP)* and competitive factor (*F.PAY.COMP)*.

IV Determining Factors of Tax Auditors' Time Consumption

1 Introduction

External tax audits are the most suitable tax authorities' instrument for state interference in order to detect tax noncompliance—in terms of discrepancies, unlawful tax avoidance, tax fraud, or tax evasion (see e.g., Alm 2014)—and, of course, as a prevention measure for better compliance due to direct and indirect effects of the audit (e.g., Alm et al. 2009; Ratto et al. 2013). However, during the conduct of an audit, the taxpayer will be impacted by a great uncertainty[34] relating to additional tax payments (Scotchmer 1989a), penalties, and by the costs (e.g., Franzoni 2008) of the mentoring of the audit itself. Therefore, it is favorable for the taxpayer to know how long the audit will last. On the other hand, the tax authorities require such information too, since they have to employ their human recourses in the best possible way to realize specified goals (Welch 1954; Goode 1981; Biber 2010; Ravikumar/Zhang 2012). This information includes primarily the knowledge about revenue agents' time consumption[35] before, during and after the audit as well as the residence time of audit cases in audit departments. Time consumption is an important factor for proactive staff planning and for reviewing the work performance of fielded revenue agents. Residence time is a factor that greatly influences the calculation of the average last audit fiscal year in a planned calendar year. Therefore it is important for both parties, taxpayers—also referred to as auditees—and tax authorities, to know the duration of tax audits and the effective time consumption (see also Bright et al. 1988: 318). To what extent this conception is biased will be examined in the following monograph based on the results of survey data from German field audits.

The German tax system is mainly based on assessment procedures, whereby the everyday practical implementation of the tax assessment allows merely a cursory examination of tax returns at best. Given this fact tax audits play an important role for enforcement of the tax laws (e.g., Hoopes et al. 2012),[36] as well as in other countries (OECD 2006). More recently, tax audits have been considered as part of a service paradigm (see also Alm et al. 2010), but also as a management tool for state government decision making (see, e.g., in cases of fiscal equalization mechanisms, Bönke et al. 2015, Ulbricht 2008; Stöwhase/Traxler 2005;

[34] Tax uncertainties stem in general from various reasons (e.g., Alm et al. 1992; Scotchmer/Slemrod 1989).
[35] Some researchers use instead the term time-on-task. Both terms are used interchangeably.
[36] In addition tax audits also promote a reduction in cost of capital (Guedhami/Pittman 2008; El Ghoul et al. 2011) and an increase in quality of financial reporting (Hanlon et al. 2014).

Spahn/Föttinger 1997). Above all, field audits generate the possibility of identifying the taxable amount (Scotchmer/Slemrod 1989). At the same time, it should be emphasized that the limitation to essential elements is the most important auditing standard in German tax law.[37] This means on the one hand that an audit has to be reduced to key audit issues,[38] and on the other hand that the duration of an audit should be restricted to levels that are necessary (see also Rhines et al. 2003: 1000). The principle of proportionality dictates these restrictions (Mösbauer 2005: 230). According to German tax law the duration of audits is unpredictable, which has led to the author of this monograph restricting the parameters of the investigation in the following way.

A field audit can be divided into four phases of auditing by abstracting the pre-audit phases of case selection and the post-audit phase for appeal.[39] First, the revenue agent carries out a thorough preparation. The auditing of records and finding of supporting evidence in the field follow, and after that the phase of negotiation. Finally, the agent draws up a report. Note that between these phases varying time intervals may exist, and often the borders between the second to the third phase are fluent. Therefore, the auditee directly experiences only the two middle phases, even though the audit can also be divided into four phases for the auditees, if pre-audit and post-audit phases are taken into account (see Roginske/Collins 1982). The tax authority requests the recording of the actual time consumption, that is the effective time per case measured in working days, whereas the period of time between the first and the final activity of the revenue agent denotes the entire duration of an audit, measured in months or years. From the point of the tax-reviewing authority, the duration begins with the preparation, and for the auditee with the announcement of the procedure. The difference between both perspectives might be negligible, but in cases needing intensive preparation—large and affiliated auditees—the time specifications fall widely apart.

So far audit time duration has been studied from different viewpoints, but not under the aspect of tax audits. With regard to government reporting *Modlin* (2012) examined the effect of an audit timeframe on county government financial reporting problems. *Leventis* and *Caramanis* (2005) investigated determinants of audit time, measured in hours, as a proxy of audit quality. In the same context, several studies are dedicated to the problem of time

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[37] See section 7 of the General Administrative Regulation for Tax Audits from the year 2000 (*Betriebsprüfungsordnung*, BpO 2000).

[38] In German tax law these emphases are not legally binding. The local tax office determines the extent of an audit and the taxpayer cannot raise a claim to find out which particular issues will be examined.

[39] The tax audit phases differ from internal or financial audit phases (e.g., Felix/Kinney 1982; Abdolmohammadi 1999).

pressure and the resulting impact of earnings quality (e.g., McDaniel 1990; Glover 1997; Caramanis/Lennox 2008; Lambert et al. 2016 with further references). *Sinha* used audit hours as a parameter of audit effort, in the first instance computed as tax deficiency per hour of audit (2007) and later as a normalized explanatory variable (2010). Beyond that, insofar as tax audit duration is described (e.g., Lai et al. 2013) the tax audit time consumption has not been studied systematically. *Hauptman et al.* (2014) found in their survey of Slovenian taxpayers that the majority of corporate companies surveyed report that their experienced audit duration is adequate. In Germany there were lively exchanges going on relating to a perceived lengthy duration of tax audits. In order to address this problem the timely tax audit was introduced into German legislation as of 1 July 2011,[40] which was intended to enable audit departments to start an audit earlier and with shorter audit periods in individual cases. But there was no accompanying investigation into further causes, with the exception of the delayed start of an audit as a result of all tax returns of a given audit period needing to be assessed beforehand. The time delay can frequently amount to a period of up to five years between the first audited year and the audit itself. In addition, in this context it should not be overlooked that such lengthy and also invasive auditing could be used as an administrative lever (Franzoni 2008).

I will examine the determinants of audit time in the form of revenue agents' time consumption. In this process the observed time is not a proxy for another parameter, but rather a measurement unit for the transition from one state to another, in other words, the audit time is the transition period from the beginning to the finalization of an audit. Such an approach has its basis in survival analysis. For this I will use the flexible parametric model by *Royston* and *Parmar* (2002) where the auditee 'survives' the field audit. Surviving covers the entire duration of the audit until the submission of the audit report regardless of the respective outcome. Due to surmised non-binding timeframes, my model includes a restricted cubic spline function (Herndon/Harrell 1990, 1995; Royston/Parmar 2002; Lambert/Royston 2009) so that the observed survey data produce an expected bell-shaped transition rate (Allison 2014) in the best possible manner.

For this study I conducted a written survey with the participants of an obligatory advanced training course in Berlin, a federal state in Germany. I collected data relating to three main determinants which are expected to impact audit time, namely: the characteristics of the auditee, the audit itself, and the executing revenue agent. Since the rules for research of real

[40] See section 4a of the BpO 2000.

German tax and agent data are very restricted, my selection is limited to objective explanatory variables. Nevertheless, my study will join in with a series of studies based on real tax audit cases (e.g., Alissa et al. 2014; Alm et al. 1996; Chan et al. 2013; Chan/Mo 2000; Cho et al. 2006; Hite/Hasseldine 2003; Mills 1998). In contrast to prior research, in which firm size is manifested mainly as a control or an explanatory variable, I will examine each size category separately, because the above-mentioned timeframes differ with the size of businesses. Thus it is possible to investigate size-specifically whether and to what extent time consumption is affected by the observed parameters.

My most important findings are the following: first, characteristics of auditees affect revenue agents' time consumption. Results indicate that the time needed increases with increase of task complexity. Therefore time-on-task depends primarily on the type of determination of income, whether a group affiliation exists,[41] and on the group of sectors as well as occasionally on the legal form. In detail, audit and/or report time consumption increases if book-tax conformity decreases and disparities are difficult to control, if the auditee is an affiliate—not with medium firms with routine audit work—or if the auditee is a manufacturing-oriented firm, respectively. Furthermore, audits of medium corporations consume more time than that of other legal forms in the medium size category, unless the corporation is a member of an affiliated group. Moreover, my findings disclose that agents adapt their working methods to the specific condition relating to the legal form of auditees. Therefore, a differentiation according to the degree of complexity by means of the legal form is not possible in principle. Only for audited partnerships in the smallest size category revenue agents anticipate increased complexity. So they decrease their audit effort slightly to compensate for their expected increased consumption of report time, only in the presence of high time pressure such as occurs in the smallest size category. Such an approach harbors the risk of a reduction of the number of focal points for audit and/or an increased likelihood of auditors' avoidance of more complex focal points in the case of micro-sized auditees.

Second, time consumption is influenced by characteristics of the audit itself. So it will be presented that time consumption increases generally if the revenue agents have a suspicion of tax evasion. However, relating to small businesses the increase is limited, because agents are probably more familiar with focal points which tend to support previous suspicion so that they do not need more time-on-task in such cases. Furthermore, time consumption is

[41] No distinction is made between corporate companies and affiliated companies relating to the investigated time consumption.

influenced by the actual place of work during the audit phase. As a general rule, field audits take place at the auditee's office or at home. If agents leave the premises, their time-on-task increases in special cases and decreases in one case only. In principle, a field audit encompasses three concluded fiscal years, but exceptions are possible. Hence, if revenue agents audit fewer years in micro-sized firms, their time consumption decreases. And for large-sized firms, if more years are audited time consumption increases.

In addition, for follow-up audits the time consumption increases only if they are unusual for the firms audited. But, if additional specialized auditors are called in, revenue agents' time consumption is unaffected. Moreover, it may seem surprising that it is not important whether the parties reach a consensus on agents' findings or not. Although, revenue agents' time consumption decreases when agents are open-minded and prepared to compromise during lengthy audits—normally of large businesses—or use the threat of non-agreement in cases of audit delay due to unexperienced auditees—mostly in the case of smaller businesses. Other measures of agents to accelerate the audit are associated with increased time consumption. Whereas, concerning the audit duration itself, it is not surprising that an increasing (decreasing) of duration results in an increasing (decreasing) of time consumption and vice versa. In contrast, an outcome leading to increased field audits affects only the report time, whereas the audit time is mainly unaffected.

Third, special characteristics of revenue agents influence time consumption. The most influential factor is the agents' experience, which is composed of life experience expressed by age and work experience measured in years as an agent and by salary grades as well as the agent's main field of work. My results will reveal different and in part surprising effects on revenue agents' time consumption. As expected, the time-on-task decreases with an increase in experience. But this effect is limited: it reverses if the references basis is transgressed and also occurs only in one of the four studied firm size categories. Rather, it appears that older agents with great experience consume significantly more time than agents of the same age with lesser experience. In addition, in two firm size categories, younger and/or unexperienced agents consume less time than the control group.

Moreover, the results of the interdependent impact of salary grades and the agents' main field of work indicate that more experienced agents save report time for audits with lesser task complexity. But only a few agents are capable of fitting their method of work so that audit time increases in such cases. Finally, concerning gender, my study will disclose that under time pressure female and male auditors use the same information processing strategies so that their time consumption does not differ. However, as soon as time pressure is lessened female auditors spent less time on complex tasks. These findings concur with recent research and prove to be valid according to laboratory results (Breesch/Branson 2009; Chung/Monroe 2001; O'Donnell/Johnson 2001). Besides, a control estimation shows that auditors' subjective perceptions of time pressure do not have any influence on the actual time consumption and duration of an audit. Hence it can be assumed that the selection of the correct applicable information processing strategy is unconscious.

Everything taken into consideration, I will show that the characteristics of a revenue agent along with the characteristics of the audit exert the greatest influence on agents' time consumption, whereas the characteristics of the auditee affect the time only occasionally.

This monograph is organized as follows. Section IV 2 describes the institutional background of my survey. Section IV 3 reviews prior literature to develop my research questions. Section IV 4 outlines my empirical design, and section IV 5 describes the data. Section IV 6 reports the results. Section IV 7 concludes.

2 Institutional Background

In Germany the financial administration competence is split between the Federal Ministry of Finance as the supreme authority of the Federal Revenue Administration and sixteen state tax authorities (Spahn/Föttinger 1997: 239-241; Ulbricht 2008: 197-199; Brown 2012: 160). Thereby, the federal supreme authority shall ensure, amongst other objectives and responsibilities, that taxation in the states is handled as evenly as possible. This also includes the commitment to a broadly similar audit frequency in all states (but see Spahn/Föttinger 1997: 246; Stöwhase/Traxler 2005; Ulbricht 2008: 205-206; Bönke et al. 2015). The federal authority sets out a framework and the state authorities report several indicators (e.g., number of registered firms, number of audit staff, number of finished audits, and accumulated audit results)[42] for purposes of country-wide comparison. In light of this all registered firms are classified by the revenue service into four main classes according to their size. This classification is usually valid for three years. Size is measured using industry-specific annual profit and sales thresholds. The category 'large' is further divided into three subclasses. An overview of the thresholds is given in Appendix H Table 72. In the field audit

[42] Further (unpublished) indicators could be the proportion of audits without result, or only with a small deviation, the averaged last year of the audit period, and the averaged number of finished tax audits per revenue agent and year.

departments of the sixteen state tax authorities there worked a full-time-equivalent of 13,210 revenue agents altogether in 2010. They completed during this year 203,903 tax audits in total.[43] Table 30 shows the distribution by size categories for all 8,571,515 registered firms and completed tax audits.

Table 30: Registered Firms and Completed Tax Audits in Germany by Size Categories (Year 2010)

	Registered	Audits
Micro firms	6,391,015	108,086
Small firms	1,189,727	
Medium firms	799,135	55,315
Large firms	191,638	40,502

The German tax system currently provides that the main relevant taxes (e.g., income tax, business tax, value-added tax) are to be assessed every fiscal year. For this purpose, taxpayers are legally required to declare their taxable amount (Brown 2012: 160-161). In any case the assessment service checks the tax returns to a greater or lesser extent for completeness and conclusiveness, and prepares all formal tax assessment notes. In the event that the tax officer uncovers discrepancies that he or she does not clarify or decide, then the back office can register the case as basically possible for an audit. This non-automated practice for the proposal to conduct an audit is typical for all cases that should not be examined continuously. According to German tax law a field audit shall be conducted in principle without unaudited fiscal years only for large enterprises and affiliated companies. For all other, unaffiliated firms which are classified in the micro, small, or medium size category (so-called small and medium-sized enterprises (SMEs)), the law stipulates merely that an audit includes no more than three consecutive taxable periods, but audits do not have to be consecutive. In addition to the personal notification of a need for an audit, cases can also potentially be selected randomly—including for verification of standard rates—due to information from third parties, other audits, and from a prior audit, respectively, and recently via a risk analysis process. All forms of case selection follow on from the Rationalization Edict from 1995, in which the state tax authorities contracted updated instructions for the process of tax audits. In addition to that, currently the federal and the state tax authorities are developing a risk management system which also improves the audit case selection process;

[43] Not included are special audits of value-added tax, wage tax, investment grant, and tax fraud investigations.

already publicly requested by, among others, *Engels* (2006) and is defined legally in the Act on the Modernization of the Taxation Process of 18 July 2016.

From the cluster of potential audit cases (*P*)[44] the head of the relevant department narrows down the choice, and spreads the selected cases among several revenue agents. This distribution is determined by the urgency, the affiliation of the corporation to a group, the annual target agreement between the tax office and the state tax authority,[45] the personal expectations of agent experiences usually, and by the anticipated expenditure for an audit in particular. In the end the selected agents decide together with their direct superiors which taxpayer is actually examined. Therefore the revenue agent shall carry out an audit preparation in the first instance. As a result of this the revenue agent concludes that the case will need to be examined—whereby the largest firms (L1)[46] are non-auditing only in exceptional cases—and shall define key auditing areas. This focus on a few chosen key topics is a defining feature of the rationalism of tax audit.

The average procedure of a field audit is the following: the revenue agent announces the audit to the auditee in writing. Thereby the taxpayer must be informed of when the audit will start, the revenue agent's name, and the scope of the audit—typically three assessment periods. Usually, field audits take place in the firm's office. If a suitable bureau is not available, the agent can conduct the audit at the auditee's home, or in the agent's office. Only in exceptional cases shall the field audit be conducted in the tax adviser's office. The revenue agent examines the firm's books and records in order to investigate whether tax law has been correctly applied, in favor of the auditee or not. Thereby the audit shall extend only to permanent tax shortfalls or refunds and not to slight profit shifts.[47] On completion of the field audit the revenue agent will offer a final discussion which may be attended by the agent's direct superior, if desired. An audit ends with a written report of all findings regardless of possible legal steps against the results.

There are only loose time constraints for the conduct of field audits. Procedural law requests solely that the field audit begins before the limitation period has elapsed. This period is four years—ten years in the case of tax evasion—and normally begins with the expiry of the year in which the tax return arrived at the tax office responsible, but not later than three years after the relevant fiscal year has ended. The audit delay can amount to up to seven years. If

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[44] See below Figure 6.
[45] Section 21a of the Financial Administration Act (*Finanzverwaltungsgesetz*, FVG)
[46] See Table 72 in Appendix H.
[47] The third sentence of section 7 of the BpO 2000.

the audit begins on time, or, on the auditee's request, later, the limitation period does not end before the amended tax assessment notice becomes final. However, the duration of the audit itself shall be limited to the extent necessary. There are no legal requirement concerning length.[48] Taking into account allowing periods for the announcement of an audit as well as for the final discussion, the field audit (preparation, auditing, and writing a report) will last anything from several weeks and a few years in total (Ränsch 2002: 60). In practice most revenue agents work on different cases at the same time. So the actual working time must be defined for each case separately. It can be expected that an internal time guideline exists for the time consumption per case which is very likely derived from the size categories and the average number of audited cases per year by a full-time-equivalent agent.[49]

Usually, the career of a revenue agents starts in the position of a tax officer after graduating from a federal university of applied sciences (see at a glance Ulbricht 2008: 201-202). After about six to eight years (Senate Report 2013) a few of them are transferred into field audit departments and begin another training on top to qualify as an agent. Presently, this lasts five years in total in Berlin, and takes the form of training on the job. Tax advisers, often the counterparts of revenue agents, have to pass a national exam to perform their job in principle. In order to be admitted to this exam they need either, likewise, a degree from university or a college with a standard period of study more than four years and two years on the job or less than four years at the university and three years on the job or a completed vocational training and practical experience for ten years.[50] According to the law, tax officers and agents are considered as equal to advisers fifteen years after graduating. So, they can switch career paths without the obligation to take an adviser exam,[51] but without differentiation between previous fields of work—comparable with *Dubin* (2012: 54)—and qualifications in terms of tax officers or revenue agents.

3 Literature Review and Hypotheses Development

Everybody will agree that tax audits play a prominent role in tax enforcement. Therefore a lot of studies exist around this topic. The rules of selection for audit cases have been the subject of several studies (e.g., Alm et al. 1993; Murray 1995; Macho-Stadler/Pérez-

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48 If the audit duration is moderate the strain on the auditee is not excessive and the ratio between outcome and effort is more balanced (Mösbauer 2005: 230).

49 *Strangmeier* (2000: 273) refers, e.g., to an instruction from the *Oberfinanzdirektion Hamburg*, an intermediate authority, from 1996 which specifies 21 working days to audit three fiscal years for a large enterprise.

50 The first and second paragraph of section 36 of the Tax Consulting Act (*Steuerberatungsgesetz*, StBerG).

51 The first paragraph no. 4 and the second paragraph of section 38 of the StBerG.

Castrillo 2002; Santoro/Fiorio 2011; Scotchmer 1987). Audit probability has been looked at by *Andreoni et al.* (1998) and many more (e.g., Hoopes et al. 2012; Slemrod et al. 2001; Tan/Yim 2012). The rate of detection of noncompliance was of great interest (e.g., Allingham/Sandmo 1972; Graetz et al. 1986; Erard 1997; Feinstein 1991), as well as direct and indirect effects of auditing on compliance (e.g., Alm et al. 2009; Blaufus et al. 2016b; DeBacker et al. 2015b; Kirchler et al. 2014; Ratto et al. 2013) and on other aspects (e.g., El Ghoul et al. 2011; Guedhami/Pittman 2008; Hanlon et al. 2014). The role of tax advisers on tax compliance has been widely researched (Andreoni et al. 1998; e.g., Beck/Jung 1989; Beck et al. 1996; Erard 1993; Hite/Hasseldine 2003; Klepper et al. 1991; Reinganum/Wilde 1991; Scotchmer 1989a, 1989b) and tax evasion was focused (e.g., Pickhardt/Prinz 2014). The changes in compliance under influence of specific communication were an aspect (eg., Hasseldine et al. 2007; Kleven et al. 2011; Slemrod et al. 2001), and the consequences of audit delay on taxpayers' compliance another (e.g., Andreoni 1992; Muehlbacher et al. 2012). The most expedient administration structure of audit departments and the efficient deployment of auditors has been explored (Welch 1954; Goode 1981; Biber 2010; Ravikumar/Zhang 2012; Wertz 1979),[52] and means of measurement of audit/auditors' performance (e.g., Alissa et al. 2014; Sinha 2007, 2010). In addition to that, the choice of audit areas, e.g., book-tax differences (e.g., Mills 1998; Cho et al. 2006), or transfer pricing (e.g., Chan et al. 2006; Klassen et al. 2017) have been researched.[53]

However, in respect of tax audit time aspects the research findings are slim. Among other researchers, *Sinha* (2007, 2010) and *Alissa et al.* (2014) apply audit time as a measure to estimate audit effort, while *Biber* (2010) describes the development of effective plans for tax audits and also the expected time consumption (in staff days) and the changes in duration depending on the size of the audited firm. An in-depth review of factors influencing time duration and consumption is not enclosed. *Franzoni* (2008) indicates that lengthening audits could be used to generate income from the auditee. Because the willingness to come to an agreement on auditors' findings could rise with increasing duration if the auditing procedure becomes cumbersome, and if additional tax payments will lead to costly interest. The German Tax Code dictates that after the fifteenth month after the fiscal year ended .5 %

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52 It is important to highlight the different opinions about the measurement of detected overassessment and underassessment. *Welch* (1954) prefers an equal treatment of both, whereas *Goode* (1981) proposes to take positive adjustment with greater numerical weight into account than the negative.

53 Also an outright issue is the negotiation between revenue agents and their counterparts due to the as far as possible unavoidable information asymmetry between them, tax law complexity and ambiguity, and their personal attitude, moral as well as ethical. In relation to taxpayers' compliance some of them are examined, but with a view to negotiation in tax audits further research is needed (see above Chapter III).

interest to be raised per commenced month. I believe, since this also works the other way round, the audition becomes cumbersome for the agent and the state has to pay interests on tax refunds, it can be presumed that both parties should have a strong interest in minimizing audit duration (Bright et al. 1988: 318). Insofar as audit duration is discussed in the literature (Lai et al. 2013), research examines the extent to which auditors follow the rules of termination of audits and how long the average duration of observed cases lasts. *Lai et al.* (2013) presume that the significant overrunning of the timeframe—most cases took between 6 and 18 months instead of 3 months—is related to firm size, complexity, type of records, and taxpayers' cooperation, but a more precise examination of exact causes has not been carried out.

The relevant German literature provides merely rough estimations of the duration of tax audits—which can be, depending on the firm's size, anything from several weeks or months and sometimes up to several years (representatively Ränsch 2002: 60)—and nothing about actual time consumption, relating to average time at the place of work in papers for practitioners at best. A hindering circumstance is that tax administrations have refrained from disclosing any such information. This may be due to the fact that the government aims to avoid situations where revenue agents are exposed to additional time pressure, and to keep their counterparts from adapting their tactics and behavior—according to *Mikesell/Birskyte* (2007: 1066), "[b]*ecause the tax authority and the taxpayers interact strategically*". Fixed timelines are not set, because they may be used against the agent. But this is no argument against more transparency: auditees and tax advisers doubtlessly discuss experiences of field audits, this being an indirect effect of tax audits (e.g., Alm et al. 2009). Furthermore, through the Act of 19 December 2008, German legislature has created with the legal requirement for penalties on time lags in order to increase cooperation on the part of taxpayers.[54] So the agent can counteract, if an auditee tries to delay the audit to enforce revenue agent's willingness to reach agreement by the means of an increase in time pressure. However, the auditee's uncertainty might increase beyond the inherent part of an audit as a result of published time specifications if his or her audit lasts longer than expected. Nevertheless, I suppose, following *Alm* and *Torgler* (2011), that cooperative behavior on the side of government and/or revenue agents, such as friendly treatment during the auditing processes itself (Feld/Frey 2007), represents an argument for transparency, because transparency promotes compliance more than an approach of deterrence and of intentionally keeping things vague

54 See section 146 paragraph 2b of the German Tax Code (*Abgabenordnung*, AO).

(see for non-deterrence policies Slemrod 2016: 43-48). This is in line with *Muehlbacher et al.* (2011: 95) assessment that "[i]*ncreasing transparency in governmental decisions and expenditures, for instance, may be a way to increase taxpayers' trust in authorities.*"

The ongoing lively and at times intense exchange of positions in Germany about the duration of tax audits perceived as prolonged is another aspect of the literature. As a consequence of this debate, the legislator introduced a so-called timely tax audit as of 1 July 2011. This should enable to an audit to start earlier and with shorter audit periods in individual cases. But the accompanying investigation into criteria influencing audit duration did not examine further factors other than the delay in beginning an audit, due to the fact that all tax returns of all audit periods must be assessed prior to the audit's start. This rule, which will occasionally be applied, came into effect shortly after my survey and so lies beyond the scope of the current investigation.

Studies about audit time in accounting issues have taken different viewpoints. One area of research is focused on how audit performance is affected by time pressure (e.g., McDaniel 1990; Glover 1997), whereby pressure may rise as a result of time limitation (e.g., Sweeney/Pierce 2004; Lambert et. al. 2016 with further references). *Caramanis* and *Lennox* (2008) have shown that less audit time, measured in hours, is associated with lower earning quality. The earlier investigation from *Leventis* and *Caramanis* (2005), on the other hand, investigated determinants of audit time as a proxy of audit quality. Audit quality is defined by *DeAngelo* (1981) as the probability that an auditor will discover and report an accounting breach, here the probability of detection depends on the auditor's competence, and the probability of reporting on the auditor's independence. The relationship of both probabilities constitutes audit quality (Richard 2006).

For tax audits the situation is quite different because conflicts of interest are not congruent. The tax auditor, as an employee of a tax authority, conducts tax audits without a contractual basis, no audit fees have to be paid, and non-auditing services are forbidden, so that a revenue agent is fundamentally more independent than any other auditor. Even though with regard to an auditor's attitude, impartiality and objectivity (ibid.) ought to be only marginally different, it is in their perception by auditees where the essential mismatch occurs. That means that tax auditors can suggest (possible) audit adjustments (e.g., Wright/Wright 1997; Joe et al. 2011) in order to reach an agreement,[55] for instance, based on the societal rule of

[55] See Chapter III .

reciprocation (e.g., Sanchez et al. 2007; Hatfield et al. 2008). But the consequences differ relating to a loss of auditor's reputation and chance of litigation, because neither bear the same importance in this eventuality. For further consideration of tax audit time, the auditor's competence will be a crucial issue (see also Quick/Wolz 1999: 176), hence the influence of several objective variables pertaining to competence will be examined below.

Another aspect is the ambiguity and complexity of audit adjustments (e.g., Krause 2000). It can be assumed that these issues affect audit time. Extensive rules, legislative changes, instructions, or jurisdiction (e.g., Slemrod 2005) might influence the auditing process. Then again, if timelines are predetermined auditors might not even audit specific issues due to their expected complexity and therefore excessive expenditure of time. In this context *Modlin* (2012) states that a timeframe of completion—here on county government financial reporting—is significant in limiting the number and in determining the type of reporting issues. But to what extent time consumption is affected by focal points which are to be audited and by waived or reported adjustments will not be subject of this study. Indeed, the focal points and findings have been surveyed but their respective necessary expenditure of time has not yet been recorded in the investigated area and hence stays unobserved.[56] In addition, due to legal requirements which prescribe a special auditing of permanent and only substantially shifted adjustments, a diminishing marginal utility of time required to discover further prospective findings can be expected, so that the auditor must weigh the expected additional tax and cost of auditing (Mösbauer 2005: 230) with a potential increase in time consumption and/or duration as a result of the extra effort. In case of doubt, the auditor ought to waive further auditing (Streck 1993: 91). At present in the area investigated, the order in which focal points are audited stay unrecorded, as well as how much time is spent in each case, and what amount of total outcome these constitute in detail. Consequently, it is not possible to predict certain likely effects of these points on revenue agents' time consumption and/or on audit duration. Thus the relationship between audit time and points of examination must be reserved to further research into audit complexity and quality.

It can be expected that the influence of multiple variables affects the time consumption as well as the duration of each field audit in varying intensity in the absence of an absolute time limitation as in German tax law. Hence, it is advisable to study the driving factors of revenue agents' time consumption and of audit duration. Assessing variables that affect time

[56] The conducted aggregation of all focal points and findings (Appendix F Table 61) may not remove this shortcoming.

consumption is the subject of this paper, while research on variables in relation to time duration will be left to future research.

Figure 5: Influencing Parameter Groups of the Audit Time Relationship Graph

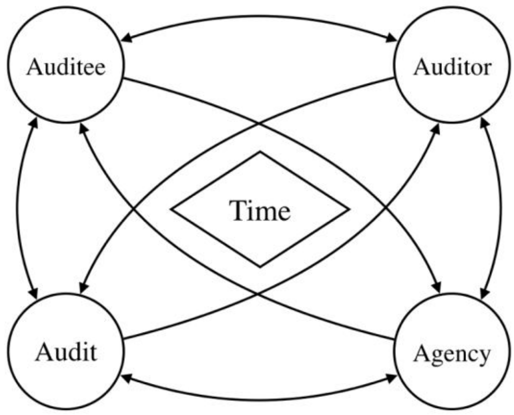

Figure 5 charts the relationship between four different interacting groups. The auditee group represents the characteristics of audited taxpayers, the auditor group the characteristics of revenue agents,[57] the agency group represents state tax authorities,[58] and the audit group shows characteristics of the audit process. Each group contains many parameters which may interact with each other within or with parameters of other groups. All influence the audit time according to revenue agents' time consumption and audit duration.[59] A good means to plot a network of relationships is an analogous sociogram following the concept of *Moreno* (1953), under the condition that the characteristics of an audit are detached from a specific responsible person. Nevertheless, task characteristics are elements of task complexity (Bonner 1994) and hence have a relationship with expected and separable influences on audit time. For the following consideration I will abstract from an investigation of effects of agency interactions because all participants in my study were subject to the same state tax authority, so I will assume that the same guidelines and performance evaluations apply to all auditors and audit cases. Thus, described below will be the characteristics of auditee (Section IV 3.1), audit (Section IV 3.2), and auditor (Section IV 3.3).

Firm size is a primary feature of the auditee, determined by economic indicators such as assets (e.g., Anderson/Zéghal 1994), turnover (e.g., Quick/Wolz 1999), profit, and/or staff

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57 In the following, the terms revenue agent and auditor are used as synonyms. In particular, a functional distinction is not preexisting in the German staff definition of income tax audit, in contrast to other countries (e.g., Dubin 2012: 15).

58 Where necessary, it is also possible to refer to the smallest common administrative unit (mostly the local tax office).

59 According to *Feinstein* (1990) my analysis includes possible variations from different views of firms' characteristics and agents.

indicators, such as number of employees. It is an established fact that size has a decisive influence on the probability of audit to be held, the intensity of audit (Hanlon et al. 2005), and so also on the expected time consumption as well as the expected duration (Anderson/Zéghal 1994; Caramanis/Lennox 2008). Beneficially the German Federal Ministry of Finance divides all firms regular into four categories of firm size for the purpose of auditing.[60] This classification provides the general number of fiscal years under review and the audit probability (for the latter see e.g., Hanlon et al. 2014). Furthermore, it would be more likely to be decisive for the (assumed) recommended time consumption and the auditor choice.[61] For this reason, it is expedient to conduct separate investigations for each firm size category. Another supporting fact is that according to the political assumption larger businesses need to be audited more closely than smaller firms because noncompliance increases with size (Hanlon et al. 2005) or, in the words of *Zimmermann* (1983), "*large firms choose income reducing accounting procedures* [sector-specific] *more frequently than small firms*", and a greater leverage effect of errors detected on the tax due can also be assumed.[62] Hence, the audit probability increases gradually with raising assignment; however, the probabilities correspond to each other within the size categories. Restrictively, in respect of absent records on the respective audit selection rule (e.g., Alm et al. 1993) it is unfeasible to examine their actual impact on revenue agents' time consumption.

The following development of hypotheses will principally apply to all categories of auditee size. Only in cases where size-specific differences can be expected the hypothesizing will be more nuanced.

3.1 Characteristics of the Auditee

The first group of characteristics are the auditee-specific parameters, also called client-specific in financial audit research (Quick/Wolz 1999). Overall, this group involves all objectively measurable indicators and also the subjective behavior and all attitude features of a taxpayer. For this investigation the most relevant objective parameters have been chosen: legal form of the auditee, determination of income, sector groups, and affiliation to a group. Those parameters are representatives of firm complexity and, due to statutory requirements, in part require one another. However, as already stated, firm size variables

[60] The criteria are constituted in Appendix H Table 72. *Hanlon et al.* (2005) use seven categories in their study.

[61] Further features for a distinction of audit criteria may be degree of diversification, complexity of corporate structure (Anderson/Zéghal 1994), position in an affiliates group, and market position or sector.

[62] This is also evident from increasing de minimis limits over the size categories.

cannot be included here. Within the bounds of each size category it is expected that the chosen characteristics—subsequently described in detail—affect the time consumption. It can be expected that, with an increase in the auditee's complexity, the revenue agent's time consumption also increases (Anderson/Zéghal 1994).

So the first hypothesis, stated in alternative form, is:

> ***H1**: The characteristics of the auditee influence the revenue agent's time consumption.*

3.1.1 Legal Form

Taxpayers can choose different legal forms for their businesses. Those legal forms can be classified in three main groups: individual entrepreneurs, partnerships, and corporations (Sinha 2010). The particular choice is usually determined by several influencing factors as where suitable individually or jointly with others, by differences in taxation and liability (e.g., Blaufus/Mantei 2014), by separation of management and control, risk attitude, financing, available assets and so on.[63] In general—and abstracted from research made into noncompliance which is split up according to legal forms (e.g., Tedds 2006)—the legal form defines the regulatory framework of the audited business. Thus, constant influence on the revenue agent's time consumption is not to be expected, rather, that auditors adapt their working methods to specific conditions.

Following the findings of *Cole* and *Sokolyk* (2015), it is furthermore conceivable that auditees chose their legal form depending on the complexity of their business. The researchers found that firms choose a more complex legal form of organization if the firm is more complex. The consequence would be an increase in revenue agents' time consumption the more complex the legal form.

I assume that an impact of time results only for the auditing of more complex legal forms, where the degree of complexity is so high that a normal adaption of working methods is not sufficient to counteract the expected negative time effects. This is particularly important in the medium firm size category as this category is the highest class of SMEs and thus below the threshold of large business. So I conjecture a concentration of more complex businesses in the specific legal form of the corporation and a variety of less complex businesses in all

[63] *Herzig* (2008) gives a short overview of ownership and control in Germany compared to the United Kingdom as well as the United States. *Harhoff et al.* (1998) describe the reasons for growth of the non-public corporate legal form in Germany.

other legal forms in the medium size category. In addition, with regard to the specific German tax law that requires, in the case of partnerships, a split of tax bases over a lot of (usually heterogeneous) members, it can be expected that report writing is more time-consuming than in the case of other legal forms. During audit preparation the auditor will take precautions, contributing toward adapting the pure audit time consumption so that the total time consumption does not exceed the recommended timeline. This is more likely under time pressure.

So the first hypothesis is extended by:

> *H1-1: The legal form does not influence revenue agents' time consumption in total; however, a complex legal form provokes a task complexity which the agents cannot compensate by adapting their working methods.*

Moreover, since the choice of a specific legal form also defines other characteristics of an auditee, I will control this, not least because legal forms are also a means to take advantage of loopholes and other gaps in the law (Slemrod 2004: 9) so that they may indirectly influence auditors' time consumption.

3.1.2 Determination of Income

First and foremost, the law dictates that the type of determination of income is stipulated in the investigation area. With no exception, corporations must prepare balance sheets,[64] partnerships and individual entrepreneurs only if the auditee engages in commercial business, or is legally required by the tax law, or prepares balance sheets on a voluntary basis. In all other cases auditees determine their taxable profit by means of accounting of income and expenditure. In addition, in accounting there are three types of profit determination: the tax balance sheet in accordance with or separately from the trade balance sheet; or a trade balance sheet with an annual offsetting and reconciliation to the taxable income. Given this complexity, it is obvious that occurrence and treatment of possible book-tax differences (Atwood et al. 2010; Cho et al. 2006) influence revenue agents' time consumption. If book-tax conformity increasingly diminishes, I assume that the level of complexity increases. This is supported by the fact that according to *Mills* (1996, 1998) audit adjustments increase as the extent of book-tax differences increase. Thus it can expected that the time required to identify these also will increase. Furthermore, if the disclosure of

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64 Current simplifications from this obligation were introduced only after the investigation period.

differences within the auditee's documents becomes more complicated, an audit of them will be even more time-consuming. In accordance with previous research on book-tax conformity and managers' behavior (see e.g., Tang 2014) these effects arise even stronger in those members of the group classified as corporations, because it is this legal form favors this effect with its structural.[65] In the case of small businesses, the relation between simplified methods of tax accounting and the choice of legal forms has been studied (Bergner/Heckemeyer 2017). Hence this analysis will control for possible interaction effects between the various legal forms and the types of determination of income. So the first hypothesis is further extended by:

> *H1-2: The type of determination of income influences revenue agents' time consumption. If book-tax conformity decreases, the time consumption increases.*

3.1.3 Group of Sectors

As already stated, *Zimmermann* (1983) states that larger firms reduce their income with the help of accounting procedures more frequently than smaller firms, but such conduct depends on the current sector of auditee. *Hanlon et al.* (2005) have shown that medium-sized businesses have the lowest rate of noncompliance following a U-shaped trajectory, whereby noncompliance, in turn, is related to auditees' sector, among other factors, because some "*industries have a higher proposed deficiency rate and a lower proportion of deficiency agreed to upon exam relative to the other groups.*" Since it can be assumed that each sector affects revenue agents' time consumption in various ways and that, moreover, no sector exclusively polls noncompliant behavior, it follows that different sectors need to be included.

In the present study it is helpful to cluster the observed sectors with regard to the findings of researchers cited above and to the specific similarities under the aspect of the audit process itself. Accordingly, the groups are to be split up in: manufacturing/production, trading (wholesale and retail), utilities, and service. The latter includes all service companies and will be the basis for the comparison. Furthermore, the group of utilities is separated as it is subject to state control to a greater or lesser extent.[66]

Chan and *Mo* (2000), e.g., have distinguished in their study between manufacturing-oriented and service-oriented firms. They assume that detecting inconsistencies in production cost only on the basis of a firm's documents and ledgers will create obstacles. Analytical

[65] For an overview about ownership and control in Germany, see, e.g., *Herzig* (2008).
[66] In accordance with *Lennox et al.* (2013), utilities have only a low frequency of occurrences of fraud.

procedures are required to test reasonablety. Hence it can be expected that auditing will take more time in the manufacturing-oriented than in the service-oriented firms. A corresponding difference between the trading-oriented and the service-oriented sector cannot be expected. The provision of services and goods resemble each other strongly. So the first hypothesis is further extended by:

> *H1-3: The group of sectors influences revenue agents' time consumption. If the auditee conducts a manufacturing-oriented business, time consumption increases compared to the other groups of sectors.*

It has to be emphasized here that due to the above-named interdependent relationship between sector and noncompliance, it is conceivable that, if the auditor suspects tax evasion, his or her assumption is influenced by the specific sector of the auditee. Consequently, possible interaction effects should be taken into consideration.

3.1.4 Corporate Company

If the auditee belongs to an affiliated group, it can be expected that the degree of complexity (Carney et al. 2011) and hence the audit time required increases (Anderson/Zéghal 1994). There are many reasons for this: the build of grown or consolidated structures within a group, a wider range of tax planning opportunities (see e.g., Beuselinck/Deloof 2014),[67] revenue agents' difficulties in dissolving the information asymmetry relating to define the relevant facts—the probability of detection of noncompliance depends on the interdependent agents' competence (Feinstein 1991) and task complexity—and the potentially highly time-consuming coordination process between what might be a number of agents from different state and/or tax audit departments. However, it can be assumed that only a few executive agents have to bear the majority of the additional work within a coordinated tax audit. The other benefit from the audit guidelines of these executive agents.[68] These guidelines can state, e.g., limitation of topics to be audited, unification of exchange of information and legal assessments, or even offer support in person. Furthermore, agents often perform repetitive tasks when they audit a number of comparable affiliates from the same corporate company. Consequently, routine audits of smaller dependent firms typically take less time than individual audits, with one exception: the amount of report work increases if dependent

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[67] This includes above all income shifting between countries (e.g., Klassen et al. 2017) or states (e.g., Gupta/Mills 2002).

[68] According to German law guidelines in principal have to be provided, see sections 14, 16, 17 of the BpO 2000.

auditors need to communicate additional data to the executive agent. So the first hypothesis is further extended by:

> *H1-4: The time consumption increases if the auditee is an affiliated company. But, if the agent can conduct a routine audit of a smaller dependent firm, in contrast, audit (report) time consumption decreases (increases).*

3.2 Characteristics of the Audit

The group encompassing characteristics of any particular audit result from different combinations of several independent variables. Some variables may be influenced by characteristics groups of auditee or auditor, others are subject to the presence of obvious control parameters. In detail, the time effects of 1) auditor's suspicion of tax evasion, 2) place of work during the field audit, 3) the number of fiscal years audited, specialist auditors consulted and follow-up audits, 4) consensus about auditor's findings and final discussion conducted between conflicting parties, 5) measures to accelerate the audit and audit duration itself as well as 6) outcome are of particular interest. It is to be expected that most of them have varying degrees of influence on revenue agents' time consumption. So the second hypothesis, stated in alternative form, is:

> ***H2**: The characteristics of an audit influence the revenue agent's time consumption.*

The ways in which these characteristics can manifest themselves will be described below. However, first it is necessary to point out that an essential topic in this group of characteristics must remain unconsidered. Indeed, revenue agents' focal points and findings are known, but the individual period of time they need stays unobserved. The focal points of the audit and the agent's findings cannot be used as a distinct group with different properties, e.g., relating to tax complexity and ambiguity (see e.g., Krause 2000; Slemrod 2005), but has to be left to further research.

3.2.1 Suspected Tax Evasion

The analysis of tax evasion encompasses a variety of research in economics, based on the seminal contributions of *Allingham* and *Sandmo* (1972)—by applying *Becker*'s (1968) neoclassical model on criminal activity to tax evasion—as well as *Srinivasan* (1973) and *Yitzhaki* (1974), psychology and sociology (Pickhardt/Prinz 2014 with further references). A large body of research results has subsequently emerged from interdisciplinary and multidisciplinary studies (see for an overview e.g., ibid.; Alm 2012; Andreoni et al. 1998;

Slemrod/Yitzhaki 2002; Slemrod 2016). In connection to the present study, it should be stressed that according to *Feinstein* (1990, 1991) the detection of tax evasion is imperfect and varies from case to case. The probability of detection as well as the extent of determination of tax evasion depends particularly on revenue agents' individual properties. These include characteristics of competence—which will be reviewed below—as well as revenue agents' attitude and conscientiousness, which might be affected by the time consumption, if a suspicion increases the revenue agent's time-on-task.

According to German tax law a distinction must be made between field/tax audits and tax investigation audits. Revenue agents conduct field audits, examine both, in favor and to the detriment of auditees, but with the presumption of innocence. However, as soon as the agent has a suspicion of tax evasion, he or she has to interrupt the audit to inform the tax investigation department and, if appropriate, to initiate criminal proceedings. After that, tax proceedings and/or criminal proceedings take place simultaneously. As a result, efforts on the coordination have to be undertaken and determining the facts will become more difficult as suspects have the right not to testify, though they are obliged to cooperate in tax proceedings is still valid, hence the relationship between auditor and auditee is disrupted. The result is an increase in revenue agents' effort and hence his or her time consumption and therefore in audit duration.

If the suspicion of tax evasion emerges at the end of a field audit, the revenue agent may finish the audit and must send the audit report to the tax investigation department for further (criminal) investigation. The result is that the revenue agent has to present a more thorough explanation of all salient facts so that the follow-up process has a greater chance of success (see Slemrod/Yitzhaki 2002: 1448). Thus time consumption increases again, but not the audit duration.[69]

The findings of *Chan* and *Mo* (2000) and *Hanlon et al.* (2005) show that noncompliance is also dependent on an auditee's industry sector. Therefore it is necessary to control for possible interaction effects between suspected evasion and sector groups.

So the second hypothesis is further extended by:

[69] The result of a control estimation shows that a suspicion does not affect audit duration in this study (see Appendix F Table 63). In line with this it can be expected that suspicion arises in most cases at the end of an audit.

H2-1: If the revenue agent has a suspicion of tax evasion, his or her time consumption increases.

Whether this assumption holds true regardless of a firm's size, has to be seen. *Hanlon et al.* (2005) find that generally noncompliance increases with firm size. The combination with other information suggests that: "*the noncompliance rate for corporations relative to their size is 'U-shaped', with medium-sized businesses among the set of large companies having the lowest rate of noncompliance*" (Slemrod 2007). Whereas *Rice* (1992) makes clear in his study of much smaller firms that firm size is indeed positively associated with the absolute level of noncompliance, but he did not deduce a similar correlation between tax compliance and firm size. Given that tax evasion is not synonymous with tax noncompliance, it is to be expected that the association between firm size and suspected tax evasion differs from the relationship with noncompliance which is the more comprehensive issue. This is supported by the facts that a) the type of findings which justify the suspicion vary across the different size categories, because incentives and opportunities are different,[70] and b) due to a higher frequency of focal points, which are often found with suspected tax evasion, agents might be more familiar with processing such cases in special size categories. For example, *Slemrod* (2016) points out in his description of tax authorities' investigations that "[s]*mall and medium-sized enterprises account for over half of the overall tax gap.*" If one accepts the assumption that with larger firms using income reducing accounting procedures, detected errors have a greater leverage effect on the tax due (see above), this can only imply that the number of evasion cases increases in general with reduction in firm size.[71] Revenue agents who mostly conduct audits of SMEs thus would be more familiar with processing individual evasion findings here, so that their time consumption could be less affected by suspected evasion than elsewhere.

To complement this, intrinsic factors (attitude and conscientiousness) will gain greater significance in handling of suspicions if the revenue agent's time-on-task increases. And the

70 In detail, influencing factors are inter alia the behavior of individuals and corporations, the latter within a principal-agent framework, profit performance, competitive pressure, owner structure, lack of control, and so on.

71 The German Federal Government publishes only heavily summarized statistical key figures with regard to tax evasion detected. There is no breakdown according to size categories, legal forms, findings, determination time, or effort.

agent may fail to examine suspicious incidents with the necessary intensity as time pressure builds up.[72]

Further research should investigate this.

3.2.2 Place of Work

German law prescribes that a field audit has to take place in a business or residence office. Just if the auditee has no suitable premises for the revenue agent during the field audit, usually the audit is held at the local tax office;[73] but a visit to the company's premises cannot be refused. The nature of the field audit is not changed in this respect. This can be contrasted with taxation systems of other countries, which know discrepancies between audits in the field and in the tax office—e.g., relating to the complexity of an audit or the income and expense levels (e.g., Dubin 2012: 50); or countries where more detailed auditing normally takes place in the tax office (e.g., Ho/Lau 1999: 65; Chan et al. 2013: 39). Furthermore in Germany, in exceptional cases the auditee can apply for the agent to conduct the audit elsewhere,[74] and in this case the tax adviser's office is generally used as the investigative base.

As a general principle, the place of work should not influence the revenue agent's time consumption. If the audit takes place on the company's premises or in tax adviser's office, the revenue agent will expect that requests can be made directly in situ and queries get a prompt reply. However, given the general advice to control the flow of information (e.g., Rhines et al. 2003: 1007), the time advantages against an audit in the tax office is not reliable. At the auditee's premises unoccupied time goes wasted, whereas in the tax office the agent can use the spare time for other work, so that the time consumption for this audit is not burdened. Another related issue is that auditees are to minimize (uncontrolled) potential contact between the revenue agent and the firm's employees upon the recommendation of tax advisers (ibid.; Ränsch 2002: 56; Roginske/Collins 1982: 145). There are tax advisers who want the audit to take place in his or her office using their expertise as a reason, or in order to be able to generate additional cost for his or her support. The auditee will be more likely to agree to pay the cost involved if he or she is in doubt about their own tax position, maybe because he or she feels overtaxed due to tax complexity and ambiguity or because he

[72] Also, it should be taken into consideration that it cannot be ruled out that agents may use a possible criminal proceeding in an improper way as a lever in the framework of negotiation.
[73] The second paragraph of section 200 of the AO.
[74] The third sentence of section 6 of the BpO 2000.

or she is simply inexperienced. So he or she thinks that the audit cost and tax liability would be even higher otherwise. The auditee also might have used aggressive tax planning and hence believe that the detection or adjustment risk is smaller in a tax adviser's office than if the investigation takes place elsewhere. For these reasons the auditee or his or her adviser will attempt to impact the decision about the place of work, in the best interest of the auditee (see also Jones 2013). Whether and to what extent revenue agents' time consumption will be affected by this is unobserved until now.

From another perspective, the revenue agent will not become an excessive burden for the auditee if he or she conducts the audit in the tax office. Moreover, the revenue agent has a better chance to conduct a comprehensive audit, especially, if the number of documents and business transactions is relatively small and all of them have to be transported to the tax office. Apart from this, an agent can also switch between different places in order to prevent work delays.[75] Both, in-depth audits and work delays increase revenue agents' time consumption. In practice some auditors and their superiors suppose that audits in the tax office last longer than in other places of work. It might well be they mean the residence time of a case in the department and not to the time consumption itself.[76] However, it can be assumed that the revenue agent's time consumption for audits in a tax office increases if the duration increases due to long interruptions or a lot of breaks. After every interruption agents have to get reacquainted with the case. In contrast, audits of smaller cases outside the local tax office usually are conducted in one go. So the second hypothesis is further extended by:

> *H2-2: Revenue agents' time consumption is affected by the place of work. If agents conduct audits of small (large) firms in the tax office, audit time consumption increases (decreases). In the case of alternating places, audit time consumption regularly increases.*

3.2.3 Fiscal Year, Follow-up Audits, Additional Specialized Agent

As stated above, the usual scrutiny period comprises three concluded fiscal years. Auditing SMEs, fewer years are also permissible and for large businesses, which are subject to audit follow-up anyway, even more years can be audited. If the agent conducts audits with more (fewer) than three years, it can be expected that the time consumption increases (decreases).

[75] Agents may use multiple offices in order to minimize audit duration (see so Appendix F Table 63).

[76] However, this assumption cannot be proven. The results of a control estimation do not show any significant effect of audits conducted in local tax offices on audit duration (Appendix F Table 63).

The time effects stem from work steps which arise for every individual year audited and not in general.

In the context of follow-up audits research results relating to the auditees' behavior after field audits (see e.g., Snow/Warren 2007) has to be reviewed. So *Andreoni et al.* (1998) have come to the conclusion that audits may cause different effects on auditees' behavior after an audit. If audits fail to detect an existing noncompliance, auditees could assume that unlawful demeanor pays off. Otherwise, if their experiences are negative, auditees may evade taxes to gain 'repayments'. The authors refer to *Erard* (1992) who found only a weaker effect of auditees' experience on their future behavior. A more recent study from *DeBacker et al.* (2015b) shows that auditees changed their behavior after an audit. Their strategic responses give rise to a negative and U-shaped impact on subsequent tax payments. In other words, auditees show higher tax aggressiveness for a few years after audit and this behavior reduces gradually until they fear to be audited again. Firms which have to pay a penalty react more aggressively after audits than firms which go without punishment. On the other hand, *Sinha* (2010) finds that the potential outcome from previously unaudited firms amounts to approximately 70 % of the potential outcome from auditees with prior audits. *Kleven et al.* (2011) also find that prior audits have significant effects on self-reported income.

In the case of follow-up audits revenue agents conduct audits which, in general, connect to the period of the prior audit. So that unaudited fiscal years do not occur between the prior and the following audit. Furthermore, most of the audits take place after a long time delay so that a change in the auditee's behavior is shown in the audit after next at the earliest, unless the auditee has corrected his or her already reported income on his or her own initiative.[77] But on the other hand, revenue agents examine during the follow-up audit whether the findings of prior audits are continued or have changed. Thus, a decrease in time consumption cannot be assumed. Moreover, from the point of view of the agent additional time-on-task has to be spent, but this is the rule for audits of large businesses and is priced in, and the revenue agent's time consumption is unaffected in the large size category. This is no contradiction to the assumption relating to the large auditee's attitude. Auditees with a permanently high audit probability continuously adapt their tax planning strategy with more or less clear tax positions,[78] hoping that revenue agents do not take up and/or query all of

77 It is also conceivable that auditees do not adapt their positions as long as a definite (court) decision has not yet been taken.

78 Such activities may take place without committing tax evasion at once (see e.g., Alm 2014). This is in line with research findings that larger firms are more noncompliant (Hanlon et al. 2005; Zimmermann 1983), but the tax evasion rate decreases due to an increase in audit probability (DeBacker et al. 2015b) or in the

them.[79] Overall, it can be assumed that time consumption is affected in the case of smaller firms.

Consultation of an additional specialized auditor is another interesting issue. In this case, the specialized person takes over individual focal points from the proper revenue agent and supports him or her up to the final decision. *Modlin* (2012: 572), e.g., points out "*that more people assigned to the audit process decreases the number of specific problem findings*". However, in this special case the situation is different. It is not a team audit from the beginning. The additional auditor does not provide support until a specific request is made and the auditor already perceived problems. Therefore, the initial revenue agent does not audit unfamiliar and highly complex issues, enabling him or her to use their time-on-task for other purposes.[80] Hence it can be expected that revenue agents' time consumption stays unaffected. So the second hypothesis is further extended by:

> *H2-3: Revenue agents' time consumption increases (decreases) if they audit more (less) than three fiscal years. Furthermore, the time consumption increases for follow-up audits if auditees are not usually subject to this. An additional involvement of specialized agents does not affect time consumption.*

3.2.4 Final Discussion and Consensus

Practitioners point out that in their experience the auditor's willingness to compromise generally grows with an increase in duration of the negotiation. To validate this thesis findings from the psychology literature are appropriate. *Pruitt* and *Drews* (1969) emphasize, e.g., that time pressure affects the minimum of goals, the level of demand (see also De Dreu 2003), and the extent of bluffing. In addition, time elapsed has an effect on the last two issues, which seems at first to provide support for this thesis. However, why not all auditees are affected in the same manner is not obvious. The principal aim of a tax audit is to reach a consensus. By consensus legal certainty is obtained, particularly in order to avoid an appeal in the post-audit phase, because that leads to an increase in uncertainty regarding completion time, tax burden/relief, and additional costs (primarily see Blaufus et al. 2016a). Normally

number of prior audits (Spicer/Hero 1985). However, it cannot be ruled out that taxpayers ultimately use rules of thumb in making tax evasion decisions (Spicer/Thomas 1982).

79 Possible reasons are, e.g., that agents do not recognize all positions or make concessions during the negotiation.

80 The specialized agent's time consumption will be disregarded with respect to revenue agents' time-on-task.

these effects occur on both sides, but the individual consequences of non-agreement burden people involved to a varying extent.

The consensus building can take place during the audit and/or in the final discussion between representatives of the auditee—the decision-maker and tax adviser—and the audit department—their revenue agents and superiors (see also Rhines et al. 2003: 1001). For the auditee, a non-agreement leads to an undesirable result in the first step. The risk that this (or even a worse) result may become final exists, and the time until the final decision is reached is marked by great insecurity (see also Ränsch 2002: 60-61) and incurs additional costs: for legal advice and/or court costs as well as interest payments. Moreover, auditees may want to close the books on past years one at a time. Thus the decision-making process of the auditee is ruled by a comparison of costs either way and partly by time pressure.[81] It can be expected that these issues become more important with increasing firm size because the absolute height of possible adjustments and the exculpation pressure of the decision-makers also increase. Nevertheless, an effect on agent's time consumption can only be expected if he or she informs the auditee about findings immediately during the audit and discusses them and then completes the audit as soon as the sum of the agreement justifies premature termination.[82] Both can be expected mostly for lengthy audits, hence for audits in the large firm size category.

For the revenue agent a non-agreement will lead especially to additional time-on-task preparing other comments and even helping in redress procedures. This working time is lost to other audits so it is a burden, and hence leads to time pressure for other cases. Furthermore, agents do not have to worry about further direct consequences; in particular with regard to possible court costs.[83] As a result, whether a revenue agent accepts an agreement or not is irrelevant for his or her time consumption as defined in the present study (not counting post-audit time).

For the report time consumption it is fundamentally irrelevant whether the parties reach an agreement because it is not legally binding. So the report must include all essential issues to enhance the chances of success in post-audit conflicts. On the other hand, the agent may tend

81 A dispute about principles is also possible, but it will be unobserved in this context.

82 In German tax law, auditors are obliged to provide information as long as the purpose of the audit is not jeopardized (see the second paragraph of section 199 of the AO). The auditor can terminate an audit premature if he or she examines all essential topics in accordance with the limitation of section 7 of the BpO 2000 (see also Mösbauer 2005: 230).

83 However, a reputational damage can occur, see above outline number (2) in Chapter III 2.2, p. 65.

to describe his or her findings less accurately if he or she has found an agreement with the auditee. So the second hypothesis is further extended by:

> *H2-4: The revenue agent's time consumption is generally not affected by the consensus building with the decision-makers of auditees, unless it occurs already during the audit phases and the agent terminates his or her audit prematurely. Moreover, for non-agreements the report time consumption is also unaffected whether or not a final discussion is conducted.*

3.2.5 Accelerating Issues, Duration in Total

In accordance with German tax law, auditees have to cooperate during field audits.[84] This especially includes establishing facts pertinent to the investigation. It is generally true that auditees or their tax advisers usually enjoy an information advantage due to the asymmetrical distribution of information. Practitioners recommend to take control of the flow of information (e.g., Rhines et al. 2003: 1007). This boils down to tactical considerations. If the revenue agent has the suspicion that the auditee or his or her advisers are delaying, refusing cooperation or are misleading the agents, they are invested with different means to put pressure on the auditee or his or her advisers to fulfill their obligations sufficiently.

For the present study, participants could choose which of three different measures were used. Initially, it has been common practice to shorten the auditee's time limit for replying to a request. The second means is imposing penalty payments or third, the threat of non-agreement.

In order to assess the likely impact of these measures it is advisable to scrutinize the auditees' perception and their possible responses to these steps. First, these measures are intended to create time pressure, which is principally experienced subjectively. Time pressure increases according to *Stuhlmacher* and *Champagne* (2000) as deadlines approach but may have little influence at the beginning of a task. Therefore the auditee is more likely to change his or her strategy towards the end of an audit. Consequently, it must be assumed that auditors will use preferred types of pressure if they perceive major delays. However, this also means that auditor's use of these measures increases in direct proportion to an increase in audit duration rather than to an increase in time consumption.[85] As a result it can be expected that

[84] See the first paragraph of section 200 of the AO.

[85] The results of a control estimation suggest that agents use a threat of non-agreement in part in the case of audit delay (Appendix F Table 63).

consumption increases due to additional effort applying pressure—this implies above all to the elaborate procedure of imposing penalty payments and affects particularly audits with already short time windows, as is usually the case with SMEs—and the audit duration itself increases in the case of large firms because work processes are usually prolonged and more sensitive to great delays. So the second hypothesis is further extended by:

> *H2-5: Measures to accelerate the process are applied if the revenue agent perceives a delay. His or her time consumption is indirectly affected and increases with short time limits for reply in the large firm size category and with penalty payments in the size categories of SMEs.*

In this context, it should be highlighted that the measure of threat of non-agreement is chosen not only as a way of reducing audit duration. *Stuhlmacher* and *Champagne* (2000) show that decisions taken under time pressure are characterized by more concessions and less exploration than those taken under low time pressure. If these findings are taken into account it can be assumed that agents may use such threats to accelerate their audit in order to come to a fast consensus. But, for this measure to work, it is necessary that auditees are intimidated by this. However, this is less likely as soon as the auditee is more experienced in tax auditing, which is true for large firms as they ought to be audited regularly.[86] In contrast, smaller businesses are merely subject to a slight audit probability. So the second hypothesis is further extended by:

> *H2-6: The revenue agent's time consumption decreases in the smaller size categories, if the agent uses a threat of non-agreement to accelerate the audit.*

This hypothesis expands the previously deduced hypothesis H2-4: in summary, it can be said that the revenue agent's time consumption decreases if the agent is open-minded and prepared to agree during lengthy audits or uses the threat of non-agreement in cases of audit delay with inexperienced auditees. Besides, the latter assumption holds also true if a non-agreement is actually kept up and agents take action.

Furthermore it can be assumed that, generally, the audit duration itself affects revenue agents' time consumption and vice versa:[87] an increase (decrease) in duration results in an

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[86] See above in section IV 2.
[87] See also above in subsection 3.2.2) for explanations of long time interruptions and their consequences.

increase (decrease) in time consumption and the other way round. So the second hypothesis is further extended by:

> *H2-7: If audit duration increases (decreases) beyond expectation, the revenue agent's time consumption also increases (decreases).*

3.2.6 Outcome of the Audit

Finally, it is important to analyze, whether and to what extend the outcome of the audit impacts the revenue agent's time consumption. This outcome comprises two parts. For one, additional taxes and tax refunds after audit[88] are netted, in line with *Welch* (1954), and changes of loss carried forward. In accordance with German tax authorities, a conceivable balancing according to *Goode* (1981) and in favor of additional taxes (loss reduction) toward tax refunds (loss increased) is not done. This procedure is logical as field audits must be conducted according to German tax law equally to the advantage and to the disadvantage of the auditee.[89] Furthermore, in contrast to other countries (e.g., Alissa et al. 2014), German tax authorities do not use outcome as direct performance measure. Only the ratio of cases without outcome and the ratio with outcome below the de minimis limits are compared, but not the amount of additional taxes. Indeed, the revenue agent shall investigate closely only those focal points that will lead to final tax losses or tax refunds and significant profit shifting,[90] but agents are not officially instructed to preferably generate high additional taxes. This may seem contrary to the central role of tax administrations as they are, in the words of *Bright et al.* (1988: 318), "*responsible for collecting the maximum amount of taxes legally due as equitably and efficiently as possible.*"

What is the consequence of this in relation to revenue agents' time consumption? For cases of minor importance two main directions are conceivable: a) If agents are subject to pressure due to a personal or department-wide high ratio of unimportant cases, they may increase their effort and hence time-on-task in order to avoid an outcome below the de minimis limits. b) In accordance with German tax law an audit case is to be terminated if the auditee's income is stated correctly. Here, the time consumption would decrease. Both options are in general as likely so that, within a sufficiently representative sample, the revenue agent's time

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88 Subsequent changes after audit end are disregarded just as in the post-audit time consumption.

89 Such an approach is not applicable to each tax system (e.g., due to unrecorded negative adjustments, see Alissa et al. 2014).

90 See the second sentence of section 7 of the BpO 2000.

consumption is unaffected by cases of minor importance. So the second hypothesis is further extended by:

> *H2-8: From the view of revenue agents' time consumption there is no difference whether the outcome of field audits is below the de minimis limits or not.*

Furthermore, the relationship between auditors' effort and performance has to be investigated. Psychologic literature provides arguments and evidence in support of a positive relationship between both (Alissa et al. 2014; Yoe/Neal 2004). This is based on reasonable arguments since performance consists of effort and ability (Christen et al. 2006). According to *Weingart* (2006) effort, in turn, consists of intensity and duration (see also Christen et al. 2006), whereby the latter is measured by total time consumption and the intensity by rate of work. An increase in either is an increase in effort. Since intensity will stay unobserved in this study, only time consumption is relevant. Thus, if revenue agents' time consumption increases, their performance likewise increases and hence, due to the suggested positive relationship ceteris paribus, also vice versa.

However, there is a limitation resulting from legal requirement: agents have to restrict the time spent—this means the time-on-task and the duration equally—to the level that is necessary. Consequently, their time consumption is not only finite but also stringently limited.[91] Furthermore, performance matters; it can be abstracted from a determination of how well a particular task has been performed in relation to a specific criterion (Cloyd 1997). With regard tax audits, such a criterion is a mixture of several components, above all of supreme goals, and is not merely reduced to a maximum of additional tax payments.[92] Hence it can be concluded that an increase in performance is not a consequence of an increase in outcome. Finally, it seems questionable that effort, in terms of time consumption, and outcome, as a measure of (a task-specific) performance, stand in a constant linear relationship to one another. *Streck* (1993: 91) points out that the auditor's effort and adjustments are not related to each other linearly. Rather, auditors should take into account the fact that most of their outcome will be generated during the initial days and weeks. The longer the audit lasts, the more time-on-task has to be spent for less and less outcome. The author does not prove his statement, but he is in line with the assumptions from *Sinha* (2007, 2010). In accordance with the central principal of diminishing marginal utility, the agent has

[91] In accordance to German tax law, revenue agents' superiors are obliged control agents' compliance with this guideline (see the rationalization edict from 1995).

[92] *Border* and *Sobel* (1987) have already pointed out the importance of the ability of tax authorities to make commitments, because a solely net revenue maximizing orientation is not a viable option.

to terminate his or her audit in a timely manner, due to their obligation to weight costs and benefits against each other. Consequently, it cannot be expected that an increase (decrease) in outcome increases (decreases) the audit time consumption.

Another point is to verify the consequences for the report time consumption in relation to an increase in outcome. With an increase in additional taxes, auditees' burden increases so that the risk of an appeal also increases. The agent is therefore well-advised to justify his or her findings in a more detail, so that his or her adjustments hold in a potential dispute. Hence, it can be expected that an increase in outcome increases the report time consumption. So the second hypothesis is further extended by:

> *H2-9: If the outcome of field audits increases, report time consumption also increases; in contrast, the audit time consumption stays unaffected.*

3.3 Characteristics of the Auditor

As stated earlier, auditor's competence is a crucial issue for an investigation of potential impacting factors on revenue agents' time consumption (see also Quick/Wolz 1999: 176). The concept of competence takes a prominent role in literature on audit quality (e.g., Richard 2006; for an overview see Watkins et al. 2004). Competence means primarily the auditor's ability to detect a breach (DeAngelo 1981). In accordance with *Libby* and *Luft* (1993), building on the results of *Bonner* and *Lewis* (1990), a finer gradation is determined by experience (e.g., Libby/Frederick 1990) and ability. In combination with effort, both generate task-specific knowledge, related to technical aspects and individual know-how rather than personal aspects (ibid; Richard 2006); and, continuing this, (individual-specific) performance (see also Christen 2006). Performance includes in line with *Yeo* and *Neal* (2004) cognitive ability, conscientiousness, goal orientation, and motivation. Environment complements the schematic subdivision.

For the present study it has not proven possible to observe all components and corresponding variables, so that a limitation was unavoidable. First, it is unnecessary to distinguish between impacts of engagement of several revenue authorities, as all participants in the study serve in the same state tax authority. Additionally, the level of education is not appropriate as a measure of differentiation, since all auditors on an identical career path have identical degrees and have completed the similar training on the job in the beginning of their deployment as revenue agents.[93] However, additional training may influence the time consumption. More training on the job undergone by already introduced revenue agents—regardless of the existing level of experience acquired—is helpful to sensitize them to new legal rules and unfamiliar topics. Their competence and hence the audit quality may increase if the frequency of auditors' participation in training courses grows. *Frederick* (1991) investigates the nature of internal knowledge, differentiated according to different levels of expertise and whether this affects information retrieval, comes to the conclusion that an increased training rate is neither decisive for time-saving nor time-consuming. More experienced auditors tend to process new information in a different way from inexperienced auditors so that the recall of information differs during actual audits at a later time (Frederick 1991).[94] Because experience will be explicitly considered below, the amount of training does not need further remark, apart from the acknowledgement that there may be impacts due to potentially broad differences between knowledge and performance between both auditor types (Libby/Frederick 1990).

Furthermore, it can be expected that, first and foremost, high learning-oriented auditors frequently visit trainings. According to *Fisher* and *Ford* (1998) such individuals spend more effort on a task, so their time consumption does not necessarily decrease as a result of possibly increased competence.[95] On the other hand, this study is vague in relation to time consumption of performance-oriented auditors (Performers). Performers strive to minimize their amount of effort required (ibid.), but this effect cannot be studied with the aid of the retrieved objective information. Moreover, these statements are also influenced by the auditor's conscientiousness (Yeo/Neal 2004) and motivation—particularly with regard to time pressure combined with a high level of audit structure (McDaniel 1990)—so that several other (in part unobserved) subjective variables would be needed to investigate this phenomenon. In addition, in this context, time consumption rather would be a proxy for audit quality (e.g., Leventis/Caramanis 2005) and auditors' effort (e.g., Sinha 2007, 2010), further consideration of these reciprocal effects must be reserved for future research.

In order to determine an auditor's level of experience, several objective variables are clearly suitable: 1) years of work experience as an auditor (e.g., Cahan/Sun 2015), 2) the main field of work, 3) age as a proxy for life experience (e.g., Johnson 1995) and deprivation of

93 These circumstances differ from many other countries (OECD 2006: 18-19)

94 Besides, different auditors interpret and use ambiguous accounting and tax rules in different ways (Abdolmohammadi 1987).

95 Indeed, the frequency of participation in training courses does not have a significant effect on time consumption in each size category.

cognitive abilities over time (Kubeck et al. 1996). However, it is difficult to include objectively evaluated features of auditors' abilities, the second constituent of knowledge, because these are the base of professional, analytical, personal, special, and communication skills in particular. With this consideration, all these factors have to be an integral part of assessment criteria for promotion in the public service—just like performance, knowledge, experience, and hence ability—so that the set grades of salary are appropriately representative of experience (Libby/Frederick 1990), acquired knowledge, and level of familiarity with task complexity (Abdolmohammadi/Wright 1987). The latter will be controlled by the auditor's main field of work.

In line with *Alissa et al.* (2014) it can be expected that with an increasing competence of the auditor the processing of an audit task should be less time-consuming. So the third hypothesis, stated in alternative form, is:

> ***H3***: *The characteristics of the auditor influence his or her time consumption. If his or her competence increases the time consumption decreases.*

In addition, gender is included, as is usual in socio-economic analysis.

3.3.1 Auditor's Experience

The Revenue agents' "*experience is limited but expanding over a long period*" (Abdolmohammadi 1987) because they conduct a limited number of audits per year. During the course of time, the auditor gains task-specific knowledge and gains the ability to process more complex tasks gradually (Abdolmohammadi/Wright 1987).[96] However, with regard to increased complexity performance decreases, because the higher level of skill is necessary (Bonner 1994) and that decreases the impact of auditor effort on performance (Alissa et al. 2014). This means that a more experienced auditor—with prior experience (see e.g., Roberts 1995)—will handle a complex task in a less time-consuming manner than a less experienced auditor *ceteris paribus*. Moreover, the experienced auditor knows what information to look for, so that he or she usually needs less time-on-task due to their advantage in information selection (Simnett 1996 with further references). So the third hypothesis is further extended as follows:

[96] In this sense, the initial training plan lasts five years in the investigation area and combines initial instruction with elements of practice (Bonner/Pennington 1991).

H3-1: The revenue agent's time consumption decreases if his or her experience increases.

3.3.2 Auditor's Age

Revenue agents are a tax authority's 'public face' (OECD 2006). They combine the roles of investigator, denouncer, and decision maker, as well as they exercise control on the audit itself (see also Roberts 1995). First, the agent is the sole decision maker. Although he or she is supervised him- or herself and bound to the law. Especially with regard to balancing the high requirements of the law and the consequences of their decisions, it can be expected that more life experience will have a positive effect on the conduct of an audit and hence on the auditor's time consumption.

Here age represents life experience, regardless of seniority and specific job tenure (Johnson 1995), and on the other hand, is a measure for cognitive abilities volatilized through the years (Kubeck et al. 1996). Some researchers have studied possible results. *Gul* (1983), e.g., investigated the relationship between age, experience, cognitive style and decision confidence, and found that age is not related to the auditor's confidence in his or her decisions, but unexpectedly negatively correlated with experience, which is in line with *Taylor* (1975). Other studies have investigated the relationship between age and job performance, though without finding a connection between the two (Kubeck et al. 1996 with further references). However, these findings do not hold following *Murphy* (1989), who divided performance conditions. He distinguishes between the transition stage and the maintenance stage, and it can be expected that during the transition stage the auditor's job performance will decrease as a result of older age, and hence time consumption increases.

The transition stage occurs when the auditor is new to a job or subject to changes in his or her job environment, so that the auditor "*must learn new skills and tasks and make decisions about unfamiliar topics*" (Murphy 1989). In these situations, cognitive ability strongly affects the auditor's performance. According to *Kubeck et al.* (1996) older adults take more time to complete a post-training task than younger adults and need more time for computer training. In particular, the deficit in computer skills influences time consumption negatively during the report-writing period. As auditors were exposed to frequent changes in previous years, older auditors are less familiar with computer programs than the younger. The effect on time consumption is enhanced by the fact that older auditors do not invest the amount of time it would take to properly consolidate their learning of new computer standards. Since all auditors have computer training together, the older auditors gain a less sustainable increase in knowledge.[97] With this in mind, e.g., *Sundgren et al.* (2014) state that older auditors are less likely to learn a new standard. But, older auditors maintain their competence through the development of compensatory mechanisms and expertise (Charness/Bosman 1990; Salthouse 1990) so that in the audit phase the impact of older age on time cannot be expected.

Conversely, between periods of transition, audits "*can be performed with minimal effort*" so that "*job performance* [is] *not affected by differences in cognitive ability*" (Murphy 1989: 190) and hence personality and motivation become relevant. Thus an impact of age on time consumption cannot be expected, but following *Murphy* (1989) experience in the job is correlated with age, so that the interaction effect should be controlled. Moreover, it is possible to examine whether a change of occupation of a younger auditor impacts subsequent time consumption. So the third hypothesis is further extended by:

> *H3-2: If the revenue agent is older, the time consumption increases if he or she is exposed to unfamiliar tasks, in the report phase predominantly, or if the auditor was young when he or she began his or her career.*

3.3.3 Grade of Salary and Auditor's Main Field of Work

Auditors only gradually acquire task-specific knowledge and certainty. In a homogenous career path, it is to be expected that the attainable knowledge and the knowledge needed differ, depending on different career stages (Abdolmohammadi/Wright 1987; Libby/Luft 1993) and due to the plurality of audit tasks fulfilled (Abdolmohammadi 1987). These differences become obvious when comparing, e.g., IRS tax auditors and revenue agents (Dubin 2012: 50). In Germany the situation is different as the starting point of acquiring tax knowledge is the same for all employees following the same career path. However, the acquisition of additional knowledge and hence job experience occurs at varying rates before and after employees transfer to the audit department. In order to address this problem, the grade of salary will be taken as an indicator of the particular stage of a career.

In general, auditors will be promoted if they command more knowledge and experience than others. As a consequence, it seems obvious that better paid auditors perform their audits more effectively. However, it cannot be presumed that all experienced auditors are equal and show superior performance at all tasks (Libby/Luft 1993). Furthermore, it can be expected

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[97] In contrast to *Rosen et al.* (1965), in this sample older auditors participate in job training just as much as younger auditors.

that auditors with lower grades of salary are highly motivated to promote their careers (see e.g., Holmström 1999) so that their performance could have a reversing effect relating to time consumption. To investigate this issue, it is useful to study the main field of work of the auditor. This consists of the types of cases which the revenue agent audits normally and it indicates the task complexity he or she is familiar with (Abdolmohammadi/Wright 1987). Due to the matching of the familiar task to the experience level of the auditors (see also Frederick/Libby 1986) one can draw conclusions whether the auditor’s deployment is in accordance with role and payment.[98]

In addition, *Hardies et al.* (2015) and *Ittonen* and *Peni* (2012) investigate audit fees and show that female auditors typically get higher fees than their male counterparts. A higher perceived audit quality from auditor firms with female partners is described as a possible cause by the researchers. In the absence of fees, it is questionable whether female auditors earn more money than male auditors within the salary grades. In Germany, Equal Opportunities Acts regulate gender equality. According to these acts, in areas in which women have been underrepresented historically, they can be given priority for promotion if equally suitable, unless reasons concerning the person of a fellow applicant are predominant. Consequently, an analogous impact on the audit fees cannot be expected. So the third hypothesis can therefore be extended by:

> *H3-3: The time consumption does not differ if the revenue agent’s grade of salary and main field of work correspond with the case-specific complexity.*
>
> *H3-4: If agents conduct audits with a lower (higher) complexity than they are accustomed to, time consumption decreases (increases) due to the higher (lower) competence level.*

3.3.4 Gender

Numerous studies have examined gender differences in various scientific disciplines (see e.g., Breesch/Branson 2009). However, results from studies not concerning audits should not be transferred uncritically to audit domains. *Hardies et al.* (2011) have shown, e.g., that generalizing findings related to overconfidence could not provide evidence to be true in the case of auditors. The otherwise stated variations between audit fees for female and male

[98] That applies with regard to the Edict of Functional Groups resulting from the Salary Act.

auditors can at least not be linked to overconfidence.[99] With regard to audit time consumption the development of hypotheses follows the approach of task complexity (Bonner 1994) and of information processing efficiency. *O'Donnell* and *Johnson* (2001: 101) found that "*female auditors spent significantly less time on the* [highly complex] *task than male auditors did.*" But on the low complexity task, "*males spent less time on the task than females did, but the difference was only marginally significant.*" But these differences disappear when both genders need to work under time pressure, because women as well as men are motivated to adopt simplified processing strategies (Rosenthal/DePaulo 1979). In addition, the results of *Breesch* and *Branson* (2009) indicate, that time pressure may be responsible for compensating for women's advantage in analyzing more complex situations, in line with the selectivity hypothesis (Chung/Monroe 2001; Meyers-Levy 1989).

But during tax audits, time pressure is inherent due to three reasons: the auditor should a) minimize his or her residence time at the auditee's premises, b) endeavor to comply with possible existing time constraints, and c) attain (quantitative) goals and objectives. As a result, it can be expected that women and men perform audits in the same manner. However, as soon as time pressure is lessened, women use their cognitive advantage in complex tasks so that their time consumption decreases.[100] So the third hypothesis is further extended by:

> *H3-5: If female and male auditors are working under time pressure, their time consumption does not differ.*
>
> *H3-6: In the absence of time pressure, time consumption of male auditor increases if the audit task is complex.*

4 Estimation Strategy

For this study survival analysis is a particularly suitable estimation strategy because the survey is based on time-to-event data (e.g., Harrell 2015: 399).[101] This means the focus is on time from some event, such as the beginning of a field audit, to another event, such as the ending of a field audit. Thereby in the investigation unit i with $i \geq 1$, an auditee "*is said to become at risk* […] *of the event of interest after the initial event has occurred*" (Rabe-

[99] The gender distribution depending on auditors' salary grade is not equal for all groups in the investigated sample. In the first career path were almost no differences, whereas in the second career path female agents predominate up to the middle grade (A11), and male agents predominate at higher grades.

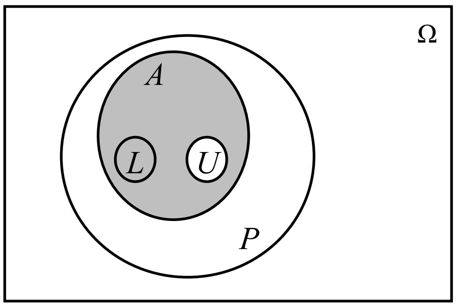
[100] In this study, it is not possible to demonstrate that gender differences in accuracy of task performance (see e.g., Chung/Monroe 2001) exist, nor that these could be a cause of different time consumption.

[101] The descriptions survival, failure-time, event-history, or duration data are used interchangeably.

Hesketh/Skrondal 2012: 743).[102] In this study the latter one—the first event in the origin of the time scale ($t = 0$)—occurs when the revenue agent is beginning his or her audit preparation. The second event will be achieved once the revenue agent closes his or her auditing proceedings. The third event will usually follow if the revenue agent submits his or her report. It should be noted that all following processing steps (such as defenses against adjustments) are not subjects of this investigation. In order that these three events qualify the audit time. A distinction must be made between investigation time on the one hand, according to the duration from the first day to the last day of an audit, and on the other hand in terms of the actual time consumption in working days. The latter is targeted in the present case.

Yet before the relevant points in time are further defined it is necessary to consider which percentage of taxpayers is relevant in this study. In the first instance the range of taxpayers is limited to these for which an initial selection is already proceeding. But it should be noted that the percentage of *P*, potential audit cases cumulated, of all tax cases is not known. In the second step the population is reduced by cases for which the revenue agents decide that a field audit is not required. Even this proportion is not transparently recorded. Hence the investigation is limited to *A*, actual audited cases. Additionally, the period under review starts for all cases at the moment when the revenue agent records his or her time consumption, and ideally with the start of his or her audit preparation.

Figure 6: Sample Space Ω of all Taxpayers with Profit or Important Non-Profit Income[103]



The Venn diagram in Figure 6 illustrates that the totality of field audits (*A*) can be distinguished between audits without adjustments (*U*) and audits with adjustments ($R=A|U$), depicted in the shaded area. The latter also includes audits with low outcomes (*L*).[104] For both types of outcome the revenue agent examines in the field and so the second event occurs

[102] At risk of the event must not be misunderstood: in survival analysis a subject is at risk of an event regardless of the perceived threat that either the event will occur or not.

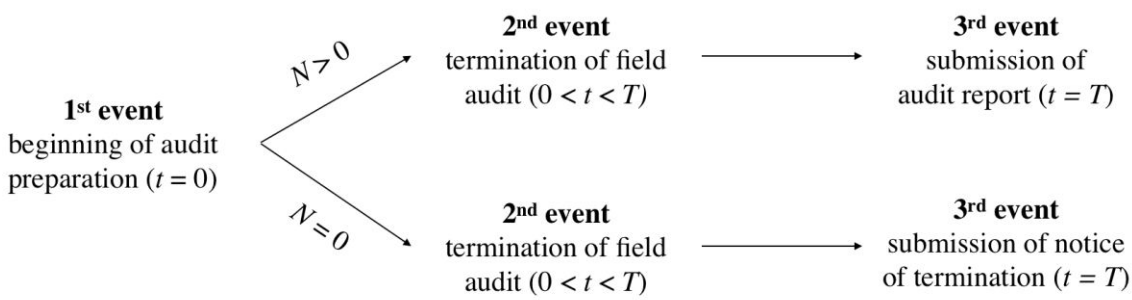
[103] Hence income from employment is not included.

[104] This study abstracts from the occasionally abortion of an audit.

after completion of the audit, but with the addition that the time consumption and the risk of these competing events do not have to be identical. The second events are competing risks because if one of the event types occurs the subject is no longer at risk of the other event (Allison 2014); more specifically, as soon as the agent finds an adjustment the auditee is no longer at risk of an event without outcome. Comparability in time may be deemed to exist for audits without outcome on the one hand if the revenue agent exposes the problems arising from his or her findings first and gives these up during the subsequent discussion. On the other hand both are comparable if negotiation is unnecessary whether with outcome or without findings. However, the basic consideration is that "[a] *distinct causal mechanism implies that different explanatory variables affect the occurrence of each event type, or that the same explanatory variables have different coefficients or different functional forms*" (Allison 2014).

The third event depends on the prior event, and it occurs after submission of the audit report, or the notice of finishing the audit without adjustment, respectively. The stage of report differs from the stage of auditing: if the revenue agent does not find adjustments, he or she does not need to write a comprehensive report. The agent only has to inform the auditee in written form about his or her decision to terminate the audit beside the administrative actions (e.g., internal processing, statistical records, control reports for other taxpayers). Figure 7 represents the three events differentiated according to outcomes.

Figure 7: Events in the Tax Audit Process



However, field audits without adjustments must be excluded because not enough cases are observed. The first equation takes account of the fact

$$N = \begin{cases} N^* & \text{if } N^* > 0 \text{ (audit with outcome)} \\ 0 & \text{otherwise (audit without outcome)} \end{cases} \tag{1}$$

An isolated consideration is immediately possible while all other events can be treated as censored in the estimating model (Allison 2014).[105] Following this preliminary consideration, the estimation strategy will be explained as follows. Use of the specialist method of survival analysis thereby becomes obvious because the failure time has a skewed distribution due to its restriction to positive values. Hence, it will never be normally distributed (Harrell 2015: 400).

The response variable T, the time until an event, is measured in the model in terms of the expected failure time, or rather in terms of the survival function $S(t)$, given by

$$S(t) = \mathrm{P}\{T > t\} = 1 - F(t) \tag{2}$$

where $F(t)$ is the cumulative distribution function for T (Harrell 2015: 402), defined for discrete and continuous distributions (Kalbfleisch/Prentice 2002: 6). Pursuing, the density function, $f(t)$, can be received from $S(t)$:

$$f(t) = \frac{dF(t)}{dt} = \frac{d}{dt}\{1 - S(t)\} = -S^{'}(t). \tag{3}$$

For the second event in Figure 7, for instance, $S(t)$ is the probability that the termination of field audit occurs after time t. At least until time t the auditee will survive in terms of being under stress from the ongoing audit process. The survival function decreases as t increases because, where $t = 0$, $S(t)$ is always equal to one and this decreases over time until the last field audit in the survey is terminated. So long as an event for the individual has not occurred, it is at risk. According to this the hazard function (or rate), $h(t)$, is related to the probability that the event occurs in a given small interval around t to $t + \Delta$ (where Δ is positive), as long as the event has not occurred at the beginning of that interval, that is, $T \geq t$ (Cox 1972; Cox/Oakes 1984: ch. 2.2; Rabe-Hesketh/Skrondal 2012: ch. 15.3; Harrell 2015: ch. 17.3; Cleves et al. 2016: 7). So the instantaneous failure (event) rate (Kalbfleisch/Prentice 2002: 7, 96), measured in units $1/t$, is defined formally by

$$h(t) = \lim_{\Delta \to 0^+} \frac{\mathrm{P}\{t \leq T < t + \Delta | T \geq t\}}{\Delta} = \frac{f(t)}{S(t)}. \tag{4}$$

[105] In what follows it is unnecessary to distinguish between competing risks (for more details see, e.g., Prentice et al. 1978).

Taking into consideration that the underlying process—described below—determines the shape of the hazard function, the cumulative hazard function measures the accumulated risk up to time t (Rabe-Hesketh/Skrondal 2012: ch. 15.3; Harrell 2015: ch. 17.3; Cleves et al. 2016: 8), and this is defined by

$$H(t) = \int_0^t h(v)dv = \int_0^t \frac{f(v)}{S(v)}dv$$
$$= -\int_0^t \frac{1}{S(v)}\left\{\frac{d}{dv}S(v)\right\}dv = -\ln S(t)$$

or

$$S(t) = \exp[-H(t)] \tag{5}$$

so that the relationship between the accumulated risk and the probability of survival is disclosed (Harrell 2015). It still holds also for discrete time with the convention

$$H(t) = \sum_{a_q<t} \log(1 - h_q)\ . \tag{6}$$

If, as in the present study, the central focus is on probabilities of events then the hazard models are represented by the upfront approach (Green 2012). First and foremost this estimation is based on the relative risk model of Cox (1972), the standard for the regression analysis of univariate failure time data (e.g., Prentice/Hsu 1997):

$$h(t|x) = h_0(t)r(t|x), \qquad t > 0 \tag{7}$$

with $h_0(.)$ as the baseline hazard function,[106] and the relative risk function $r(t|x)$ which specifies the relationship between the covariates x and the failure rate; such as for the exponential form $r(t|x) = \exp[W(t)'\beta]$ where $W(t) = [W_1(t), \ldots, W_p(t)]'$ "*is a vector of derived, possibly time-dependent covariates obtained as functions of t and the basic covariates x*" (Kalbfleisch/Prentice 2002: 96). Given this, the cumulative hazard function is

[106] This is the hazard for an individual under the standard condition, $x = 0$, and hence, $r(t \mid 0) = 1$ (Cox/Oakes 1984: ch. 5.3).

$$H(t|x) = H_0(t)\exp(W(t)'\beta)\,. \tag{8}$$

Due to the survey design and obtained data it will be assumed that time-dependent covariates do not occur (see Appendix F Table 52) so that (8) is simplified to

$$H(t|x) = H_0(t)\exp(W'\beta)\,. \tag{9}$$

This approach assumes a proportional hazard (PH) and allows for a semi-parametric method of analyzing the estimation of effect of covariates on the hazard rate (Green 2012), whereby the assumptions about the predictors on the hazard function are parametric. However, relating to a specific shape of the hazard function $h(t)$ itself is an assumption not provided (e.g., Harrell 2015: 475). But the selection procedure will be more restricted if the failure time is not continuously distributed, the possibility of ties exists, the hazard is non-proportional, or the baseline hazard contains useful information.

In this study the recorded time is subdivided into four quarters of a workday. Due to the requirements of non-flexible working hours in the investigation area, this division of time is usually consistent and comparable. Hence, the observation time until an event of interest is discrete and not continuous so that time is grouped in intervals $[0, a_1), [a_1, a_2), \dots, [a_{q-1}, a_q), [a_q, a_{T_{real}}]$.[107] This means if failure is observed in $T_{real} = t_{real}$ then it occurs within the interval $[a_{t_{real}-1}, a_{t_{real}})$ whereby in the present study the length of this amounts to a constant quarter of a workday (Tutz/Schmid 2016: 51). The necessity of integral value requires for the estimation (Allison 1982: 71) that all values of intervals and hence of time are multiplied by four ($t = 4t_{real}$). In order that the length of a_q is equal to one ($4(a_q - a_{q-1}) = 1$), this remains constant for all *t* by which the splitting of the time axis into successive intervals is simplified to $t = 1,2, \dots, T$. Furthermore it is assumed that for an auditee occurs at most one event in time interval *t*, and that all changes in the risk set will happen at the end of the time interval (Hamerle 1986). Given that the auditee has survived to *t* the hazard at *t* for the covariate W is $1 - (1 - h_t)^{\exp(W'\beta)}$ then this is defined as the conditional probability of failure at *t* (Kalbfleisch/Prentice 2002: ch. 1, 2).

It is also conceivable that for more than one audit an event of interest occurs in the same unit of time, whereby ties arise. In addition it is probable that the hazard is non-proportional for the whole time of duration because the tax authority specifies most probably a non-binding

[107] For all individuals occur an event so that the last interval is not infinite and, thus, also closed.

timeframe for the purpose of tax audits, so the shape of the time consumptions needs to be taken into account. It can be expected that a timeframe—albeit only in a non-binding recommendation—would lead to the bulk of audit finishing occurring around the given time mark (Allison 2014). Hence, "*the transition rate is somehow bell-shaped*" so that "[i]*n the literature, the log-logistic model along with the log-normal and the sickle distributions are the most commonly recommended models*" (Blossfeld et al. 2009). Alternatively, "*another flexible strategy to model bell-shaped transition rates is to use a combination of two time-dependent variables*" (ibid. 2009), or in the sense of *Allison* (2014) who proposes including time and time squared into the model if curvilinearity occurs. The general (linear) notation for a log-logistic regression is then

$$\log\left(\frac{F(t_i)}{1-F(t_i)}\right) = b_0 + \sum_{j=1}^{k} b_j x_j + b_{j+1} t_i + b_{j+2} t_i^2 \,. \tag{10}$$

This approach is suitable in the present study for gathering an impression of the effect of the regressors, and the shape of the transition curve (see also e.g., Sinha 2010: 355).[108]

However, it is not possible to fit the estimation based on the observed curve progression so that for the actual estimation a better fitting approach has been chosen, namely, an accelerated failure time (AFT) model (Allison 2014; Harrell 2015: ch. 18.3; Kalbfleisch/Prentice 2002: ch. 2.3.3; Rabe-Hesketh/Skrondal 2012: ch. 15.5) where the baseline distribution function will be estimated as a restricted (natural) cubic spline function (Herndon/Harrell 1990; Royston/Parmar 2011: ch. 5). An AFT model is useful in the present study because different individuals accumulate some characteristics at different rates to reach the same failure (Hutchinson 1988).

In contrast to the PH model, which models the effect on the hazard function, the AFT model specifies that the effect of a fixed covariate W acts multiplicatively on the failure time or additively on the log failure time, $\log(T)$ (Wei 1992; Harrell 2015: 436; Kalbfleisch/Prentice 2002: 44, 218).[109] The model is

[108] At first I estimate multilevel mixed-effect parametric survival models with this approach, whereby the parameters outlined below are included. The results confirm the expected curvilinearity: see the extracts in Table 50 in Appendix E.

[109] Compared to the PH model *Cox* believes "that accelerated life models are in many ways more appealing because of their quite direct physical interpretation" (Reid 1994: 450).

$$S(t_i|x) = \psi[(\log(t_i) - W'\beta/\sigma] \tag{11}$$

where ψ is any standardized survival distribution function, $W' = (W_1, \dots, W_p)$ is a vector of dimension p, obtained as a function of the basic covariates x, and β is a corresponding vector of regression coefficients. The parameter σ is called scale parameter and (11) implies that σ is a constant independent of W'. Therefore, each W_p effects log(T) or $\psi^{-1}[S(t_i|x)]$ linearly if W' is free from nonlinear or interaction terms. However, an inclusion of interaction terms is unavoidable in the present study so that the assessment procedure will respect this (e.g., Harrell 2015: 16-17).

Furthermore it is necessary to distinguish between three different investigations of time consumption so that the estimation will be grouped: the time until the termination of the field audit at first, the time of the period of writing the report, and lastly the sum of both time periods:

$$t_v = \begin{cases} t_1 & \text{for } t = 1, \dots, t_1 \quad \text{(audit time consumption)} \\ t_2 & \text{for } t = t_1, \dots, T \quad \text{(report time consumption)} \\ t_3 & \text{for } t = 1, \dots, T \quad \text{(total time consumption)} \end{cases}.$$ [110]

Consequently, a linear modeling gives

$$Y_v = \log(T_{iv}) = \alpha_{t_{iv}} + W^{'}\beta + \sigma\xi_i \tag{12}$$

where ξ_i is a random variable from the distribution ψ (Cox/Oakes 1984, 64-65). For the set of constants it will be assumed that $\alpha_{t_{iv}} = \gamma_v$, even if the present study is based on discrete time. It can abstract thereof from different constants at the current time intervals in the same period of interest, v.[111]

As already stated, the volume of all tax audit cases is separated into four basic size categories. Maintaining this distinction indicates that different non-binding timeframe exist for each of them so that the estimation needs to be split by means of the size categories. The differentiator is d with d=1,…,4. Considering that it is possible that covariates x depend either from the current size category or not, a vector of dimension p and d is more precise so that $W' = (W_{1d}, \dots, W_{pd})$ is obtained as a function of the basic covariates x. The dependence

[110] Left-truncation of the time scale is used if the report time consumption is isolated, $v = 2$.
[111] Thus, leaving them out is analogous to leaving $h_0(t)$ out in the PH model (Allison 1982).

means here that it will be necessary to specify for the different size categories different covariates, or different base-level assumptions, respectively. Furthermore, from the nature of the survey—the respondents were invited to describe their last two concluded audit cases—it follows that due to the respondents (revenue agents) r, $r \geq 1$, the investigation units i, $i \geq 1$, are clustered if the described cases belong to the same size category. For this within-subject dependence it is indicated to split the residual ξ_i into two uncorrelated components: a specific permanent component ζ_r for each agent *r*, which is constant across (maximum two) units *i*, and an idiosyncratic component ε_{dir}, which is specific to each unit *i* in each size category *d* for each agent *r* (Rabe-Hesketh/Skrondal 2012: 77). This correction enables valid inference to be made, in hand, by using the so-called "sandwich" method of *Huber* (1967) and *White* (1980) to calculate robust standard errors (Allison 2014; Harrell 2015: ch. 9.5). Further adjustments in respect of a shared frailty model are not required in this study (e.g., Cleves et al. 2016: ch. 15.1.4). Also an additional stratification is not effected because suitable arguments (e.g., functional units/separation of workspaces) which might be in favor of doing this are interesting itself in the present study so that they may be included in the covariates, directly, or indirectly, respectively. From (12) follows then

$$Y_{vdir} = \gamma_{vd} + W^{'}\beta + \sigma(\zeta_r + \varepsilon_{vdir}) \,. \tag{13}$$

The use of restricted (natural) cubic spline function is as aforementioned also appropriate because this has "*the potential for almost unlimited flexibility*" (Royston/Sauerbrei 2008: 203).[112] Their ability is to be linear in the unknown parameters and, compared to a linear function, increasingly flexible, however, too flexible in the tails so that the function should be constrained to be linear in the tails (Stone/Koo 1985). This is in order that only *K*-1 parameters need to be estimated besides the intercept so that the restricted spline function *s*(.) with *K* knots $k_1, \dots, k_k$ is generally given by

$$s(x) = \gamma_0 + \gamma_1 z_1 + \gamma_2 z_2 + \cdots + \gamma_{K-1} z_{K-1} = \gamma_0 + \sum_{j=1}^{K-1} \gamma_j z_j. \tag{14}$$

The derived variables, z_j (basis functions), are calculated as follows (Harrell 2015: 24; Devlin/Weeks 1986; Royston/Parmar 2002; Lambert/Royston 2009):

[112] As above in (8) assumed time-varying covariates will be abstracted (see more detailed Herndon/Harrell 1995).

$$z_1 = x$$
$$z_j = (x - k_j)_+^3 - \lambda_j (x - k_1)_+^3 - (1 - \lambda_j)(x - k_K)_+^3 \,, \; j = 2, \dots, K - 1$$

where $\lambda_j = (k_K - k_j)/(k_K - k_1)$. Due to the possibility that z_j can be highly correlated the derived spline variables are orthogonalized by using Gram-Schmidt orthogonalization (Leon et al. 2013; Gram 1883; Schmidt 1907). However, before the formulas (13) and (14) can be summarized it is required to prepare from which the choice of knots will be affected and which distribution function ψ appears most suitable.

The fit of the model depends on the choice of *k*, though the number of knots is crucial, not the place (Stone 1986). The knot locations in the *Royston/Parmar* model used are at the centiles of the distribution of uncensored log event times and follow the advice of *Durrlemann/Simon* (1989). It is favorable "*to allow the data to be most closely modeled in the region of greatest density*", hence, the knots are placed "*not so far from the median of the survival-time*" (Royston/Parmar 2011: 109).[113] For the present study this placement is ideal because the median validates the expected non-binding timeframe to quite a large extent. Relating to the number of knots it is recommended that, depending on sample size, between three to five knots are sufficient (ibid.; Durrlemann/Simon 1989; Harrell 2015: 28) whereas more than five knots are seldom required (Stone 1986).

In this investigation several models with different numbers of knots will be compared. The choice has been made on the basis of the Akaike's information criterion (AIC) (Akaike 1973, 1974), the small-sample version AIC_c (Sugiura 1978), and the Bayesian information criterion (BIC) (Schwarz 1978).[114] The latter is a more stringent criterion and will be preferred for models with between one and six degrees of freedom (d.f.),[115] thus between one and five interior knots (Royston/Parmar 2011: 110–111). All tables are presented in Appendix G. From the various values this model is best fitted with the smallest value of AIC, AIC_c, or BIC, respectively, but it should be noted that negative values for them are better than positive values because the loss of information is lower (Baguley 2012: 402). Models have a substantial support if the difference in the values from the best and the second best model is less than or equal to two (Burnham/Anderson 2004: 271).

[113] *Harrell* propose a "*placing* [of] *knots at fixed quantiles (percentiles) of a predictor's marginal distribution*" (2015: 26).
[114] The formal presentations are omitted here (see for this, e.g., Burnham/Anderson 2002, 2004).
[115] This assumption will be important for choosing in the medium size category, see Table 68 in Appendix G.

In order to using the restricted cubic spline function and as perceived already from (11), it is expected to select one or more possible distributions ψ of the baseline function because "*the AFT model requires that the distribution form of the error term be known, or at least estimable*" (Hutchinson 1988). First and foremost, the above-named log-logistic and log-normal distributions are eligible for an assumed bell-shaped transition rate in this study.

The log-logistic model is a parametric proportional odds (PO) model

$$\text{logit}\{1 - S(t_i|x)\} = \text{logit}\{1 - S_0(t_i)\} - W'\beta^* \tag{15}$$

with the special feature $\beta = -\beta^*$ and the baseline survival function

$$S_0(t_i) = \left[1 + \{\exp(-\beta_0)t_i\}^{\frac{1}{\gamma}}\right]^{-1}$$

where $\gamma > 0$ (Cleves et al. 2016: 275) which is transformed to

$$\text{logit}\{1 - S_0(t_i)\} = (-\beta_0 + \text{log}t_i)/\gamma = \gamma_0 + \gamma_1 \text{log}t_i \tag{16}$$

where $\gamma_0 = -\beta_0/\gamma$, $\gamma_1 = 1/\gamma$, and $\text{logit}\{1 - S_0(t_i)\} = \log[\{1 - S_0(t_i)\}/S_0(t_i)]$. The parameter β is interpreted "*as log odds-ratios, with a positive value of regression coefficient indicating an increased risk of an event and hence diminished survival*" (Royston/Lambert 2011: 113). An alternative interpretation of β^* is only feasible in an AFT model without spline terms and therefore negligible.

A log-normal model is a probit model for a binary outcome and written in survival metric as

$$-\Phi^{-1}\{S(\text{log}t_i)\} = -\Phi^{-1}\{S_0(\text{log}t_i)\} + x\beta \tag{17}$$

with the baseline survival function, transformed with $\gamma_1 = 1/\sigma$ and $\gamma_0 = -\beta/\sigma$,

$$-\Phi^{-1}\{S_0(\text{log}t_i)\} = \frac{\text{log}t_i - \beta_0}{\sigma} = \gamma_0 + \gamma_1 \text{log}t_i. \tag{18}$$

Both models have similar underlying density functions. The distributions are symmetric on the log scale, but the log-logistic model has longer tails.[116] The shape of the hazard functions is usually similar as well and tends toward zero as $t \to \infty$.

The sickle distribution—also cited previously as one of the most commonly recommended models—is ruled out although a quintessential aspect is that the probability of change to a state can depend on the duration of these states themselves, but also immanent is the probability that an individual will never change his or her state (Diekmann/Mittag 1983, 1984; Billari 2001). Whereas the first feature would be suitable; the latter assumption prevents use in this study because all investigation units experience the different events described in Figure 7 (see Figure 6: extent *A* rather than *P* or Ω).

Moreover, a PH model with Weibull distribution, $h_0(t_i) = \gamma_1 t^{\gamma_1 - 1}\exp(\gamma_0 + \xi_i)$,[117] seems certainly possible too. The placing of knots in the course of the use of the restricted cubic spline function enables a redirection of the actual monotonic increasing $(\gamma_1 > 1)$ or the monotonic decreasing $(\gamma_1 < 1)$ of the Weibull hazard function.[118] Thus it also provides an alternative for a bell-shaped transition and "*a (flexible) parametric version of the Cox PH model*" (Royston/Lambert 2011: 102).[119] The baseline hazard function of the cumulative hazard function is

$$\log H_0(t_i) = \gamma_0 + \gamma_1 \log t_i \tag{19}$$

with shape parameter γ_1 for some $\gamma_1 > 0$ and an ancillary parameter γ_0.[120]

So three different distributions are available and used hereafter because it is not possible to decide a priori which distribution is the most suitable one. This applies all the more so in the present study, where four different investigation groups—the size categories *d*—and three time periods—time consumption t_v of auditing, reporting, and both together—will be considered; in sum, thirty-six models (3 x 4 x 3). Furthermore, this accords with "*the*

[116] For log-normal: ε_i is normal with σ^2, and for log-logistic: ε_i is logistic with variance $\gamma^2\pi^2/3$.

[117] If the assumption is that the baseline hazard $h_0(t)$ is constant, hence $h_0(t) = \lambda$, then it is convenient due to the nonnegative hazard rate λ to write it as $\lambda = \exp(\gamma_0)$; and neglect a disturbance term (Rabe-Hesketh/Skrondal 2012: 806).

[118] The Weibull hazard function leads to the exponential subcase if it is constant ($\gamma_1 = 1$).

[119] By convention to the cumulative hazard function, $H_0(t) = H(t \mid 0)$.

[120] The parameters are named γ instead of (usually) p or α, respectively, and take subscripts in anticipation of the restricted cubic spline function and in accordance with the function as defined before.

conclusion that the best strategy is always to estimate a broad variety of different models in order to find robust estimation results" (Blossfeld et al. 2009).

In this sense, the flexible parametric model from *Royston* and *Parmar* (2002) allows a differentiation to be made between either proportional hazards or proportional odds scaling of covariate effects, and also the probit class. The relationship of $H(t) = -\log S(t)$ in (5) allows (8) to be rewritten in the following equivalent form:

$$\log\{-\log S(t)\} = \log\{-\log S_0(t)\} + W'\beta \tag{20}$$

where $S_0(t) = S(t|0)$ is the transformed baseline survival function and will be estimated by a restricted cubic spline, see (12) and below (23). After generalizing (20) to

$$g_\theta\{S(t)\} = g_\theta\{S_0(t)\} + W'\beta \tag{21}$$

where $g_0(.)$ is a monotonic increasing function, depending on a parameter θ, it is enabled by using the parametrized link function of *Aranda-Ordaz*'s (1981)

$$g_\theta(u) = log\left(\frac{u^{-\theta} - 1}{\theta}\right) \tag{22}$$

where $\theta > 0$, to obtain a PH model, $g_{\theta\to 0}(u) = \log(-\log u)$, and a PO model, $g_{\theta=1} = \log(u^{-1} - 1) = \log\{(1-u)/u\}$. Form equation (2) follows the cumulative distribution function $F(t) = 1 - S(t)$. "[T]*hat is, the probability of failure in the interval* (0, *t*)" (Royston/Lambert 2011: 118). Written $u = S(t)$ formula (22) results in $g_1\{S(t)\} = \log[\{1 - S(t)\}/S(t)] = \log[F(t)/\{1 - F(t)\}]$. In addition the third member of the RP family, the probit class, $g_\theta(.)$ is defined as minus the probit or inverse normal cumulative distribution function, $-\Phi^{-1}(.)$, because the parameter θ is redundant (ibid.).[121]

The combining of formulas (13) with (16), (18), and (19) gives under the transformation of $s(\log t_i|x) = \gamma_0 + \gamma_1 \log t_i$ then

[121] Models with θ not equal to 0 or 1 are not converged in this study so that this expression does not have to be described.

$$\left.\begin{array}{lr} \text{PH spline models} & : \qquad \log H(t_{vdi}) \\ \text{PO spline models} & : \ \mathrm{logit}\{1 - S(t_{vdi}|x)\} \\ \text{probit spline models} : & -\Phi^{-1}\{S(\log t_{vdi})\} \end{array}\right\} \tag{23}$$
$$= \ \mathrm{s}\left(\log t_{vdi}\middle|\gamma_{vd}\right) + W^{'}\beta + \zeta_r + \varepsilon_{vdir}$$

whereat distinguishing features are investigation unit, $i \geq 1$; time consumption period of interest, $v = 1,2,3$; size category, $d = 1,2,3,4$; and revenue agent, $r \geq 1$. Further the amalgamation of this with spline function (14) and the link function (22) gives

$$\begin{aligned} g_\theta(u_{vdi}) = -\log t_{vdi} &+ \log(\gamma_{vd1}z_1' + \gamma_{vd2}z_2' + \cdots + \gamma_{vdm+1}z_{m+1}') \\ &+ \gamma_{vd0} + \gamma_{vd1}z_1 + \gamma_{vd2}z_2 + \cdots + \gamma_{vdm+1}z_{m+1} + W^{'}\beta \\ &+ \zeta_r + \varepsilon_{vdir} \end{aligned} \tag{24}$$

where $\theta > 0$ in addition with m interior knots and two boundary knots and at once

$$z_1 = \log t_{vdi}$$
$$z_1' = 1$$
$$z_j = (\log t_{vdi} - k_j)_+^3 - \lambda_j(\log t_{vdi} - k_{min})_+^3 - (1 - \lambda_j)(\log t_{vdi} - k_{max})_+^3$$
$$z_j' = 3(\log t_{vdi} - k_j)_+^2 - 3\lambda_j(\log t_{vdi} - k_{min})_+^2 - 3(1 - \lambda_j)(\log t_{vdi} - k_{max})_+^2,$$
$$j = 2, \dots, m + 1$$

where $\lambda_j = (k_{max} - k_j)/(k_{max} - k_{min})$; alternatively, in a compressed form

$$\begin{aligned} g_\theta(u_{vdi}) &= -\log t_{vdi} \\ &+\log(\gamma_{vd1} + \sum_{j=2}^{m+1} \gamma_{vdj}[\,3\left(\log t_{vdi} - k_j\right)_+^2 - 3\lambda_j(\log t_{vdi} - k_{min})_+^2 \\ &\qquad - 3\left(1 - \lambda_j\right)(\log t_{vdi} - k_{max})_+^2]) \\ &+\gamma_{vd0} + \gamma_{vd1}\log t_{vdi} \\ &+ \sum_{j=2}^{m+1} \gamma_{vdj}[\,\left(\log t_{vdi} - k_j\right)_+^3 - \lambda_j(\log t_{vdi} - k_{min})_+^3 - (1 - \lambda_j)(\log t_{vdi} - k_{max})_+^3] \\ &+W^{'}\beta + \zeta_r + \varepsilon_{vdir} \end{aligned}$$

(Royston/Parmar 2002; Royston/Sauerbrei 2008: 203-204; Royston/Lambert 2011: 102-103).[122] The regression coefficients for _rsc$j$ (see the results below) correspond to the parameter γ_j (Royston/Lambert 2011: 98). The constant (_cons)— γ_0 —is dropped because the results below are constituted in an exponentiated form.

The function $W' = (W_{1d}, \ldots, W_{pd})$ of the basic covariates x differs scattered between the size categories and includes several interaction effects so that it is given as follows, separated into three groups of features:[123]

1. characteristics of the auditee (p = 1,…,7)

$$W' = (LEGFORM; DETINC; LEGFORM \times DETINC; SECTORGR; GROUP),$$

2. characteristics of the audit (p = 8,…,20)

$$W' = (EVASION; SECTORGR \times EVASION; PLACE; CONSEN; DISC; SHDEAD;\\ PANDELAY; NONAGREE; TRIFLINGAMOUNT; LNDIFFPAY; LNLOSSREDUC)$$

and

$$W'_d = \begin{cases} d = 1 & (FY\_SHORT; \qquad\qquad DURATION\_MSM) \\ d = 2 & (FY\_SHORT; FUPAUD; DURATION\_MSM) \\ d = 3 & (FY\_SHORT; FUPAUD; DURATION\_MSM; SPECS) \\ d = 4 & (FY\_SHORT; FUPAUD; DURATION \qquad ; SPECS) \end{cases}$$

3. characteristics of the auditor (p = 21,…,27)

$$W' = (AGENTY; AGEGR; AGENTY \times AGEGR; GRADE\_NM; FOW\_NM;\\ GRADE\_NM \times FOW\_NM; SEX).$$

The estimation of parameters is by maximum likelihood. The likelihood function, l_{vdi}, can described in a simplified form because right-censored observations are not available (Rabe-Hesketh/Skrondal 2012: 745-746; Cleves et al. 2016: ch. 4.1.1). Let $\eta_{vdi} = s(\log t_{vdi}|\gamma_{vd}) + W'\beta + \zeta_r + \varepsilon_{vdir}$ and its first derivative be $\eta'_{vdi} = t'_{vdi} ds(\log t_{vdi}|\gamma_{vd})/d(\log t_{vdi})$ then there follows for the three different models

[122] See above towards formula (14): if K knots—and thus also the same d.f.—will be estimated then the spline function has K — 1 interior knots and when $k > 1$, two boundary knots.
[123] The description of all variables is shown in Appendix F Table 51.

$$l_{vdi} = \begin{cases} \eta'_{vdi} \exp(\eta_{vdi} - \exp\eta_{vdi}) & \text{PH models} \\ \eta'_{vdi} \exp(\eta_{vdi})(1 + \exp\eta_{vdi})^{-2} & \text{PO models} \\ \eta'_{vdi} \, \phi(\eta_{vdi}) & \text{probit models} \end{cases} \quad (25)$$

where $\phi(.)$ is the standard normal destiny function (Royston/Lambert 2011: 120). To obtain estimates of γ and β the necessary starting values will be determined by ordinary least-squares regression of these three models on $\log t_{vdi}$, x_i and spline basis functions with the desired number of knots (ibid.:121; Royston/Parmar 2002: 2182). The latter will be exhausted up to ten, or until convergence no longer arises in the particular model. The criteria for the conclusive analysis will therefore also be AIC, AIC$_c$, or BIC, respectively (see Appendix G).

Furthermore, effects are classified as robust if significance stays approximate constantly or increases in strength with an increase in fitting of the models. Hence occasional effects in particular models are not regarded as robust. The effects can be interpreted as tendency if the significance of these effects decreases with increase in fitting of the models.

5 Data

5.1 Sample Selection

Research into the conduct of tax audit generates two main problems: due to the stipulations of privacy in German tax law, researchers crucially do not have access to German tax audit data and, even if this were possible, collected data are either not recorded or not uniformly recorded in electronic form. Furthermore, the tax authorities themselves are not allowed to match tax audit data with individual information about the revenue agent. Thus, the only way to raise field audit as well as revenue agent data is to conduct a survey among revenue agents. In order to reach as many of them as possible, and to avoid sample selection bias, I used, with the official approval of the Berlin tax authority, an advanced tax law training course which was obligatory for revenue agents in Berlin as a means of conducting the survey. I taught this course and handed out questionnaires to participants in the second part of the first day of a two-day training course. The course took place between October 2010 and February 2011. In 2010 there were 13,210 revenue agents working in Germany, of whom 682 worked for the Berlin tax authority. In sum, 646 of them participated in the course and from these I received 610 questionnaires, which corresponds to a high response rate of 94 %.

To gain information of interest about field audit cases, I made use of so-called “experiential questionnaires” (Gibbins/Qu 2005). In these the participants were asked to report on the last two concluded field audit cases they had experienced and were able to describe in detail. The questionnaire is based on several pre-survey interviews to obtain information about firm characteristics which revenue agents are usually aware of after completion of a case. It emerged from responses to the questionnaires that revenue agents generally remember central key characteristics of a case, e.g., the audit result (additional tax burden), the firm’s size (profit and sales), audited tax years, industry, ownership structure, and audit issues. These data are memorable for two main reasons: firstly, revenue agents have to fill out several forms at the beginning and at the end of each case in which they have to report these data to the revenue agency, and, secondly, several parameters (e.g., audit results, time consumption) may (at least indirectly) affect the personal performance evaluation of the revenue agent. In particular, the last point makes it important that I assure revenue agents’ anonymity. Therefore, I did not collect any identifying information and officially committed myself not to hand over non-aggregated data to the tax authority.

The questionnaire consists of two parts (see Appendix I): in the central part revenue agents report their last two audit cases. In the second part the revenue agents have to answer several socio-demographic questions, whereby some of them are introductory questions. Prior to final conduct of the survey the questionnaire was pre-tested by two revenue agents who did not participate in the final survey and one superior of a local tax audit department to ensure that all questions were understandable and that the questionnaire was feasible. On average, participants needed about thirty minutes to complete the questionnaire.

In Berlin, revenue agents completed 8,681 tax audits during 2010. Altogether, I received information about 1,244 audit cases.[124] From these cases I eliminated those that differed in their tax treatment from “normal” business income (e.g., nonprofit associations, charitable trust, agriculture and non-business income). In this way, I obtained 1,104 cases so that the sample represents rounded 12 % of all completed cases. Insofar as the cases do not or not completely contain information about time consumption, these cases are excluded; this consequently concerned 72 cases. Furthermore, with respect to equation (1), cases without outcome ($N = 0$) must be disregarded as well. According to these criteria, a total of 987 observations can be included in my estimation. Table 31 contrasts all registered businesses

[124] Some revenue agents voluntarily reported information about further cases in an additional questionnaire which was provided on request. Thus, I received slightly more than the expected 1,220 (= 610 × 2) cases.

and finished (revenue) tax audits in Germany and in Berlin for the year 2010 as well as the sample selection for my analyses, whereby their distribution in size categories is also shown.

Table 31: Sample Selection (Chapter IV)

The table shows the registered firms and completed tax audits in Germany and Berlin as well as the sample selection step by size categories (year 2010).

	Total	Micro	Small	Medium	Large
registered businesses in Germany 2010	8,571,515	6,391,015	1,189,727	799,135	191,638
finished tax audits in Germany 2010	203,903	108,086		55,315	40,502
registered businesses in Berlin 2010	412,546	330,123	49,015	26,635	6,773
finished tax audits in Berlin 2010	8,817	2,649	2,315	2,415	1,438
Original sample	1,244				
Less “non-business cases”	1,104	157	258	363	326
Less cases without time data	1,032	147	241	340	304
audits without outcome ($N = 0$)	45	17	8	14	6
audits with outcome ($N = N^*$)	987	130	233	326	298
Less cases without weighting data	959	127	228	318	286
Less cases with incomplete covariates	817	112	190	269	246

Another issue is that firms are not randomly selected for audits (see above section IV 2). But given that only the current risk set—where in all observations for these the initial event occurred—for one of the four different size categories is relevant, a weighting with respect to the whole population of companies in Berlin is not required. However, it is necessary to ensure that the selection of cases takes place randomly within the risk sets. On the one hand this will be achieved through the type of data collection. As all revenue agents ought to describe their last two cases, the selection procedure is random and sample selection bias does not exist in relation to the subjective case selection due to the participants.[125] On the other hand it is possible that the distribution is skewed within the risk sets with respect to the different types of audit cases. As described above (see Figure 6) completed audit cases can be distinguished in cases without outcome (U), with low outcome (L) and all the rest of them with outcome (R). The proportion of L and U is a pre-defined requirement and therefore has an impact on the risk set structure. The revenue service provided me with confidential data containing the average audit results of all cases completed in 2010. From these, the proportion of L and U within each size category can be derived and, furthermore, the probability that such a case was chosen from the population, grouped at different levels of

[125] The Heckman and Roy test is not required.

audit results.[126] The sample weights for my analysis are then calculated as the inverse of these probability values (Valliant et al. 2013). Unless otherwise stated the descriptive statistics as well as estimation results will be based on the weighted data set.

Finally, Table 31 shows the minus of observation with regard to incomplete covariates, whereby Table 52 in Appendix F contrasts this in detail for the unweighted and the weighted data. As far as two covariates are concerned (visible by *_NM*) I anticipate that not all cases with incomplete covariates must be excluded. Instead, it is possible to interpret these cases as a summarized control group relating to the base-level assumption for each investigation size category. This assumption is permitted because in the survey period an old orientation framework provided by the tax administration still affected the revenue departments for both covariates.[127]

5.2 Descriptive Statistics

5.2.1 Magnitude of Time

According to my model specification the survey contained on the one hand questions on the separate time consumption for audit and report, and on the other hand on the duration of the field audit from the first day of preparation to the submission of the report. The time consumption consists of the working time of a revenue agent and is measured in (working) days. However, the duration of an audit is classified and measured in months or years, respectively. The latter time specification is in my estimation model an independent variable and will be described below (see below subsection 5.2.2). The essential component of my model is that, in a departure from the standard hazard model, the dependent variable is not the log of the carry-over rate from one to another state but the log of the waiting/process time that passes until the event of interest occurs (in the AFT-metric). Given that time consumption is the central and key point, it is first necessary to consider more closely which assorted characteristics have occurred. Due to the different size categories and bearing in mind the related point that a non-binding timeframe of the tax authority relates to the sum of audit and report (total) time consumptions—notwithstanding the above consideration of whether the audit ends with or without outcome—it seems obvious to compare first the total time consumption in my survey. The median is most suitable for this because it is more robust toward outliers. The unweighted data produce for audits of micro firms a median of

[126] At this derivation were taken into account the six different size categories (Appendix H) with their confidential de minimis limits and with additional groups of outcome.

[127] The Edict of Functional Groups resulting from the Salary Act was valid in effect only until 1 July 2002, but it had already been affecting administrative decisions pertaining to these groups for around thirty years.

7 days, for small firms 8 days, for medium firms 10 days, and for large firms 20 days. The latter complies with the source quoted by *Strangmeier* (2000: 273). Table 32 shows the distribution of the total time consumption of unweighted data across the four size categories.

Table 32: Descriptive Statistics of Total Time Consumption (Unweighted Data)

The table shows descriptive statistics of the total time consumption across the size categories for the unweighted data.

Size	N	Incidence Rate	p25	p50	p75
Micro	130	0.12387	5.25	7	10
Small	233	0.11346	6	8	10
Medium	326	0.08600	8	10	13
Large	298	0.02650	14	20	30

Furthermore, Table 32 and Table 33 include the incidence rate which can be interpreted as completion velocity of tax audit. This is calculated from the number of subjects divided by time at risk, and the inverse represents the mean time at which one subject is at risk of an event of interest: audit, report, or total time, respectively. For auditees with large firms it follows from this that their tax audit consumes rounded 37.75 days on average altogether and thus exceeds even the 75th percentile clearly.[128] This already surmises that the distribution of time is positively skewed. However, it can be assumed that the skewness differs between the size categories.

According to the summary statistics of weighted data in Table 33 the average total time in the micro firm size category amounts to 8.5 days, ranging from 2 to 31 days. It exceeds the median of 8 days only negligibly; however, the tail is wide-ranging as the maximum length compared to the 75th percentile of 10 days is far outwards. In the small size category the situation is different. The average time amounts here to around 14.75 days, ranging from 4 to 30 days, and exceeds the median of 9 days in evidence so it may be assumed that the distribution is positively skewed. Yet a special aspect in this size category is that the maximum time consumption corresponds to the 75th percentile. This is because a few outliers with significant time consumption are observed. Only 22 cases have an unweighted consumption over 13.5 days, and only 4 over 25 days. Moreover, the average time consumption increases from rounded 8.75 days for the unweighted data to 14.75 days for weighted data. This means that not only are just a few outliers included, but also those whose weights strengthen this impact. Another striking effect is that the average report time consumption increases so significantly compared to the micro and medium size categories.

[128] All values in this chapter are rounded to quarters of a day because this is the unit of measurement in which the time shall be recorded as stipulated by the administrative department.

To this it will be examined below which covariates could be the causes. In the medium size category the average total time amount to rounded 14 days, ranging from 3 to 69 days, and considerably exceeds the median of 11.5 days, but not so extremely as is the case with the small size category, and not over the 75th percentile. In the large size category the average total time amounts to rounded 34.25 days, ranging from 3 to 500 days, and exceeds the median with 20 days and the 75th percentile with 32 days. Hence, for both the medium and the large size category, it can be assumed that the distribution is highly skewed.

It should be noted that a summation of the location parameter for audit and report time does not necessarily correspond to that of the total time. Different cases produce for various reasons different time consumptions. Therefore, it is indispensable for an estimation to split the total time consumption into its components.

Table 33: Descriptive Statistics of Audit, Report, and Total Time Consumption

The table shows the descriptive statistics of audit, report, and total time consumption which are measured in days (α=.25) across the size categories for the weighted data (unweighted N in parentheses).

		Weighted Data							
Size	Parameter	N	Mean	Incidence Rate	Min	Max	p25	p50	p75
Micro (130)	Audit Time	1,008	6.9171	0.14457	1	25	4	6	9
	Report Time		1.5933	0.62762	1	6	1	1	2
	Total Time		8.5104	0.11750	2	31	5	8	10
Small (233)	Audit Time	1,780	9.6484	0.10364	3	25	6	8	15
	Report Time		5.0902	0.19646	0.5	15	1	2	15
	Total Time		14.7386	0.06785	4	30	7	9	30
Medium (326)	Audit Time	2,307	11.8290	0.08454	2	65	7	9	15
	Report Time		2.2802	0.43855	0.5	7	1	2	3
	Total Time		14.1093	0.07088	3	69	8	11.5	17
Large (298)	Audit Time	1,871	28.7079	0.03483	2	350	12	18	30
	Report Time		5.4672	0.18291	1	200	2	3	5
	Total Time		34.1751	0.02926	3	500	14	20	32

5.2.2 Variables in the Equation

The transition from an initial state to a target state can be examined in a dynamic perspective based on the individual tendency toward a change in status (e.g., Yamaguchi 1990). This tendency, in turn, can be affected by different components, based on the parties involved or the audit itself. In order to capture the variables influencing this effect, the questionnaire also reveals information about specific characteristics of the auditee, the audit itself, and the auditor (qua revenue agent). The following descriptions mirror this division into three characteristic groups and are therefore separated according to the four size categories. It is expected that for several variables the percentage of observation depends on the size itself so that with growing size these are also either increased or decreased.

5.2.2.1 Characteristics of the Auditee

According to the derivation of the hypothesis *H1-1* I have selected the variable *LEGFORM*. It results from a closing range of different legal forms which I compressed to three main groups: individual entrepreneurs, partnerships, and corporations. Each group is characterized by consistent properties relating to ownership structure, exclusion of liability, and participation rights. Therefore, it is a factor variable with the aforementioned virtual dummy variables. Table 34 shows all individual dimensions separated for each size category. The proportion of *INDIVIDUAL ENTREPRENEUR* is highest in the micro size category with rounded 61.4 % and lowest in the large size category with just 8.4 %. The difference amounts to more or less 15 % within SMEs. For the two other legal forms the alteration of proportion is not so uniform. *PARTNERSHIP* achieves the highest proportion in the small size category with almost 39.1 %, followed by the large size category (almost 28.8 %), the medium size category (almost 19.7 %), and the micro size category with almost 13 %. In contrast, the proportion of *CORPORATION* is highest in the large size category with rounded 62.8 %, and hence it is in comparison with the *INDIVIDUAL ENTREPRENEUR* similar significantly, but in the opposite small size category. The base level in my estimations are the *INDIVIDUAL ENTREPRENEUR* for SMEs and the *CORPORATION* for large firms.

In addition due to the hypothesis *H1-2* I have added four different virtual dummy variables through the factor variable *DETINC* in the equation. The information corresponded to the ‘responds’ options in my questionnaire. As mentioned above, according to tax law a dichotomous classification exists, namely, *ACCOUNTING OF INCOME AND EXPENDITURE* which ranges from 59.6 % in the micro size category to 8.6 % in the large one, or balancing of accounts which ranges in sum from 40.4 % to 91.4 % in the same direction, respectively. Moreover, for the latter a distinction can be made between three types of declaration of taxable results. In the supposed simplest case the tax balance sheet corresponds to the trade balance sheet. This variant comprises the major share, fluctuating from almost 33 % to rounded 58.4 % of the whole weighted sample. Alternatively, the auditee prepares either a separate tax balance sheet besides the trade balance sheet, or submits only a reconciliation from the trade balance sheet to the taxable result (named *TRANSITION § 60 II EStDV*[129]). Whereas the latter is relevant in the medium (11.1 %) and the large size category (31.8 %), the other in the micro (5.6 %) and the large size category (31.8 %), otherwise both are only weakly pronounced (< 5 %).

Considering that there is both a causal relation and a statistical correlation—Cramér's V ranging from 0.347 (small size) to 0.534 (micro size)—between the legal form and the type of determination, I have incorporated within the equation their interaction as well. Appendix F shows from Table 57 to Table 60 the correlation and from Table 53 to Table 56 it can be seen which distributions occur between both variables, differentiated according to the different size categories.

Most of the individual entrepreneurs with micro firm size are not balanced, from the 61.4 % there are distributed to this only 4.6 % (this equates to 7.5 %). In the small size category the proportion shifts to almost 38.2 % because the share of *INDIVIDUAL ENTREPRENEUR* (46.9 %) is split into 29.5 % for non-balancing, 15.7 % for identical balance sheets, and 2.2 % for *INDEPENDENT TAX BALANCE SHEETs*. For the medium size category their proportion (30.3 %) is split into 20.3 % for non-balancing (this equates to 67.2 %), 9.5 % for identical balance sheets, and less than 1 %, and therefore negligible, for *INDEPENDENT TAX BALANCE SHEETs*. And lastly, in the large size category the proportion of *INDIVIDUAL ENTREPRENEUR* (8.4 %) is spread almost similarly across non-balancing and identical balance sheets.

According to both of the other legal forms this can be read by analogy. In so doing, striking distributions show on the one hand that partnerships are predominantly balanced with identical balance sheets (micro 64.4 %, small 77.4 %, medium 54 %, and large 57.8 %). The remaining part is allocated for the SMEs almost completely of non-balancing, and only in the large size category does a share of 4.8 % of 28.8 % distribute to the reconciliation (this equates to 16.5 %). On the other hand, for *CORPORATION* the distribution is slightly different: the type of identical balance sheets is also predominant (micro 78.2 %, small 80.3 %, medium 76.5 %, and large 41.8 %) but the remaining part is spread to *INDEPENDENT TAX BALANCE SHEET* (micro 14.6 %, medium 3.1 %, and large 15.6 %) and reconciliation (micro 7.3 %, small 19.7 %, medium 29.4 %, and large 43 %). The actual situation is reflected particularly with regard to the latter. With an increase in the firm size the probability of corresponding trade and tax balance sheets decreases so that the alternative

[129] German Income Tax Ordinance.

types are increased, whereby for the large size category the preparing of an *INDEPENDENT TAX BALANCE SHEET* produces a greater effort in terms of reconciliation so that the proportion of the latter is comprehensibly and significantly increased.

Overall I assume that the base level is non-balancing for the micro and small size categories, and I also assume identical balance sheets for the medium and large size categories.

Starting with the hypothesis *H1-3* my questionnaire contains several options to select the sector in which the auditee mainly practices its business activities. In accordance with the type of activity and the classification of parameters to determine the size categories (Appendix H) I have summarized the sectors to four main groups, namely, *PRODUCTION*, *TRADING*, *SERVICE*, and *UTILITIES*. All of them are virtual dummy variables of the factor variable *SECTORGR*. Table 34 shows that the proportion of *SERVICE* activities in all size categories range from almost 57.7 % to 75.6 %, taking into account that I consider this sector group as base level in all size categories. Otherwise the *PRODUCTION* sector ranges from 10 % to 21.3 %, the *TRADING* sector from almost 8 % to 15.8 %, and the *UTILITIES* sector from barely 0.1 % to 7.8 %. It should be noted here that in the following group of characteristics the sector groups resurface as an interaction effect with *SUSPECTED TAX EVASION*.

The last variable in this class is *GROUP* and follows from the hypothesis *H1-4*. It is also a dummy variable and takes a value of one if the auditee is an affiliated company. In the small size category their proportion is just nearly 1.6 %, in the micro size category in contrast 19.3 %, in the medium size category 36.3 %, and finally in the large size category 55.5 %. The questionnaire includes several control variables, in place to verify that the auditee is a true affiliated company. I asked the participants in detail if the auditee is a controlling or controlled enterprise, related to a national or multinational group, and a part of group taxation or not.

Table 34: Descriptive Statistics for Covariates relating to Characteristics of the Auditee

The table shows descriptive statistics for covariates relating to characteristics of the auditee. It is a parallel chart of weighted and unweighted data across the size categories.

		Weighted Data						Unweighted Data		
Parameter	Size	Obs	Weight	Mean	SD	Min	Max	Obs	Mean	SD
legform										
individual entrepreneur										
	micro	127	1,008	0.6141	0.4887	0	1	130	0.7769	0.4179
	small	228	1,780	0.4688	0.5001	0	1	233	0.7253	0.4473
	medium	318	2,307	0.3025	0.4601	0	1	326	0.4080	0.4922
	large	286	1,871	0.0840	0.2779	0	1	298	0.0839	0.2777
partnership										
	micro	127	1,008	0.1299	0.3375	0	1	130	0.0923	0.2906
	small	228	1,780	0.3909	0.4890	0	1	233	0.1588	0.3663
	medium	318	2,307	0.1967	0.3981	0	1	326	0.2423	0.4292
	large	286	1,871	0.2879	0.4536	0	1	298	0.2685	0.4439
corporation										
	micro	127	1,008	0.2561	0.4382	0	1	130	0.1308	0.3385
	small	228	1,780	0.1403	0.3480	0	1	233	0.1159	0.3208
	medium	318	2,307	0.5008	0.5008	0	1	326	0.3497	0.4776
	large	286	1,871	0.6281	0.4842	0	1	298	0.6477	0.4785
detinc										
accounting of income and expenditure										
	micro	127	1,008	0.5958	0.4927	0	1	130	0.7462	0.4369
	small	226	1,761	0.3732	0.4847	0	1	231	0.5498	0.4986
	medium	318	2,307	0.2700	0.4447	0	1	326	0.3221	0.4680
	large	284	1,862	0.0860	0.2809	0	1	296	0.0676	0.2514
trade balance sheet = tax balance sheet										
	micro	127	1,008	0.3297	0.4720	0	1	130	0.2154	0.4127
	small	226	1,761	0.5719	0.4959	0	1	231	0.4113	0.4931
	medium	318	2,307	0.5841	0.4937	0	1	326	0.5460	0.4986
	large	284	1,862	0.4740	0.5002	0	1	296	0.4088	0.4924
independent tax balance sheet										
	micro	127	1,008	0.0559	0.2306	0	1	130	0.0231	0.1507
	small	226	1,761	0.0273	0.1632	0	1	231	0.0303	0.1718
	medium	318	2,307	0.0345	0.1827	0	1	326	0.0429	0.2030
	large	284	1,862	0.1222	0.3281	0	1	296	0.1486	0.3563
transition § 60 II EStDV										

	micro	127	1,008	0.0186	0.1358	0	1	130	0.0154	0.1236
	small	226	1,761	0.0277	0.1644	0	1	231	0.0087	0.0928
	medium	318	2,307	0.1114	0.3151	0	1	326	0.0890	0.2851
	large	284	1,862	0.3177	0.4664	0	1	296	0.3750	0.4849
sectorgr										
production										
	micro	127	1,008	0.1459	0.3544	0	1	130	0.1154	0.3207
	small	228	1,780	0.1002	0.3009	0	1	233	0.1502	0.3581
	medium	317	2,278	0.2127	0.4099	0	1	325	0.1785	0.3835
	large	286	1,871	0.2077	0.4064	0	1	298	0.2483	0.4328
trading										
	micro	127	1,008	0.1575	0.3658	0	1	130	0.2077	0.4072
	small	228	1,780	0.1348	0.3423	0	1	233	0.2060	0.4053
	medium	317	2,278	0.0798	0.2715	0	1	325	0.1385	0.3459
	large	286	1,871	0.1550	0.3626	0	1	298	0.1644	0.3713
service										
	micro	127	1,008	0.6189	0.4876	0	1	130	0.6385	0.4823
	small	228	1,780	0.7555	0.4308	0	1	233	0.6094	0.4889
	medium	317	2,278	0.6584	0.4750	0	1	325	0.6369	0.4816
	large	286	1,871	0.5768	0.4949	0	1	298	0.5201	0.5004
utilities										
	micro	127	1,008	0.0777	0.2687	0	1	130	0.0385	0.1931
	small	228	1,780	0.0095	0.0973	0	1	233	0.0343	0.1825
	medium	317	2,278	0.0491	0.2164	0	1	325	0.0462	0.2101
	large	286	1,871	0.0605	0.2388	0	1	298	0.0671	0.2506
group										
	micro	127	1,008	0.1932	0.3964	0	1	130	0.0846	0.2794
	small	228	1,780	0.0157	0.1246	0	1	233	0.0258	0.1587
	medium	318	2,307	0.3626	0.4815	0	1	326	0.1871	0.3906
	large	286	1,871	0.5546	0.4979	0	1	298	0.5772	0.4948

5.2.2.2 Characteristics of the Audit

Besides the firm characteristics I also obtained several pieces of information about the audit itself, in particular issues pertaining to the process of audit, additional parties, outcome, and findings. The latter primarily conduce to control participants' precision. In view of the fact that in-depth information about the time consumption of single findings or main topics was unrecorded I could not include their explicit responses in my estimation equation, although it can be assumed with reasonable certainty that different audit issues produce varying time consumptions. So I envisage additional research opportunities that could be investigated through experiments with the collaboration of tax authorites. The situation is different with regard to variables which are based on objectively defined criteria, such as can be included in the equation. Table 35 shows their descriptive statistics.

First and foremost and in accordance with the hypothesis *H2-1* the questionnaire contains the question of whether the revenue agent suspected tax evasion by the auditee during the audit. The variable *EVASION* includes this information, and, in addition, I controlled it by means of information about the findings for which the agent had suspicions. The biggest percentage of weighted data is obtained in the medium size category with almost 25.4 %, followed by the micro size category with almost 15 %, the large size category with 11 %, and the small size category with 8.7 %. As already mentioned, I also control for the interaction effect between *EVASION* and the four different sector groups due to the assumption that certain business activities are more susceptible to tax evasion than others, even though correlation is not observed (Appendix F from Table 53 to Table 56).

In turn, Appendix F shows from Table 53 to Table 56 the distribution of both interaction variables. Above all, for the medium size category it appears that 70.8 % of all suspected evasion audits belong to the *SERVICE* sector (almost 18 % / 25.4 %), followed by the *PRODUCTION* with 23 %, the *TRADING* with 3.9 %, and the *UTILITIES* sector with 2.1 %. In view of these business activities this means that in almost 27.3 % of all audits in the *SERVICE* sector the revenue agent suspected tax evasion by the auditee. In the *PRODUCTION* sector it is the same in almost 27.5 % of all audits. In contrast, the proportion amounts in the *TRADING* sector to a rounded 7.4 %, and in the *UTILITIES* sector to 11 % of all audits.

In the micro size category the proportion of suspected tax evasion amounts to 77.1 % in the *SERVICE*, 16.5 % in the *PRODUCTION*, and 6.5 % in the *trading* sector. It appears with regard to the proportion of audits per sector in this size category that 18.7 % of all audits in the *SERVICE* sector, 16.9 % in the *PRODUCTION* sector, and 6.2 % in the *TRADING* sector are cases with suspected evasion. For the small size category the relations are the following: 69.1 % of all cases with suspected evasion are from the *service* sector, 27.7 % from the *TRADING* sector, and 3.2 % from the *UTILITIES* sector. In the *PRODUCTION* sector such cases do not occur. For the proportion of audits with suspected evasion per sector it results in almost 8 % in the *SERVICE* sector, 17.8 % in the *TRADING* sector, and 29.5 % in the *UTILITIES* sector. And finally, in the large size category the proportion of suspected tax evasion amounts to 81.4 % in the *SERVICE*, 5.9 % in the *PRODUCTION*, and 12.6 % in the *TRADING* sector. In the *UTILITIES* sector such cases do not occur. The results of audits with suspected evasion per sector amount to 15.5 % in the *service* sector, 3.1 % in the *PRODUCTION* sector, and almost 9 % in the *TRADING* sector.

The hypothesis *H2-2* refers to the place of a field audit. For this purpose the questionnaire contains a choice of possibilities which are all included as virtual dummy variables in the factor variable *PLACE*. The primary place according to the law is the *COMPANY OFFICE* and hence the base level. In this case the agent works usually on the company premises. With regard to the size categories it is observed that audits of small firms take place there only in 9.7 % of the cases. In contrast, for audits of medium firms it is ever 24 %, of micro firms 31.4 %, and of large firms 59.7 %. If the auditee does not have a suitable business or residence office for the revenue agent, German law stipulates that the audit is to be conducted in the local *TAX OFFICE*. This place of work is selected in 28.6 % of audits of micro size firms, in almost 43.4 % of small size firms, in 13.5 % of medium size firms, and only in 9.8 % of large size firms. Another place can be chosen if an exception is proposed. This will usually entail an audit in a *TAX ADVISER OFFICE*. It is obvious that for SMEs this exception plays an important role because audits are conducted there in up to 56 % of all cases (36.1 % micro size, 42.8 % small size, and 56.4 % medium size). For audits of large firms it still remains the place of work in 24.4 % of all cases. The last option in my questionnaire affects cases in which the revenue agent worked in multiple locations. This ranges from almost 3.9 % (micro size category) to 6.4 % (large size category).

The hypothesis *H2-3* concerns special features of an audit which differs from the usual case so that they can affect the time consumption. Therefore, the questionnaire reveals information about the first and the last audited fiscal year, whether it is a follow-up audit, and whether and which specialist revenue agents are consulted. Firstly, German statutory rules stipulate that, if the auditee is a large business, the current audit joins the previous audit in general. Besides, the last audit fiscal year should be present and the number of audited fiscal years at once should not be more than three fiscal years in audits of SMEs. Consequently, an audit can be comprised of more than three fiscal years for large auditees, and fewer than three years for SMEs. Thus I compute the number of audited fiscal years at once from the first and the last audited fiscal year and hereafter two dummy variables:[130] *FY_SHORT* if is lower than three and *FY_LONG* if it is more than three years. Table 35

[130] If a piece of information is missing I assume that the usual audit period (3 years) has been taken as a basis.

shows that this differentiation is important for the boundary size categories: in 23.3 % of all audits in the micro size category the number of audited fiscal years at once is lower than three, in 20.4 % of all audits in the large size category it is higher than three. In the other cases the proportion of these cases ranges from 1.9 % to almost 8.2 %.

Furthermore, my equation includes two additional dummy variables: in order to examine the effect of activities that arise if the current audit is a follow-up audit I use *FUPAUD*. With regard to the aforementioned rules it can be considered surprising that the proportion of follow-up audits is high not only in the large size category (almost 68.1 %), but also in the small (43.7 %) and medium size category (49.5 %), though the proportion is 15.3 % in the micro size category. The second variable is *SPECS*. This includes the information on whether another specialized revenue agent was consulted during the audit. In the large size category this is true in 28.9 % of all cases. In the other categories the proportion is lower (micro almost 5 %, small 3.2 %, and medium 14 %).

In the order of the audit process the questionnaire reveals additional information about the process itself. This are useful for examining the hypotheses *H2-5* and *H2-6*. On the one hand I include in my equation three dummy variables relating to possible steps the revenue agent can take to accelerate the audit process if he or she is of the opinion that the auditee is delaying the audit process. One possibility is that the revenue agent has granted only short deadlines for reply (*SHDEAD*). This measure is taken in a range from 31.2 % to 47.7 % of all cases, differentiated according to the four size categories. Another option is that the revenue agent threatens and determines a penalty for delay (*PANDELAY*). This measure was first introduced into German tax law roughly two years before the survey was conducted and is taken in a range from 2.2 % to 5.1 % along the same lines. It is notable that with an increase in firm size the proportion decreases. The third alternative is when the revenue agent threatens the auditee with a non-agreement at the end of the audit (*NONAGREE*). This measure is taken in a range from 9.7 % to 16.8 % along the same lines. Overall, it can be recognized that with increasing of the sanction their proportion of treatment decreases.

On the other hand I include in my equation a factor variable for the duration of the audit in total (hypothesis *H2-7*), from the first day of preparation to the date of submission of the report. Thereby I distinguish between two following characteristics: the variable *DURATION_MSM* is grouped into six virtual dummy variables for SMEs, and the variable *DURATION* is grouped into eight virtual dummy variables for the large size category. In detail Table 35 shows that for the micro size category audits survive mostly *4 to 6 months*

(40.7 %), followed by *1 TO 3 MONTHS* (25.3 %), and then *7 TO 9 MONTHS* (11 %); for the small size category most are *OVER 1 YEAR* (33.8 %), followed by *1 TO 3 MONTHS* (30.4 %), and then *4 TO 6 MONTHS* (22.1 %); for the medium size category most are *1 TO 3 MONTHS* (28.7 %), followed by *OVER 1 YEAR* (21.7 %), and then *4 TO 6 MONTHS* (21.2 %); lastly, for the large size category most audits survive *4 TO 6 MONTHS* (18.5 %), followed by *1 TO 3 MONTHS* (18 %), *7 TO 9 MONTHS* (16.7 %), *10 TO 12 MONTHS* (15.8 %), and then *1 TO 1.5 YEARS* (11 %). In contrast to the other size categories the latter spreads relatively smoothly over the different duration groups. For the base level I assume an increase of the duration over the size categories so that my assumption is for the micro and small firms a duration of *4 TO 6 MONTHS*, for the medium firms *7 TO 9 MONTHS*, and for the large firms *1 TO 1.5 YEARS*. From this step, I expect also to uncover the effect of disparate frequencies of occurrence between the different duration classes on time consumption.

By the end of an audit the findings of the revenue agent should be highlighted. In accordance with the hypothesis *H2-4* the questionnaire reveals information concerning the conversation between auditee, tax adviser, and revenue agent and whether the parties have reached a consensus about all findings. From these I accommodate in my equation for the latter the dummy variable *CONSEN* and for the first *DISC*, which includes the information on whether a final discussion took place or not. Table 35 shows that for both cases a large proportion of audits end with a final discussion, ranging from 62 % to 80.1 %, and consensus about all finding, ranging from 55.7 % to 78.7 %, in each case with regard to the weighted data across all size categories.

Lastly for this group of characteristics I compute, with a view to hypotheses *H2-8* and *H2-9*, three variables that include information about the outcome of an audit. The first distinction, appearing as the dummy variable *TRIFLINGAMOUNT*, concerns the delimitation between whether the case exceeds a specific de minimis limit or not. The proportion of minor cases of my observations ranges from 2.9 % in the medium size category to 13.3 % in the large size category. The other two variables refer to the results itself. The first, *LNDIFFPAY*, measures the difference between the logarithm of revealed additional tax payment and the logarithm of revealed tax refund on completion of the audit, the second, *LNLOSSREDUC*, by contrast, the difference between the logarithm of revealed loss reduction and the logarithm of revealed loss increase. For both, the logarithm is taken because all underlying parameters are highly positively skewed. After that the mean of

LNDIFFPAY increases from 6.031 in the micro size category to 9.166 in the large size category, whereas the mean of *LNLOSSREDUC* fluctuates from 1.793 to 3.332 over all size categories.

Table 35: Descriptive Statistics for Covariates relating to Characteristics of the Audit

The table shows descriptive statistics for covariates relating to characteristics of the audit. It is a parallel chart of weighted and unweighted data across the size categories.

		Weighted Data						Unweighted Data		
Parameter	Size	Obs	Weight	Mean	SD	Min	Max	Obs	Mean	SD
evasion										
	micro	124	979	0.1498	0.3584	0	1	127	0.1417	0.3502
	small	220	1,720	0.0871	0.2826	0	1	225	0.1067	0.3094
	medium	304	2,205	0.2535	0.4357	0	1	312	0.1314	0.3384
	large	276	1,830	0.1101	0.3136	0	1	286	0.0629	0.2433
place										
company office										
	micro	127	1,008	0.3137	0.4659	0	1	130	0.2308	0.4230
	small	228	1,780	0.0968	0.2964	0	1	233	0.1030	0.3046
	medium	317	2,304	0.2402	0.4279	0	1	325	0.2277	0.4200
	large	286	1,871	0.5973	0.4913	0	1	298	0.6678	0.4718
tax office										
	micro	127	1,008	0.2862	0.4538	0	1	130	0.3154	0.4665
	small	228	1,780	0.4338	0.4967	0	1	233	0.2876	0.4536
	medium	317	2,304	0.1346	0.3418	0	1	325	0.1508	0.3584
	large	286	1,871	0.0976	0.2973	0	1	298	0.0638	0.2447
tax adviser office										
	micro	127	1,008	0.3614	0.4823	0	1	130	0.3769	0.4865
	small	228	1,780	0.4276	0.4958	0	1	233	0.5494	0.4986
	medium	317	2,304	0.5643	0.4966	0	1	325	0.5508	0.4982
	large	286	1,871	0.2414	0.4287	0	1	298	0.2114	0.4090
multiple offices										
	micro	127	1,008	0.0387	0.1936	0	1	130	0.0769	0.2675
	small	228	1,780	0.0417	0.2003	0	1	233	0.0601	0.2382
	medium	317	2,304	0.0609	0.2395	0	1	325	0.0708	0.2568
	large	286	1,871	0.0637	0.2447	0	1	298	0.0570	0.2323
consen										
	micro	126	989	0.7216	0.4500	0	1	129	0.7287	0.4464
	small	220	1,760	0.5572	0.4979	0	1	225	0.7911	0.4074
	medium	314	2,264	0.7123	0.4534	0	1	322	0.7919	0.4066
	large	283	1,835	0.7872	0.4100	0	1	295	0.8373	0.3697
disc										
	micro	127	1,008	0.6203	0.4872	0	1	130	0.6154	0.4884
	small	227	1,777	0.8063	0.3960	0	1	232	0.7241	0.4479
	medium	315	2,273	0.6863	0.4647	0	1	323	0.6842	0.4656
	large	286	1,871	0.6832	0.4660	0	1	298	0.6779	0.4681
shdead										
	micro	127	1,008	0.4773	0.5015	0	1	130	0.5538	0.4990
	small	227	1,777	0.3121	0.4644	0	1	232	0.4526	0.4988
	medium	317	2,278	0.4270	0.4954	0	1	325	0.4554	0.4988
	large	286	1,871	0.3338	0.4724	0	1	298	0.2953	0.4569

pandelay										
	micro	127	1,008	0.0512	0.2214	0	1	130	0.0462	0.2106
	small	227	1,777	0.0459	0.2097	0	1	232	0.0431	0.2035
	medium	317	2,278	0.0348	0.1836	0	1	325	0.0492	0.2167
	large	286	1,871	0.0218	0.1462	0	1	298	0.0168	0.1287
nonagree										
	micro	127	1,008	0.1583	0.3664	0	1	130	0.1692	0.3764
	small	228	1,780	0.0972	0.2969	0	1	233	0.1631	0.3702
	medium	318	2,307	0.1680	0.3744	0	1	326	0.1442	0.3518
	large	286	1,871	0.1309	0.3379	0	1	298	0.1376	0.3450
trifling amount										
	micro	127	1,008	0.0554	0.2297	0	1	130	0.0923	0.2906
	small	228	1,780	0.0327	0.1782	0	1	233	0.0386	0.1931
	medium	318	2,307	0.0292	0.1686	0	1	326	0.0276	0.1641
	large	286	1,871	0.1333	0.3405	0	1	298	0.0570	0.2323
lndiffpay										
	micro	127	1,008	6.0309	5.3603	-7.7832	12.4292	130	7.4770	3.8022
	small	228	1,780	8.1183	6.1510	-9.3057	13.8155	233	8.6222	3.1493
	medium	318	2,307	8.3042	5.3154	-9.4727	14.1520	326	9.0550	3.2295
	large	286	1,871	9.1657	6.0278	-13.8155	17.5044	298	9.9290	5.1482
lnlossreduc										
	micro	127	1,008	3.1032	5.5285	-9.9035	15.6073	130	1.6366	4.2265
	small	228	1,780	1.7926	4.0165	0.0000	12.8992	233	0.9396	3.0243
	medium	318	2,307	3.3315	5.3894	0.0000	16.0127	326	1.5382	3.9195
	large	286	1,871	2.4454	6.4493	-16.5236	19.8070	298	1.6816	5.5216
fy_short										
	micro	127	1,008	0.2333	0.4246	0	1	130	0.2000	0.4015
	small	228	1,780	0.0760	0.2656	0	1	233	0.0858	0.2807
	medium	318	2,307	0.0816	0.2742	0	1	326	0.0460	0.2098
	large	286	1,871	0.0384	0.1924	0	1	298	0.0403	0.1969
fy_long										
	micro	127	1,008	0.0186	0.1358	0	1	130	0.0077	0.0877
	small	228	1,780	0.0760	0.2656	0	1	233	0.0386	0.1931
	medium	318	2,307	0.0364	0.1877	0	1	326	0.0429	0.2030
	large	286	1,871	0.2038	0.4035	0	1	298	0.2215	0.4159
fupaud										
	micro	124	995	0.1533	0.3617	0	1	127	0.1260	0.3331
	small	225	1,755	0.4365	0.4971	0	1	230	0.1957	0.3976
	medium	315	2,299	0.4208	0.4945	0	1	322	0.2578	0.4381
	large	286	1,871	0.6806	0.4671	0	1	298	0.7450	0.4366
duration_msm / duration										
up to 1 month										
	micro	127	1,008	0.0853	0.2805	0	1	130	0.1154	0.3207
	small	227	1,777	0.0263	0.1603	0	1	232	0.0560	0.2305
	medium	318	2,307	0.0432	0.2036	0	1	326	0.0552	0.2288
	large	285	1,867	0.0121	0.1097	0	1	297	0.0135	0.1155
1 to 3 months										
	micro	127	1,008	0.2525	0.4362	0	1	130	0.3231	0.4695
	small	227	1,777	0.3035	0.4608	0	1	232	0.4267	0.4957
	medium	318	2,307	0.2868	0.4530	0	1	326	0.3405	0.4746
	large	285	1,867	0.1796	0.3845	0	1	297	0.1684	0.3748
4 to 6 months										
	micro	127	1,008	0.4067	0.4932	0	1	130	0.3308	0.4723
	small	227	1,777	0.2208	0.4157	0	1	232	0.2802	0.4501

		medium	318	2,307	0.2118	0.4092	0	1	326	0.2699	0.4446
		large	285	1,867	0.1848	0.3888	0	1	297	0.2222	0.4164
	7 to 9 months										
		micro	127	1,008	0.1099	0.3141	0	1	130	0.1000	0.3012
		small	227	1,777	0.0478	0.2137	0	1	232	0.0733	0.2612
		medium	318	2,307	0.1555	0.3629	0	1	326	0.1687	0.3751
		large	285	1,867	0.1666	0.3733	0	1	297	0.1448	0.3525
	10 to 12 months										
		micro	127	1,008	0.0697	0.2557	0	1	130	0.0769	0.2675
		small	227	1,777	0.0637	0.2447	0	1	232	0.0776	0.2681
		medium	318	2,307	0.0861	0.2810	0	1	326	0.0828	0.2760
		large	285	1,867	0.1580	0.3654	0	1	297	0.1212	0.3269
	over 1 year										
		micro	127	1,008	0.0758	0.2658	0	1	130	0.0538	0.2266
		small	227	1,777	0.3381	0.4741	0	1	232	0.0862	0.2813
		medium	318	2,307	0.2166	0.4126	0	1	326	0.0828	0.2760
	/ 1 to 1.5 years	large	285	1,867	0.1096	0.3129	0	1	297	0.1111	0.3148
	/ 1.5 to 2 years	large	285	1,867	0.0824	0.2754	0	1	297	0.0943	0.2927
	/ over 2 years	large	285	1,867	0.1069	0.3095	0	1	297	0.1246	0.3308
specs											
		micro	127	1,008	0.0496	0.2181	0	1	130	0.0385	0.1931
		small	228	1,780	0.0324	0.1774	0	1	232	0.0302	0.1714
		medium	318	2,307	0.1400	0.3475	0	1	326	0.0828	0.2760
		large	286	1,871	0.2890	0.4541	0	1	298	0.3054	0.4613

5.2.2.3 Characteristics of the Auditor

According to the hypotheses from *H3-1* to *H3-6* the questionnaire reveals several items of information about personal characteristics of the revenue agent. Table shows the descriptive statistics. At first, I include in my estimation equation the factor variable *AGENTY* which differs between five time-classes to provide information on how long the revenue agent has already been conducting field audits. All classes are addressed as virtual dummy variables. In the micro size category the highest proportion is observed in the third experience class *10 TO 15* with almost 32.5 %, closely followed by the first class *UP TO 5* with 31.2 %, and the others with a range from 8.8 % to 12 %. I assume the third class as the base level for this size category because such cases are often audited by experienced revenue agents from salary grades without the need for having a general qualification for university entrance. In the small size category the highest proportion is in the second class *5 TO 10* with 35.3 %, followed by the first class with 24.4 %, the third class with 20.8 %, and the other with 8.2 % (fourth), 11.2 % (fifth), respectively. This size category is often the first to be encountered by a revenue agent so that I assume the first class as the base level. In the medium size category the highest proportion is, in turn, the third class with almost 36 %. The proportions of revenue agents in the other experience classes are 19.3 % (first class), 11.7 % (second class), 16.9 % (fourth class), and 16.1 % (fifth class). Due to the—in reality obsolete—Edict of Functional Groups (see footnote 127) experience and firm size as well as the grade of salary being more or less affiliated with each other, I again assume the third class as the base level. This corresponds with my assumption for the micro size category. In the large size category the distribution is concentrated on the higher experience classes, in detail, from the first class to the last 2.3 %, 14 %, almost 30.6 %, 25 %, and 28.1 %. For the base level I continue my aforementioned approach and choose the fourth class. As a result it is very possible to control for the previous and following experience classes.

As reviewed, the age of a revenue agent usually affects his or her performance. So the questionnaire contains five possible options for the participants to specify their age based on age groups. All of them I have computed as virtual dummy variables of the factor variable *AGEGR*. A query of the exact age was not allowed for me because there were concerns that a few of the participants could be identified due to this information being potentially cross-referenced with other responses. The bulk of revenue agents are members of the third age group (i.e., aged between 40 and 50), thus conforming to the average age (48.4) of employees in the investigated administration (PStat 2011) so that I assume this class to be the base level. Table 36 shows the remaining proportions of age groups per size category. It should be noted that the proportion of participants is less than 7 % in the boundary groups, at which the highest proportion obtains in the age group *OVER 60* for the large size category.

In accordance with the rules an employee should be not changed into the audit department if he or she is older than 45. Thereby, an agent's experience and age are correlated so that a high Cramér's V value is to be expected. This in fact ranges from 0.347 to 0.5 (see Appendix F from Table 57 to Table 60). Therefore, I include in my estimation equation an additional interaction effect of both (see ibid. from Table 53 to Table 56 and hereinafter in detail).[131] Because of this I can also control for an early or late change into the agent's department.

In the micro size category the share of agents with low experience in the field (31.2 %) is spread into 42.8 % at the age of *30 TO 40* (13.3 %), 44 % at the age of *40 TO 50* (13.7 %), and only 12.1 % at the age of *20 TO 30* (3.8 %). The latter is dropped in the second step of experience (12 %) and the second age group obtains with 68.4 % (8.2 %) a significantly greater proportion than the third age group with 32.7 % (3.9 %). In the next experience step,

[131] Due to the loss of scattered uncompleted covariates the sum of proportions in Appendix F from Table 53 to Table 56 is not exactly identical to the individual proportions in Table 33.

this is the base level (32.5 %), all but one age group are represented, at which a high concentration is observed in the age groups *40 TO 50* with 36.4 % and *50 TO 60* with 36.6 %. Then follow the age group *30 TO 40* with 19.4 % and *OVER 60* with 8.7 %. The share of agents with experience of *15 TO 20* years (15.5 %) is, in turn, spread in only two age groups, firstly the base level with 69.5 % (10.8 %), and secondly the age group *50 TO 60* with 29.3 % (4.5 %). In the last experience class (8.8 %) the highest proportion is contributed by the age group *50 TO 60* with 78.8 % (6.9 %), followed by the group *OVER 60* with 18.4 % (1.6 %) and *40 TO 50* with 4 % (0.4 %).

According to the proportions these can be distinguished in the other size categories. In what follows only the pronounced distributions shall be described. This comprises for the small size category the proportions in the early experience classes. The share *UP TO 5* (24.4 %) is spread in particular across the age groups *30 TO 40* with 41.4 % (10.1 %) and *40 TO 50* with 45.6 % (11.1 %). In the next step *5 TO 10* the age group *30 TO 40* already combines to 87.3 % (=0.308/0.353), the remaining part being dropped to the age group *40 TO 50*. For the following steps it can be shown that each proportion is essentially spread to the same age groups, with the exception of the last step because the age group *OVER 60* already constitutes 44.6 % (=0.05/0.112). In the medium size category it can be seen that in the first experience class 26.2 % of the revenue agents are under 30 years of age (=0.05/0.193) whereas the highest proportion is spread to the age group *40 TO 50* with 59.9 % (=0.116/0.193). The following two experience steps are dominated by the age groups *30 TO 40* and *40 TO 50* with together over 90 %. The same applies for the step *15 TO 20* years; however, it is changed to the age groups *40 TO 50* and *50 TO 60*. In the step *OVER 20* years the age group *50 TO 60* is most exclusively represented with 85.6 %, *OVER 60* representing only 9.6 %. Lastly, in the large size category most of the revenue agents have an experience above 10 years, at which the third step has a share of 70.9 % revenue agents between *40 TO 50*. Revenue agents from neighboring age groups are in 17.6 % of instances younger and in 9 % older. In the next step the proportion amounts to 59.5 % for the age group *30 TO 40* and 39.2 % for the group *40 TO 50*. If the experience is *OVER 20* years the share of 28.1 % is spread into 55.3 % for the age group *50 TO 60* and 22.4 % or 23.6 % for the bordering groups.

On this point, therefore, the conclusion has to be that the distribution of experience and age differs between the size categories and, although the strong influence of the base level age group is perceived, it cannot be concluded that both alone are relevant for the allocation formula of audit cases onto revenue agents. In turn, in respect of the Edict of Functional

Groups resulting from the Salary Act (see above footnote 127) the salary grade of a revenue agent and his or her usual field of work are issues so that I include both factors, as well as their interaction, in my estimation equation.

A revenue agent belongs to one of two different careers which can distinguished by means of grades. The factor variable *GRADE_NM* includes all grades—partly combined—as virtual dummy variables. Those on the first career path are not required to have a general qualification for university entrance. Employees are started off after a two-year training in this path with grade A6. Those who have proven especially competent in practical work over many years get the chance to change in the agent department. These revenue agents are salaried usually and in the sample with grade A8 or A9s or rather A9z. However, they shall be employed as agents according to the law only in exceptional circumstances so that their share is relatively small. Furthermore, according to the Edict of Functional Groups (see above footnote 127) such revenue agents may only audit micro- or small-sized firms. As shown in Table 36 the proportions of grades *A8* and *A9s/A9z* are very small, with the latter grade constituting the majority, and concentrated in the micro and small size categories. I assume the grades *A9s/A9z*, so-called "micro-entity revenue agents", as the base level for the micro size category, although only 9.1 % of all cases in this category are audited by them. The largest proportion is represented by the grades *A9/A10* with 50.9 %, followed by *A11* with 23.8 %, and *A12/A13s* with 12.6 %.

In contrast, employees with a general qualification for university entrance are started after a three-year dual curriculum. These achieve a diploma (bachelor degree) upon successful graduation and the first salary grade is then A9. Ideally, a change into an agent department should not occur immediately. The change can be done in principle in each grade. Due to the increase in difficulty levels it occurs up to grade A10 generally and, more rarely, at grade A11. At the beginning of working as a revenue agent all beginners have to pass a special training course in theory and practice. Since 2003/2004 the training concept has lasted five years overall in the geographical area covered by the present study.[132] According to the job descriptions I have combined the different grades of the second career. Taking into account the remaining rules of the Edict of Functional Groups—which are still to a large extent followed—for the deployment of different grades in audits depending on firm size, I have

[132] The individual elements of this concept were well-established at the time of implementing this concept. However, the new feature is the central management of the revenue authority training institute. The minimum period of vocational adjustment amounts according to the law to six months.

defined as base levels the grades *A9/A10* for the small size category, *A11* for the medium size category, and *A12/A13s* for the large size category.

In the small size category the proportion of the base level amounts to almost 42.3 %. The grade *A11* represents 44.1 % of the weighted data, *A12/A13s* only 9.1 %. For the next size categories Table 36 shows that the base levels represent in each case the highest proportion; in the medium size category it is grade *A11* with 43.1 %, followed by *A9/A10* with 31.1 % and *A12/A13s* with 20.4 %, in the large size category the highest proportion is grade *A12/A13s* with 50 %, followed by *A11* with 36.6 % and *A9/A10* with only 9.6 %. The virtual dummy variable *ITEM-NONRESPONSE* represents in each size category only a very small proportion.

In addition to this the Edict of Functional Groups suggests the need to control for the main field of work. Thus, due to the grade each revenue agent occupies a specific position, making it necessary to control whether the revenue agent has been instructed in each case in accordance with this position. Therefore, I include in my equation on the one hand the factor variable *FOW_NM* with four virtual dummy variables and on the other hand their interaction effect with the virtual dummy variables of *GRADE_NM*. For the latter my assumption corresponds to the high values of Cramér's V, ranging from 0.594 to 0.732 (see Appendix F from Table 57 to Table 60).

The first dummy variable of *FOW_NM* is *MICRO/SMALL/MEDIUM ENTERPRISES* and it represents SMEs so that this is also the base level for the corresponding size categories. Table 36 shows that for the vast majority of the cases the participants examine according to their main field of work. The proportion ranges from 48.3 % in the medium size category to 86.7 % in the micro size category. A share of 17.4 % examine auditees from the large size category instead. In contrast, revenue agents who normally examine *LARGE ENTERPRISES* were only instructed to audit large firms in 40.2 % of these. Looking at the revenue agents of medium firms, 31.6 % declare that they usually examine large enterprises, just like 34.4 % of revenue agents of small firms. That is rather an improper deployment. The third dummy variable *CORPORATE GROUPS* reflects a concentration of revenue agents of medium (16 %) and large firms (38.5 %) as well as of micro firms (6 %). A clear assertion is not possible from these data because the increased level of complexity due to the affiliation of the auditee is independent of the size category. Relating to a proper deployment it is necessary to consider the interaction effect with other than grade *A12/A13s*. The virtual dummy variable *ITEM-NONRESPONSE* represents in each size category, in turn, only a very small proportion.

Table 53 in Appendix F shows for the micro size category how the proportions of the different grades distribute to the main field of work of revenue agents. Agents who are salaried with *A8*, *A9s/A9z*, or *A9/A10* usually examine SMEs; only from the latter a negligible share of 0.6 % examine *CORPORATE GROUPS*. In grade *A11* the proportion of SME-auditors amounts to 77.9 % (=0.185/0.238). The remaining proportions are spread over *LARGE ENTERPRISES* (13.3 %) and *CORPORATE GROUPS* (8.8 %). Unexpectedly, from the proportion of revenue agents who are salaried at the *A12/13s* grade, 55.7 % (=0.07/0.126) are dropped to SMEs with the remainder going to *LARGE ENTERPRISES* (14.7 %) and *CORPORATE GROUPS* (29.6 %).

For the small size category Table 54 in Appendix F presents the allocations. In detail, as before the revenue agents with grade *A8* or *A9s/9z* usually examine SMEs and with grade *A9/A10* almost completely (96.6 %). In grade *A11* the distribution is spread in other ways: only 28.5 % declare that they usually audit SMEs, as against 70.1 % usually auditing *LARGE ENTERPRISES* and 1.4 % *CORPORATE GROUPS*. For the grade *A12/A13s* the unexpected result as before still increases: 75.6 % usually examine SMEs, as against only 22.9 % *LARGE ENTERPRISES* and a mere 1.6 % examining *CORPORATE GROUPS*.

Accordingly, Table 55 in Appendix F presents the results for the medium size category. Likewise, in grade *A8* and *A9s/A9z* the revenue agents usually examine SMEs but in grade *A9/A10*, however, only 66.7 % of them, while the others declare *LARGE ENTERPRISES* (33.3 %). Agents with grade *A11* declare in 56.6 % of the cases a usual auditing of SMEs, in 33.1 % of *LARGE ENTERPRISES*, and in 10.3 % of *CORPORATE GROUPS*. With grade *A12/A13s* the proportion of SMEs decreases to 10 %, while the proportion of *LARGE ENTERPRISES* increases to 33.3 % and of *CORPORATE GROUPS* to 56.6 %.

Lastly, Table 56 in Appendix F presents the distribution of cases in the large size category. The grade *A8* is not observed and grade *A9s/A9z* is negligible, so for the sake of completeness the latter is dropped to SMEs. Agents with grade *A9/A10* declare that they usually examine SMEs in 89.1 % of the cases, while the remainder is spread between *LARGE ENTERPRISES* (6.2 %) and *CORPORATE GROUPS* (4.6 %). In grade *A11* the proportion of SMEs decreases to 19.9 %, whereas the proportion of *LARGE ENTERPRISES* significantly increases to 68.3 % and of *CORPORATE GROUPS* to 11.8 %. With grade *A12/A13s* the proportion of SMEs decreases compared to the previous size category to 2.8 % and of *LARGE ENTERPRISES* to 29.6 %, while the proportion of *CORPORATE GROUPS* increases to 67.6 %.

Finally, I control in my estimation equation for gender based on the variable *SEX*. The proportion of men ranges from 43.9 % in the micro size category to 63 % in the large size category.

Table 36: Descriptive Statistics for Covariates relating to Characteristics of the Auditor

The table shows descriptive statistics for covariates relating to characteristics of the auditor. It is a parallel chart of weighted and unweighted data across the size categories.

		Weighted Data						Unweighted Data		
Parameter	Size	Obs	Weight	Mean	SD	Min	Max	Obs	Mean	SD
agenty										
up to 5										
	micro	118	918	0.3119	0.4653	0	1	121	0.2727	0.4472
	small	207	1,702	0.2443	0.4307	0	1	212	0.2642	0.4419
	medium	289	2,061	0.1930	0.3954	0	1	297	0.1582	0.3656
	large	261	1,721	0.0232	0.1509	0	1	273	0.0293	0.1690
5 to 10										
	micro	118	918	0.1201	0.3264	0	1	121	0.1074	0.3110
	small	207	1,702	0.3532	0.4791	0	1	212	0.1557	0.3634
	medium	289	2,061	0.1172	0.3222	0	1	297	0.1212	0.3269
	large	261	1,721	0.1403	0.3480	0	1	273	0.1392	0.3468
10 to 15										
	micro	118	918	0.3249	0.4703	0	1	121	0.3884	0.4894
	small	207	1,702	0.2082	0.4070	0	1	212	0.2830	0.4515
	medium	289	2,061	0.3598	0.4808	0	1	297	0.3805	0.4863
	large	261	1,721	0.3057	0.4616	0	1	273	0.3443	0.4760
15 to 20										
	micro	118	918	0.1550	0.3634	0	1	121	0.1405	0.3489
	small	207	1,702	0.0823	0.2755	0	1	212	0.1509	0.3588
	medium	289	2,061	0.1689	0.3753	0	1	297	0.1717	0.3778
	large	261	1,721	0.2500	0.4338	0	1	273	0.1978	0.3991
over 20										
	micro	118	918	0.0881	0.2846	0	1	121	0.0909	0.2887
	small	207	1,702	0.1120	0.3161	0	1	212	0.1462	0.3542
	medium	289	2,061	0.1611	0.3682	0	1	297	0.1684	0.3748
	large	261	1,721	0.2808	0.4502	0	1	273	0.2894	0.4543
agegr										
20 to 30										
	micro	120	965	0.0354	0.1857	0	1	123	0.0407	0.1983
	small	221	1,759	0.0305	0.1722	0	1	226	0.0177	0.1321
	medium	307	2,253	0.0503	0.2189	0	1	315	0.0381	0.1917
	large	272	1,764	0.0104	0.1014	0	1	284	0.0141	0.1180
30 to 40										
	micro	120	965	0.2620	0.4416	0	1	123	0.2276	0.4210
	small	221	1,759	0.4178	0.4943	0	1	226	0.2478	0.4327

		medium	307	2,253	0.1999	0.4006	0	1	315	0.1714	0.3775
		large	272	1,764	0.1435	0.3513	0	1	284	0.1620	0.3691
	40 to 50										
		micro	120	965	0.4407	0.4985	0	1	123	0.4228	0.4960
		small	221	1,759	0.3692	0.4837	0	1	226	0.5044	0.5011
		medium	307	2,253	0.4466	0.4980	0	1	315	0.4762	0.5002
		large	272	1,764	0.4989	0.5009	0	1	284	0.4542	0.4988
	50 to 60										
		micro	120	965	0.2201	0.4161	0	1	123	0.2683	0.4449
		small	221	1,759	0.1309	0.3381	0	1	226	0.2080	0.4068
		medium	307	2,253	0.2839	0.4516	0	1	315	0.2857	0.4525
		large	272	1,764	0.2774	0.4486	0	1	284	0.2817	0.4506
	over 60										
		micro	120	965	0.0418	0.2009	0	1	123	0.0407	0.1983
		small	221	1,759	0.0517	0.2218	0	1	226	0.0221	0.1474
		medium	307	2,253	0.0193	0.1378	0	1	315	0.0286	0.1669
		large	272	1,764	0.0697	0.2552	0	1	284	0.0880	0.2838
grade_nm											
	A8										
		micro	127	1,008	0.0146	0.1203	0	1	130	0.0231	0.1507
		small	228	1,780	0.0178	0.1327	0	1	233	0.0258	0.1587
		medium	318	2,307	0.0074	0.0858	0	1	326	0.0123	0.1103
		large	286	1,871	0.0000	0.0000	0	0	298	0.0000	0.0000
	A9s/A9z										
		micro	127	1,008	0.0907	0.2883	0	1	130	0.1231	0.3298
		small	228	1,780	0.0192	0.1377	0	1	233	0.0472	0.2125
		medium	318	2,307	0.0044	0.0664	0	1	326	0.0123	0.1103
		large	286	1,871	0.0030	0.0545	0	1	298	0.0034	0.0579
	A9/A10										
		micro	127	1,008	0.5089	0.5019	0	1	130	0.5308	0.5010
		small	228	1,780	0.4226	0.4951	0	1	233	0.5107	0.5010
		medium	318	2,307	0.3107	0.4635	0	1	326	0.2883	0.4537
		large	286	1,871	0.0955	0.2944	0	1	298	0.0906	0.2875
	A11										
		micro	127	1,008	0.2379	0.4275	0	1	130	0.2462	0.4324
		small	228	1,780	0.4407	0.4976	0	1	233	0.2918	0.4556
		medium	318	2,307	0.4310	0.4960	0	1	326	0.4387	0.4970
		large	286	1,871	0.3629	0.4817	0	1	298	0.3624	0.4815
	A12/A13s										
		micro	127	1,008	0.1262	0.3334	0	1	130	0.0615	0.2412
		small	228	1,780	0.0901	0.2869	0	1	233	0.0944	0.2930
		medium	318	2,307	0.2040	0.4036	0	1	326	0.2025	0.4024
		large	286	1,871	0.5001	0.5009	0	1	298	0.5067	0.5008
	item-nonresponse										
		micro	127	1,008	0.0218	0.1465	0	1	130	0.0154	0.1236
		small	228	1,780	0.0095	0.0973	0	1	233	0.0300	0.1711
		medium	318	2,307	0.0426	0.2023	0	1	326	0.0460	0.2098
		large	286	1,871	0.0385	0.1928	0	1	298	0.0369	0.1889
fow_nm											
	micro/small/medium enterprises										
		micro	127	1,008	0.8666	0.3413	0	1	130	0.9154	0.2794
		small	228	1,780	0.6389	0.4814	0	1	233	0.8369	0.3702
		medium	318	2,307	0.4833	0.5005	0	1	326	0.5920	0.4922

large	286	1,871	0.1742	0.3799	0	1	298	0.1577	0.3651
large enterprises									
micro	127	1,008	0.0503	0.2195	0	1	130	0.0385	0.1931
small	228	1,780	0.3440	0.4761	0	1	233	0.1159	0.3208
medium	318	2,307	0.3155	0.4654	0	1	326	0.2607	0.4397
large	286	1,871	0.4020	0.4912	0	1	298	0.4094	0.4925
corporate groups									
micro	127	1,008	0.0613	0.2407	0	1	130	0.0308	0.1734
small	228	1,780	0.0089	0.0943	0	1	233	0.0215	0.1452
medium	318	2,307	0.1597	0.3669	0	1	326	0.1043	0.3061
large	286	1,871	0.3853	0.4875	0	1	298	0.3960	0.4899
item-nonresponse									
micro	127	1,008	0.0218	0.1465	0	1	130	0.0154	0.1236
small	228	1,780	0.0082	0.0902	0	1	233	0.0258	0.1587
medium	318	2,307	0.0415	0.1998	0	1	326	0.0429	0.2030
large	286	1,871	0.0385	0.1928	0	1	298	0.0369	0.1889
sex									
micro	125	1,002	0.4387	0.4982	0	1	128	0.4375	0.4980
small	224	1,770	0.5676	0.4965	0	1	229	0.4323	0.4965
medium	307	2,244	0.4626	0.4994	0	1	315	0.4698	0.4999
large	278	1,829	0.6302	0.4836	0	1	290	0.6138	0.4877

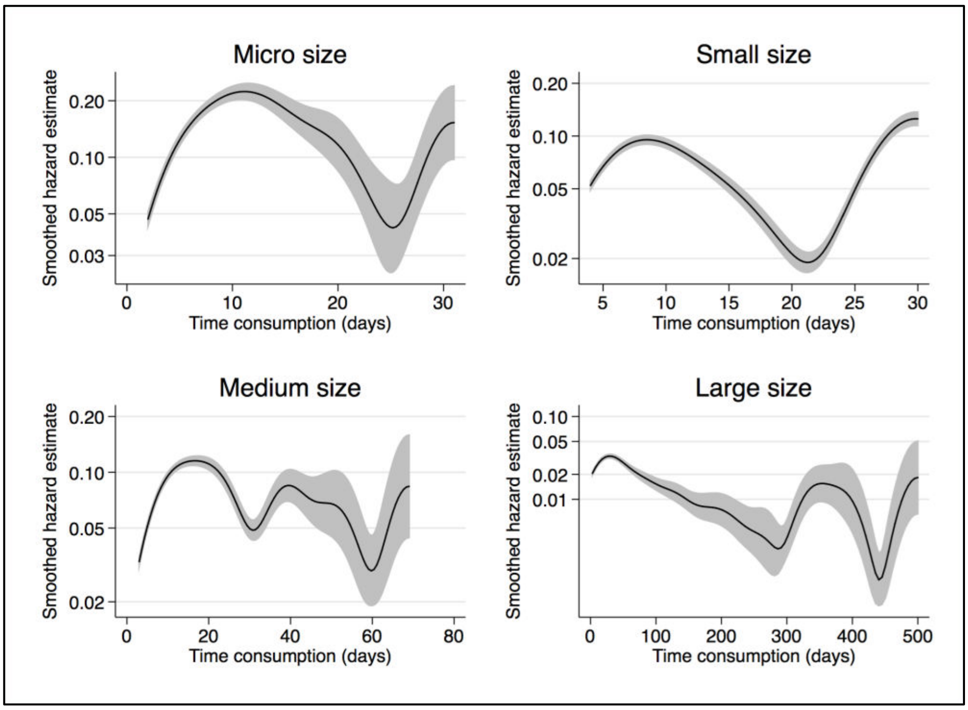
6 Results

The starting points of the analysis are multilevel mixed-effect parametric survival models. Thereby the regression equations from each size category are being based on the Weibull, log-logistic, or lognormal distribution, respectively, and include the variables of time consumption (audit and report time) in single and squared form (see above equation 10). The expected bell-shaped transition rate is proven as the audit (report) single time variables have a positive and significant effect in the audit (report) phase whereas their squared values have a negative and likewise significant effect.[133]

A differentiation is already taking place according to the four different size categories as it is more than likely that presumed time requirements are applied for each size category separately. With changes of size the influencing factors affect the time consumption in a different manner. This is confirmed by Figure 8 which illustrates, for each size category based on the weighted data and in relation to the total time consumption, a graph of a smoothed hazard estimate, by plotting on a log scale and inclusive of confidence intervals (gray-shaded).

[133] The extracts of the time variables are summarized in a tabular overview in Appendix E Table 50.

Figure 8: Smoothed Hazard Estimates of Total Time Consumption (Equation of Weighted Data)



These hazard functions represent the size-specific averaged hazard rate and stand for the instantaneous chance of the event "termination of the audit (total time)" per unit of time, given that the termination has not yet occurred.[134] The reciprocal of the hazard represents how long an auditee still has to wait for completion of the audit at the current hazard rate level. In all size categories the hazard initially increases up to a peak and subsequently decreases. Of particular interest is the finding that in the medium and large size category a second wave follows before the last non-interpretable climbs are arisen.

It should be noted that a differentiated consideration has been used, since the possibility cannot be ruled out that different impacts have canceled each other out within the total audit process. Hence the audit phase and the report phase are viewed separately. The results are then compared with the total time consumption. At the outset, it will be illustrated graphically with the aid of the special feature in the large firm size category. This is an open class with three subcategories.[135]

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[134] The hazard function, $h(t)$, is a derivation of the cumulated hazard function, $H(t)$. Since the latter is an increasing step function, a kernel smoother is needed; here it is the gaussian kernel. However, boundary bias and poor estimates in the range should be noted when only a few audit cases remain (Cleves et al. 2016). Comparative plots of individual variables (not printed) confirm the above assumption of non-proportional hazards.

[135] See above section IV 2 and Appendix H.

Figure 9: Hazard Functions of Audit Time Consumption (Equation of Weighted Data without Covariates and Separated according to the Different Large Size Subcategories L3, L2, and L1)

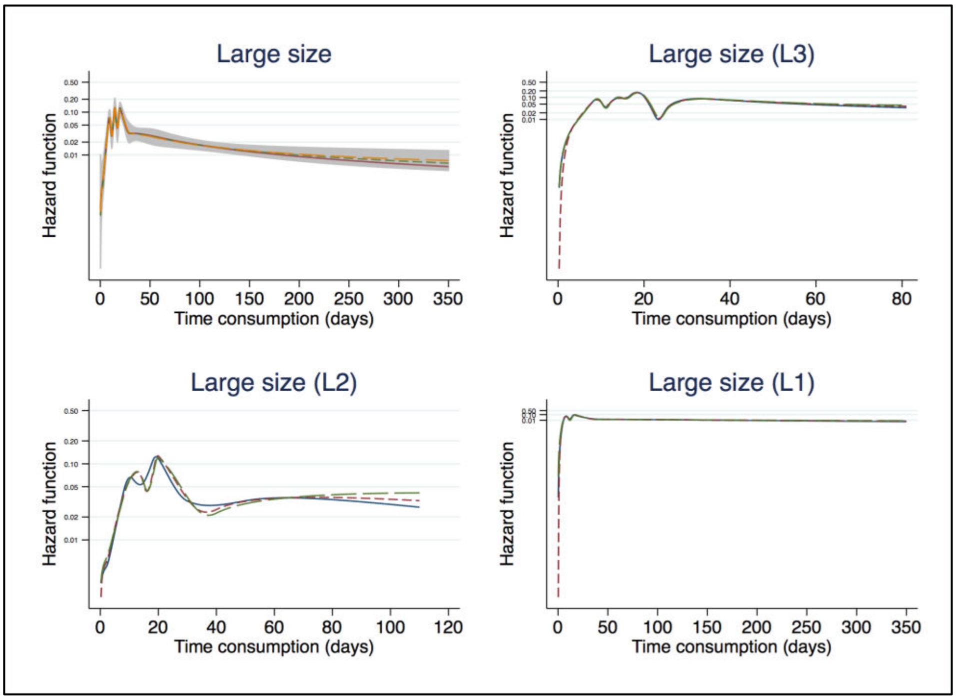

Figure 9 presents for the entire category and each subcategory the hazard function of the audit time consumption, this being the total time reduced by time to write the audit report, with the best fitted odds (solid line), normal (long dashed line) and hazard (normal dashed line) model each.[136] The equation is based on weighted data and disregards all covariates, but includes the restricted cubic spline function (see above equation 24).

Due to the cubic splines the curve progression follows the specific hazards more closely. Besides, in the subcategory L2 it can be seen that the different models are fitted in part differently. Consequently, comparative analyses take place within the three models (PO = odds, probit = normal, PH = hazard) to find the one with the best overall fit, and between the models to find out the best fitted model, in each case per size category. But this is not enough to obtain robust results. As mentioned above, effects are classified as significant if they stay approximately constantly or increase in strength with an increase in model fitting. Hence occasional effects in particular models are not regarded as significant. Weak significance applies in cases where the fitting of the models increases, whereas the significance of the effects decreases. Thus the results of all three models are represented in each of the three time periods—audit, report and total—and for each size category (3 x 3 x 4), considered on the above basis of a segmentation of characteristics of auditee, audit, and auditor. Since in

[136] The hazard model includes in the main category the confidence interval (gray-shaded).

this study no censoring occurs, it is not necessary to display the whole results. The derived coefficients (*dxb*) comply with the coefficients (*xb*) so that only the latter are issued in exponentiated form. The first output of each size category includes further the coefficients of the cubic spline function knots—demarcated in the subdivision *dxb*—and the additional information, especially the selection criteria AIC and BIC. An interesting pattern arises from a comparison of the ranking in all size categories. Table 37 shows that the ranking of best fitted models is equal for the small and medium size category in all time periods, and for the micro and large size category in the audit and total time periods.

Table 37: Ranking of the Best Fitted Models (Grouped by the Different Time Periods)

Time Periods	Audit Time			Report Time			Total Time		
Model Size	(1) odds	(2) normal	(3) hazard	(4) odds	(5) normal	(6) hazard	(7) odds	(8) normal	(9) hazard
Micro	2nd	3rd	1st	1st	2nd	3rd	2nd	3rd	1st
Small	1st	3rd	2nd	1st	3rd	2nd	1st	3rd	2nd
Medium	1st	3rd	2nd	1st	3rd	2nd	1st	3rd	2nd
Large	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st

6.1 Characteristics of the Auditee

This section covers the characteristics of auditees. The relevant parameters are the dummy variables for each category of legal form, determining of income, and sector group as well as whether the auditee is a member of an affiliated group. The interaction effects of legal form and determining of income is included if it contributes to a better fit for the respective model. The base references of legal form and determining of income are predetermined depending on the respective size category. However, the situation is not the same for the working sector. The most frequently occurring one is the service sector in all subsamples so that this has been taken as the base reference for the independent variable *SECTORGR*. The other expressions—production industry, trade industry (wholesale and retail), and utilities—are controlled.

6.1.1 Micro Firm Size Category

The legal form is investigated at first, to test the hypothesis *H1-1*. The *INDIVIDUAL ENTREPRENEUR* is the most common of all relevant legal forms in the micro firm size category (see above section IV 5), and is therefore used as the reference basis in this subsample. By comparison, in the case of *PARTNERSHIP*s the report time is decelerated in all models. It can be seen that the significance of this effect varies slightly between them: the strongest time lag occurs in the second best fitted probit model (5),[137] with one knot in accordance with a log-normal model, followed by the best fitted PO model (4), with one knot in accordance with a log-logistic model, and the PH model (6), with one knot in accordance with a Weibull model. On the whole, it shows clearly that the report phase lasts longer compared with *INDIVIDUAL ENTREPRENEURs* when the auditee's legal form is a *PARTNERSHIP*. As this aspect is not visible in the portrayal of the total time consumption, it can be assumed that revenue agents anticipate additional report time and as a result they attempt to compensate for this due to reduced audit time. This practice is observable in the corresponding audit time models, albeit not significant. The audit time is changed with an increase in model fitting from an initial decelerating in the probit model (2) to a clear accelerating in the best fitted PH model (3). For comparison only, the auditing of *CORPORATION*s proceeds at a faster pace than that of entrepreneurs, but this effect, however, is not significant.

To test the hypothesis *H1-2* the determination of income is specified in more detail. The reference basis is in this size category the most commonly used *ACCOUNTING OF INCOME AND EXPENDITURE*. A comparison with the consistent accounting of trade and tax balance sheet shows that the audit time is decelerated, but this effect is only in the best fitted model (3) and the worst model (2) significant at the .05 level, while in contrast the second best fitted model (1) is non-significant. So it lacks a clear and robust result. The differences follow rather from the otherness of the determination with acceptable higher task-complexity instead of the level of conformity. In addition, the group of audits of *INDEPENDENT TAX BALANCE SHEET*s cannot be unambiguously evaluated as the number of representatives is too small and all of these are part of *CORPORATION*s.[138]

The next test of hypothesis *H1-3* concerns three different groups of sectors, namely *PRODUCTION*, *TRADING*, and *UTILITIES*. Compared to the *SERVICE* sector, the *PRODUCTION* sector and the *TRADING* sector are stressed. The latter shows a significant acceleration of audit time in the best fitted model (3) and the worst fitted model (2), but not in the second best model (1). Consequently, it lacks a robust result. In the case of the

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[137] In what follows the numbers in parentheses comply with the number of the model in the respective table.

[138] The obvious interaction effect is not presented because the estimate excluding this gives the lowest BIC (see Table 65 in Appendix G).

PRODUCTION sector significant effects are likewise shown in two models for the report time; however, the ratios are decreased corresponding to the increase in fit and hence the best (4) and second best fitted models (5) are significant. It seems justified to conclude that writing of reports for *PRODUCTION* businesses is more time consuming than for *SERVICE* businesses.

For the test of hypothesis *H1-4* the consequences of affiliation to a corporate group are considered. In the phase of auditing the time consumption decreases, but the effect is non-significant. In contrast, the report time decelerates, at which significant effects occur as the fitting of the model increases. Both inverse trends appear to neutralize each other in the total time consideration. In this size category it can merely be concluded that the report time is decelerated if the auditee is an affiliated firm. For the report time an accelerated trend can be recognized, but this is non-significant.

Table 38: Characteristics of the Auditee in the Micro Firm Size Category

The table shows the exponentiated coefficients and the z statistics in parentheses for the group of characteristics of the auditee in the micro firm size category, separately per audit, report and total time consumption with a PO, probit and PH model in each case. The table lists also: the knots of the restricted cubic spline function, the selection criteria AIC and BIC, the number of clusters of respondents whom described two cases in the same size category to calculate cluster-based robust SEs, and the number of observations (waiting times of all conducted audit cases). + p<.1, * p<.05, ** p<.01, *** p<.001

Time Periods	Audit Time			Report Time			Total Time		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	odds	normal	hazard	odds	normal	hazard	odds	normal	hazard
xb									
partnership	0.527	0.921	1.998	0.015	0.182	0.277	0.289	0.742	1.124
	(-0.184)	(-0.111)	(0.560)	(-2.984)**	(-3.499)***	(-1.986)*	(-0.433)	(-0.402)	(0.099)
corporation	4.350	2.208	6.491	1.103	0.594	0.690	4.612	2.179	7.287
	(0.550)	(1.232)	(1.360)	(0.078)	(-1.049)	(-0.453)	(0.637)	(1.215)	(1.321)
trade balance sheet = tax balance sheet	0.073	0.273	0.096	0.124	0.833	1.433	0.072	0.249	0.076
	(-1.572)	(-2.173)*	(-1.981)*	(-0.937)	(-0.320)	(0.451)	(-1.605)	(-2.381)*	(-1.921)+
independent tax balance sheet	9.6E+06	1855.180	3.6E+04	7.8E+04	341.442	3.5E+04	9.2E+07	4756.631	2.9E+05
	(2.507)*	(4.481)***	(3.924)***	(2.509)*	(3.448)***	(4.158)***	(3.126)**	(4.927)***	(4.348)***
production	0.364	0.618	1.550	0.020	0.227	0.296	0.245	0.511	1.083
	(-0.568)	(-0.929)	(0.775)	(-2.820)**	(-2.985)**	(-1.269)	(-0.841)	(-1.401)	(0.154)
trading	10.225	2.397	7.195	0.139	0.478	0.789	8.767	2.099	7.021
	(1.455)	(2.033)*	(2.160)*	(-1.223)	(-1.570)	(-0.283)	(1.334)	(1.690)+	(1.999)*
utilities	0.384	0.543	0.611	0.168	0.436	1.472	0.456	0.457	0.423
	(-0.389)	(-0.840)	(-0.561)	(-1.119)	(-1.390)	(0.304)	(-0.346)	(-1.107)	(-1.019)
group companies	2.732	1.857	2.463	0.005	0.152	0.043	0.687	1.258	1.277
	(0.395)	(0.770)	(0.941)	(-2.724)**	(-2.457)*	(-1.568)	(-0.154)	(0.288)	(0.274)
dxb									
_d_rcs1	281.995	15.149	62.309	1216.117	23.808	44.251	5107.292	62.198	784.141
	(5.410)***	(7.552)***	(5.009)***	(5.314)***	(8.327)***	(7.918)***	(3.762)***	(5.806)***	(4.133)***

_d_rcs2	0.183	0.448	0.366				0.431	0.689	0.799
	(-2.631)**	(-3.202)**	(-2.188)*				(-0.984)	(-1.141)	(-0.362)
_d_rcs3	0.531	0.757	0.759				0.450	0.726	0.601
	(-1.307)	(-1.746)+	(-1.023)				(-1.393)	(-1.802)+	(-1.611)
_d_rcs4	0.644	0.802	0.726						
	(-1.589)	(-2.183)*	(-1.820)+						
AIC	-45	105	-106	-234	2	32	-323	-188	-417
BIC	83	232	21	-108	127	157	-198	-63	-292
N_clust	97	97	97	97	97	97	97	97	97
k	194	194	194	203	203	203	191	191	191
Observations	2,812	2,812	2,812	644	644	644	3,456	3,456	3,456

6.1.2 Small Firm Size Category

As before, the legal form is considered first. Further, the reference basis is provided by the *INDIVIDUAL ENTREPRENEUR*. However, significant effects are not identifiable in the small size category for *PARTNERSHIP*s and *CORPORATION*s. Because of this, hypothesis *H1-1* is in general proven because a concentration of more complex businesses in a specific legal form does not occur.

As well as in the previous size category auditees under the legal form of entrepreneur do not make up the balance in the vast majority, and *ACCOUNTING OF INCOME AND EXPENDITURE* is once again taken as the reference basis. Concerning determination of income, the results show no significant difference between the basis and corresponding accounting, but time decelerates according to hypothesis *H1-2* with an increase in complexity. Revenue agents consume significantly more audit and total time in the case of *INDIVIDUAL ENTREPRENEUR*s with an *INDEPENDENT TAX BALANCE SHEET*. The report time decelerates too, but this is only significant in the second best model (6). The partly opposing effects in the cases of *PARTNERSHIP*s and *CORPORATION*s need not be taken into account because the two legal forms concern in relation to entrepreneurs only a very small percentage of independent tax accounting (see Appendix F Table 54). Furthermore, the same significant effects occur in the case of offsetting and reconciliation; however, these are attributed entirely to *CORPORATION*s. It should be noted that both types of determination of income—independent tax accounting as well as offsetting and reconciliation—are only weakly represented in the small size category (see above Table 34).

Compared to the service sector, the *PRODUCTION* sector and the *UTILITIES* sector are stressed. The latter show a significant deceleration in all models of audit and total time. But their proportion of auditees is quite small so this result should not be overinterpreted. The situation is different in the case of *PRODUCTION* businesses. Their audits are more time consuming; however, this effect is only weakly significant in the second best fitted model (3) and the worst model (2), but not in the best fitted model (1). Consequently, it lacks a robust result even if the tendency seems to confirm the hypothesis *H1-3*.

For affiliate firms significant effects are not visible; however, it should be noted that their ratio is merely infinitesimal in this subsample.

Table 39: Characteristics of the Auditee in the Small Firm Size Category

This table shows the exponentiated coefficients and the z statistics in parentheses for the group of characteristics of the auditee in the small firm size category, separately per audit, report and total time consumption with a PO, probit and PH model in each case. The table lists also: the knots of the restricted cubic spline function, the selection criteria AIC and BIC, the number of clusters of respondents whom described two cases in the same size category to calculate cluster-based robust SEs, and the number of observations (waiting times of all conducted audit cases). + p<.1, * p<.05, ** p<.01, *** p<.001

Time Periods	Audit Time			Report Time			Total Time		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	odds	normal	hazard	odds	normal	hazard	odds	normal	hazard
xb									
partnership	0.074	0.461	0.388	2.755	1.434	3.196	0.186	0.548	0.774
	(-1.434)	(-1.483)	(-0.898)	(0.547)	(0.480)	(0.980)	(-1.284)	(-1.145)	(-0.330)
corporation	28.325	1.341	12.230	2.615	1.551	5.197	26.921	0.815	9.134
	(1.162)	(0.251)	(1.446)	(0.281)	(0.432)	(1.620)	(0.912)	(-0.164)	(1.258)
trade balance sheet = tax balance sheet	0.810	1.081	0.981	1.716	1.525	1.826	0.953	1.361	1.322
	(-0.179)	(0.198)	(-0.039)	(0.480)	(0.931)	(0.957)	(-0.040)	(0.671)	(0.694)
independent tax balance sheet	0.005	0.139	0.018	0.339	0.438	0.139	0.004	0.209	0.024
	(-2.692)**	(-2.260)*	(-2.859)**	(-0.422)	(-1.022)	(-2.062)*	(-2.212)*	(-1.700)+	(-2.904)**
transition § 60 II EStDV	0.001	0.074	0.005	0.035	0.184	0.005	0.000	0.078	0.001
	(-2.329)*	(-1.861)+	(-2.145)*	(-0.723)	(-1.206)	(-2.741)**	(-2.128)*	(-1.710)+	(-2.912)**
partnership # trade balance sheet = tax balance sheet	8.562	1.781	4.455	0.006	0.084	0.068	0.417	0.484	0.684
	(1.089)	(0.811)	(1.279)	(-1.380)	(-1.771)+	(-1.233)	(-0.478)	(-0.731)	(-0.397)
partnership # independent tax balance sheet	8.3E+04	115.648	5050.389	0.554	1.650	2.644	2.8E+05	92.984	4625.349
	(2.968)**	(3.438)***	(4.272)***	(-0.165)	(0.443)	(0.492)	(2.892)**	(3.364)***	(4.804)***
partnership # transition § 60 II EStDV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
corporation # trade balance sheet = tax balance sheet	0.152	1.175	0.136	2.881	0.998	0.154	0.488	2.086	0.126
	(-0.630)	(0.127)	(-1.102)	(0.311)	(-0.002)	(-1.424)	(-0.196)	(0.553)	(-1.119)

corporation # independent tax balance sheet	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(1.687)+	(3.609)***	(-2.594)**	(2.136)*	(3.091)**	(2.146)*	(2.069)*	(3.843)***	(2.965)**
corporation # transition § 60 II EStDV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
production	0.397	0.461	0.334	2.375	1.018	1.378	0.872	0.508	0.440
	(-0.750)	(-1.714)+	(-1.743)+	(0.662)	(0.046)	(0.618)	(-0.114)	(-1.529)	(-1.415)
trading	1.010	0.888	0.899	2.607	1.243	0.957	2.251	1.076	0.772
	(0.010)	(-0.360)	(-0.192)	(0.842)	(0.597)	(-0.097)	(0.534)	(0.204)	(-0.564)
utilities	0.015	0.071	0.056	0.490	0.580	0.146	0.021	0.117	0.069
	(-3.250)**	(-3.735)***	(-2.918)**	(-0.461)	(-0.994)	(-1.246)	(-2.243)*	(-3.177)**	(-2.918)**
group companies	0.718	0.679	2.543	0.002	0.157	0.060	0.051	0.516	0.544
	(-0.136)	(-0.314)	(0.544)	(-1.331)	(-1.498)	(-1.085)	(-0.903)	(-0.662)	(-0.355)
dxb									
_d_rcs1	1.7E+04	150.119	1364.072	1.3E+07	716.380	2.9E+04	2.7E+08	3746.499	1.0E+06
	(5.201)***	(6.599)***	(4.675)***	(3.757)***	(5.908)***	(4.455)***	(3.681)***	(5.912)***	(4.212)***
_d_rcs2	0.455	1.093	1.453	377.365	10.152	42.567	14.317	3.168	10.461
	(-0.437)	(0.289)	(0.591)	(3.930)***	(4.245)***	(5.013)***	(2.243)*	(3.130)**	(3.263)**
_d_rcs3	0.467	0.849	0.941	0.069	0.350	0.183	0.390	0.693	0.557
	(-0.786)	(-0.800)	(-0.246)	(-2.458)*	(-3.123)**	(-2.620)**	(-1.424)	(-1.577)	(-1.596)
_d_rcs4	0.447	0.820	0.808						
	(-1.020)	(-1.460)	(-1.330)						
_d_rcs5			1.025						
			(0.336)						
AIC	-1,697	-983	-1,004	-1,122	-533	-1,013	-1,774	-1,217	-1,574
BIC	-1,515	-801	-815	-943	-354	-831	-1,592	-1,036	-1,392
N_clust	167	167	167	167	167	167	167	167	167
k	240	240	243	237	237	237	237	237	237
Observations	5,384	5,384	5,384	1,166	1,166	1,166	6,550	6,550	6,550

6.1.3 Medium Firm Size Category

The reference basis, in turn, is the *INDIVIDUAL ENTREPRENEUR* and, henceforth for the first time, corresponding accounting. In respect of legal forms it is recognizable that audits of *CORPORATION*s are more time consuming than of *INDIVIDUAL ENTREPRENEUR*s, namely in all time periods. This legal form concentrates more complex businesses in the present size category. Moreover, revenue agents consume significantly more time in auditing in the highly complex issue of offsetting and reconciliation. The single and the interaction effect relate primarily to *CORPORATION*s because the others with this type of determination are not at all represented, or only very weakly, respectively. The results of independent tax accounting cannot be taken reliably into account as such cases are not sufficiently represented in this size category. In addition, agents consume significantly less report time when auditees determine their income due to *ACCOUNTING OF INCOME AND EXPENDITURE*. Since no significant effects appear for *PARTNERSHIP*s, only an opposite tendency, it can be assumed that the acceleration of report time relates to *INDIVIDUAL ENTREPRENEUR*s. The results prove hypothesis *H1-2* and hypothesis *H1-1*.

As far as the group of sectors is concerned, no robust significant effects are shown. Only the comparison with the *PRODUCTION* business provides a significant acceleration of audit time, but this relates solely to the best fitted model (1) and the worst model (2) so that even though this tendency seems to refute hypothesis *H1-3*, it cannot be declared a robust result.

Hypothesis *H1-4* is proven. Revenue agents consume less audit time and hence less total time to audit an affiliated entrepreneur. This saving of time is only partly compensated for if the auditee is a *PARTNERSHIP* or *CORPORATION*. But the interaction with the legal form—for the vast majority of cases the affiliates are *CORPORATION*s in this size category—leads to the conclusion that the above result, that audits of *CORPORATION* take longer to complete, explicitly applies only if the *CORPORATION* is not a member of an affiliate group. The effect for the report time cannot be declared a robust result as the best fitted model (4) does not show a significant effect.

Table 40: Characteristics of the Auditee in the Medium Firm Size Category

This table shows the exponentiated coefficients and the z statistics in parentheses for the group of characteristics of the auditee in the medium firm size category, separately per audit, report and total time consumption with a PO, probit and PH model in each case. The table lists also: the knots of the restricted cubic spline function, the selection criteria AIC and BIC, the number of clusters of respondents whom described two cases in the same size category to calculate cluster-based robust SEs, and the number of observations (waiting times of all conducted audit cases). + p<.1, * p<.05, ** p<.01, *** p<.001

Time Periods	Audit Time			Report Time			Total Time		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	odds	normal	hazard	odds	normal	hazard	odds	normal	hazard
xb									
partnership	0.337	0.653	0.764	0.454	0.724	0.322	0.342	0.609	0.652
	(-1.109)	(-1.201)	(-0.714)	(-0.820)	(-0.804)	(-2.296)*	(-1.072)	(-1.426)	(-1.071)
corporation	0.141	0.364	0.419	0.294	0.542	0.479	0.141	0.352	0.417
	(-2.376)*	(-3.043)**	(-2.148)*	(-1.807)+	(-2.195)*	(-2.140)*	(-2.378)*	(-3.215)**	(-2.270)*
accounting of income and expenditure	1.085	1.284	1.107	3.520	1.755	2.058	1.536	1.459	1.355
	(0.114)	(0.831)	(0.279)	(1.892)+	(2.386)*	(2.997)**	(0.614)	(1.341)	(0.846)
independent tax balance sheet	0.674	1.265	3.872	5.785	2.045	2.157	1.502	1.601	3.834
	(-0.301)	(0.453)	(2.046)*	(1.023)	(1.022)	(0.882)	(0.325)	(1.046)	(2.301)*
transition § 60 II EStDV	0.047	0.256	0.175	0.197	0.317	0.133	0.038	0.254	0.151
	(-2.677)**	(-3.202)**	(-2.956)**	(-1.413)	(-2.501)*	(-1.747)+	(-2.695)**	(-3.162)**	(-2.876)**
partnership # accounting of income and expenditure	1.462	0.825	0.820	0.386	0.618	1.121	0.986	0.800	0.783
	(0.279)	(-0.360)	(-0.308)	(-0.740)	(-1.051)	(0.196)	(-0.011)	(-0.449)	(-0.378)
partnership # independent tax balance sheet	15.589	2.470	1.209	0.025	0.173	0.389	1.519	1.076	0.672
	(0.944)	(0.906)	(0.160)	(-1.244)	(-1.568)	(-0.801)	(0.143)	(0.079)	(-0.393)
partnership # transition § 60 II EStDV	0.494	0.530	0.644	12.886	4.953	12.911	1.813	0.994	0.898
	(-0.310)	(-0.634)	(-0.472)	(0.789)	(1.518)	(1.502)	(0.281)	(-0.007)	(-0.101)
corporation # accounting of income and expenditure	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
corporation # independent tax balance sheet	221.343	13.653	7.910	0.810	1.216	1.757	73.957	8.945	6.240
	(3.326)***	(4.268)***	(2.807)**	(-0.111)	(0.261)	(0.600)	(2.894)**	(3.753)***	(2.650)**

corporation # transition § 60 II EStDV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(-0.980)	(1.500)	(-1.111)	(-2.365)*	(-2.078)*	(-3.577)***	(.)	(.)	(4.070)***
production	7.273	2.328	1.618	1.508	1.362	1.027	5.685	2.140	1.504
	(2.078)*	(2.666)**	(1.625)	(0.508)	(0.958)	(0.088)	(1.874)+	(2.441)*	(1.381)
trading	1.867	1.225	1.009	0.683	0.765	0.705	1.348	1.187	0.990
	(0.736)	(0.591)	(0.018)	(-0.523)	(-0.958)	(-1.088)	(0.352)	(0.539)	(-0.024)
utilities	0.557	0.785	1.176	0.640	0.851	0.852	0.450	0.740	1.172
	(-0.599)	(-0.629)	(0.332)	(-0.353)	(-0.297)	(-0.149)	(-0.700)	(-0.756)	(0.268)
group companies	25.882	3.767	4.714	5.038	2.487	3.210	24.698	3.972	4.994
	(2.878)**	(3.393)***	(3.973)***	(1.593)	(2.481)*	(2.685)**	(2.862)**	(3.527)***	(3.930)***
dxb									
_d_rcs1	1137.634	19.508	121.976	1.5E+04	62.990	1306.025	2740.840	58.018	494.784
	(6.421)***	(6.586)***	(9.709)***	(4.856)***	(4.180)***	(6.230)***	(8.186)***	(15.141)***	(6.672)***
_d_rcs2	0.701	0.613	1.157	19.011	2.911	11.388			1.832
	(-0.568)	(-1.814)+	(0.486)	(2.847)**	(2.012)*	(3.934)***			(1.484)
_d_rcs3		1.161		0.215	0.525	0.361			0.845
		(1.035)		(-4.320)***	(-3.503)***	(-4.763)***			(-1.148)
_d_rcs4		0.989		1.149	1.075	1.167			
		(-0.148)		(0.982)	(1.005)	(2.154)*			
_d_rcs5		0.980							
		(-0.356)							
_d_rcs6		1.034							
		(0.672)							
AIC	258	438	430	290	548	396	45	217	177
BIC	470	665	642	509	768	615	254	425	396
N_clust	225	225	225	225	225	225	225	225	225
k	242	254	242	248	248	248	239	239	245
Observations	10,136	10,136	10,136	1,995	1,995	1,995	12,131	12,131	12,131

6.1.4 Large Firm Size Category

The reference basis is now the legal form *CORPORATION* and, as before, corresponding accounting. In relation to hypothesis *H1-1* the results show no significant changes if the legal form is switched. Especially in the case of *PARTNERSHIP*s, it is only evident that, if ever, a tendency for more report time consuming is given in two models, but not in the best fitted model (6). In this respect hypothesis *H1-1* is proven as agents adapt their working methods relating to the legal forms of auditees.

The further results confirm hypothesis *H1-2*. In either of the complex types of determination of income, audit time and total time are significantly decelerated, even at the .001-level in the best fitted model (3), whereas the report time is not affected.[139]

The test of hypothesis *H1-3* shows that an audit of manufacturing-oriented businesses lasts significantly longer than otherwise, and in the best fitted model even at the .001-level. The report time decelerates too, but this effect is non-significant. Hence the total time consumption increases. An interesting finding relates to time consumption in the case of trading-oriented firms. Auditors save significant report time and so compensate for their (non-significant) increased audit time consumption. The result is an almost unaffected total time consumption. For *UTILITIES* the significant effect of audit time decreases in evidence with increase in model fitting. Thus an effect is no longer visible in the best fitted model (3).

In the case of affiliated firms, revenue agents consume significantly more report time at the .05-level so that hypothesis *H1-4* is proven.

It is stressed that, in contrast to the basic recommendation of *Stone* (1986), my equation includes more than five knots in the large size category. This exception is justified on the grounds that the three subcategories L1, L2, and L3 (see above Figure 9) have many similarities but that, due to an increase in the size parameters, it is expected that from this there follow different degrees of influence on time consumption. The higher level of knots takes this into account in a more sensitive manner.

[139] The models in the report period are fitted better when interaction effects are included (see Appendix G Table 71).

Table 41: Characteristics of the Auditee in the Large Firm Size Category

This table shows the exponentiated coefficients and the z statistics in parentheses for the group of characteristics of the auditee in the large firm size category, separately per audit, report and total time consumption with a PO, probit and PH model in each case. The table lists also: the knots of the restricted cubic spline function, the selection criteria AIC and BIC, the number of clusters of respondents whom described two cases in the same size category to calculate cluster-based robust SEs, and the number of observations (waiting times of all conducted audit cases). + p<.1, * p<.05, ** p<.01, *** p<.001

Time Periods	Audit Time			Report Time			Total Time		
Model	(1) odds	(2) normal	(3) hazard	(4) odds	(5) normal	(6) hazard	(7) odds	(8) normal	(9) hazard
xb									
individual entrepreneur	1.140	1.468	1.937	1.144	1.036	1.186	1.247	1.367	2.020
	(0.140)	(1.066)	(1.469)	(0.149)	(0.088)	(0.322)	(0.262)	(0.939)	(1.767)+
partnership	0.893	0.928	1.147	0.638	0.831	1.018	0.702	0.826	1.031
	(-0.222)	(-0.349)	(0.510)	(-0.575)	(-0.606)	(0.048)	(-0.669)	(-0.872)	(0.111)
accounting of income and expenditure	1.848	1.160	1.633	2.209	1.650	0.653	2.113	1.357	1.792
	(1.070)	(0.596)	(1.420)	(0.550)	(0.922)	(-0.700)	(1.259)	(1.211)	(1.707)+
independent tax balance sheet	0.074	0.335	0.220	0.512	0.674	0.621	0.095	0.358	0.246
	(-2.800)**	(-3.034)**	(-4.241)***	(-0.821)	(-1.106)	(-1.100)	(-2.658)**	(-2.960)**	(-3.849)***
transition § 60 II EStDV	0.156	0.409	0.357	1.108	1.088	1.059	0.185	0.435	0.397
	(-3.302)***	(-3.798)***	(-3.979)***	(0.180)	(0.340)	(0.177)	(-2.929)**	(-3.527)***	(-3.535)***
individual entrepreneur # accounting of				2.479	1.477	5.241			
income and expenditure				(0.499)	(0.551)	(1.652)+			
individual entrepreneur # independent				1.533	1.634	1.202			
tax balance sheet				(0.304)	(0.767)	(0.211)			
individual entrepreneur # transition				1.000	1.000	1.000			
§ 60 II EStDV				(2.898)**	(1.562)	(0.828)			
partnership # accounting of income and				1.000	1.000	1.000			
expenditure				(.)	(.)	(.)			
partnership # independent tax balance				0.677	0.811	0.460			
sheet				(-0.238)	(-0.296)	(-1.236)			
partnership # transition § 60 II EStDV				0.228	0.481	0.331			
				(-1.271)	(-1.533)	(-2.203)*			
production	0.277	0.474	0.461	0.502	0.686	0.764	0.293	0.497	0.516
	(-2.618)**	(-3.377)***	(-3.436)***	(-1.632)	(-1.911)+	(-1.316)	(-2.660)**	(-3.444)***	(-3.173)**
trading	0.699	0.860	0.631	3.688	2.114	1.744	1.003	1.061	0.812
	(-0.594)	(-0.553)	(-1.473)	(1.999)*	(2.566)*	(1.831)+	(0.006)	(0.218)	(-0.701)
utilities	0.297	0.425	0.737	0.822	0.907	1.050	0.334	0.467	0.789

	(-2.176)*	(-3.409)***	(-1.134)	(-0.281)	(-0.322)	(0.149)	(-1.849)+	(-2.994)**	(-0.895)
group companies	0.717	0.875	0.833	0.307	0.562	0.584	0.548	0.803	0.739
	(-0.621)	(-0.575)	(-0.659)	(-2.095)*	(-2.374)*	(-1.920)+	(-1.080)	(-0.927)	(-1.100)
dxb									
_d_rcs1	380.360	18.173	55.766	459.259	22.395	55.096	645.272	24.832	83.619
	(10.399)***	(15.303)***	(12.673)***	(10.848)***	(16.114)***	(13.590)***	(7.366)***	(12.677)***	(7.545)***
_d_rcs2	1.083	1.015	1.462	4.958	2.193	4.394	1.688	1.248	2.123
	(0.272)	(0.168)	(1.929)+	(4.326)***	(6.504)***	(7.154)***	(0.678)	(1.145)	(1.458)
_d_rcs3	2.746	1.634	2.032	0.866		0.809	2.486	1.611	1.811
	(5.106)***	(5.583)***	(5.173)***	(-0.667)		(-1.777)+	(2.608)**	(3.929)***	(2.371)*
_d_rcs4	0.951	0.987	0.926			1.021	0.914	0.958	0.917
	(-0.383)	(-0.210)	(-0.840)			(0.328)	(-0.661)	(-0.636)	(-0.948)
_d_rcs5	1.190	1.081	1.098				1.118	1.056	1.054
	(2.743)**	(2.720)**	(2.421)*				(1.730)+	(1.818)+	(1.320)
_d_rcs6	0.925	0.959	0.918				0.911	0.953	0.917
	(-1.247)	(-1.359)	(-2.139)*				(-1.484)	(-1.579)	(-2.258)*
_d_rcs7	0.987	0.993	0.970				0.943	0.969	0.941
	(-0.293)	(-0.291)	(-1.190)				(-0.991)	(-1.060)	(-1.797)+
_d_rcs8	0.904	0.954	0.901				0.974	0.986	0.950
	(-1.648)+	(-1.539)	(-2.892)**				(-0.460)	(-0.492)	(-1.604)
_d_rcs9	1.063	1.032	1.009				1.043	1.021	0.998
	(1.205)	(1.344)	(0.295)				(0.871)	(0.906)	(-0.072)
AIC	1,376	1,634	1,238	1,950	2,069	1,872	1,368	1,573	1,257
BIC	1,608	1,858	1,458	2,164	2,276	2,086	1,588	1,790	1,478
N_clust	191	191	191	191	191	191	191	191	191
k	249	249	249	255	252	258	231	231	231
Observations	31,366	31,366	31,366	6,081	6,081	6,081	37,447	37,447	37,447

6.1.5 Interims Conclusion

Summarizing the above, it should be noted that revenue agents adapt their working methods mainly to the conditions that are shaped by the legal form of the auditee. Hence, a differentiation according to the degree of complexity as a rule is not possible. But agents consume more report time auditing partnerships in the micro size category than auditing individual entrepreneurs. Furthermore, a tendency toward compensation is visible in isolated cases of accelerated audit time and generally unaffected total time. This means that in fact revenue agents anticipate an increased complexity encouraged by German tax law, in particular by a split of tax bases over many (usually heterogeneous) members. So auditors decrease their audit effort to compensate for their expected and their actually increased consumption of report time under time pressure. This could be due to auditors' time pressure being susceptible to increased task complexity in the micro firm size category as here the number of recommended days is the lowest. Such results are not to be found in the other size categories.

As a result, it might be that agents audit less points or less complex focal points in audits of partnerships, in order to avoid an increase in their total time consumption. This issue should be closely investigated in further research. From the present point of view, it seems advisable for the tax agency to reduce time pressure, if partnerships in the micro firm size category are audited. So the tax authority can ensure the required equal tax treatment relating to in-depth audits regardless of the legal form of the auditee.

A further result is that audits of unaffiliated corporations are significantly more time consuming in the medium size category than audits of individual entrepreneurs, or affiliated corporations, respectively. In that respect, hypothesis *H1-1* is proven, if auditees show a tendency to choose corporation as legal form when their business is more complex, e.g., when the business reaches a certain size.

In addition, the type of determination of income affects revenue agents' time consumption together with the increase in complexity. In the small size category audit time increases in the case of entrepreneurs with independent tax accounting and corporations with offsetting and reconciliation. This is also visible in the medium size category: the report time decreases in the case of accounting of income and expenditure. In the large size category it is also shown for independent tax accounting. So hypothesis *H1-2* is proven.

Differences with regard to the group of sectors are occasionally observed. Compared to service-oriented businesses, agents consume more report time for manufacturing-oriented businesses in the micro size category, in the small size category only weakly significantly more audit time, and in the large size category highly significantly more audit time. In the last category they save, furthermore, report time in the case of trading-oriented businesses. Overall, hypothesis *H1-3* is proven only in part.

Moreover, with regard to affiliated companies it is shown that in the case of membership in such a group the report time increases in the micro size category, and meanwhile the audit time decreases, but not significantly. In the large size category the report time increases equally. In that respect both size categories are similar. In contrast, in the medium size category the audit time decreases highly significantly, the report time likewise, though the evidence points to a decrease in significance. Either effect points to the using of certain standard patterns for the routine audits of dependent firms. Consequently, hypothesis *H1-4* is proven in part.

6.2 Characteristics of the Audit

In this section I assume as a reference basis that auditors do not suspect tax evasion on the part of the auditee, conduct the audit in a company office, inspect three fiscal years as standard, do not achieve a consensus and do not conduct a final discussion about their findings, and that accelerating issues are not required. Furthermore, the outcome exceeds the de minimis limits.

The post estimation parameters from Table 38 to Table 41 are omitted in the following tables with the exception of the number of observations.

6.2.1 Micro Firm Size Category

In the case of revenue agents' suspicion of tax evasion—this is the test of hypothesis *H2-1*—the time decelerates in all periods. The effects are significant in the best fitted models at the .01-level for audit time (3) and total time (9), and at the .1-level for report time (4). Features of the sector groups are not considered.

If audits are conducted anywhere other than at the company office, the audit time decelerates highly significantly in the events of *TAX OFFICE* and *MULTIPLE OFFICES* (hypothesis *H2-2*). These effects are also shown in the total time period. Insofar as an audit is conducted in a *TAX ADVISER'S OFFICE*, a tendency is visible for the audit time to be also strongly loaded. But this effect is not significant in the second best fitted model (1) so that it cannot be considered a robust result. The same applies for the deceleration of report time in the event of *MULTIPLE OFFICES* as the significance level decreases until it lapses with an increase in model fitting.

In the event of an audit period with less than three years the results confirm hypothesis *H2-3*: the audit time and hence the total time are accelerated, although the significance level decreases with increase in model fitting. Hypothesis *H2-4* is proven because the time is to the greatest possible extent unaffected by the events of *CONSENSUS* and *FINAL DISCUSSION*. Neither show robust significant effects in each model of the relevant time period. In particular, in the event of a *FINAL DISCUSSION* the surprisingly significant effect of report time acceleration—lesser time without *CONSENSUS* in the case of a *FINAL DISCUSSION*—evaporates with increase in model fitting. Furthermore, the possible issues of acceleration in the event of audit delay also show at best sporadic significant effects so that hypotheses *H2-5* and *H2-6* are not proven in this size category. Scattered effects are insufficiently significant.

In comparison with the duration in the reference basis, *4 TO 6 MONTHS*, the time span with the highest occurrence in this size category, the audit time accelerates in the event of a shorter duration and decelerates in the event of a longer duration (up 10 months). This is the assumption of hypothesis *H2-7*. However, only the latter effect is significant in all models, even at the .01-level in the best fitted one (3), and hence robust. The time saving effect in the report period in the event of the shortest duration loses its significance with increase in model fitting.

Hypothesis *H2-8* is applicable as time is unaffected in the event of trifling outcome. Finally, hypothesis *H2-9* confirms insofar as the audit time is actually unaffected, but the report time shows virtually no changes. The exponentiated coefficients amount to a figure of around one.

Table 42: Characteristics of the Audit in the Micro Firm Size Category

This table is the continuation of Table 38 and shows the exponentiated coefficients and the z statistics in parentheses for the group of characteristics of the audit in the micro firm size category, separately per audit, report and total time consumption with a PO, probit and PH model in each case. + p<.1, * p<.05, ** p<.01, *** p<.001

Time Periods	Audit Time			Report Time			Total Time		
Model	(1) odds	(2) normal	(3) hazard	(4) odds	(5) normal	(6) hazard	(7) odds	(8) normal	(9) hazard
xb									
suspected tax evasion=1	0.018	0.151	0.092	0.018	0.166	0.228	0.012	0.141	0.081
	(-2.334)*	(-3.055)**	(-2.694)**	(-1.845)+	(-3.073)**	(-2.215)*	(-2.414)*	(-2.976)**	(-2.893)**
production # suspected tax evasion=1				28.668	6.628	37.030			
				(1.268)	(1.862)+	(1.506)			
trading # suspected tax evasion=1				1.201	3.597	1.542			
				(0.077)	(1.447)	(0.197)			
utilities # suspected tax evasion=1				1.000	1.000	1.000			
				(.)	(.)	(.)			
tax office	0.008	0.109	0.027	0.134	0.536	0.715	0.013	0.115	0.026
	(-2.602)**	(-3.965)***	(-3.540)***	(-1.488)	(-1.401)	(-0.466)	(-2.478)*	(-3.900)***	(-3.230)**
tax adviser office	0.158	0.424	0.235	0.834	1.151	1.495	0.211	0.437	0.241
	(-1.607)	(-2.093)*	(-1.776)+	(-0.245)	(0.423)	(0.523)	(-1.428)	(-2.005)*	(-1.695)+
multiple offices	0.008	0.127	0.037	0.057	0.252	0.072	0.007	0.103	0.019
	(-2.668)**	(-3.440)***	(-3.260)**	(-1.287)	(-1.794)+	(-2.245)*	(-2.642)**	(-3.342)***	(-3.463)***
up to 1 month	2.220	1.692	1.918	11.776	3.036	11.122	3.097	2.043	2.390
	(0.394)	(1.043)	(0.768)	(1.749)	(2.117)*	(2.939)**	(0.616)	(1.284)	(1.038)
2 to 3 months	5.974	2.082	4.882	1.377	1.066	1.121	4.945	1.914	3.756
	(0.875)	(1.982)*	(1.836)+	(0.335)	(0.176)	(0.148)	(0.975)	(1.698)+	(1.544)
7 to 9 months	0.018	0.239	0.045	0.034	0.504	1.177	0.030	0.234	0.056
	(-1.159)	(-1.754)+	(-1.326)	(-1.501)	(-0.869)	(0.130)	(-1.179)	(-1.843)+	(-1.201)

10 to 12 months	0.011	0.131	0.027	0.245	0.613	0.453	0.009	0.118	0.023
	(-2.792)**	(-2.947)**	(-2.801)**	(-0.803)	(-0.978)	(-0.574)	(-2.826)**	(-3.408)***	(-2.771)**
over 1 year	0.003	0.051	0.026	0.593	0.514	0.730	0.003	0.051	0.030
	(-2.320)*	(-4.328)***	(-2.639)**	(-0.198)	(-0.896)	(-0.380)	(-2.477)*	(-4.083)***	(-2.350)*
fy_short	102.527	9.016	9.759	3.097	1.504	2.549	130.060	9.382	16.280
	(2.684)**	(4.155)***	(2.523)*	(1.000)	(1.030)	(1.683)+	(2.576)**	(4.040)***	(2.552)*
consensus	0.305	0.649	0.353	1.706	1.022	0.841	0.416	0.743	0.429
	(-1.021)	(-1.090)	(-1.255)	(0.627)	(0.049)	(-0.237)	(-0.815)	(-0.815)	(-1.226)
final discussion	1.626	1.336	3.197	5.208	2.172	5.121	2.379	1.583	4.571
	(0.348)	(0.908)	(1.955)+	(1.617)	(1.907)+	(2.145)*	(0.691)	(1.376)	(2.623)**
short deadline for reply	0.420	0.726	0.445	1.941	1.113	0.548	0.349	0.711	0.406
	(-0.866)	(-1.193)	(-1.436)	(0.783)	(0.353)	(-1.282)	(-1.113)	(-1.258)	(-1.419)
penalty for delay	0.087	0.293	0.061	1.108	1.820	2.913	0.124	0.391	0.051
	(-1.184)	(-1.800)+	(-2.002)*	(0.055)	(0.979)	(0.700)	(-0.822)	(-1.282)	(-1.895)+
threat of non-agreement	6.111	2.136	10.780	22.170	2.149	1.207	6.346	2.116	8.024
	(0.896)	(1.382)	(1.964)*	(1.748)	(1.396)	(0.227)	(0.915)	(1.407)	(1.644)
trifling amount	0.583	0.879	0.305	0.127	0.544	0.299	0.772	0.824	0.279
	(-0.349)	(-0.235)	(-1.445)	(-1.136)	(-1.151)	(-1.615)	(-0.192)	(-0.374)	(-1.637)
lnlossreduc	0.971	0.999	0.893	1.054	1.032	1.042	0.981	1.002	0.913
	(-0.111)	(-0.013)	(-1.592)	(0.708)	(1.027)	(0.449)	(-0.097)	(0.040)	(-1.303)
lndiffpay	0.907	0.965	0.790	0.997	0.998	0.946	0.948	0.980	0.821
	(-0.549)	(-0.826)	(-2.558)*	(-0.047)	(-0.061)	(-0.944)	(-0.343)	(-0.488)	(-2.296)*
Observations	2,812	2,812	2,812	644	644	644	3,456	3,456	3,456

6.2.2 Small Firm Size Category

In this size category time is unaffected by auditors' suspicion of tax evasion. The tendency suggests a deceleration of audit time and total time, but significance occurs only in the respective worst fitted model (2 & 8). This is most probably due to suspected findings being related to routine activities, see Appendix F Table 61 and Table 62, and this confirms hypothesis *H2-1*. The results of the interaction effect between suspicion and the *UTILITIES* sector group is not interpretable as the combined occurrence is only marginal (see Appendix F Table 54).

The test of hypothesis *H2-2* shows only occasional significant effects. In no event do robust results arise. Especially in the event of *MULTIPLE OFFICES* the deceleration of audit time is not significant in the best fitted PO model (1). The same applies in the case of report time increasing due to an audit at a *TAX ADVISER'S OFFICE*.

Notwithstanding the fact that *FOLLOW-UP AUDITS* are rather untypical in the prior size category, it can now be seen that in this event the audit time and the total time are significantly decelerated. In the report time a decreasingly significant effect results so that in this case it comes merely from a tendency to spend more time-on-task. This can be assumed as the coefficients of all models in the total period are smaller than their counterparts in the audit period, i.e., the report time also has a delaying effect. Furthermore, a time saving effect does not occur due to there being fewer than three fiscal years in one audit. Hence hypothesis *H2-3* can be confirmed only in its second part.

As expected with hypothesis *H2-4*, achievement of *CONSENSUS* and conduct of *FINAL DISCUSSION* do not significantly affect time consumption. In contrast, agents' *THREAT OF NON-AGREEMENT* accelerates the total time with significance and the audit time in two of the three models, although not in the best fitted one (1). Nonetheless, hypothesis *H2-6* is proven as it can be expected that auditors use this measure principally to reduce their total time consumption in order to improve their own performance. Furthermore, the audit time decelerates with significance at the .1-level in the best fitted model in the event of *PENALTY FOR DELAY*. That is hypothesis *H2-5*.

In addition, hypothesis *H2-7* is proven in part. The reference basis for the duration is once again *4 TO 6 MONTHS*. The audit time accelerates in the event of a shorter duration, but the significance level decreases with an increase in model fitting, hence the effect is no more significant in the total time period with the best fitted PO model (7). The total time decelerates significantly at the .1-level in the latter model in the event of a longer duration (*OVER 1 YEAR*).

The time is unaffected in the event of trifling outcome (hypothesis *H2-8*). With regard to the other outcome variables this also applies for the audit time period (hypothesis *H2*-9). However, the report time decelerates but this effect is not significant in the best fitted model (4) so this does not represent a robust result.

Table 43: Characteristics of the Audit in the Small Firm Size Category

This table is the continuation of Table 39 and shows the exponentiated coefficients and the z statistics in parentheses for the group of characteristics of the audit in the small firm size category, separately per audit, report and total time consumption with a PO, probit and PH model in each case. + p<.1, * p<.05, ** p<.01, *** p<.001

Time Periods	Audit Time			Report Time			Total Time		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	odds	normal	hazard	odds	normal	hazard	odds	normal	hazard
xb									
suspected tax evasion=1	0.143	0.184	0.112	1.270	0.810	0.394	0.583	0.326	0.186
	(-1.075)	(-2.374)*	(-1.624)	(0.064)	(-0.328)	(-0.708)	(-0.242)	(-1.729)+	(-1.587)
production # suspected tax evasion=1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
trading # suspected tax evasion=1	0.786	1.533	2.454	0.828	1.100	22.716	0.258	1.176	2.878
	(-0.119)	(0.510)	(0.646)	(-0.034)	(0.097)	(1.269)	(-0.530)	(0.197)	(0.812)
utilities # suspected tax evasion=1	7.0E+04	2038.102	1.8E+05	4.065	8.913	270.816	1.5E+05	890.098	8.0E+04
	(3.014)**	(4.258)***	(2.791)**	(0.242)	(1.280)	(1.497)	(2.156)*	(3.951)***	(3.277)**
tax office	0.803	0.522	0.510	0.136	0.375	0.600	0.301	0.357	0.573
	(-0.149)	(-1.183)	(-1.050)	(-1.290)	(-1.864)+	(-0.632)	(-0.531)	(-1.709)+	(-0.806)
tax adviser office	0.927	0.488	0.442	0.225	0.432	0.087	0.233	0.357	0.217
	(-0.050)	(-1.315)	(-1.427)	(-0.946)	(-1.686)+	(-2.386)*	(-0.640)	(-1.727)+	(-1.947)+
multiple offices	0.050	0.117	0.047	0.687	0.509	0.071	0.070	0.139	0.031
	(-1.153)	(-2.608)**	(-2.781)**	(-0.149)	(-0.876)	(-1.587)	(-0.920)	(-2.535)*	(-3.440)***
up to 1 month	108.129	16.188	22.691	9.488	3.723	1.489	688.748	21.223	17.126
	(2.058)*	(3.800)***	(3.251)**	(0.762)	(1.691)+	(0.432)	(1.601)	(3.312)***	(2.737)**
2 to 3 months	6.618	3.101	3.024	0.823	1.031	0.983	4.727	2.425	2.757
	(1.922)+	(3.327)***	(2.845)**	(-0.195)	(0.090)	(-0.044)	(1.351)	(2.640)**	(2.946)**
7 to 9 months	0.620	1.170	1.281	0.455	0.690	0.663	0.355	1.139	1.014
	(-0.326)	(0.280)	(0.421)	(-0.549)	(-0.780)	(-0.474)	(-0.707)	(0.230)	(0.024)

10 to 12 months	0.233	0.477	0.180	0.339	0.585	0.990	0.217	0.505	0.243
	(-1.003)	(-1.608)	(-1.305)	(-0.639)	(-1.355)	(-0.011)	(-1.133)	(-1.589)	(-1.300)
over 1 year	0.114	0.479	0.399	0.014	0.197	0.023	0.009	0.273	0.194
	(-1.109)	(-1.304)	(-1.481)	(-1.433)	(-1.963)*	(-2.389)*	(-1.739)+	(-1.867)+	(-2.354)*
fy_short	0.296	0.728	0.478	0.124	0.491	0.951	0.236	0.641	0.545
	(-0.928)	(-0.728)	(-1.275)	(-0.970)	(-1.755)+	(-0.086)	(-1.023)	(-1.008)	(-1.056)
follow-up audit	0.131	0.443	0.446	0.139	0.365	0.143	0.113	0.377	0.292
	(-2.065)*	(-2.136)*	(-2.172)*	(-1.288)	(-2.509)*	(-2.993)**	(-2.261)*	(-2.537)*	(-2.812)**
consensus	2.729	1.254	1.057	5.256	1.590	1.025	5.222	1.708	1.004
	(0.724)	(0.535)	(0.068)	(0.772)	(1.098)	(0.042)	(1.025)	(1.129)	(0.005)
final discussion	0.672	0.916	1.093	3.621	1.299	1.959	0.634	1.008	1.572
	(-0.474)	(-0.299)	(0.179)	(1.250)	(0.698)	(1.074)	(-0.481)	(0.023)	(0.899)
short deadline for reply	1.872	1.764	1.505	1.027	1.221	1.208	2.353	1.832	1.565
	(0.647)	(1.561)	(0.882)	(0.034)	(0.668)	(0.363)	(0.927)	(1.651)+	(0.854)
penalty for delay	0.028	0.222	0.131	54.055	3.176	0.759	0.205	0.621	0.447
	(-1.941)+	(-2.092)*	(-1.817)+	(1.766)	(1.317)	(-0.234)	(-0.625)	(-0.831)	(-0.942)
threat of non-agreement	3.521	2.508	3.027	5.580	2.512	2.046	10.535	2.789	5.404
	(1.192)	(1.756)+	(1.685)+	(0.857)	(1.631)	(0.832)	(1.656)+	(1.813)+	(2.081)*
trifling amount	1.873	1.204	0.675	5.347	1.590	3.493	0.550	1.495	0.764
	(0.148)	(0.257)	(-0.449)	(0.666)	(0.712)	(0.828)	(-0.109)	(0.467)	(-0.279)
lnlossreduc	1.084	1.010	0.956	0.876	0.942	1.094	1.061	1.001	1.063
	(0.792)	(0.230)	(-0.683)	(-0.711)	(-1.476)	(0.757)	(0.556)	(0.039)	(0.646)
lndiffpay	1.052	1.015	0.892	0.794	0.898	0.792	0.998	0.997	0.893
	(0.725)	(0.427)	(-1.762)+	(-1.721)	(-3.182)**	(-5.036)***	(-0.023)	(-0.102)	(-2.539)*
Observations	5,384	5,384	5,384	1,166	1,166	1,166	6,550	6,550	6,550

6.2.3 Medium Firm Size Category

If agents have a suspicion of tax evasion, their audit time decelerates significantly. The report time also shows a negative effect, but without significance. In the total time period the effect of the audit time period is extant, but this occurs at a lower significance level. In addition, in the event of auditing of trading-oriented businesses this effect is generally compensated for, in comparison to service-oriented businesses. However, this result is not robust as it does not occur in the best fitted models (1 & 7). The same conclusion is obtained in the report time period as there the second best model (6) is without a significant effect. Hypothesis *H2-1* is proven, however, with the restriction that this result applies only in the *SERVICE* sector without reservation even though not robustly verified.

As far as the place of work is affected (hypothesis *H2-2*), results show that audits with *MULTIPLE OFFICES* consume in total more time. This effect is significant at the .1-level in the best fitted model (7). In the individual time periods such effects occurs in two of three models in each case, but not in the best fitted models (1 & 4) although there is also a negative tendency. The same applies to the event of audits in a *TAX ADVISER'S OFFICE*. The deceleration of report time occurs only in the second best (6) and worst models (5). An audit in the *TAX OFFICE* does not lead to significant time changes.

In this size category different totals of audited fiscal years are not considered since the reasons for fewer (more) than three years occur rather in the case of smaller (larger) businesses. Instead additional *SPECIALIZED AUDITORS* arise more frequently so that their occurrence is investigated. The results show that no significant additional time consumption follows from their additional involvement. Almost the same result applies in the event of *FOLLOW-UP AUDIT*s. Audits in the medium size category are more familiar with this so that robust significant time effects do not arise. Thus hypothesis *H2-3* is proven.

Auditors' time consumption is not affected by the events of *CONSENSUS* and conduct of a *FINAL DISCUSSION*. All exponentiated coefficients are non-significant in the sense of hypothesis *H2-4*. Measures of acceleration are also without robustly significant time effects so that the second part of hypotheses *H2-5* and *H2-6* cannot be proven in this respect.

However, hypothesis *H2-7* holds true as, in comparison to the reference basis of *7 TO 9 MONTHS*, auditors' time consumption decreases in all periods in the event of a shorter duration (*1 TO 3 MONTHS*) and increases in the event of a longer duration (*OVER 1 YEAR*).

Only in the audit time period and total time period does the latter show highly significant effects at the .001-level. On the contrary the report time period is unaffected.

In the event of a trifling outcome (Hypothesis *H2-8*) the time is again unaffected. However, the result is different with regard to the other outcome variables. The audit time and the total time decelerate with high significance at the .01-level in the best fitted models (1 & 7) if additional payments increase. The report time period is unaffected. Modifications of loss carried forward show no time results. Thus hypothesis *H2-9* is disproved.

Table 44: Characteristics of the Audit in the Medium Firm Size Category

This table is the continuation of Table 40 and shows the exponentiated coefficients and the z statistics in parentheses for the group of characteristics of the audit in the medium firm size category, separately per audit, report and total time consumption with a PO, probit and PH model in each case. + p<.1, * p<.05, ** p<.01, *** p<.001

Time Periods	Audit Time			Report Time			Total Time		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	odds	normal	hazard	odds	normal	hazard	odds	normal	hazard
xb									
suspected tax evasion=1	0.198	0.349	0.357	0.328	0.751	0.947	0.218	0.393	0.338
	(-2.145)*	(-2.627)**	(-2.609)**	(-1.182)	(-0.830)	(-0.135)	(-1.919)+	(-2.560)*	(-2.549)*
production # suspected tax evasion=1	1.433	1.175	2.260	0.517	0.654	0.581	1.361	1.151	2.362
	(0.152)	(0.195)	(1.133)	(-0.362)	(-0.592)	(-0.657)	(0.123)	(0.171)	(1.159)
trading # suspected tax evasion=1	4.503	3.088	5.080	16.852	3.453	3.653	6.984	3.136	5.618
	(1.062)	(1.877)+	(1.958)+	(1.673)+	(2.002)*	(1.617)	(1.338)	(1.891)+	(2.325)*
utilities # suspected tax evasion=1	12.661	3.000	4.457	0.897	0.930	0.743	8.705	2.750	2.831
	(1.664)+	(1.455)	(1.606)	(-0.053)	(-0.086)	(-0.193)	(1.243)	(1.254)	(1.007)
tax office	0.550	0.787	0.774	0.840	0.624	0.725	0.499	0.710	0.747
	(-0.664)	(-0.641)	(-0.567)	(-0.167)	(-1.230)	(-0.745)	(-0.836)	(-0.963)	(-0.612)
tax adviser office	0.594	0.751	0.775	0.338	0.464	0.522	0.415	0.651	0.782
	(-0.661)	(-0.912)	(-0.684)	(-1.450)	(-2.574)*	(-1.890)+	(-1.098)	(-1.397)	(-0.634)
multiple offices	0.159	0.389	0.301	0.193	0.380	0.278	0.106	0.343	0.280
	(-1.553)	(-1.803)+	(-2.064)*	(-1.347)	(-2.005)*	(-2.665)**	(-1.814)+	(-2.004)*	(-2.228)*
up to 1 month	0.488	1.092	1.032	1.442	1.877	3.327	0.590	1.307	1.247
	(-0.505)	(0.180)	(0.053)	(0.283)	(1.296)	(1.735)+	(-0.371)	(0.554)	(0.397)
2 to 3 months	5.682	3.017	4.479	5.343	3.614	5.992	7.348	3.493	5.038
	(2.414)*	(3.587)***	(4.068)***	(2.533)*	(3.947)***	(3.305)***	(2.619)**	(3.986)***	(4.164)***
4 to 6 months	1.183	1.218	1.102	1.466	1.623	1.436	1.404	1.371	1.143
	(0.258)	(0.728)	(0.320)	(0.548)	(1.617)	(0.825)	(0.501)	(1.127)	(0.437)

10 to 12 months	0.221	0.496	0.545	0.802	1.352	1.934	0.264	0.588	0.644
	(-1.625)	(-1.887)+	(-1.230)	(-0.216)	(0.655)	(0.774)	(-1.477)	(-1.403)	(-0.764)
over 1 year	0.009	0.119	0.121	0.221	0.697	0.961	0.013	0.149	0.137
	(-4.429)***	(-5.022)***	(-4.009)***	(-1.261)	(-0.853)	(-0.064)	(-4.372)***	(-4.795)***	(-3.355)***
consulted specialized auditors	0.184	0.659	0.705	0.392	0.593	0.554	0.238	0.702	0.772
	(-1.421)	(-1.038)	(-0.810)	(-1.115)	(-1.497)	(-0.899)	(-1.438)	(-1.019)	(-0.581)
follow-up audit	0.654	0.939	1.640	0.422	0.573	0.585	0.610	0.839	1.554
	(-0.786)	(-0.246)	(1.256)	(-1.422)	(-2.304)*	(-1.787)+	(-0.945)	(-0.830)	(1.152)
consensus	0.987	0.853	0.795	0.656	0.898	0.772	0.988	0.857	0.768
	(-0.018)	(-0.649)	(-0.887)	(-0.638)	(-0.416)	(-0.718)	(-0.020)	(-0.623)	(-0.949)
final discussion	0.643	0.878	0.886	2.179	1.291	1.402	0.925	0.976	0.988
	(-0.848)	(-0.604)	(-0.464)	(1.347)	(1.164)	(0.898)	(-0.153)	(-0.114)	(-0.043)
short deadline for reply	0.579	0.743	0.598	0.818	0.951	1.128	0.565	0.766	0.656
	(-1.164)	(-1.489)	(-2.401)*	(-0.420)	(-0.245)	(0.594)	(-1.230)	(-1.352)	(-1.937)+
penalty for delay	1.620	1.251	1.792	2.040	1.381	1.584	2.127	1.334	1.857
	(0.498)	(0.544)	(1.251)	(1.198)	(1.048)	(1.026)	(0.897)	(0.757)	(1.391)
threat of non-agreement	0.664	0.907	0.648	2.531	1.787	2.344	0.763	1.018	0.752
	(-0.515)	(-0.319)	(-1.176)	(1.640)	(2.483)*	(2.423)*	(-0.348)	(0.059)	(-0.878)
trifling amount	1.360	1.512	2.321	1.896	1.357	1.533	1.764	1.879	2.568
	(0.381)	(0.973)	(1.507)	(0.788)	(0.874)	(0.948)	(0.669)	(1.396)	(1.689)+
lnlossreduc	0.960	0.969	0.957	1.018	0.990	0.998	0.964	0.967	0.954
	(-0.376)	(-1.034)	(-1.477)	(0.206)	(-0.353)	(-0.070)	(-0.359)	(-1.122)	(-1.573)
lndiffpay	0.786	0.887	0.873	1.090	1.030	1.025	0.815	0.900	0.897
	(-3.068)**	(-3.754)***	(-4.569)***	(1.026)	(0.885)	(0.669)	(-2.721)**	(-3.421)***	(-3.755)***
Observations	10,136	10,136	10,136	1,995	1,995	1,995	12,131	12,131	12,131

6.2.4 Large Firm Size Category

In the event of a suspicion of tax evasion, auditors' audit time and total time decelerate highly significantly at the .001-level in the best fitted PH models (3 & 9). The report time shows no significant effects. From the interaction effect with the sector groups there result no additional significant effects.[140] Hypothesis *H2-1* is proven.

When audits take place in *AUDITORS' TAX OFFICES*, time accelerates highly significantly at the .001-level in the PH models. This effect occurs in the audit time and total time period, but agents also consume less time in the report period. This could stem from the fact that auditors perform all work steps rather in summarized form in this event. The audit itself and the report writing are conducted at the same place of work. In contrast, in the reference basis the audit is conducted at the business place. The report writing can then proceed across different places. In general the *TAX OFFICE* is appropriated, but in the case of large businesses it is also possible that agents write their report on the firm's premises as all their records are on site. It is presumed that report writing would take place in each case at *TAX OFFICE*s, and it should not make a difference whether an agent audits in his or her office or on the firm's premises. Consequently, the significant report time effects must be a result of writing on the firm's premises. However, whether this assumption is true cannot be proven as the participants did not make a statement specifically about this. In addition, the sporadic effects in the event of *MULTIPLE OFFICES* are not robust because the second best fitted PO model shows no significance. But the actual place where agents write their report is relevant, as in the previous cases when audits were conducted at *MULTIPLE OFFICES*. In sum, hypothesis *H2-2* is proven and outstanding issues should be elucidated by further research.

Revenue agents' time consumption increases when more than three fiscal years are audited; this is at least relevant in approximately 20 % of all audit cases in this size category (see above Table 35). The significance increases in the audit time period with increasing fitting of the model and achieves the .001-level in the PH model. This effect is mitigated due to the report time period so that in the total time period the significance falls at the .01-level in the PH model. Besides this, the deceleration in the report is not significant in the best fitted PH model, even though the conclusion is allowed that with an increase in the number of audited fiscal years the time consumption also increases as a whole. Furthermore, the involvement

[140] See for an including of interactions Appendix G Table 71.

of *SPECIALIZED AGENTS* affects time consumption only in scattered cases and hence without a robust result. In addition, *FOLLOW-UP AUDIT*s decelerate time, but without any significance. That is, in sum, hypothesis *H2-3*.

To hypothesis *H2-4* a distinction should be drawn between cases of *CONSENSUS* and *FINAL DISCUSSION*. In the event of the latter, report time decelerates significantly at the .05-level. This result is valid in the case of non-agreement and shows that agents spend more time in report writing following a *FINAL DISCUSSION* than without such an intensive exchange. In my opinion this could be caused by an additional effort to deal with any arguments or disagreements submitted against auditors' findings. Results also show that in the event of *CONSENSUS* an opposite effect does not occur in the report time; however, the audit time accelerates, but without significance in the best fitted PH model. Due to this hypothesis *H2-4* is not proven, but a tendency is recognizable.

Concerning possible issues of acceleration, the measure of *SHORT DEADLINES FOR REPLY* shows a deceleration of audit time in fact, with significance at the .1-level in the PH model. This reinforces the assumption (hypothesis *H2-5*) that time consumption is actually increased when revenue agents perceive audit delay by auditees as conscious and they are tempted to counteract. For the other measures no significant effects result.

Insofar as it concerns the duration, hypothesis *H2-6* is tested on the reference basis of a relatively long period (*1 TO 1.5 YEARS*). The results show a significant acceleration of audit time and total time as well as of report time in the first two duration intervals. In contrast, if the audit lasts longer then report time decelerates significantly, but this is not applicable to the audit time and total time even though a similar tendency is visible.

The test of hypothesis *H2-8* proves the exception that the de minimis limit does not affect revenue agents' time consumption. All models have no significant effects. The situation is different in the cases of additional payments and reduction of loss carried forward. With an increase in the latter reduction, audit time and report time decelerate at the .1-level of significance in the best fitted PH models. The report time decelerates too, but the significant effect is lacking in the PH model so that this result is not classified as robust. The same occurs with regard to additional payments as the second best PO model has no significant effects whereas the best fitted are significant at the .01-level, and the worst fitted probit model at the .1-level. Thus hypothesis *H2-9* is not explicitly proven.

Table 45: Characteristics of the Audit in the Large Firm Size Category

This table is the continuation of Table 41 and shows the exponentiated coefficients and the z statistics in parentheses for the group of characteristics of the audit in the large firm size category, separately per audit, report and total time consumption with a PO, probit and PH model in each case. + p<.1, * p<.05, ** p<.01, *** p<.001

Time Periods	Audit Time			Report Time			Total Time		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	odds	normal	hazard	odds	normal	hazard	odds	normal	hazard
xb									
suspected tax evasion=1	0.067	0.246	0.168	0.798	0.799	1.265	0.088	0.288	0.225
	(-2.897)**	(-3.268)**	(-3.836)***	(-0.324)	(-0.686)	(0.606)	(-3.778)***	(-4.292)***	(-4.340)***
production # suspected tax evasion=1	0.713	0.882	1.091	0.536	0.896	0.456			
	(-0.274)	(-0.226)	(0.124)	(-0.429)	(-0.161)	(-1.058)			
trading # suspected tax evasion=1	2.506	2.263	2.342	0.668	0.581	0.182			
	(0.466)	(0.976)	(0.842)	(-0.302)	(-0.685)	(-1.372)			
utilities # suspected tax evasion=1	1.000	1.000	1.000	1.000	1.000	1.000			
	(.)	(.)	(.)	(.)	(.)	(.)			
tax office	12.724	2.769	3.537	14.024	4.118	4.467	14.995	3.554	4.008
	(2.082)*	(2.712)**	(3.428)***	(4.094)***	(4.707)***	(3.826)***	(2.491)*	(3.487)***	(3.707)***
tax adviser office	1.073	1.078	1.435	1.432	1.162	1.535	1.057	1.102	1.484
	(0.139)	(0.350)	(1.324)	(0.610)	(0.639)	(1.451)	(0.105)	(0.447)	(1.391)
multiple offices	0.650	0.750	0.769	0.302	0.483	0.353	0.483	0.648	0.516
	(-0.483)	(-0.853)	(-0.589)	(-1.621)	(-2.031)*	(-2.685)**	(-0.725)	(-1.177)	(-1.392)
up to 1 month	759.640	15.124	13.321	252.549	16.687	89.931	1383.555	21.685	20.748
	(3.519)***	(3.478)***	(2.170)*	(4.797)***	(6.398)***	(6.913)***	(3.925)***	(3.805)***	(2.585)**
2 to 3 months	52.768	6.178	12.949	7.480	2.891	5.116	55.575	6.461	13.605
	(3.951)***	(5.094)***	(5.784)***	(2.633)**	(3.502)***	(4.629)***	(4.065)***	(5.276)***	(6.267)***
4 to 6 months	5.192	1.930	2.349	2.442	1.610	2.104	4.936	1.935	2.401
	(2.396)*	(2.304)*	(2.451)*	(1.293)	(1.624)	(2.319)*	(2.289)*	(2.276)*	(2.637)**

7 to 9 months	3.788	1.701	2.658	1.284	1.169	1.513	3.466	1.628	2.404
	(1.727)+	(1.775)+	(2.885)**	(0.339)	(0.541)	(1.316)	(1.656)+	(1.657)+	(2.708)**
10 to 12 months	3.583	1.710	1.757	1.284	1.162	0.885	3.860	1.755	1.595
	(1.486)	(1.618)	(1.548)	(0.285)	(0.456)	(-0.287)	(1.501)	(1.688)+	(1.251)
1.5 to 2 years	0.398	0.583	0.512	0.218	0.438	0.305	0.356	0.567	0.484
	(-1.029)	(-1.411)	(-1.601)	(-1.798)+	(-2.194)*	(-2.775)**	(-1.136)	(-1.440)	(-1.833)+
over 2 years	0.551	0.765	0.548	0.143	0.417	0.332	0.525	0.704	0.564
	(-0.844)	(-0.746)	(-1.722)+	(-2.649)**	(-2.624)**	(-3.210)**	(-0.933)	(-1.019)	(-1.722)+
consulted specialized auditors	0.608	0.870	0.642	0.522	0.748	0.805	0.538	0.790	0.625
	(-0.953)	(-0.546)	(-1.738)+	(-1.337)	(-1.298)	(-0.997)	(-1.183)	(-0.943)	(-1.790)+
fy_long	0.286	0.670	0.495	0.491	0.692	0.867	0.298	0.630	0.532
	(-2.451)*	(-1.749)+	(-3.392)***	(-1.720)+	(-1.858)+	(-0.651)	(-2.419)*	(-2.189)*	(-3.238)**
follow-up audit	0.689	0.710	0.730	0.924	0.950	0.984	0.732	0.735	0.764
	(-0.734)	(-1.361)	(-1.128)	(-0.145)	(-0.230)	(-0.068)	(-0.586)	(-1.235)	(-1.016)
consensus	2.810	1.708	1.311	1.066	1.053	0.824	2.254	1.557	1.223
	(1.980)*	(2.328)*	(1.167)	(0.128)	(0.215)	(-0.822)	(1.513)	(1.901)+	(0.864)
final discussion	0.571	0.737	0.720	0.335	0.613	0.585	0.509	0.722	0.682
	(-1.435)	(-1.700)+	(-1.611)	(-1.984)*	(-2.277)*	(-2.417)*	(-1.573)	(-1.768)+	(-1.823)+
short deadline for reply	0.484	0.740	0.704	1.066	1.018	1.073	0.542	0.750	0.740
	(-1.976)*	(-1.775)+	(-1.790)+	(0.143)	(0.091)	(0.363)	(-1.715)+	(-1.814)+	(-1.619)
penalty for delay	1.765	1.439	1.711	0.874	1.021	1.414	1.482	1.319	1.759
	(0.686)	(1.038)	(1.151)	(-0.168)	(0.049)	(0.824)	(0.448)	(0.750)	(1.184)
threat of non-agreement	0.580	0.729	0.704	0.736	0.858	0.977	0.607	0.753	0.750
	(-0.987)	(-1.261)	(-1.257)	(-0.472)	(-0.619)	(-0.078)	(-0.868)	(-1.127)	(-1.007)
trifling amount	1.146	1.149	1.742	0.673	0.911	1.052	1.011	1.106	1.689
	(0.200)	(0.495)	(1.622)	(-0.616)	(-0.345)	(0.157)	(0.016)	(0.358)	(1.550)
lnlossreduc	0.949	0.977	0.973	0.961	0.981	0.986	0.950	0.977	0.976
	(-2.079)*	(-1.944)+	(-1.957)+	(-1.930)+	(-1.733)+	(-1.205)	(-2.160)*	(-1.968)*	(-1.764)+

lndiffpay	0.988	0.995	0.978	0.952	0.972	0.949	0.974	0.988	0.969
	(-0.271)	(-0.295)	(-1.122)	(-1.358)	(-1.744)+	(-2.626)**	(-0.566)	(-0.658)	(-1.518)
Observations	31,366	31,366	31,366	6,081	6,081	6,081	37,447	37,447	37,447

6.2.5 Interims Conclusion

If a suspicion of tax evasion arises, revenue agents' time consumption increases during the audit time period and hence also for the total time period if micro, medium, or large firms are subject to the audit. So far as micro firms are audited, the report time increases too, as the fraudulent adjustments require more detailed representations. So it is expected that the strongest time pressure in labor-intensive tasks, such suspected tax evasion, occurs in the smallest size category. This effect vanishes the more familiar the agent becomes with the relevant findings—routine activities—and time pressure decreases as well. This explains the absence of results in the small size category. Again, attention should be directed to the summarized presentations of findings in Table 61 and Table 62 in Appendix F. Apart from this, the results do not show an impact of the group of sectors on agents' time consumption for suspected tax evasion.

By way of derogation from the principle of an audit on business premises, the different places of work lead to various results. If auditors conduct audits in a local tax office their consumption of audit time and total time increase in the case of micro firms and decrease in the case of large firms. In addition, insofar as the report time is further affected it could be caused by the assumption that auditors usually write a report on an audit of large firms on those firms' actual premises, so that report time will accelerate in the event of an audit in a tax office. This cannot be proven by this study, as the place of report writing was not queried in the questionnaire. This outstanding issue should be addressed by further research. If audits are at several offices simultaneously, audit time and total time increase in the case of micro firms. In the case of medium firms only audit time increases; for the total time consumption the results show merely a tendency. This tendency shows in the case of small firms too. Neither trends are considered as robust.

Furthermore, audit time and total time consumption decrease significantly in the micro size category, if agents audit less than three fiscal years. However, the significance of this effect decreases with an increase in model fitting. Additionally, this effect does not occur in the next size category. No evidence for an explicit time saving has been provided for shorter audit periods (fewer than three fiscal years). So new aspects to the ongoing debate arise from these findings. If agents audit more than three fiscal years in the case of large firms,[141] their time consumption increases significantly.

Relating to follow-up audits revenue agents consume more time when they audit small firms. With an increase in firm size such effects disappear. In all size categories it is without an effect whether the parties reach an agreement about auditors' findings or not. For SMEs the same is true for final discussions. However, in the case of large firms agents spend more time in report writing following a final discussion, probably caused by additional effort required to address any arguments submitted against auditors findings.

If revenue agents perceive audit delay caused by auditees or by their tax advisers, they are tempted to counteract. The results of the observed accelerating measures show that time-on-task is unaffected in most cases. Thus it appears that the use of such counteracting measures is often successful. Only in two cases does audit time increase, namely in the event of penalty in the small and of short deadlines in the large size category. In addition, the results prove in part the assumption that agents use the threat of non-agreement to cut their own time-on-task in the case of smaller auditees in part.

A further interesting issue is that audits with an outcome less than the de minims limits have no effect on revenue agents' consumption of audit time and report time, regardless of the size category. As well as the obtained outcomes, these do not affect the time consumption in the micro and small size category. In contrast, the audit time increases with an increase in additional payments in the medium size and reductions of loss carried-forward in the large size category.

As expected, audit duration affects time consumption. With regard to the reference basis, in each case the consumption increases in the event of a longer duration. The difference between the different size categories is that either the audit and/or total time is affected (SMEs) or the report time (large businesses). In the event of a shorter duration it is similar: either the audit and total time is affected (small businesses) or all time periods (medium and large businesses).

Finally, with regard to medium and large-sized businesses, time consumption is unaffected by an additional involvement of specialized agents. This means that auditors' time-on-task neither increases nor decreases. The first effect is in line with the administrative motivation

[141] This situation is obligatory in accordance with German tax law if audits have to connect to prior audits in the case of a delayed beginning.

to implement specialized agents. However, the latter is surprising as auditors have vacant time windows due to the transfer of highly complex focal points.

6.3 Characteristics of the Auditor

With regard to the characteristics of auditors I assume as reference basis a female agent who is between 40 and 50 years of age. This category includes the average age in the Berlin tax administration. The other parameters depend on the respective size category.

The post estimation parameters from Table 38 to Table 41 are once again omitted in the following tables with the exception of the number of observations.

6.3.1 Micro Firm Size Category

This size category departs from the others as so-called “micro-entities agents” conduct field audits in many cases. These agents usually have a lower education level and are paid less than auditors from a higher career path. Therefore the female agents in the reference basis are salaried according to the grade *A9s/A9z*, predominately conduct audits of SMEs, and have between 10 and 15 years’ experience as auditors.

The results show that in the event of beginning as an auditor the audit time is significantly decelerated. This effect is mitigated due to the report time period so that in total time robust effects cannot be assumed as the second best fitted PO model loses its significance. But audit time also decelerates to a greater extent with experience. In the group of *15 TO 20* years the significance of this effect still decreases with an increase in model fitting so that in the best fitted PH model no significance is found. However, in the most experienced group this effect is robust with regard to the audit time at the .1-level, and to the total time even at the .05-level. Taking interaction effects into account, the results show that the effect relating to the experience group *15 TO 20* concerns almost exclusively the age group *50 TO 60* because older agents are only represented in two experience groups, namely in the reference basis and *OVER 20* (see Appendix F Table 53). The adjusted result is that the level of coefficients is closer together.[142] Besides, the combination of *OVER 20* years’ experience and older than 60 is only poorly represented so that the interacting effects are not interpretable. Consequently, hypothesis *H3-1* is only partly proven as the time consumption is also increased if agents have already changed at an early stage in their careers to the audit

[142] PO model: $.034 \times 3.326 = .113$; probit model: $.195 \times 1.928 = .378$; PH model: $.237 \times .486 = .115$.

department. In other words, for the same age group and the same career path and step those agents who changed at a younger age consume more audit time per case.

With regard to auditors' age, hypothesis *H3-2* is partly proven as only older agents (*50 TO 60*) consume more report time. This effect is significant at the .1-level across all models.

Agents who are salaried on a lower career step (*A8*) consume significantly more audit time. This effect is weakened as shown in the total time period. Due to only a few representatives making up this subgroup the result should not be overvalued. Agents from a higher career path consume time in different manner. Agents with salary grades *A9/A10* audit with more time-on-task but this result is not robust. The report time is decelerated with significant effects, although not in the best fitted model. Nonetheless, the comparison of agents in the entry salary grades of the second career path with agents in the highest salary grade in the lower career path shows that the consumption of audit time hardly differs and the consumption of report time increases. However, audit time decelerates significantly when the main field of work of agents with grades *A9/A10* is with corporate companies instead of SMEs (PH model: .970 × .00007 × 168.679 = .012), in which case the report time then accelerates significantly (PO model: .306 × .0007 × 9,446.593 = 2.057). The latter follows from their greater experience in more complex tasks. Agents from the lower career path do not audit *LARGE ENTERPRISES* or corporate companies in general (see Appendix F Table 53). However, agents on the higher career path and who declare up to 15 years' experience as an agent and their main field of work in SMEs should consume less time. It could be assumed that their performance is weaker so that they were not promoted to higher grades in the past. But agents with higher salary grades do not consume less time in each case. In detail, if the main field of work is SMEs, agents with salary grades *A11* or *A12/A13s* consume less audit time and report time in the best fitted models, at which a significant effect occurs only in the highest grades *A12/A13s*. It should be noted that audits of SMEs are not the main field of work for the highest salaried agents in general. Therefore, these results do not count as robust. It is taken into account though that the main field of work becomes more complex with an increase in salary grade. The interaction results show that agents with grade *A11* consume significantly less audit time and report time,[143] whereas audits conducted by

[143] If the main field of work is large enterprises, PH model (audit period): 2.234 × 8.62E-16 × 6.02E+14 = 1.159 and PO model (report period): 1.658 × 8.65E-16 × 4.45E+16 = 63.833, and if it is corporate companies, PH model: 2.23 × .00007 x 1,204,170 = 195.590 and PO model: 1.658 × .0007 x 8,596.107 = 10.155.

agents with *A12/A13s* significantly decelerate, with the exception of report time which accelerates in the event of corporate companies representing the main field of work.[144]

The conclusion from these results provides that an increase in experience measured in salary grades does not affect revenue agents' time consumption in the event of the same experience as an auditor and the same main field of work (SME). Hypothesis *H3-3* is proven, but this result is surprising and requires further research into the quality of audits. Two main questions are obvious: 1) Do differences exist between agents of either career path as their education is different, or not? In the first alternative agents of the second career path audit more complex focal points than their counterparts of the first career path in the same time, and in the second alternative all agents audit focal points with comparable complexity in the same time. 2) Why do agents with a less complex main field of work than their salary grade demands—*A12/A13s* and SMEs—not save significant time? If the main field of work changes to more complex fields—in connection with increased salary grades—it is shown that report time accelerates significantly due to more experience in task complexity. Hence hypothesis *H3-4* is proven. However, only agents with grade *A11* can apparently fit their working methods to cases of the micro size category relating to their audit time and report time. Agents with the highest grades (*A12/A13s*) consume much more audit time than reference agents from the lower career path. It can be assumed that they apply their methods of working for *LARGE ENTERPRISES* and corporate companies to micro firms so that, consequently, they spend more time-on-task. Agents with grade *A11* are still more familiar with audits of SMEs than higher salaried agents who usually conduct audits of more complex firms.

In addition, hypothesis *H3-5* is valid since in the smallest size category time pressure is inherent and the results relating to auditors' *SEX* are almost identical. The exponentiated coefficient for male auditors differs only slightly compared to 1.

[144] If the main field of work is large enterprises, PH model (audit period): 143.188 × 8.62E-16 =1.234E-13 and PO model (report period): 3074.243 × 8.65E-16 = 2.659E-12, and if it is corporate companies, PH model: 143.188 × .00007 = .010 and PO model: 3,074.243 × .0007 = 2.190.

Table 46: Characteristics of the Auditor in the Micro Firm Size Category

This table is the continuation of Table 38 and Table 42 and shows the exponentiated coefficients and the z statistics in parentheses for the group of characteristics of the auditor in the micro firm size category, separately per audit, report and total time consumption with a PO, probit and PH model in each case. + p<.1, * p<.05, ** p<.01, *** p<.001

Time Periods		Audit Time			Report Time			Total Time	
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	odds	normal	hazard	odds	normal	hazard	odds	normal	hazard
xb									
up to 5	0.012	0.127	0.016	0.326	1.001	0.985	0.024	0.170	0.014
	(-2.054)*	(-2.887)**	(-2.585)**	(-0.644)	(0.002)	(-0.014)	(-1.554)	(-2.574)*	(-2.493)*
5 to 10	0.155	0.654	0.039	7.655	2.783	7.065	0.522	0.867	0.075
	(-0.226)	(-0.375)	(-1.120)	(1.641)	(1.616)	(1.473)	(-0.113)	(-0.143)	(-0.923)
15 to 20	0.034	0.195	0.237	0.101	0.379	0.128	0.054	0.238	0.235
	(-1.872)+	(-2.722)**	(-1.159)	(-1.384)	(-1.321)	(-1.114)	(-1.828)+	(-2.518)*	(-1.151)
over 20	0.005	0.088	0.060	0.035	0.317	0.756	0.008	0.098	0.053
	(-1.946)+	(-3.023)**	(-1.905)+	(-1.217)	(-1.441)	(-0.200)	(-1.985)*	(-2.934)**	(-2.150)*
20 to 30	6.673	2.710	20.373	10.155	2.054	4.624	7.765	3.072	21.496
	(0.744)	(1.220)	(2.691)**	(1.548)	(1.188)	(1.674)+	(0.805)	(1.384)	(2.594)**
30 to 40	5.920	2.258	4.870	1.177	0.957	2.230	7.231	2.707	5.030
	(0.873)	(1.084)	(0.968)	(0.097)	(-0.066)	(0.699)	(1.002)	(1.400)	(0.927)
50 to 60	0.244	0.546	0.519	0.023	0.304	0.162	0.156	0.494	0.280
	(-0.861)	(-1.116)	(-1.044)	(-1.907)+	(-1.719)+	(-1.693)+	(-1.052)	(-1.323)	(-1.792)+
over 60	0.016	0.234	0.022	0.000	0.079	0.013	0.003	0.187	0.006
	(-0.628)	(-0.962)	(-1.781)+	(-2.020)*	(-1.353)	(-1.057)	(-1.075)	(-1.145)	(-2.015)*
up to 5 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
up to 5 # 30 to 40	4.066	1.999	8.925	0.711	0.738	0.264	2.552	1.421	7.888
	(0.490)	(0.748)	(1.039)	(-0.189)	(-0.385)	(-0.864)	(0.321)	(0.370)	(0.992)

up to 5 # 50 to 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
up to 5 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
5 to 10 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
5 to 10 # 30 to 40	1.198	0.730	24.422	0.123	0.296	0.116	0.292	0.435	6.913
	(0.023)	(-0.275)	(1.021)	(-0.888)	(-1.488)	(-1.248)	(-0.225)	(-0.784)	(0.628)
5 to 10 # 50 to 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
5 to 10 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
15 to 20 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
15 to 20 # 30 to 40	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
15 to 20 # 50 to 60	3.326	1.938	0.486	5.784	2.237	14.075	3.447	1.613	0.475
	(0.368)	(0.621)	(-0.499)	(0.578)	(0.797)	(1.486)	(0.354)	(0.469)	(-0.459)
15 to 20 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(2.629)**	(2.987)**	(4.435)***	(.)	(.)	(.)	(1.770)+	(2.144)*	(3.100)**
over 20 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
over 20 # 30 to 40	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
over 20 # 50 to 60	0.101	0.563	0.036	0.011	0.291	0.008	0.011	0.382	0.011
	(-0.366)	(-0.429)	(-1.148)	(-1.041)	(-0.734)	(-2.240)*	(-0.863)	(-0.616)	(-1.453)
over 20 # over 60	8.1E+04	104.553	3.9E+04	489.032	1.375	1.256	4.0E+04	53.420	2.7E+04
	(1.669)+	(2.688)**	(3.426)***	(1.046)	(0.171)	(0.056)	(1.838)+	(2.288)*	(3.014)**

A8	0.013	0.108	0.047	2.484	2.289	4.209	0.023	0.158	0.131
	(-1.743)+	(-2.862)**	(-2.863)**	(0.272)	(0.860)	(1.124)	(-1.536)	(-2.396)*	(-1.653)+
A9/A10	0.191	0.433	0.970	0.306	0.405	0.146	0.091	0.355	0.753
	(-0.803)	(-1.361)	(-0.028)	(-1.095)	(-1.755)+	(-2.025)*	(-1.211)	(-1.721)+	(-0.240)
A11	0.360	0.579	2.234	1.658	0.995	1.194	0.305	0.539	1.612
	(-0.523)	(-1.015)	(0.991)	(0.461)	(-0.009)	(0.206)	(-0.734)	(-1.156)	(0.532)
A12/A13s	7.674	1.466	143.188	3074.243	4.405	9.307	21.345	1.978	247.249
	(0.616)	(0.294)	(2.360)*	(2.018)*	(1.028)	(0.856)	(0.857)	(0.510)	(2.382)*
large enterprises	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(-3.517)***	(-6.146)***	(-4.425)***	(-3.163)**	(-4.396)***	(-4.356)***	(-3.884)***	(-6.473)***	(-4.269)***
corporate groups	0.000	0.015	0.000	0.001	0.137	0.043	0.000	0.012	0.000
	(-2.023)*	(-2.616)**	(-4.206)***	(-1.649)+	(-1.354)	(-1.474)	(-2.217)*	(-2.945)**	(-4.227)***
A8 # large enterprises	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A8 # corporate groups	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A9/A10 # large enterprises	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A9/A10 # corporate groups	309.890	16.187	168.670	9446.593	29.462	96.191	615.495	31.966	392.239
	(1.273)	(1.742)+	(2.443)*	(2.531)*	(2.022)*	(2.113)*	(1.573)	(2.289)*	(2.881)**
A11 # large enterprises	1.1E+20	1.3E+09	6.0E+14	4.4E+16	1.6E+06	1.5E+09	3.6E+21	3.2E+09	3.0E+16
	(3.460)***	(5.973)***	(4.339)***	(3.191)**	(4.206)***	(4.150)***	(3.934)***	(6.163)***	(4.249)***
A11 # corporate groups	4.7E+05	612.686	1.2E+06	8596.107	44.322	99.797	5.0E+05	838.018	9.4E+05
	(2.107)*	(3.327)***	(4.105)***	(1.824)+	(2.273)*	(2.047)*	(2.310)*	(3.736)***	(3.800)***
A12/A13s # large enterprises	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A12/A13s # corporate groups	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)

sex	0.923	0.967	0.990	0.766	0.925	1.029	0.883	0.940	0.828
	(-0.106)	(-0.122)	(-0.022)	(-0.380)	(-0.297)	(0.071)	(-0.197)	(-0.236)	(-0.402)
Observations	2,812	2,812	2,812	644	644	644	3,456	3,456	3,456

6.3.2 Small Firm Size Category

This size category is normally the starting point for new revenue agents. The reference basis is *5 TO 10* years' experience as an agent on the basis of having undergone training on the job within the first five years of the career. The reference basis comprises, moreover, the first two salary grades of the second career path (*A9/A10*) and SMEs as the main field of work.

The results show no robust effects of more experience on time even though the tendency suggests an acceleration in the groups *10 TO 15* and *15 TO 20*. Neither do any robust results occur relating to auditors' age. Only the youngest auditors save time, but this effect is not significant in the audit time period in the second best fitted model (3) and in the total time period in the best fitted model (7). The same applies with regard to the interaction effect of experience and age. The expected deceleration effect on report time (*H3-2*) is not proven in the event of older agents with more experience. In no cases are all models significant.

Furthermore, the results cannot prove hypothesis *H3-4*. More experienced auditors do not save audit and/or report time. This is true regardless of more complex main fields of work and also in the interaction of salary grade *A11* and *CORPORATE GROUPS*. The significance of the latter results solely from too few participants appearing within this combination.

Hypothesis *H3-5* is valid as before. Time pressure is also inherent in the small size category and significant effects do not occur. Hence there are no existing differences in time consumption between the *SEX*es.

Table 47: Characteristics of the Auditor in the Small Firm Size Category

This table is the continuation of Table 39 and Table 43 and shows the exponentiated coefficients and the z statistics in parentheses for the group of characteristics of the auditor in the small firm size category, separately per audit, report and total time consumption with a PO, probit and PH model in each case. + p<.1, * p<.05, ** p<.01, *** p<.001

Time Periods	Audit Time			Report Time			Total Time		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	odds	normal	hazard	odds	normal	hazard	odds	normal	hazard
xb									
up to 5	0.430	1.887	11.301	6.527	2.836	2.757	0.730	2.606	11.772
	(-0.302)	(0.718)	(1.162)	(0.939)	(1.670)+	(0.780)	(-0.115)	(1.129)	(1.350)
10 to 15	2.411	2.944	15.301	46.693	5.630	4.032	10.434	3.873	21.012
	(0.300)	(1.098)	(1.251)	(1.168)	(2.029)*	(0.821)	(0.683)	(1.397)	(1.534)
15 to 20	6.935	6.446	34.484	118.839	8.511	2.153	20.902	10.104	26.274
	(0.671)	(1.903)+	(1.465)	(1.854)+	(2.459)*	(0.497)	(0.848)	(2.395)*	(1.692)+
over 20	2.006	1.399	0.702	0.296	0.678	1.058	1.083	1.211	2.919
	(0.231)	(0.296)	(-0.211)	(-0.273)	(-0.462)	(0.032)	(0.028)	(0.215)	(0.545)
20 to 30	77.939	7.540	7.165	1.206	1.060	1.344	67.884	5.807	24.935
	(2.788)**	(2.694)**	(1.306)	(0.063)	(0.077)	(0.275)	(1.723)	(2.284)*	(2.530)*
30 to 40	0.153	1.142	3.455	0.037	0.298	0.036	0.038	0.544	1.631
	(-0.579)	(0.141)	(0.541)	(-0.835)	(-1.331)	(-1.621)	(-0.931)	(-0.748)	(0.258)
50 to 60	0.145	0.383	0.194	274.622	3.716	0.126	0.346	0.964	0.065
	(-0.623)	(-0.751)	(-0.686)	(1.333)	(1.362)	(-0.925)	(-0.298)	(-0.035)	(-0.944)
over 60	2.106	2.922	23.609	5.356	2.086	2.253	28.293	5.126	14.869
	(0.473)	(1.079)	(1.608)	(0.669)	(1.173)	(0.870)	(1.559)	(1.909)+	(1.936)+
up to 5 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
up to 5 # 30 to 40	21.854	1.006	0.231	10.121	1.794	5.838	48.930	1.454	0.472
	(0.880)	(0.005)	(-0.571)	(0.502)	(0.567)	(0.992)	(0.960)	(0.388)	(-0.389)

up to 5 # 50 to 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
up to 5 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
10 to 15 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
10 to 15 # 30 to 40	11.974	1.454	0.223	0.821	0.731	3.104	22.902	2.355	0.426
	(0.651)	(0.291)	(-0.590)	(-0.040)	(-0.271)	(0.549)	(0.700)	(0.729)	(-0.396)
10 to 15 # 50 to 60	0.307	0.724	1.026	0.000	0.105	2.880	0.082	0.296	2.237
	(-0.343)	(-0.239)	(0.011)	(-1.590)	(-1.879)+	(0.454)	(-0.633)	(-0.997)	(0.294)
10 to 15 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(0.699)	(1.753)+	(-4.871)***	(-0.986)	(-0.988)	(0.990)	(0.267)	(0.892)	(1.574)
15 to 20 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
15 to 20 # 30 to 40	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
15 to 20 # 50 to 60	0.036	0.280	0.343	0.000	0.017	1.405	0.012	0.068	1.712
	(-0.677)	(-0.873)	(-0.457)	(-2.280)*	(-3.084)**	(0.124)	(-1.024)	(-1.960)*	(0.163)
15 to 20 # over 60	0.054	0.054	0.011	0.000	0.015	0.114	0.000	0.011	0.024
	(-0.732)	(-1.698)+	(-1.577)	(-1.783)+	(-3.169)**	(-0.927)	(-1.227)	(-2.643)**	(-2.089)*
over 20 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
over 20 # 30 to 40	0.002	0.092	0.411	1.321	1.239	0.298	0.040	0.222	0.129
	(-1.696)+	(-1.479)	(-0.405)	(0.044)	(0.145)	(-0.317)	(-0.661)	(-1.006)	(-0.754)
over 20 # 50 to 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
over 20 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)

A8	1.177	1.001	1.105	0.480	0.728	2.599	0.459	0.931	1.586
	(0.092)	(0.001)	(0.113)	(-0.374)	(-0.418)	(1.098)	(-0.518)	(-0.128)	(0.707)
A9s/A9z	9.229	3.497	3.175	0.061	0.403	0.620	4.216	2.620	3.590
	(1.321)	(1.849)+	(1.516)	(-1.458)	(-1.658)+	(-0.523)	(0.846)	(1.455)	(1.686)+
A11	0.385	0.594	0.604	0.603	0.607	0.577	0.222	0.576	0.575
	(-0.951)	(-1.357)	(-0.738)	(-0.463)	(-1.604)	(-1.207)	(-1.364)	(-1.487)	(-0.999)
A12/A13s	0.650	0.805	0.551	2.521	1.732	1.272	0.367	0.831	0.427
	(-0.220)	(-0.364)	(-0.754)	(0.544)	(0.728)	(0.255)	(-0.369)	(-0.283)	(-0.880)
large enterprises	0.149	0.491	2.349	0.027	0.411	0.776	0.028	0.338	0.717
	(-1.282)	(-0.911)	(0.502)	(-0.810)	(-0.800)	(-0.143)	(-1.386)	(-1.706)+	(-0.370)
corporate groups	4.001	4.982	28.951	0.015	0.295	6.074	5.628	5.232	171.423
	(0.551)	(1.554)	(1.681)+	(-1.087)	(-1.014)	(1.160)	(0.540)	(1.508)	(1.804)+
A8 # large enterprises	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A8 # corporate groups	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A9s/A9z # large enterprises	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A9s/A9z # corporate groups	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A11 # large enterprises	0.471	0.719	0.069	0.024	0.210	0.020	0.517	0.434	0.020
	(-0.276)	(-0.323)	(-1.101)	(-1.055)	(-1.433)	(-1.612)	(-0.207)	(-0.865)	(-1.177)
A11 # corporate groups	0.003	0.009	0.001	0.008	0.062	0.007	0.000	0.004	0.000
	(-1.807)+	(-2.987)**	(-2.146)*	(-0.864)	(-1.637)	(-1.819)	(-1.890)	(-3.389)***	(-2.365)*
A12/A13s # large enterprises	1.082	0.706	0.325	4.049	0.925	3.068	3.214	0.984	2.451
	(0.029)	(-0.258)	(-0.419)	(0.250)	(-0.065)	(0.427)	(0.404)	(-0.017)	(0.594)
A12/A13s # corporate groups	313.273	12.100	3.594	100.089	3.183	0.589	688.616	7.098	1.893
	(1.617)	(1.661)+	(0.429)	(0.716)	(0.614)	(-0.175)	(1.449)	(1.322)	(0.277)

sex	2.053	1.228	1.336	0.487	0.753	1.260	1.627	0.934	1.204
	(0.948)	(0.722)	(0.850)	(-0.436)	(-0.855)	(0.595)	(0.534)	(-0.222)	(0.606)
Observations	5,384	5,384	5,384	1,166	1,166	1,166	6,550	6,550	6,550

6.3.3 Medium Firm Size Category

The reference basis is further characterized by *10 TO 15* years' experience, the middle salary grade *A11*, and as before SMEs as the main field of work.

Agents with the lowest experience (*UP TO 5*) consume significantly less audit time and total time whereby the latter is weakened due to partly significantly increased report time. This result applies in the reference age group (*40 TO 50*). In the case of agents between 30 and 40 the results show that audit time further accelerates (e.g., PO model: 13.746 × 2.757 × .465 = 17.619) and report time changes from deceleration to acceleration (e.g., PO model: .290 × 1.611 × 9.924 = 4.636). The same results occur in the case of the age group *20 TO 30*; audit time (e.g., PO model: 13.746 × 16,295 × .00003 = 6.832) and report time accelerate (e.g., PO model: .290 × 2,183.475 × .013 = 8.232), as does total time. In addition, agents with age from *30 TO 40* and experience between 15 and 20 years consume more audit time (e.g., PO model: 1.841 × 2.757 × .001 = .005) and total time than the older reference group with lower experience. In contrast, the report time (e.g., PO model: .270 ×1.611 × 3.236 = 1.408) accelerates. The results cannot be interpreted as robust in the cases of agents between 50 and 60 and experience between 5 and 10 as well as agents *OVER 60* and experience *OVER 20* years as the number of participants is not enough in these subgroups. The conclusion is that younger agents with less experience consume less time than the reference group. New agents with the reference age also audit faster than their experienced counterparts. Hence with an increase in experience the audit time increases and with additional increases in age the report time increases too. The exact causes of this surprising result should be investigated by further research. Possible clues are the interaction between life experience on the one hand, and on the other hand task-complexity as well as the building and maintenance of task-specific knowledge (legal basics and technical implementation).

The results of the test of hypotheses *H3-3* and *H3-4* contain in part interaction effects. At first, it is shown that the time consumption is not affected by different salary grades in the reference main field of work. But, agents with the reference salary grade *A11* consume more audit time in the event of more experience in more complex audits of large enterprises and corporate companies. In the latter case this effect is highly significant. Their report time accelerates in either of the events, although these represent non-significant effects. In comparison, agents with the highest salary grades *A12/A13s* and *LARGE ENTERPRISES* as the main field of work consume less audit time (PO model: 4.812 × .242 × .894 = 1.041) and less report time (PO model: 3.855 × 1.281 × .383 = 1.891). In the event of *CORPORATE*

GROUPS as the main field of work they consume lesser audit time (e.g., PO model: 4.822 × .010 × 24.257 = 1.170) and more report time (e.g., PO model: 3.855 × 6.811 × .035 = .919). Either effect is weakly significant in the best fitted models, but not robust in either case.

Moreover, a salient finding is that agents consume more audit time (e.g., PO model: .337 × .242 × .076 = .006) and significantly more report time (e.g., PO model: 1.246 × 1.281 × .005 = .008) when they are salaried at their first career steps in the second career path—salary grades *A9/A10*—and audit predominately large enterprises. It seems that they apply their working methods from already familiar more complex tasks to less complex audits. Further research could indicate whether they audit more complex focal points due to their increased experience. As a result of this the description of more complex adjustments in the final report usually needs more report time so that the above finding can be explained.

Hypothesis *H3-5* is valid as before. Time pressure is likewise inherent in the medium size category. The exponentiated coefficients vary somewhat more strongly than before, but robust significant effects are not shown. Differences between *SEX*es do not exist relating to time consumption.

Table 48: Characteristics of the Auditor in the Medium Firm Size Category

This table is the continuation of Table 40 and Table 44 and shows the exponentiated coefficients and the z statistics in parentheses for the group of characteristics of the auditor in the medium firm size category, separately per audit, report and total time consumption with a PO, probit and PH model in each case. + p<.1, * p<.05, ** p<.01, *** p<.001

Time Periods	Audit Time			Report Time			Total Time		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	odds	normal	hazard	odds	normal	hazard	odds	normal	hazard
xb									
up to 5	13.746	3.427	3.383	0.290	0.495	0.386	7.616	2.609	2.656
	(2.472)*	(2.687)**	(2.043)*	(-1.071)	(-1.813)+	(-1.981)*	(1.855)+	(2.110)*	(1.721)+
5 to 10	0.657	1.130	1.483	0.298	0.497	0.385	0.421	0.974	1.031
	(-0.401)	(0.285)	(0.948)	(-0.794)	(-1.191)	(-1.171)	(-0.785)	(-0.058)	(0.058)
15 to 20	1.841	1.043	0.806	0.270	0.495	0.822	0.930	0.846	0.853
	(0.719)	(0.109)	(-0.376)	(-1.744)+	(-2.243)*	(-0.466)	(-0.086)	(-0.468)	(-0.305)
over 20	12.120	3.209	7.922	0.288	0.430	0.377	5.631	2.477	8.702
	(0.613)	(1.433)	(2.354)*	(-0.496)	(-1.127)	(-1.361)	(1.246)	(1.732)+	(3.100)**
20 to 30	1.6E+04	65.214	675.759	2183.475	67.167	411.061	3.2E+04	93.066	999.160
	(3.280)**	(3.369)***	(5.206)***	(2.816)**	(4.107)***	(3.160)**	(3.351)***	(3.630)***	(5.213)***
30 to 40	2.757	1.665	2.855	1.611	1.028	1.087	2.136	1.526	2.708
	(1.050)	(1.379)	(2.166)*	(0.531)	(0.072)	(0.205)	(0.852)	(1.204)	(2.175)*
50 to 60	0.885	0.938	1.075	1.338	1.136	1.694	0.778	0.943	1.253
	(-0.162)	(-0.198)	(0.164)	(0.407)	(0.429)	(1.368)	(-0.305)	(-0.177)	(0.526)
over 60	0.002	0.048	0.014	0.896	1.108	1.438	0.004	0.069	0.013
	(-1.397)	(-3.028)**	(-3.816)***	(-0.039)	(0.113)	(0.424)	(-2.703)**	(-3.471)***	(-4.669)***
up to 5 # 20 to 30	0.000	0.013	0.002	0.013	0.099	0.024	0.000	0.014	0.001
	(-2.676)**	(-2.876)**	(-4.538)***	(-1.180)	(-1.904)+	(-2.185)*	(-2.492)*	(-2.740)**	(-4.309)***
up to 5 # 30 to 40	0.465	0.820	0.796	9.924	5.031	6.690	1.042	1.216	0.886
	(-0.449)	(-0.316)	(-0.292)	(1.389)	(2.729)**	(2.674)**	(0.023)	(0.305)	(-0.168)

up to 5 # 50 to 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
up to 5 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
5 to 10 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
5 to 10 # 30 to 40	1.175	0.947	0.339	7.663	3.197	4.742	3.113	1.280	0.555
	(0.099)	(-0.084)	(-1.633)	(1.113)	(1.513)	(1.737)+	(0.646)	(0.377)	(-0.834)
5 to 10 # 50 to 60	224.957	7.234	7.633	14.953	2.964	6.481	180.970	6.115	8.898
	(2.153)*	(1.884)+	(1.948)+	(0.849)	(1.041)	(1.044)	(2.077)*	(1.861)+	(1.822)+
5 to 10 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(3.586)***	(0.094)	(2.767)**	(1.426)	(2.221)*	(0.750)	(.)	(.)	(-1.554)
15 to 20 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
15 to 20 # 30 to 40	0.001	0.038	0.023	3.236	3.354	4.827	0.005	0.076	0.035
	(-3.319)***	(-4.139)***	(-3.360)***	(0.790)	(1.723)+	(2.055)*	(-2.968)**	(-3.519)***	(-3.153)**
15 to 20 # 50 to 60	0.156	0.496	0.794	0.971	0.954	0.502	0.253	0.531	0.592
	(-1.531)	(-1.300)	(-0.353)	(-0.031)	(-0.104)	(-1.182)	(-1.243)	(-1.269)	(-0.865)
15 to 20 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(3.930)***	(1.164)	(3.072)**	(1.556)	(2.477)*	(1.033)	(.)	(.)	(1.380)
over 20 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
over 20 # 30 to 40	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
over 20 # 50 to 60	0.109	0.416	0.176	0.544	0.873	0.846	0.159	0.433	0.118
	(-0.526)	(-0.944)	(-1.778)+	(-0.228)	(-0.160)	(-0.207)	(-1.065)	(-1.225)	(-2.529)*
over 20 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(-3.459)***	(-0.414)	(-2.634)**	(2.008)*	(2.557)*	(1.900)+	(.)	(.)	(-0.408)

item-nonresponse	0.026	0.127	0.301	0.002	0.038	0.023	0.021	0.095	0.209
	(-1.991)*	(-2.991)**	(-1.663)+	(-2.887)**	(-4.301)***	(-3.982)***	(-2.457)*	(-3.487)***	(-2.236)*
A8	0.672	0.869	0.813	11.136	2.555	7.652	1.249	1.242	1.159
	(-0.312)	(-0.267)	(-0.235)	(1.714)+	(1.471)	(1.742)+	(0.150)	(0.398)	(0.154)
A9s/A9z	0.847	1.071	2.022	4.068	1.849	2.602	1.326	1.280	2.161
	(-0.130)	(0.134)	(1.764)+	(1.302)	(1.171)	(1.415)	(0.240)	(0.583)	(2.052)*
A9/A10	0.337	0.679	0.527	1.246	0.963	1.145	0.408	0.717	0.628
	(-1.233)	(-1.228)	(-1.596)	(0.254)	(-0.138)	(0.439)	(-0.997)	(-1.070)	(-1.198)
A12/A13s	4.822	2.198	2.194	3.855	1.506	1.888	5.587	2.170	2.188
	(1.450)	(1.746)+	(1.405)	(1.273)	(0.922)	(1.284)	(1.580)	(1.810)+	(1.361)
large enterprises	0.242	0.496	0.266	1.281	0.914	0.712	0.325	0.533	0.301
	(-1.474)	(-1.903)+	(-2.272)*	(0.258)	(-0.245)	(-0.852)	(-1.274)	(-1.832)+	(-2.178)*
corporate groups	0.010	0.164	0.112	6.811	2.686	1.465	0.033	0.261	0.156
	(-3.819)***	(-3.247)**	(-3.340)***	(1.141)	(1.851)+	(0.356)	(-3.147)**	(-2.539)*	(-2.755)**
item-nonresponse # large enterprises	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
item-nonresponse # corporate groups	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A8 # large enterprises	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A8 # corporate groups	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A9s/A9z # large enterprises	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A9s/A9z # corporate groups	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A9/A10 # large enterprises	0.076	0.332	0.382	0.005	0.066	0.056	0.040	0.236	0.221
	(-1.115)	(-1.340)	(-0.962)	(-2.892)**	(-4.249)***	(-2.620)**	(-1.497)	(-1.799)+	(-1.420)

A9/A10 #	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
corporate groups	(2.014)*	(1.748)+	(1.431)	(-1.802)+	(-2.523)*	(-1.387)	(.)	(.)	(0.769)
A12/A13s #	0.894	1.138	2.014	0.383	0.799	0.590	0.577	1.044	1.690
large enterprises	(-0.080)	(0.203)	(0.799)	(-0.657)	(-0.369)	(-0.845)	(-0.402)	(0.073)	(0.607)
A12/A13s #	24.257	3.328	2.852	0.035	0.176	0.169	6.898	2.029	1.863
corporate groups	(2.014)*	(1.748)+	(1.431)	(-1.802)+	(-2.523)*	(-1.387)	(1.283)	(1.066)	(0.769)
sex	1.315	1.087	0.994	2.062	1.413	1.485	1.456	1.127	1.100
	(0.540)	(0.420)	(-0.025)	(1.427)	(1.694)+	(1.569)	(0.778)	(0.629)	(0.405)
Observations	10,136	10,136	10,136	1,995	1,995	1,995	12,131	12,131	12,131

6.3.4 Large Firm Size Category

Agents of the reference basis have experience as an agent between 15 and 20 years, are paid in accordance with the highest salary grades in this career path (*A12/A13s*) and conduct mostly audits of large enterprises.

The group of agents aged between 30 and 40 with experience between 10 and 15 years is heavily represented. Their time consumption differs from the reference basis: audit time (e.g., PH model: $2.025 \times .396 \times 5.316 = 4.263$) and report time (e.g., PH model: $.685 \times .568 \times 5.139 = 1.999$) accelerate significantly. And in the event of less experience (*5 TO 10*) the acceleration of audit time (e.g., PH model: $.992 \times .396 \times 3.208 = 1.260$) is also shown in this age group. In contrast, if age is only changed to the group *30 TO 40*, audit time increases significantly. This means in effect than more experience decelerates the audit. Furthermore, agents aged *OVER 60* at the reference level of experience consume significantly more time in total. The results of the age group *20 TO 30* are not meaningful as only a few participants are observed. The same applies for *50 TO 60* and experience between 5 and 10 years.

If large firms are audited by agents who are salaried at the lowest salary grades and who usually conduct audits of SMEs, the audit time (e.g., PH model: $1.013 \times 20.255 \times .037 = .759$) and report time (e.g., PH model: $8.093 \times 21.868 \times .004 = .708$) increase significantly. These effects are intensified when the agents are salaried in accordance with *A11* so that audit time (e.g., PH model: $1.057 \times 20.255 \times .017 = .364$) and report time (e.g., PH model: $.499 \times 21.868 \times .016 = .175$) decelerate even more compared to the reference basis. However, in the event of agents with the highest salary grade who atypically conduct mostly audits of SMEs, the time consumption decreases significantly at the .001-level. But this finding should not be overvalued as only a few participants are observed. The effects of corporate companies as the main field of work on report time are not robust because for the reference salary grades the second best model is not significant. In the case of the salary grade *A9/10* only a few participants are observed.

Time pressure decreases in the large size category. However, the complexity of disclosed breaches increases and hence their presentation in the report produces an increase in time. The results show that female auditors require less time-effort for this. In other words, male auditors consume more report time with significance at the .001-level (PH model).[145]

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[145] Either *SEX* is sufficiently represented in the subcategories L1, L2, and L3 (see Appendix H).

Table 49: Characteristics of the Auditor in the Large Firm Size Category

This table is the continuation of Table 41 and Table 45 and shows the exponentiated coefficients and the z statistics in parentheses for the group of characteristics of the auditor in the large firm size category, separately per audit, report and total time consumption with a PO, probit and PH model in each case. + p<.1, * p<.05, ** p<.01, *** p<.001

Time Periods	Audit Time			Report Time			Total Time		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	odds	normal	hazard	odds	normal	hazard	odds	normal	hazard
xb									
up to 5	2.935	1.244	3.438	2.188	2.619	0.527	3.725	1.369	2.913
	(1.027)	(0.456)	(2.024)*	(0.163)	(0.771)	(-0.547)	(1.167)	(0.589)	(1.543)
5 to 10	0.527	0.545	0.992	1.641	1.368	2.093	0.634	0.607	1.094
	(-0.599)	(-1.498)	(-0.016)	(0.585)	(0.906)	(1.279)	(-0.464)	(-1.310)	(0.179)
10 to 15	3.414	1.664	2.025	1.151	1.134	0.685	3.120	1.606	1.741
	(1.791)+	(1.770)+	(2.073)*	(0.207)	(0.411)	(-1.093)	(1.704)+	(1.647)+	(1.600)
over 20	0.595	0.877	1.061	1.389	1.226	1.251	0.752	0.957	1.061
	(-0.544)	(-0.281)	(0.157)	(0.381)	(0.483)	(0.529)	(-0.322)	(-0.098)	(0.168)
20 to 30	11.810	3.896	14.993	0.000	0.012	0.017	2.033	1.691	6.829
	(1.503)	(1.779)+	(3.167)**	(-4.955)***	(-5.233)***	(-4.869)***	(0.443)	(0.684)	(2.290)*
30 to 40	0.055	0.213	0.396	0.135	0.335	0.568	0.063	0.221	0.410
	(-2.131)*	(-2.817)**	(-2.263)*	(-1.510)	(-2.020)*	(-1.281)	(-2.131)*	(-2.955)**	(-2.230)*
50 to 60	1.285	0.904	0.901	0.364	0.638	0.398	1.085	0.846	0.792
	(0.302)	(-0.288)	(-0.233)	(-1.272)	(-1.274)	(-2.388)*	(0.097)	(-0.466)	(-0.517)
over 60	0.160	0.346	0.590	0.472	0.769	0.982	0.122	0.309	0.497
	(-1.479)	(-2.183)*	(-1.065)	(-0.678)	(-0.585)	(-0.038)	(-1.689)+	(-2.464)*	(-1.428)
up to 5 # 20 to 30	0.141	0.343	0.063	2.3E+05	342.846	866.339	0.807	0.850	0.210
	(-0.885)	(-1.066)	(-2.294)*	(2.183)*	(3.497)***	(4.129)***	(-0.096)	(-0.159)	(-1.296)
up to 5 # 30 to 40	14.936	4.729	3.956	1.128	0.547	7.629	6.153	3.179	4.040
	(1.493)	(1.944)+	(1.636)	(0.024)	(-0.417)	(1.332)	(0.967)	(1.376)	(1.467)

up to 5 # 50 to 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
up to 5 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
5 to 10 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
5 to 10 # 30 to 40	53.783	13.959	3.208	9.961	4.444	0.964	48.918	13.135	2.787
	(2.322)*	(3.671)***	(1.820)+	(1.329)	(2.174)*	(-0.043)	(2.258)*	(3.643)***	(1.504)
5 to 10 # 50 to 60	14.906	2.397	4.338	2.400	2.738	4.414	40.896	5.954	10.398
	(1.381)	(0.870)	(1.291)	(0.498)	(1.170)	(0.789)	(2.316)*	(2.262)*	(2.471)*
5 to 10 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(0.166)	(0.068)	(-0.517)	(-1.843)+	(-1.966)*	(-2.927)**	(3.361)***	(3.982)***	(4.736)***
10 to 15 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
10 to 15 # 30 to 40	36.620	7.338	5.316	17.011	6.315	5.139	43.000	8.100	6.249
	(2.024)*	(2.746)**	(2.492)*	(1.678)+	(2.617)**	(2.445)*	(2.057)*	(2.922)**	(2.684)**
10 to 15 # 50 to 60	0.129	0.459	0.502	8.558	2.669	3.980	0.261	0.593	0.782
	(-1.751)+	(-1.569)	(-1.208)	(1.409)	(1.435)	(2.275)*	(-1.161)	(-1.043)	(-0.469)
10 to 15 # over 60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(0.462)	(0.912)	(0.600)	(-1.166)	(-0.126)	(-0.376)	(1.132)	(1.293)	(1.103)
over 20 # 20 to 30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
over 20 # 30 to 40	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
over 20 # 50 to 60	0.306	0.610	0.495	0.517	0.630	0.643	0.278	0.567	0.484
	(-0.870)	(-0.845)	(-1.092)	(-0.593)	(-0.839)	(-0.770)	(-1.000)	(-0.991)	(-1.163)
over 20 # over 60	3.915	1.703	1.253	0.471	0.562	0.475	4.146	1.791	1.470
	(0.890)	(0.817)	(0.353)	(-0.557)	(-0.945)	(-1.166)	(0.970)	(0.928)	(0.623)

item-nonresponse	0.129	0.484	0.716	0.191	0.433	0.797	0.113	0.421	0.746
	(-1.547)	(-1.308)	(-0.621)	(-1.388)	(-1.578)	(-0.353)	(-1.773)+	(-1.788)+	(-0.646)
A9s/A9z	0.321	0.469	0.586	0.065	0.306	0.201	0.252	0.473	0.428
	(-0.707)	(-1.084)	(-0.590)	(-1.579)	(-1.582)	(-2.123)*	(-0.804)	(-1.105)	(-0.973)
A9/A10	2.966	1.778	1.013	239.930	19.108	8.093	7.753	3.030	1.205
	(0.625)	(0.711)	(0.015)	(2.887)**	(3.343)***	(2.172)*	(1.083)	(1.330)	(0.212)
A11	1.627	1.344	1.571	0.382	0.515	0.499	1.194	1.165	1.284
	(0.769)	(1.030)	(1.192)	(-1.303)	(-2.053)*	(-1.987)*	(0.297)	(0.547)	(0.680)
item-nonresponse	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
micro/small/medium enterprises	38.844	6.933	20.255	51.317	6.279	21.868	63.378	8.882	32.616
	(3.330)***	(4.203)***	(4.025)***	(2.537)*	(2.795)**	(4.445)***	(3.481)***	(4.597)***	(4.961)***
corporate groups	1.840	1.405	1.658	0.304	0.535	0.425	1.317	1.244	1.342
	(1.066)	(1.297)	(1.737)+	(-1.613)	(-1.887)+	(-2.621)**	(0.493)	(0.839)	(1.019)
item-nonresponse # item-nonresponse	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(0.769)	(1.030)	(1.192)	(-1.951)+	(-2.956)**	(-7.109)***	(-5.556)***	(-7.292)***	(-6.304)***
item-nonresponse # micro/small/medium enterprises	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
item-nonresponse # corporate groups	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A9s/A9z # item-nonresponse	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A9s/A9z # micro/small/medium enterprises	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A9s/A9z # corporate groups	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
A9/A10 # item-nonresponse	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)

A9/A10 # micro/small/medium enterprises	0.004	0.076	0.037	0.000	0.004	0.004	0.001	0.033	0.019
	(-2.728)**	(-2.693)**	(-2.624)**	(-4.227)***	(-4.740)***	(-5.308)***	(-3.347)***	(-3.426)***	(-3.411)***
A9/A10 # corporate groups	0.243	0.522	1.565	0.006	0.050	0.361	0.091	0.304	1.534
	(-0.742)	(-0.672)	(0.489)	(-2.121)*	(-2.663)**	(-0.854)	(-1.127)	(-1.201)	(0.450)
A11 # item-nonresponse	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(0.769)	(1.030)	(1.192)	(-1.809)+	(2.910)**	(-4.112)***	(2.977)**	(4.594)***	(4.355)***
A11 # micro/small/medium enterprises	0.003	0.058	0.017	0.004	0.085	0.016	0.002	0.047	0.010
	(-3.518)***	(-4.312)***	(-4.509)***	(-2.698)**	(-2.952)**	(-4.366)***	(-3.567)***	(-4.512)***	(-5.205)***
A11 # corporate groups	0.137	0.639	0.295	1.437	1.183	2.177	0.167	0.569	0.341
	(-1.570)	(-0.605)	(-2.475)*	(0.248)	(0.268)	(1.128)	(-1.233)	(-0.797)	(-2.057)*
sex	0.533	0.726	0.657	0.290	0.525	0.393	0.483	0.660	0.589
	(-1.529)	(-1.753)+	(-2.000)*	(-2.726)**	(-3.355)***	(-4.449)***	(-1.697)+	(-2.261)*	(-2.473)*
Observations	31,366	31,366	31,366	6,081	6,081	6,081	37,447	37,447	37,447

6.3.5 Interims Conclusion

The impact of characteristics of auditors varies for the four size categories. According to the individual parameters the results can be summarized as followed.

In the micro size category audit time decreases with an increase in experience up to the reference basis and increases after it. It is noteworthy, that the latter occurs predominantly for older agents who changed into an audit department at a younger age. In addition, agents consume more report time if they are older than the reference basis. These findings apply with regard to the reference salary group, which is the highest grade in the first career path. This path has a lower level in education than the second career path. Such effects cannot be observed in the entry audit category for new agents of the second career path, in the small size category. Here the audit and report time consumption is not affected by either experience as an auditor or age at a robust significant level. In the medium size category the results show that younger agents with less experience consume less time than the reference group. New agents with the reference age also audit faster than their more experienced counterparts. Hence with an increase in experience the audit time increases and with additional increases in age the report time increases, too. The results of the large size category show likewise that audit time increases with an increase in experience as an auditor. In comparison with the reference basis audit time and report time partly accelerate significantly if agents have less experience as auditors. This result persists if auditors' age decreases. In contrast, if auditors are aged older, their time consumption increases significantly in all time periods.

Age and experience as an agent affect time consumption in different ways. Their interdependence as factors must also be taken into account. The interaction between life experience on the one hand and, on the other hand, task-complexity as well as the building and maintenance of task-specific knowledge (legal basics and technical implementation) have apparently significant effects on time consumption. So it should be emphasized that a later entry into an audit department decreases revenue agents' time consumption with regard to the middle salary grade (A11) in the medium size category. The exact causes of this result should be investigated by further research. Also time increases if agents have reached the highest salary grades and have a higher level of experience as an agent (large size category). This effect can be caused by an increased level of task complexity or a loss of auditors' motivation and sense of challenge.

If experience is measured on the basis of salary grades, the results show that revenue agents' time consumption is not affected by an increase in the experience level with regard to the reference basis in each case and for the case of the same experience as an auditor as well as the same main field of work in the firm size categories of SMEs so that hypothesis *H3-3* is proven. Furthermore, it is absolutely essential to include the interdependent effect of salary grades and agents' main field of work as latter depends from the salary grade in principal. This interaction tests hypothesis *H3-4* and results in different findings. Agents who are more familiar with more complex tasks save report time in comparison to the reference salary grade in general. This effect is significant in the micro firm size category and a tendency in the medium firm size category.[146] The small firm size category is without any effect in this respect.

However, the results differ in relation to audit time. More highly experienced agents with salary grade A11 consume less audit time in the micro firm size category, but not in the medium firm size category. In contrast, agents with salary grades A12/A13s and a more complex main field of work consume significantly more audit time in the micro firm size category and less audit time in the medium firm size category, though the latter is not a robust significant effect. If lower salaried agents with higher experience in more complex tasks—salary grades A9/A10 and already large enterprises as the main field of work—audit firms with a lower level of complexity, they consume more audit time and significantly more report time. This result is shown in the medium firm size category. In the large size category the results prove hypothesis *H3-4* since less experienced agents—with the lower salary grades A9/A10 or A11 and SMEs as the main field of work—consume significantly more audit time and report time. However, further research is required, because hypothesis *H3-4* is only partly proven. Here the audit quality is predominantly interesting along the dimensions of complexity of audit adjustments and auditors' motivation, who usually are at the end of their career path.

Finally, the results show that no differences occur with regard to gender under time pressure. In the audit time period it is customary that the audit is conducted in one go. In doing so auditees' burden can minimize. This applies in particular if audits are not conducted in the local tax office. However, time pressure decreases if firm size increases and therefore task

[146] Exceptions are agents at salary grades A12/A13s and large enterprises as the main field of work in the micro firm size category and at the same salary grades with corporate companies as the main field of work in the medium firm size category.

complexity, too. Consequently, in the large size category, differences are visible. Female auditors save audit time and report time, while the latter point is highly significant as soon as time pressure is hardly observable in the report time period.

7 Conclusion

Tax audit duration and revenue agents' time consumption have only been investigated in isolated cases to date. *Sinha* (2007, 2010) and *Alissa et al.* (2014) used the time-on-task to estimate auditors' effort. *Franzoni* (2008) points to tax audit length as a possible means of putting pressure on auditees. However, the determinants of time consumption or duration itself are not examined. My study fills this gap insofar as revenue agents' time consumption is considered. The smallest unit of measurement is a quarter of a working day. I have considered the observed time as the waiting period. This period includes the phases of auditing and reporting. Both phases are characterized by a large number of parameters with different influences on revenue agents' time consumption and/or audit duration. The parameters can be assigned to the characteristic groups of auditee, audit, and auditor as well as agency. Though agency is a negligible group in terms of representation in this study. Each group is based on objective and individual parameters. But only objective parameters are currently observable in this highly sensitive data area so that my study is limited to such parameters.

The time consumption cumulates up to occurrence of the event of interest. This failure time is restricted to a positive value so that the observed time has a skewed distribution (Harrell 2015). Some control estimations prove this assumption and, on top, show bell-shaped transition rates (Allison 2014) in all four investigated firm size categories. Furthermore, it is expected that different parameters and the different ways these parameters combine influence the failure time in different manners (Hutchinson 1988). Besides, an optimal approach needs the flexibility to consider the possibility of truncation—in the case of an investigation of isolated time periods—and censoring if required. Censoring is not an issue in the present study, but it can be recommended as a fertile area for future research. Consequently, my estimation strategy is based on the methods of survival analysis.

In addition, it has been known that each method of the survival analysis is fitted to the data in a different manner so that my approach consists of three different models. Thereby the order of fitting changes in part. Nonetheless, all results have been subjected to a comparative analysis to identify robust results (Blossfeld et al. 2009). A result is robust, if a significant effect of an individual variable occurs in each of the three models. Furthermore, an effect has a considerable tendency in the event of increased model fitting along with increased significance of this effect. But the selection of all potential distributions is an unconditional prerequisite for meaningful results. So I have used two of the three models most recommended in the literature for such right-skewed distribution (ibid.)—namely a log-logistic model and a log-normal model—and along with these a Weibull model. The latter is used due to implement of a restricted cubic spline function as a baseline so that my approach has almost unlimited flexibility (Royston/Sauerbrei 2008). As an aside, sickle distribution (Diekmann/Mittag 1983, 1984)—the third recommended model—is another appropriate model for further research if the population includes taxpayers who never will be audited.

The analysis of the results discloses in part the expected effects and even surprising effects. At the same time it calls attention to further research topics. At the beginning of this study, the characteristics of auditees were investigated. These include parameters of: legal form, types of determination of income, group of sectors, and corporate company. All of them typify auditees' complexity because the first main hypothesis suggests an increase in revenue agents' time consumption for higher task complexity (Anderson/Zéghal 1994). However, firm size is of particular importance as the shape of time consumption depends on four given categories of firm size. Each category is studied separately so that size-specific effects are distributed equally within the respective boundaries. The micro and the large firm size categories include an open boundary condition (see Appendix H).

The results show with regard to the legal form that generally agents adapt their working methods to the specific conditions of each organizational form. Therefore, it is not possible to define a general appraisal of the influence of different legal forms on revenue agents' time consumption. But two points of task complexity have to be emphasized: agents consume significantly more report time in the case of audited micro-sized partnerships, as well as more audit and report time in the case of audited medium-sized (unaffiliated) corporations.

Since the number of recommended days is the lowest in the micro size category, the total time consumption is susceptible to increased task complexity. The result is an increase in auditors' time pressure. Revenue agents usually anticipate increased complexity during their audit preparation and the findings of my study suggest that agents decrease their audit effort in the audit phase with the aim of compensation of the expected increased report time. However, such a procedure harbors the risk of a reduction in the number of focal points for audit and/or a greater prevalence of auditors' avoidance of more complex focal points in the case of micro-sized auditees. Further research is needed to tease out the implications of this assumption. Until that time, audit departments are advised to reduce time pressure for audits of partnerships in the micro firm size category, in order to enable the tax authority to ensure the required equal tax treatment relating to in-depth audits regardless of the legal form of the auditee.

As far as medium-sized firms are concerned, compared to the other legal forms and in line with the findings of *Cole* and *Sokolyk* (2015), the results indicate a pooling of more complex businesses under the legal form of corporations. However, this legal form is not necessarily per se more complex than other forms. But the legal form of corporation offers numerous options for engaging in more complex business. Further, it can be expected that the business gets more and more complex at the threshold from SMEs to large firms. This is confirmed by the increased time consumption auditing medium-sized corporations. As a consequence, audit departments are advised to make a distinction between legal forms in their staff planning and formulation of targets for the medium size category.

However, in doing so, audit departments should also take into account that agents need less audit time if the audited medium-sized corporation is a member of an affiliated group. Thereby the time saving effect weakens the increased time consumption of medium-sized corporations. Furthermore, the results suggest that a large quantity of such audits are conducted as routine operations. This particularity appears only in the medium size category and can be explained by two facts: most agents benefit from audit guidelines provided by an executive revenue agent and from repetitive tasks, so that the savings in audit and total time are significant for audits of affiliated firms. In contrast, other audits of affiliates cause more time-on-task in the report period.

The types of determination of income are also relevant. The results show in the event of increased complexity a repeated increase in audit and total time as well as occasionally an increase in report time. Here the complexity is reflected in the partly absence of book-tax conformity and the chosen approach to handle this lack. The more difficult the disclosure of differences within the auditee's documents, the longer the time spent on audit.

To summarize this point, industry affiliation plays a less prominent part relating to revenue agents' time consumption. In my study the predominant proportion of auditees pursue a service-oriented business. Differences from the other groups of sectors occur only in isolated cases. In particular, the results point out that the expected and highly significant increase in time consumption for manufacturing-oriented businesses is observable in the large size category only. Additionally, if agents suspect tax evasion, an auditee's sector does not affect agents' time consumption. This means that the time-on-task spent on detected breaches is not affected by the group of sectors even though type, frequency, and extent of any breaches can depend on the auditee's industry sector (Chan/Mo 2000; Hanlon et al. 2005).

Moreover, the results show that if agents suspect tax evasion, they consume significantly more audit and total time, as well as more report time under time pressure. However, the investigated data suggest, moreover, an interdependency between type and frequency of detected breaches (with or without a suspicion) and auditee's firm size (see Appendix F Table 61 and Table 62). So this explains that the impact on time decreases, if agents are more familiar with the relevant focal points audited. But in this study it has not been possible to examine whether an interrelationship exists between time-on-task and the extent of suspected tax evasion, with regard to an auditee's industry sector and firm size, exists.

Previous research (e.g., Hanlon et al. 2005; Rice 1992; Slemrod 2007) indicates the existence of this phenomenon, so clearly supplementary research is needed. Correspondingly, it would be useful to examine the impacts of the point in time during the audit, at which the agents suspect tax evasion initially, the suspected fraudulent part of the outcome, and the interdependence between agent's attitude and conscientiousness (intrinsic factors), as well as the impact of time pressure on the detection of breaches and on revenue agents' time consumption.

Apart from the influence of suspected tax evasion on time-on-task, the second group of characteristics investigated includes further parameters intrinsic to the audit, because the second main hypothesis suggests a sensitive reaction in agents' time consumption. In detail, the place of work, deviation of the normally three fiscal years audited, the cases of follow-up audits and consulted additional specialized agents, the conducting of a final discussion and the achievement of consensus, accelerating issues in the event of audit delay, the audit duration in total, and the outcome of the audit are investigated. The multitude of results can be summarized as follows.

Auditees or their tax advisers often seek to conduct a field audit out of auditees' business premises and it is also possible that agents switch between alternative offices. The causes are various and mainly influenced by subjective factors so that particular motivations are not observable. However, the study results show, compared to business or residence offices, a significant increase (decrease) in audit and total time consumption in the micro (large) firm size category, if agents conduct an audit in their own tax office. The audit and total time consumption increase—significantly or with a tendency toward significance—moreover, in the case of audits of SMEs and alternative offices. In contrast, the audit time consumption is unaffected almost without exception, if audits take place at a tax adviser's office. On that note, time saving is not a justification for the exceptional case of an audit not taking place at the auditees' business premises and not at the local tax office.

According to German tax law, usually a field audit usually consists of three concluded fiscal years. Agents can audit without much ado less years in the case of SMEs. The results for such situations show that the audit and total time consumption decrease only in the micro firm size category with decreasing significance. In the small size category, the time consumption is unaffected due to a reduction in the scrutiny period. In contrast, the time-on-task increases with a highly significant effect, if agents audit more than three years in the large size category. New aspects to the ongoing debate around timely tax audits arise from these findings.

Follow-up audits cause a significant increase in audit and total time consumption only in the small size category. This is not surprising as such a situation is quite unusual for small-sized firms according to German tax law. Calling in specialized agents prevents an increase in revenue agents' time consumption. Otherwise, this does not lead to a time saving effect due to the transfer of highly complex focal points. There are mainly for two reasons: agents use the extra time capacity for additional focal points or they need the time window for legwork and for further processing of specialized agents' findings.

Furthermore, the decision concerning the conducting of a final discussion and the achievement of consensus about auditor's findings lack influence, according to the result above. Only the report time consumption increases if a final discussion is held in the large size category. Apart from this, all time periods are unaffected in all size categories. This result is surprising insofar as agents use the threat of non-agreement to force acceleration to shorten their own time-on-task in the case of smaller sized auditees. With regard to other means for acceleration, the results show mostly no significant effects on time consumption. Because the measures are being used if a audit delay caused by auditees or their tax advisers is perceived, the absence of time effects are a sign of effectiveness. Only in two constellations do the affected persons seem unimpressed so that revenue agents' audit time increases.

Further, audit time consumption exists in a reciprocal relationship with audit duration. The results prove in comparison to the actual base level the assumption that time-on-task increases (decreases) in one or more time periods when the audit duration is significantly longer (shorter).

The final intriguing issue of the second investigation group relates to the outcome. If should be stressed that revenue agents' time consumption is unaffected if the outcome falls below the respective de minimis limit. In addition, a higher outcome increases the time-on-task only in the medium and large size category and not in the event of smaller-sized audits.

The third group of characteristics includes the parameters of revenue agents and measures the impact of agent's competence on his or her own time consumption. In detail, this is represented as dependent on agents' experience, age, salary grade, main field of work, and gender. The results partly indicate unexpected impacts and stress the importance of research concerning personal characteristics of active parties. In summary, it can be seen that greater experience does not necessarily equate to decrease in time consumption. Further, the latter is lastingly affected by the agent's age at the date of a revenue agent's entry to an audit department.

With respect to the different size categories it appears that either the audit time consumption follows a U-shaped trajectory with an increase in experience in the case of micro-sized auditees, is unaffected in the case of small-sized auditees, or is subject to a rising trajectory in the case of medium and large-sized auditees. The report time consumption increases, moreover, for older, highly experienced agents in the case of micro- and small-sized auditees. Particularly noteworthy is the fact that a later entry into an audit department decreases revenue agents' time consumption with regard to the middle salary grade (A11) in the medium size category.

On the other hand, time consumption is unaffected by an increase in experience level—measured on the basis of salary grades—compared to the reference basis in each case and in the event of the same experience as an auditor as well as the same main field of work in the firm size categories of SMEs. However, agents save report time in these categories if they are more familiar with more complex tasks. This effect holds true solely in part for audit time. It seems that only agents with salary grade A11 and experience in more complex tasks are able to adapt their working method on a lower level so that they save audit time in the case of micro-sized auditees, since agents with salary grades A12/A13s and a higher experience level consume significantly more audit time in the micro firm size category.

The exact causes of these results should be investigated by further research. Thereby the audit quality is predominantly interesting with regard to the dimensions of complexity of audit adjustments, because it could be possible that more highly experienced agents disclose more complex findings so that they need more time. In doing so, it is desirable to cover more detailed objective parameters, e.g., individual records of time consumption of focal points with or without findings and their detailed outcomes. However, if this is not the cause, a possible reason could be a loss of auditors' motivation and sense of challenge. Hence further research also ought to analyze subjective parameters such as attitude, motivation, conscientiousness, goal orientation, environment of the tax authority, and relationship between agency and agents.

Finally, the results validate previous research (Breesch/Branson 2009; Chung/ Monroe 2001) into the differences relating to auditors' gender. Under time pressure male and female agents consume the same audit and report time. However, the impact of time pressure diminishes in the large size category, so that female agents save time, partly with a highly significant effect. However, might lead to hasty conclusions, and so it seems advisable to investigate the complexity of audited focal points and audit adjustments once again, because evidence can only be provided, once all factors relating to work performed are taken into account.

This doctoral thesis breaks fresh ground in the area of the relationship between governments and their citizens. Tax audits combine various impacts from either side so that the above findings should provide fertile soil for further research. Thereby, it is advisable to include additional determinants such as, e.g., negotiation, delaying tactics, subjective feeling and personal skills. Furthermore, the cause-and-effect chain of time pressure is of vital importance and should therefore be investigated more closely.

8 Appendix E

Table 50: Control Estimation for the Influence of Time Consumption

Extract of coefficients from 9 multilevel mixed-effect parametric survival models, subdivided according to the size categories and three time periods. The estimations do not include interaction effects. It is issued the audit days and their square as well as the report days and their square.

Time Period	Audit Time			Report Time			Total Time		
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Individuals per Size Category	Weibull	log-logisitc	log-norm	Weibull	log-logisitc	log-norm	Weibull	log-logisitc	log-norm
Micro									
auditdays	1.068	1.068	1.075	0.997	0.999	0.999	1.062	1.064	1.067
	(20.361)***	(19.106)***	(21.272)***	(-3.015)**	(-0.409)	(-1.606)	(32.609)***	(18.834)***	(21.472)***
auditdays2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999
	(-14.501)***	(-8.924)***	(-11.055)***	(2.871)**	(0.865)	(2.570)*	(-16.415)***	(-9.744)***	(-11.648)***
reportdays				1.275	1.262	1.267	1.007	1.003	0.994
				(77.418)***	(27.324)***	(47.586)***	(1.264)	(0.236)	(-0.645)
reportdays2				0.994	0.994	0.994	1.003	1.003	1.003
				(-16.962)***	(-10.280)***	(-19.451)***	(7.234)***	(3.207)**	(4.689)***
Small									
auditdays	1.054	1.058	1.056	1.002	1.013	1.008	1.042	1.049	1.047
	(13.304)***	(42.000)***	(34.083)***	(0.529)	(3.555)***	(2.818)**	(7.486)***	(38.172)***	(28.179)***
auditdays2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(-6.324)***	(-22.773)***	(-15.689)***	(-0.458)	(-2.982)**	(-2.722)**	(-2.588)**	(-21.606)***	(-11.679)***
reportdays				1.195	1.191	1.178	1.029	1.033	1.029

				(16.882)***	(18.655)***	(36.605)***	(9.288)***	(15.597)***	(11.467)***
reportdays2				0.998	0.998	0.998	1.000	1.000	1.000
				(-14.075)***	(-16.316)***	(-28.949)***	(-7.425)***	(-9.132)***	(-7.786)***
Medium									
auditdays	1.029	1.033	1.030	1.000	1.000	1.000	1.025	1.027	1.026
	(35.595)***	(6.994)***	(30.704)***	(-0.566)	(1.552)	(0.341)	(38.024)***	(6.092)***	(33.174)***
auditdays2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(-26.458)***	(-2.629)**	(-12.670)***	(-0.778)	(-1.552)	(-1.115)	(-25.926)***	(-2.126)*	(-14.580)***
reportdays				1.219	1.279	1.249	1.048	1.049	1.052
				(61.476)***	(43.008)***	(17.088)***	(15.731)***	(7.564)***	(11.803)***
reportdays2				0.996	0.993	0.995	0.999	0.999	0.998
				(-32.646)***	(-19.431)***	(-7.719)***	(-11.130)***	(-5.243)***	(-8.751)***
Large									
auditdays	1.008	1.008	1.008	1.001	1.001	1.002	1.007	1.008	1.007
	(11.104)***	(10.483)***	(15.870)***	(2.881)**	(2.071)*	(3.109)**	(11.393)***	(10.829)***	(14.366)***
auditdays2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(-9.282)***	(-7.351)***	(-9.995)***	(-3.935)***	(-2.852)**	(-3.896)***	(-8.433)***	(-7.169)***	(-9.257)***
reportdays				1.033	1.030	1.023	1.004	1.003	1.002
				(6.191)***	(3.812)***	(6.495)***	(1.327)	(1.310)	(1.790)+
reportdays2				1	1	1	1	1	1
				(-5.266)***	(-3.478)***	(-5.769)***	(-1.265)	(-0.925)	(-1.333)

9 Appendix F

Table 51: Variables Definitions

If it is a factor variable, the virtual variables are also included.

Characteristics of the Auditee		
Variable		Variables Definition
legform		Factor variable of legal forms. It distinguishes between the following three types. Missing values do not occur.
1	individual entrepreneur	Virtual dummy, 1 if the auditee is an individual entrepreneur.
2	partnership	Virtual dummy, 1 if the auditee is organized as a partnership.
3	corporation	Virtual dummy, 1 if the auditee is a corporation.
detinc		Factor variable of four different types of determining income. Four missing values are remained unchanged. In detail:
1	accounting of income and expenditure	Virtual dummy, 1 if the auditee determines the amount of taxable profit with accounting of income and expenditure.
2	trade balance sheet = tax balance sheet	Virtual dummy, 1 if the auditee determines the taxable profit with consistent trade and tax balance sheets.
3	independent tax balance sheet	Virtual dummy, 1 if the auditee determines the taxable profit with an independent tax balance sheets.
4	transition § 60 II EStDV	Virtual dummy, 1 if the auditee determines the taxable profit with offsetting and reconciliation to the trade balance sheet without preparing of a tax balance sheet.
sectorgr		Factor variable of four groups of sectors. One missing value is remained unchanged. In detail:
1	production	Virtual dummy, 1 if the auditee operates in the construction, the manufacturing, or the food, beverage and tobacco industry.
2	trading	Virtual dummy, 1 if the auditee operates in the wholesale or the retail industry.
3	service	Virtual dummy, 1 if the auditee is a freelancer or operates in the banking and insurance, the accommodation and food service, or other service industries.
4	utilities	Virtual dummy, 1 if the auditee operates in the information an communication, the transportation, or other utilities industry.
group		Dummy, 1 if the auditee is a group company, notwithstanding the above as dominant or controlled. If no such information was available I assumed control group=0.

Characteristics of the Audit		
Variable		Variables Definition
evasion		Dummy, 1 if the auditor suspected (illegal) tax evasion, zero otherwise. Missing values are remained unchanged.
place		Factor variable of the place of work during the tax audit. One missing value is remained unchanged. In detail:
1	company office	Virtual dummy, 1 if the auditor conducts the field audit in a company office.
2	tax office	Virtual dummy, 1 if the auditor conducts the field audit in the local tax office.
3	tax adviser office	Virtual dummy, 1 if the auditor conducts the field audit in a tax adviser office.

4	multiple offices	Virtual dummy, 1 if the auditor conducts the field audit in different of the mentioned offices.
consen		Dummy, 1 if auditee/tax adviser and auditor reached an agreement about audit findings. If the parties involved do not agree on a solution, or if no such information was available I assumed control group=0.
disc		Dummy, 1 if the parties involved conducted a final discussion about auditor's findings. If such discussion was not necessary or if such information was not available I assumed control group=0.
shdead		Dummy, 1 if the auditor considers necessary to take action to accelerate proceedings and for this he received that a short deadline for reply is suitable. In all other cases of actions for this or if such information was not available I assumed control group=0.
pandelay		Dummy, 1 if the auditor considered necessary to take action to accelerate proceedings and received that a penalty for delay is suitable. This measure was first introduced rough two years before the survey conducted. In all other cases of actions for this or if such information was not available I assumed control group=0.
nonagree		Dummy, 1 if the auditor considered necessary to take action to accelerate proceedings and received that the threat of a non-agreement is suitable. In all other cases of actions for this or if such information was not available I assumed control group=0.
triflingamount		Dummy, 1 if it is a petty case due to the additional result falls below the de minims limit. If such information is unendorsed or was not available I assumed control group=0.
lndiffpay		Balance of the log of additional tax burden and the log of tax refund due to the tax audit findings.
lnlossreduc		Balance of the log of reduction and log of raising of loss carried forward due to the tax audit findings.
fy_short		Dummy, 1 if the number of fiscal years < 3, zero otherwise; in particular to the general case with 3 fiscal years.
fy_long		Dummy, 1 if the number of fiscal years > 3, zero otherwise; in particular to the general case with 3 fiscal years.
fupaud		Dummy. 1 if the current audit is a follow-up audit, zero otherwise.
duration_msm / duration		Factor variable for the duration of the tax audit. Two missing values are remained unchanged. In detail:
1	up to 1 month	Virtual dummy, 1 if the audit is conducted within a month, zero otherwise.
2	2 to 3 months	Virtual dummy, 1 if the audit is finished within the limits of one and three month after it started, zero otherwise.
3	4 to 6 months	Virtual dummy, 1 if the audit is finished within the limits of four and six month after it started, zero otherwise.
4	7 to 9 months	Virtual dummy, 1 if the audit is finished within the limits of seven and nine month after it started, zero otherwise.
5	10 to 12 months	Virtual dummy, 1 if the audit is finished within the limits of ten and twelve month after it started, zero otherwise.
6	over 1 year / 1 to 1.5 years	Virtual dummy, 1 if the audit of a micro, small, or medium business is finished after one year, or of a large business within the limits of one and one and a half year after it started, zero otherwise.
7	/ 1.5 to 2 years	Virtual dummy, 1 if the audit of a large business is finished within the limits of one and a half year and two years after it started, zero otherwise.
8	/ over 2 years	Virtual dummy, 1 if the audit of a large business is finished after two years after it started, zero otherwise.
specs		Dummy, 1 if the auditor consulted specialized auditors. If such information is unendorsed or was not available I assumed control group=0.

Characteristics of the Auditor		
Variable		Variables Definition
agenty		Factor variable for groups of agent experience in years. Eighty four missing values are remained unchanged. In detail:
1	up to 5	Virtual dummy, 1 if auditor's agent experience is shorter period than five years, zero otherwise.
2	5 to 10	Virtual dummy, 1 if auditor's agent experience is within the limits of five and ten years, zero otherwise.
3	10 to 15	Virtual dummy, 1 if auditor's agent experience is within the limits of ten and fifteen years, zero otherwise.
4	15 to 20	Virtual dummy, 1 if auditor's agent experience is within the limits of fifteen and twenty years, zero otherwise.
5	over 20	Virtual dummy, 1 if auditor's agent experience is longer period than twenty years, zero otherwise.
agegr		Factor variable for age groups. Thirty nine missing values are remained unchanged. In detail:
1	20 to 30	Virtual dummy, 1 if auditor is aged between twenty and thirty years, zero otherwise.
2	30 to 40	Virtual dummy, 1 if auditor is aged between thirty and forty years, zero otherwise.
3	40 to 50	Virtual dummy, 1 if auditor is aged between forty and fifty years, zero otherwise.
4	50 to 60	Virtual dummy, 1 if auditor is aged between fifty and sixty years, zero otherwise.
5	over 60	Virtual dummy, 1 if auditor is aged sixty years, zero otherwise.
grade_nm		Factor variable for salary grades. In detail:
1	A8	Virtual dummy, 1 if auditor is salaried based on grade A8 (penultimate grade in career without graduation diploma), zero otherwise.
2	A9s/A9z	Virtual dummy, 1 if auditor is salaried based on grade A9s/9z (last grade in career without graduation diploma), zero otherwise.
3	A9/A10	Virtual dummy, 1 if auditor is salaried based on grade A9/10 (first grades in career with degree), zero otherwise.
4	A11	Virtual dummy, 1 if auditor is salaried based on grade A11 (middle grade in career with degree), zero otherwise.
5	A12/A13s	Virtual dummy, 1 if auditor is salaried based on grade A12/13s (highest grades in career with degree but not university degree), zero otherwise.
0	item-nonresponse	Virtual dummy, 1 if the participant gives no answer to this, zero otherwise.
fow_nm		Factor variable for the auditor's mainly field of work in terms of firm size and groups. In detail:
1	micro/small/medium enterprises	Virtual dummy, 1 if auditor examines predominant micro, small, or medium enterprises, zero otherwise.
2	large enterprises	Virtual dummy, 1 if auditor examines predominant large enterprises, zero otherwise.
3	corporate groups	Virtual dummy, 1 if auditor examines predominant corporate groups, zero otherwise.
0	item-nonresponse	Virtual dummy, 1 if the participant gives no answer to this, zero otherwise.
sex		Dummy, 1 if the auditor is male, 0 if she is female. Twenty five missing values are remained unchanged.

Table 52: Descriptive Statistics for Constant, Varying, or Missing Variables

The table shows the number of subjects for each variable and distinguishes between constant, varying, or missing values. It is a parallel chart of weighted and unweighted data.

	Unweighted data					Weighted data				
			missing					missing		
Variable	constant	varying	never	always	sometimes	constant	varying	never	always	sometimes
legform	987	0	987	0	0	959	0	959	0	0
detinc	983	0	983	4	0	955	0	955	4	0
sectorgr	986	0	986	1	0	958	0	958	1	0
group	987	0	987	0	0	959	0	959	0	0
evasion	950	0	950	37	0	924	0	924	35	0
place	986	0	986	1	0	958	0	958	1	0
consen	971	0	971	16	0	943	0	943	16	0
disc	983	0	983	4	0	955	0	955	4	0
shdead	985	0	985	2	0	957	0	957	2	0
pandelay	985	0	985	2	0	957	0	957	2	0
nonagree	987	0	987	0	0	959	0	959	0	0
triflingamount	987	0	987	0	0	959	0	959	0	0
lndiffpay	987	0	987	0	0	959	0	959	0	0
lnlossreduc	987	0	987	0	0	959	0	959	0	0
fy_short	987	0	987	0	0	959	0	959	0	0
fy_long	987	0	987	0	0	959	0	959	0	0
fupaud	977	0	977	10	0	950	0	950	9	0
duration_msm	985	0	985	2	0	957	0	957	2	0
duration	985	0	985	2	0	957	0	957	2	0
specs	986	0	986	1	0	959	0	959	0	0
agenty	903	0	903	84	0	875	0	875	84	0
agegr	948	0	948	39	0	920	0	920	39	0
grade_nm	987	0	987	0	0	959	0	959	0	0
fow_nm	987	0	987	0	0	959	0	959	0	0
sex	962	0	962	25	0	934	0	934	25	0

Table 53: Descriptive Statistics for Interaction Variables in the Micro Size Category

The table shows descriptive statistics for interaction variables in the micro size category. It is a parallel chart of weighted and unweighted data.

		Weighted Data						Unweighted Data		
Interaction Variables		Obs	Weight	Mean	SD	Min	Max	Obs	Mean	SD
legform	detinc									
1	1	127	1,008	0.5681	0.4973	0	1	130	0.7000	0.4600
1	2	127	1,008	0.0459	0.2102	0	1	130	0.0769	0.2675
1	3	127	1,008	(empty)				130	(empty)	
1	4	127	1,008	(empty)				130	(empty)	
2	1	127	1,008	0.0276	0.1646	0	1	130	0.0462	0.2106
2	2	127	1,008	0.0836	0.2779	0	1	130	0.0385	0.1931
2	3	127	1,008	0.0186	0.1358	0	1	130	0.0077	0.0877
2	4	127	1,008	(empty)				130	(empty)	
3	1	127	1,008	(empty)				130	(empty)	
3	2	127	1,008	0.2002	0.4017	0	1	130	0.1000	0.3012
3	3	127	1,008	0.0373	0.1902	0	1	130	0.0154	0.1236
3	4	127	1,008	0.0186	0.1358	0	1	130	0.0154	0.1236
sectorgr	evasion									
1	0	124	979	0.1255	0.3326	0	1	127	0.1024	0.3043
1	1	124	979	0.0247	0.1558	0	1	127	0.0157	0.1250
2	0	124	979	0.1455	0.3540	0	1	127	0.1811	0.3866
2	1	124	979	0.0097	0.0983	0	1	127	0.0236	0.1525
3	0	124	979	0.4992	0.5020	0	1	127	0.5354	0.5007
3	1	124	979	0.1155	0.3209	0	1	127	0.1024	0.3043
4	0	124	979	0.0800	0.2723	0	1	127	0.0394	0.1952
4	1	124	979	(empty)				127	(empty)	
agenty	agegr									
1	1	115	909	0.0377	0.1912	0	1	118	0.0424	0.2023
1	2	115	909	0.1334	0.3415	0	1	118	0.1017	0.3035
1	3	115	909	0.1371	0.3455	0	1	118	0.1186	0.3247
1	4	115	909	(empty)				118	(empty)	
1	5	115	909	(empty)				118	(empty)	
2	1	115	909	(empty)				118	(empty)	
2	2	115	909	0.0821	0.2757	0	1	118	0.0763	0.2666
2	3	115	909	0.0393	0.1951	0	1	118	0.0339	0.1817
2	4	115	909	(empty)				118	(empty)	
2	5	115	909	(empty)				118	(empty)	
3	1	115	909	(empty)				118	(empty)	
3	2	115	909	0.0629	0.2438	0	1	118	0.0593	0.2372
3	3	115	909	0.1182	0.3242	0	1	118	0.1525	0.3611
3	4	115	909	0.1190	0.3253	0	1	118	0.1695	0.3768
3	5	115	909	0.0282	0.1664	0	1	118	0.0169	0.1296
4	1	115	909	(empty)				118	(empty)	
4	2	115	909	(empty)				118	(empty)	
4	3	115	909	0.1077	0.3113	0	1	118	0.0847	0.2797
4	4	115	909	0.0454	0.2092	0	1	118	0.0508	0.2206
4	5	115	909	(empty)				118	(empty)	
5	1	115	909	(empty)				118	(empty)	
5	2	115	909	(empty)				118	(empty)	
5	3	115	909	0.0035	0.0591	0	1	118	0.0085	0.0921
5	4	115	909	0.0694	0.2552	0	1	118	0.0593	0.2372

5	5	115	909	0.0162	0.1266	0	1	118	0.0254	0.1581
grade_nm	fow_nm									
0	0	127	1,008	0.0218	0.1465	0	1	130	0.0154	0.1236
0	1	127	1,008	(empty)				130	(empty)	
0	2	127	1,008	(empty)				130	(empty)	
0	3	127	1,008	(empty)				130	(empty)	
1	0	127	1,008	(empty)				130	(empty)	
1	1	127	1,008	0.0146	0.1203	0	1	130	0.0231	0.1507
1	2	127	1,008	(empty)				130	(empty)	
1	3	127	1,008	(empty)				130	(empty)	
2	0	127	1,008	(empty)				130	(empty)	
2	1	127	1,008	0.0907	0.2883	0	1	130	0.1231	0.3298
2	2	127	1,008	(empty)				130	(empty)	
2	3	127	1,008	(empty)				130	(empty)	
3	0	127	1,008	(empty)				130	(empty)	
3	1	127	1,008	0.5058	0.5019	0	1	130	0.5231	0.5014
3	2	127	1,008	(empty)				130	(empty)	
3	3	127	1,008	0.0031	0.0561	0	1	130	0.0077	0.0877
4	0	127	1,008	(empty)				130	(empty)	
4	1	127	1,008	0.1853	0.3901	0	1	130	0.2077	0.4072
4	2	127	1,008	0.0317	0.1759	0	1	130	0.0308	0.1734
4	3	127	1,008	0.0209	0.1435	0	1	130	0.0077	0.0877
5	0	127	1,008	(empty)				130	(empty)	
5	1	127	1,008	0.0703	0.2566	0	1	130	0.0385	0.1931
5	2	127	1,008	0.0186	0.1358	0	1	130	0.0077	0.0877
5	3	127	1,008	0.0373	0.1902	0	1	130	0.0154	0.1236

Table 54: Descriptive Statistics for Interaction Variables in the Small Size Category

The table shows descriptive statistics for interaction variables in the small size category. It is a parallel chart of weighted and unweighted data.

		Weighted Data						Unweighted Data		
Interaction Variables		Obs	Weight	Mean	SD	Min	Max	Obs	Mean	SD
legform	detinc									
1	1	226	1,761	0.2947	0.4569	0	1	231	0.4805	0.5007
1	2	226	1,761	0.1566	0.3642	0	1	231	0.2294	0.4214
1	3	226	1,761	0.0223	0.1481	0	1	231	0.0216	0.1458
1	4	226	1,761	(empty)				231	(empty)	
2	1	226	1,761	0.0784	0.2694	0	1	231	0.0693	0.2545
2	2	226	1,761	0.3026	0.4604	0	1	231	0.0779	0.2686
2	3	226	1,761	0.0035	0.0595	0	1	231	0.0043	0.0658
2	4	226	1,761	(empty)				231	(empty)	
3	1	226	1,761	(empty)				231	(empty)	
3	2	226	1,761	0.1127	0.3169	0	1	231	0.1039	0.3058
3	3	226	1,761	0.0014	0.0371	0	1	231	0.0043	0.0658
3	4	226	1,761	0.0277	0.1644	0	1	231	0.0087	0.0928
sectorgr	evasion									
1	0	220	1,720	0.1023	0.3037	0	1	225	0.1511	0.3590
1	1	220	1,720	(empty)				225	(empty)	
2	0	220	1,720	0.1140	0.3186	0	1	225	0.1822	0.3869
2	1	220	1,720	0.0241	0.1536	0	1	225	0.0267	0.1615
3	0	220	1,720	0.6896	0.4637	0	1	225	0.5333	0.5000

3	1	220	1,720	0.0602	0.2384	0	1	225	0.0711	0.2576
4	0	220	1,720	0.0070	0.0838	0	1	225	0.0267	0.1615
4	1	220	1,720	0.0028	0.0531	0	1	225	0.0089	0.0941
agenty	agegr									
1	1	205	1,693	0.0316	0.1755	0	1	210	0.0190	0.1370
1	2	205	1,693	0.1011	0.3022	0	1	210	0.1238	0.3302
1	3	205	1,693	0.1114	0.3154	0	1	210	0.1190	0.3246
1	4	205	1,693	0.0014	0.0379	0	1	210	0.0048	0.0690
1	5	205	1,693	(empty)				210	(empty)	
2	1	205	1,693	(empty)				210	(empty)	
2	2	205	1,693	0.3082	0.4629	0	1	210	0.0762	0.2659
2	3	205	1,693	0.0469	0.2120	0	1	210	0.0810	0.2734
2	4	205	1,693	(empty)				210	(empty)	
2	5	205	1,693	(empty)				210	(empty)	
3	1	205	1,693	(empty)				210	(empty)	
3	2	205	1,693	0.0151	0.1223	0	1	210	0.0429	0.2030
3	3	205	1,693	0.1291	0.3361	0	1	210	0.1762	0.3819
3	4	205	1,693	0.0651	0.2473	0	1	210	0.0667	0.2500
3	5	205	1,693	(empty)				210	(empty)	
4	1	205	1,693	(empty)				210	(empty)	
4	2	205	1,693	(empty)				210	(empty)	
4	3	205	1,693	0.0441	0.2057	0	1	210	0.0762	0.2659
4	4	205	1,693	0.0336	0.1805	0	1	210	0.0667	0.2500
4	5	205	1,693	0.0037	0.0607	0	1	210	0.0048	0.0690
5	1	205	1,693	(empty)				210	(empty)	
5	2	205	1,693	0.0038	0.0618	0	1	210	0.0048	0.0690
5	3	205	1,693	0.0284	0.1664	0	1	210	0.0381	0.1919
5	4	205	1,693	0.0266	0.1612	0	1	210	0.0810	0.2734
5	5	205	1,693	0.0500	0.2184	0	1	210	0.0190	0.1370
grade_nm	fow_nm									
0	0	228	1,780	0.0082	0.0902	0	1	233	0.0258	0.1587
0	1	228	1,780	(empty)				233	(empty)	
0	2	228	1,780	0.0014	0.0369	0	1	233	0.0043	0.0655
0	3	228	1,780	(empty)				233	(empty)	
1	0	228	1,780	(empty)				233	(empty)	
1	1	228	1,780	0.0178	0.1327	0	1	233	0.0258	0.1587
1	2	228	1,780	(empty)				233	(empty)	
1	3	228	1,780	(empty)				233	(empty)	
2	0	228	1,780	(empty)				233	(empty)	
2	1	228	1,780	0.0192	0.1377	0	1	233	0.0472	0.2125
2	2	228	1,780	(empty)				233	(empty)	
2	3	228	1,780	(empty)				233	(empty)	
3	0	228	1,780	(empty)				233	(empty)	
3	1	228	1,780	0.4083	0.4926	0	1	233	0.4893	0.5010
3	2	228	1,780	0.0130	0.1135	0	1	233	0.0172	0.1302
3	3	228	1,780	0.0014	0.0369	0	1	233	0.0043	0.0655
4	0	228	1,780	(empty)				233	(empty)	
4	1	228	1,780	0.1254	0.3319	0	1	233	0.2189	0.4144
4	2	228	1,780	0.3091	0.4631	0	1	233	0.0601	0.2382
4	3	228	1,780	0.0062	0.0788	0	1	233	0.0129	0.1130
5	0	228	1,780	(empty)				233	(empty)	
5	1	228	1,780	0.0681	0.2525	0	1	233	0.0558	0.2300
5	2	228	1,780	0.0206	0.1423	0	1	233	0.0343	0.1825
5	3	228	1,780	0.0014	0.0369	0	1	233	0.0043	0.0655

Table 55: Descriptive Statistics for Interaction Variables in the Medium Size Category

The table shows descriptive statistics for interaction variables in the medium size category. It is a parallel chart of weighted and unweighted data.

		Weighted Data						Unweighted Data		
Interaction Variables		Obs	Weight	Mean	SD	Min	Max	Obs	Mean	SD
legform	detinc									
1	1	318	2,307	0.2034	0.4031	0	1	326	0.2301	0.4215
1	2	318	2,307	0.0947	0.2933	0	1	326	0.1626	0.3695
1	3	318	2,307	0.0044	0.0664	0	1	326	0.0153	0.1231
1	4	318	2,307	(empty)				326	(empty)	
2	1	318	2,307	0.0666	0.2497	0	1	326	0.0920	0.2895
2	2	318	2,307	0.1063	0.3087	0	1	326	0.1319	0.3389
2	3	318	2,307	0.0145	0.1198	0	1	326	0.0092	0.0956
2	4	318	2,307	0.0093	0.0959	0	1	326	0.0092	0.0956
3	1	318	2,307	(empty)				326	(empty)	
3	2	318	2,307	0.3831	0.4869	0	1	326	0.2515	0.4346
3	3	318	2,307	0.0155	0.1239	0	1	326	0.0184	0.1346
3	4	318	2,307	0.1022	0.3033	0	1	326	0.0798	0.2713
sectorgr	evasion									
1	0	304	2,205	0.1559	0.3634	0	1	312	0.1667	0.3733
1	1	304	2,205	0.0584	0.2349	0	1	312	0.0128	0.1127
2	0	304	2,205	0.0701	0.2558	0	1	312	0.1186	0.3238
2	1	304	2,205	0.0100	0.0998	0	1	312	0.0192	0.1376
3	0	304	2,205	0.4764	0.5003	0	1	312	0.5449	0.4988
3	1	304	2,205	0.1796	0.3845	0	1	312	0.0929	0.2908
4	0	304	2,205	0.0441	0.2057	0	1	312	0.0385	0.1926
4	1	304	2,205	0.0054	0.0735	0	1	312	0.0064	0.0799
agenty	agegr									
1	1	287	2,051	0.0506	0.2197	0	1	295	0.0373	0.1898
1	2	287	2,051	0.0276	0.1641	0	1	295	0.0407	0.1979
1	3	287	2,051	0.1157	0.3205	0	1	295	0.0814	0.2738
1	4	287	2,051	(empty)				295	(empty)	
1	5	287	2,051	(empty)				295	(empty)	
2	1	287	2,051	0.0046	0.0676	0	1	295	0.0034	0.0582
2	2	287	2,051	0.0607	0.2393	0	1	295	0.0610	0.2398
2	3	287	2,051	0.0466	0.2112	0	1	295	0.0508	0.2201
2	4	287	2,051	0.0058	0.0762	0	1	295	0.0068	0.0822
2	5	287	2,051	(empty)				295	(empty)	
3	1	287	2,051	(empty)				295	(empty)	
3	2	287	2,051	0.1208	0.3265	0	1	295	0.0712	0.2576
3	3	287	2,051	0.2033	0.4032	0	1	295	0.2508	0.4342
3	4	287	2,051	0.0338	0.1811	0	1	295	0.0576	0.2334
3	5	287	2,051	(empty)				295	(empty)	
4	1	287	2,051	(empty)				295	(empty)	
4	2	287	2,051	0.0058	0.0762	0	1	295	0.0068	0.0822
4	3	287	2,051	0.0663	0.2492	0	1	295	0.0847	0.2790
4	4	287	2,051	0.0976	0.2973	0	1	295	0.0814	0.2738
4	5	287	2,051	(empty)				295	(empty)	
5	1	287	2,051	(empty)				295	(empty)	

5	2	287	2,051	(empty)				295	(empty)	
5	3	287	2,051	0.0071	0.0839	0	1	295	0.0102	0.1005
5	4	287	2,051	0.1382	0.3457	0	1	295	0.1322	0.3393
5	5	287	2,051	0.0154	0.1232	0	1	295	0.0237	0.1525
grade_nm	fow_nm									
0	0	318	2,307	0.0415	0.1998	0	1	326	0.0429	0.2030
0	1	318	2,307	(empty)				326	(empty)	
0	2	318	2,307	0.0011	0.0333	0	1	326	0.0031	0.0554
0	3	318	2,307	(empty)				326	(empty)	
1	0	318	2,307	(empty)				326	(empty)	
1	1	318	2,307	0.0074	0.0858	0	1	326	0.0123	0.1103
1	2	318	2,307	(empty)				326	(empty)	
1	3	318	2,307	(empty)				326	(empty)	
2	0	318	2,307	(empty)				326	(empty)	
2	1	318	2,307	0.0044	0.0664	0	1	326	0.0123	0.1103
2	2	318	2,307	(empty)				326	(empty)	
2	3	318	2,307	(empty)				326	(empty)	
3	0	318	2,307	(empty)				326	(empty)	
3	1	318	2,307	0.2071	0.4059	0	1	326	0.2669	0.4430
3	2	318	2,307	0.1035	0.3052	0	1	326	0.0215	0.1452
3	3	318	2,307	(empty)				326	(empty)	
4	0	318	2,307	(empty)				326	(empty)	
4	1	318	2,307	0.2439	0.4301	0	1	326	0.2669	0.4430
4	2	318	2,307	0.1428	0.3504	0	1	326	0.1411	0.3487
4	3	318	2,307	0.0442	0.2060	0	1	326	0.0307	0.1727
5	0	318	2,307	(empty)				326	(empty)	
5	1	318	2,307	0.0205	0.1418	0	1	326	0.0337	0.1808
5	2	318	2,307	0.0680	0.2522	0	1	326	0.0951	0.2938
5	3	318	2,307	0.1154	0.3201	0	1	326	0.0736	0.2616

Table 56: Descriptive Statistics for Interaction Variables in the Large Size Category

The table shows descriptive statistics for interaction variables in the Large size category. It is a parallel chart of weighted and unweighted data.

		Weighted Data						Unweighted Data		
Interaction Variables		Obs	Weight	Mean	SD	Min	Max	Obs	Mean	SD
legform	detinc									
1	1	284	1,862	0.0364	0.1876	0	1	296	0.0270	0.1624
1	2	284	1,862	0.0450	0.2078	0	1	296	0.0507	0.2197
1	3	284	1,862	0.0015	0.0384	0	1	296	0.0034	0.0581
1	4	284	1,862	(empty)				296	(empty)	
2	1	284	1,862	0.0496	0.2176	0	1	296	0.0405	0.1976
2	2	284	1,862	0.1663	0.3730	0	1	296	0.1453	0.3530
2	3	284	1,862	0.0227	0.1491	0	1	296	0.0304	0.1720
2	4	284	1,862	0.0476	0.2133	0	1	296	0.0507	0.2197
3	1	284	1,862	(empty)				296	(empty)	
3	2	284	1,862	0.2626	0.4408	0	1	296	0.2128	0.4100
3	3	284	1,862	0.0981	0.2980	0	1	296	0.1149	0.3194
3	4	284	1,862	0.2701	0.4448	0	1	296	0.3243	0.4689
sectorgr	evasion									
1	0	276	1,830	0.2012	0.4016	0	1	286	0.2378	0.4265
1	1	276	1,830	0.0065	0.0808	0	1	286	0.0105	0.1021

2	0	276	1,830	0.1403	0.3480	0	1	286	0.1503	0.3580
2	1	276	1,830	0.0139	0.1175	0	1	286	0.0140	0.1176
3	0	276	1,830	0.4865	0.5007	0	1	286	0.4790	0.5004
3	1	276	1,830	0.0896	0.2861	0	1	286	0.0385	0.1926
4	0	276	1,830	0.0618	0.2413	0	1	286	0.0699	0.2555
4	1	276	1,830	(empty)				286	(empty)	
agenty	agegr									
1	1	260	1,700	0.0075	0.0863	0	1	272	0.0110	0.1046
1	2	260	1,700	0.0065	0.0807	0	1	272	0.0074	0.0856
1	3	260	1,700	0.0095	0.0971	0	1	272	0.0110	0.1046
1	4	260	1,700	(empty)				272	(empty)	
1	5	260	1,700	(empty)				272	(empty)	
2	1	260	1,700	0.0033	0.0572	0	1	272	0.0037	0.0606
2	2	260	1,700	0.0777	0.2683	0	1	272	0.0846	0.2787
2	3	260	1,700	0.0577	0.2337	0	1	272	0.0478	0.2137
2	4	260	1,700	0.0033	0.0572	0	1	272	0.0037	0.0606
2	5	260	1,700	(empty)				272	(empty)	
3	1	260	1,700	(empty)				272	(empty)	
3	2	260	1,700	0.0537	0.2259	0	1	272	0.0588	0.2357
3	3	260	1,700	0.2164	0.4126	0	1	272	0.2426	0.4295
3	4	260	1,700	0.0274	0.1635	0	1	272	0.0404	0.1974
3	5	260	1,700	(empty)				272	(empty)	
4	1	260	1,700	(empty)				272	(empty)	
4	2	260	1,700	0.0044	0.0665	0	1	272	0.0074	0.0856
4	3	260	1,700	0.1488	0.3566	0	1	272	0.1066	0.3092
4	4	260	1,700	0.0981	0.2980	0	1	272	0.0809	0.2732
4	5	260	1,700	0.0016	0.0402	0	1	272	0.0037	0.0606
5	1	260	1,700	(empty)				272	(empty)	
5	2	260	1,700	(empty)				272	(empty)	
5	3	260	1,700	0.0629	0.2432	0	1	272	0.0478	0.2137
5	4	260	1,700	0.1552	0.3628	0	1	272	0.1618	0.3689
5	5	260	1,700	0.0660	0.2488	0	1	272	0.0809	0.2732
grade_nm	fow_nm									
0	0	286	1,871	0.0385	0.1928	0	1	298	0.0369	0.1889
0	1	286	1,871	(empty)				298	(empty)	
0	2	286	1,871	(empty)				298	(empty)	
0	3	286	1,871	(empty)				298	(empty)	
1	0	286	1,871	(empty)				298	(empty)	
1	1	286	1,871	(empty)				298	(empty)	
1	2	286	1,871	(empty)				298	(empty)	
1	3	286	1,871	(empty)				298	(empty)	
2	0	286	1,871	(empty)				298	(empty)	
2	1	286	1,871	0.0030	0.0545	0	1	298	0.0034	0.0579
2	2	286	1,871	(empty)				298	(empty)	
2	3	286	1,871	(empty)				298	(empty)	
3	0	286	1,871	(empty)				298	(empty)	
3	1	286	1,871	0.0851	0.2795	0	1	298	0.0738	0.2619
3	2	286	1,871	0.0059	0.0770	0	1	298	0.0101	0.1000
3	3	286	1,871	0.0044	0.0666	0	1	298	0.0067	0.0818
4	0	286	1,871	(empty)				298	(empty)	
4	1	286	1,871	0.0722	0.2593	0	1	298	0.0671	0.2506
4	2	286	1,871	0.2478	0.4325	0	1	298	0.2517	0.4347
4	3	286	1,871	0.0429	0.2030	0	1	298	0.0436	0.2046
5	0	286	1,871	(empty)				298	(empty)	

5	1	286	1,871	0.0139	0.1174	0	1	298	0.0134	0.1153
5	2	286	1,871	0.1482	0.3560	0	1	298	0.1477	0.3554
5	3	286	1,871	0.3379	0.4738	0	1	298	0.3456	0.4764

Table 57: Correlation Coefficients and Cramer’s V for the Micro Size Category

This table presents for two variables (ln~) their correlation coefficients with all other variables and otherwise Cramer’s V, based on the unweighted data of the micro size category (N=119).

	lndiff-pay	lnloss-reduc	agegr	agenty	consen	detinc	disc	duration	evasion	fow_nm	fupaud	fy_long	fy_short	grade_nm	group	legform	non-agree	pan-delay	place	sectorgr	sex	shdead	specs	trifling-amount
lndiffpay	1.000																							
lnlossreduc	-0.435	1.000																						
agegr	-0.046	0.003	1.000																					
agenty	0.038	0.038	0.411	1.000																				
consen	-0.105	0.000	0.199	0.164	1.000																			
detinc	-0.297	0.302	0.349	0.173	0.087	1.000																		
disc	0.027	0.086	0.087	0.138	0.174	0.169	1.000																	
duration	-0.023	0.303	0.182	0.296	0.351	0.475	0.338	1.000																
evasion	0.230	-0.139	0.110	0.235	-0.124	0.171	0.005	0.241	1.000															
fow_nm	-0.126	0.267	0.185	0.246	0.129	0.303	0.110	0.380	0.109	1.000														
fupaud	-0.003	0.210	0.277	0.110	-0.015	0.370	-0.029	0.445	0.101	0.549	1.000													
fy_long	.	.	0.103		0.053	0.169	-0.110	0.115	-0.035	0.027	-0.033	1.000												
fy_short	-0.120	-0.073	0.162	0.163	-0.033	0.137	-0.109	0.306	-0.041	0.130	-0.077	-0.042	1.000											
grade_nm	-0.141	0.211	0.304	0.304	0.152	0.346	0.283	0.283	0.333	0.632	0.243	0.082	0.208	1.000										
group	-0.351	0.465	0.105	0.131	0.048	0.657	-0.104	0.374	-0.114	0.380	0.214	0.290	-0.009	0.434	1.000									
legform	-0.302	0.325	0.338	0.271	0.064	0.534	0.103	0.313	0.162	0.190	0.239	0.228	0.124	0.252	0.573	1.000								
nonagree	0.094	0.169	0.179	0.187	-0.245	0.207	-0.016	0.444	0.214	0.325	0.136	-0.038	-0.170	0.185	0.085	0.011	1.000							
pandelay	-0.121	0.051	0.116	0.155	0.070	0.059	0.110	0.224	0.098	0.166	0.013	-0.020	0.053	0.245	-0.068	0.050	0.163	1.000						
place	0.229	-0.161	0.165	0.146	0.123	0.201	0.087	0.220	0.143	0.136	0.090	0.112	0.204	0.225	0.335	0.317	0.099	0.160	1.000					
sectorgr	-0.235	0.198	0.129	0.145	0.144	0.181	0.157	0.313	0.111	0.151	0.098	0.245	0.140	0.226	0.241	0.229	0.053	0.069	0.183	1.000				
sex	0.051	0.104	0.077	0.267	0.077	0.196	0.065	0.181	0.102	0.251	0.189	0.098	-0.064	0.232	0.230	0.032	0.059	-0.044	0.178	0.117	1.000			
shdead	-0.086	0.069	0.211	0.115	0.143	0.088	0.024	0.145	0.059	0.138	0.028	-0.095	0.075	0.196	-0.166	0.116	-0.107	0.140	0.061	0.102	-0.059	1.000		
specs	-0.139	0.428	0.248	0.200	0.034	0.317	-0.010	0.519	-0.079	0.202	0.162	-0.016	0.003	0.144	0.373	0.303	0.018	-0.044	0.250	0.343	0.066	0.096	1.000	
trifling-amount	-0.038	-0.010	0.149	0.194	0.201	0.124	0.095	0.227	-0.131	0.103	-0.123	-0.027	0.030	0.180	-0.003	0.136	-0.143	-0.074	0.115	0.158	-0.032	0.089	0.203	1.000

Table 58: Correlation Coefficients and Cramer's V for the Small Size Category

This table presents for two variables (ln~) their correlation coefficients with all other variables and otherwise Cramer's V, based on the unweighted data of the small size category (N=205).

	lndiffpay	lnlossreduc	agegr	agenty	consen	detinc	disc	duration	evasion	fow_nm	fupaud	fy_long	fy_short	grade_nm	group	legform	non-agree	pan-delay	place	sector-gr	sex	shdead	specs	trifling-amount
lndiffpay	1.000																							
lnlossreduc	-0.169	1.000																						
agegr	-0.001	-0.016	1.000																					
agenty	0.004	0.053	0.347	1.000																				
consen	-0.103	0.007	0.058	0.105	1.000																			
detinc	-0.079	0.164	0.220	0.161	0.112	1.000																		
disc	-0.039	-0.043	0.195	0.104	0.129	0.068	1.000																	
duration	0.030	0.108	0.221	0.178	0.391	0.177	0.130	1.000																
evasion	0.160	-0.025	0.099	0.149	-0.201	0.082	-0.053	0.269	1.000															
fow_nm	0.066	0.063	0.082	0.195	0.105	0.203	0.071	0.209	0.154	1.000														
fupaud	-0.067	0.104	0.111	0.074	-0.190	0.192	-0.011	0.269	0.030	0.109	1.000													
fy_long	0.075	0.044	0.144	0.207	0.048	0.139	0.024	0.309	0.002	0.045	0.177	1.000												
fy_short	0.013	-0.110	0.110	0.112	-0.014	0.083	0.067	0.122	-0.064	0.088	-0.046	-0.060	1.000											
grade_nm	0.016	0.003	0.188	0.247	0.067	0.145	0.091	0.162	0.103	0.594	0.140	0.100	0.101	1.000										
group	0.069	0.240	0.115	0.112	-0.049	0.121	0.039	0.285	0.030	0.168	0.122	0.250	-0.049	0.161	1.000									
legform	-0.079	0.271	0.224	0.193	0.069	0.347	0.046	0.223	0.049	0.171	0.089	0.155	0.094	0.119	0.157	1.000								
nonagree	0.146	-0.100	0.093	0.126	-0.302	0.125	-0.039	0.335	0.174	0.130	0.005	0.088	-0.024	0.170	-0.070	0.096	1.000							
pandelay	0.033	0.171	0.119	0.164	-0.047	0.094	-0.010	0.309	-0.005	0.240	-0.050	0.070	-0.064	0.092	0.101	0.186	0.019	1.000						
place	0.048	0.016	0.151	0.157	0.165	0.123	0.134	0.146	0.086	0.147	0.050	0.061	0.141	0.161	0.202	0.097	0.055	0.087	1.000					
sectorgr	-0.007	-0.012	0.116	0.109	0.095	0.150	0.078	0.149	0.133	0.123	0.078	0.075	0.118	0.107	0.129	0.147	0.111	0.130	0.150	1.000				
sex	0.048	-0.061	0.087	0.156	0.103	0.183	0.072	0.147	0.033	0.126	-0.015	0.055	-0.151	0.180	0.134	0.086	-0.048	0.162	0.139	0.036	1.000			
shdead	0.033	-0.154	0.080	0.164	-0.097	0.191	0.025	0.209	0.010	0.095	-0.060	-0.015	-0.018	0.061	-0.100	0.190	0.090	-0.075	0.169	0.115	-0.151	1.000		
specs	-0.114	-0.047	0.133	0.143	-0.049	0.116	0.052	0.156	-0.060	0.133	-0.021	-0.033	0.118	0.162	-0.027	0.120	0.055	-0.035	0.097	0.191	-0.028	0.029	1.000	
trifling-amount	-0.098	0.067	0.046	0.065	0.064	0.040	-0.128	0.111	-0.076	0.054	-0.057	-0.042	0.002	0.111	-0.034	0.057	-0.043	-0.044	0.088	0.064	-0.024	0.066	-0.037	1.000

Table 59: Correlation Coefficients and Cramer's V for the Medium Size Category

This table presents for two variables (ln~) their correlation coefficients with all other variables and otherwise Cramer's V, based on the unweighted data of the medium size category (N=291).

	lndiffpay	lnlossreduc	agegr	agenty	consen	detinc	disc	duration	evasion	fow_nm	fupaud	fy_long	fy_short	grade_nm	group	legform	non-agree	pan-delay	place	sector-gr	sex	shdead	specs	trifling-amount
lndiffpay	1.000																							
lnlossreduc	-0.374	1.000																						
agegr	0.019	-0.176	1.000																					
agenty	-0.001	-0.134	0.436	1.000																				
consen	-0.052	-0.065	0.108	0.103	1.000																			
detinc	-0.049	0.268	0.133	0.159	0.055	1.000																		
disc	0.148	-0.059	0.107	0.112	0.068	0.079	1.000																	
duration	0.068	0.159	0.185	0.177	0.354	0.155	0.112	1.000																
evasion	0.144	-0.051	0.093	0.085	-0.315	0.150	0.092	0.248	1.000															
fow_nm	0.055	0.153	0.159	0.217	0.043	0.221	0.041	0.162	0.091	1.000														
fupaud	-0.067	0.220	0.128	0.220	0.007	0.266	-0.070	0.173	0.082	0.193	1.000													
fy_long	0.040	0.013	0.101	0.118	-0.006	0.105	-0.070	0.140	0.050	0.180	0.041	1.000												
fy_short	0.042	-0.025	0.067	0.143	-0.026	0.057	0.031	0.174	0.044	0.091	0.032	-0.047	1.000											
grade_nm	0.050	0.009	0.222	0.260	0.077	0.142	0.069	0.147	0.084	0.665	0.109	0.134	0.099	1.000										
group	-0.058	0.357	0.151	0.181	0.057	0.371	0.049	0.229	-0.029	0.417	0.342	0.051	0.043	0.151	1.000									
legform	-0.037	0.353	0.239	0.232	0.014	0.413	0.053	0.164	0.124	0.233	0.189	0.116	0.084	0.149	0.451	1.000								
nonagree	0.085	0.041	0.098	0.096	-0.201	0.048	0.052	0.275	0.035	0.128	0.057	-0.044	-0.008	0.121	0.034	0.065	1.000							
pandelay	0.081	-0.074	0.078	0.120	-0.130	0.118	0.002	0.205	0.172	0.083	-0.026	-0.047	-0.049	0.087	-0.030	0.066	0.070	1.000						
place	-0.019	0.047	0.199	0.131	0.211	0.178	0.148	0.162	0.185	0.152	0.136	0.052	0.104	0.130	0.249	0.238	0.147	0.164	1.000					
sectorgr	-0.040	0.103	0.133	0.110	0.063	0.214	0.113	0.134	0.077	0.105	0.089	0.092	0.062	0.247	0.148	0.147	0.044	0.065	0.105	1.000				
sex	0.034	0.040	0.179	0.032	0.196	0.153	0.032	0.148	-0.036	0.172	0.062	-0.029	-0.041	0.108	0.172	0.055	-0.033	-0.044	0.130	0.072	1.000			
shdead	0.138	-0.052	0.038	0.138	-0.089	0.056	0.071	0.153	-0.018	0.076	0.106	0.063	-0.007	0.132	-0.025	0.010	0.172	-0.063	0.106	0.107	-0.040	1.000		
specs	-0.044	0.143	0.109	0.070	-0.015	0.185	0.042	0.196	-0.008	0.109	0.131	-0.011	-0.014	0.053	0.141	0.197	0.096	0.136	0.162	0.041	0.053	-0.015	1.000	
trifling-amount	-0.092	0.054	0.110	0.075	0.044	0.140	-0.069	0.136	-0.066	0.084	-0.020	0.133	0.044	0.136	0.011	0.029	-0.069	-0.038	0.052	0.089	0.012	-0.088	-0.051	1.000

Table 60: Correlation Coefficients and Cramer's V for the Large Size Category

This table presents for two variables (ln~) their correlation coefficients with all other variables and otherwise Cramer's V, based on the unweighted data of the large size category (N=270).

	lndiffpay	lnlossreduc	agegr	agenty	consen	detinc	disc	duration	evasion	fow_nm	fupaud	fy_long	fy_short	grade_nm	group	legform	non-agree	pan-delay	place	sector-gr	sex	shdead	specs	trifling-amount
lndiffpay	1.000																							
lnlossreduc	-0.207	1.000																						
agegr	-0.004	-0.025	1.000																					
agenty	-0.012	0.001	0.500	1.000																				
consen	-0.152	0.015	0.096	0.146	1.000																			
detinc	0.002	0.078	0.131	0.158	0.183	1.000																		
disc	0.117	0.084	0.113	0.059	-0.058	0.134	1.000																	
duration	-0.039	0.056	0.158	0.163	0.197	0.209	0.136	1.000																
evasion	0.111	-0.048	0.132	0.119	-0.292	0.213	0.067	0.139	1.000															
fow_nm	0.052	0.094	0.167	0.217	0.071	0.240	0.090	0.225	0.041	1.000														
fupaud	0.040	0.029	0.127	0.140	-0.059	0.211	0.018	0.175	-0.133	0.168	1.000													
fy_long	0.033	0.006	0.209	0.183	0.017	0.103	-0.104	0.252	-0.041	0.127	0.026	1.000												
fy_short	0.135	0.022	0.083	0.085	-0.088	0.069	-0.057	0.140	0.017	0.066	0.007	-0.111	1.000											
grade_nm	0.042	0.099	0.245	0.264	0.080	0.162	0.092	0.183	0.067	0.732	0.191	0.136	0.121	1.000										
group	-0.052	0.085	0.076	0.108	0.056	0.423	-0.005	0.465	-0.175	0.410	0.339	0.051	0.012	0.347	1.000									
legform	-0.045	0.126	0.178	0.127	0.043	0.379	0.109	0.200	0.065	0.232	0.047	0.092	0.055	0.091	0.312	1.000								
nonagree	-0.009	0.074	0.086	0.200	-0.191	0.101	-0.028	0.222	0.048	0.130	-0.004	-0.019	0.055	0.080	0.022	0.038	1.000							
pandelay	0.067	0.010	0.097	0.077	-0.061	0.088	-0.001	0.080	-0.037	0.038	-0.082	-0.075	-0.029	0.073	-0.024	0.078	0.078	1.000						
place	-0.072	0.001	0.136	0.135	0.111	0.193	0.160	0.180	0.154	0.173	0.315	0.047	0.088	0.180	0.412	0.224	0.065	0.272	1.000					
sectorgr	-0.069	-0.036	0.106	0.111	0.063	0.168	0.182	0.144	0.086	0.104	0.106	0.051	0.097	0.108	0.131	0.065	0.132	0.043	0.102	1.000				
sex	0.114	0.099	0.199	0.098	0.116	0.210	0.057	0.211	-0.046	0.098	0.065	-0.034	0.003	0.143	0.071	0.135	-0.060	0.017	0.081	0.103	1.000			
shdead	0.083	-0.101	0.044	0.086	-0.090	0.179	0.066	0.123	0.105	0.146	-0.151	-0.127	0.043	0.188	-0.070	0.128	0.186	0.115	0.087	0.079	0.034	1.000		
specs	0.097	0.058	0.101	0.110	-0.033	0.256	0.118	0.427	0.006	0.295	0.093	0.119	0.001	0.216	0.307	0.180	0.129	-0.042	0.235	0.160	-0.037	-0.017	1.000	
trifling-amount	-0.039	0.040	0.056	0.091	0.108	0.116	-0.100	0.209	-0.063	0.083	0.006	-0.094	-0.049	0.059	-0.056	0.138	-0.015	-0.033	0.081	0.143	0.019	0.002	-0.097	1.000

Table 61: Cumulated Number of Focal Points

The table shows the cumulated number of focal points, sorted by the essential topics pursuant to the Rationalization Edict from 1995 (see section IV 2). It is a parallel chart for each size category of focal points without and with findings with regard to all cases.

	Micro		Small		Medium		Large	
Focal Points	without Findings	with Findings	without Findings	with Findings	without Findings	with Findings	without Findings	with Findings
completeness of revenues	24	48	37	112	40	84	13	16
delimitation between business and private	17	62	26	119	29	155	17	97
value added tax	13	35	20	69	45	89	25	86
corporate relationships	3	1	2	11	10	15	12	45
contracts between related parties	2	10	4	6	9	36	17	28
sale of business, termination of business, leasing of business	1	1	5	10	6	13	2	11
properties (acquisition, sale, change of use)	3	2	1	10	5	10	1	10
investment grant/special write-downs	3	8	4	20	8	26	1	10
foreign relations		2	2	2	1	4	6	32
financial assets, investments, securities		1		6	2	11	1	20
adaptation of taxpayers' balance sheets in follow-up audits				4	1	5	6	21
valuation adjustments on accounts receivable						4	2	8
audit of essential non-business income		7	1	9		8		8
capital gain unexplained				1				1
miscellaneous	141	147	242	248	316	333	261	279

Table 62: Cumulated Number of Findings with Suspected Tax Evasion

The table shows the cumulated number of finding with revenue agents' suspicion of tax evasion. It is a parallel chart for each size category with regard to all cases.

Findings with Suspicion of Tax Evasion	Micro	Small	Medium	Large
completeness of revenues	14	15	15	4
third-party services	1	1	8	
value added tax	1		6	2
private expenses	2	1	4	
control reports	2	2	2	1
business expenses	1	1	2	3
fixed assets	1	1	2	
loans			2	1
shareholder			2	4
cash book	1	1	1	1
deposits	1		1	
goods purchase	1	1	1	2
clients' money		1	1	
current assets			1	
employment relationships with relatives			1	
foreign facts			1	
affiliated companies				2
direct insurance				1
investment grant				2
voluntary declaration		1		
miscellaneous	1	1		

Table 63: Control Estimation for the Audit Duration

The table shows the estimation results of an ordered logistic regression with *DURATION_MSM* as dependent variable in the firm size categories of SMEs and *DURATION* in the large firm size category as well as different independent variables. The latter are zero at the base levels and in the case of the *PLACE OF WORK* this corresponds to an office on the firms' premise. If the exponentiated coefficients are > 1 (< 1), the independent variable increases (decreases) the duration of an audit whereas this depends on the cutpoints too. The cutpoints correspond to the categories of duration.
Exponentiated coefficients. * p<0.05; ** p<0.01; *** p<0.001

Dependent Variable = duration_msm/duration Variables		Micro	Small	Medium	Large
audit time (days)		1.302*	1.216**	1.178*	1.018*
report time (days)		1.112	1.438***	1.472	1.128*
member of an affiliated group=1		0.325	3.414	6.720***	4.450***
suspected tax evasion=1		1.462	1.291	1.014	0.945
place of work					
tax office		0.420	0.559	1.989	1.087
tax adviser office		1.007	0.187*	1.926	1.481
multiple offices		0.195**	0.043*	1.179	1.125
consulted specialized auditors=1		23.490*	0.487	0.660	2.002*
follow-up audit=1		15.225	0.986	1.084	1.059
short deadline for reply=1		0.897	1.585	0.933	0.787
penalty for delay=1		3.317	0.341	2.066	0.578
threat of non-agreement=1		7.442*	4.037*	1.179	1.838
consensus=1		0.582	0.167***	0.290**	0.300*
final discussion=1		0.610	0.573	0.670	0.785
feeling of time pressure due to statistical guidelines		0.981	1.004	0.923	0.923
cut1 = up to 1 month	_cons	0.189	0.009**	0.163	0.006***
cut2 = 2 to 3 months	_cons	1.818	0.453	3.198	0.282
cut3 = 4 to 6 months	_cons	29.009*	3.939	12.534*	1.009
cut4 = 7 to 9 months	_cons	117.853**	6.703	37.840**	2.958
cut5 = 10 to 12 months	_cons	439.591***	19.014*	92.552***	8.042**
cut6 = 1 to 1.5 years	_cons				21.318***
cut7 = 1.5 to 2 years	_cons				49.734***
N		113	201	282	248
N_clust		98	176	232	191
N_cd		0	0	0	1
chi2		73.600	112.842	90.105	90.407
r2_p		0.261	0.437	0.230	0.157
ll		-1.0E+03	-1.3E+03	-2.6E+03	-2.7E+03

10 Appendix G

Table 64: Comparison of the Information Criterions for the Micro Size Category

The table shows a comparison of the information criteria for choosing the best fitted model (bold) and the ideal number of knots (underlined) for the restricted cubic spline function. It is a parallel chart for the audit, report and total time consumption for the micro size category.

	Audit Time (2,812 obs)				Report Time (644 obs)					Total Time (3,456 obs)			
Model, *K*	**ll(model)**	**df**	**AIC**	**BIC**	**ll(model)**	**df**	**AIC**	**AIC$_c$**	**BIC**	**ll(model)**	**df**	**AIC**	**BIC**
odds d.f. 1	-28.019	44	144.038	405.471	162.772	46	**-233.544**	**-225.082**	**-28.030**	147.972	44	-207.943	62.563
odds d.f. 2	40.684	45	8.631	276.006						184.217	45	-278.433	-1.779
odds d.f. 3	53.659	46	-15.319	257.997						207.560	46	-323.119	-40.317
odds d.f. 4	69.514	47	-45.027	234.231									
normal d.f. 1	-107.242	44	302.485	563.918	45.091	46	1.818	10.280	207.333	89.332	44	-90.664	179.842
normal d.f. 2	-38.172	45	166.345	433.719						121.292	45	-152.585	124.069
normal d.f. 3	-24.793	46	141.587	414.903						139.851	46	-187.702	95.100
normal d.f. 4	-5.252	47	104.504	383.762									
hazard d.f. 1	33.620	44	20.761	282.193	29.917	46	32.166	40.628	237.680	212.252	44	-336.504	-65.997
hazard d.f. 2	70.339	45	-50.679	216.695						233.334	45	-376.668	-100.014
hazard d.f. 3	78.145	46	-64.290	209.026						254.720	46	**-417.441**	**-134.639**
hazard d.f. 4	100.235	47	**-106.469**	**172.788**									

Table 65: Comparison of the Information Criterions for the Micro Size Category (Interaction Effects)

The table shows a comparison of the information criteria for choosing the best fitted model (bold) with interaction effects or not and the number of knots for the restricted cubic spline function (distribution (*d*): o = odds, h = hazard; *K* knots). It is a parallel chart for the audit, report and total time consumption for the micro size category.

	Audit Time						Report Time						Total Time					
Interaction Effects	***d***	***K***	**ll**	**df**	**AIC**	**BIC**	***d***	***K***	**ll**	**df**	**AIC**	**BIC**	***d***	***K***	**ll**	**df**	**AIC**	**BIC**
without	o	5	-175.20	47	444.40	723.65	o	1	-43.25	43	172.51	364.62	o	5	-25.54	47	145.09	434.04
legform#detinc	o	5	-171.03	48	438.06	723.26	o	1	-42.33	44	172.66	369.24	o	5	-23.74	48	143.47	438.57
sectorgr#evasion	o	5	-161.34	49	420.68	711.82	o	1	-32.07	45	154.15	355.19	o	5	-11.84	49	121.68	422.92
legform#detinc & sectorgr#evasion	o	5	-157.73	50	415.45	712.53	o	1	-31.07	46	154.15	359.66	o	5	-10.30	50	120.60	427.99
agenty#agegr	o	5	-142.60	50	385.21	682.29	o	1	-35.20	46	162.39	367.91	o	5	-0.73	50	101.47	408.86
grade_nm#fow_nm	o	5	22.52	45	44.96	312.34	o	1	115.87	41	-149.75	33.43	h	3	158.14	43	-230.28	34.07
agenty#agegr & grade_nm#fow_nm	h	4	100.23	47	-106.47	**172.79**	o	1	153.07	44	-218.15	-21.57	h	3	254.72	46	-417.44	**-134.64**
sectorgr#evasion & agenty#agegr & grade_nm#fow_nm	h	3	80.70	48	-65.41	219.79	o	1	162.77	46	-233.54	**-28.03**	h	3	260.08	48	-424.15	-129.05
legform#detinc & sectorgr#evasion & agenty#agegr & grade_nm#fow_nm	h	3	80.79	49	-63.58	227.56	o	1	163.62	47	-233.25	-23.27	h	3	260.22	49	-422.44	-121.19

Table 66: Comparison of the Information Criterions for the Small Size Category

The table shows a comparison of the information criteria for choosing the best fitted model (bold) and the ideal number of knots (underlined) for the restricted cubic spline function. It is a parallel chart for the audit, report and total time consumption for the small size category.

	Audit Time (5,384 obs)				Report Time (1,166 obs)					Total Time (6,550 obs)			
Model, *K*	**ll(model)**	**df**	**AIC**	**BIC**	**ll(model)**	**df**	**AIC**	**AIC$_c$**	**BIC**	**ll(model)**	**df**	**AIC**	**BIC**
odds d.f. 1	628.689	53	-1,151.377	-802.044	90.811	53	-75.622	-64.264	192.629	704.953	54	-1,301.907	-935.397
odds d.f. 2	684.567	54	-1,261.135	-905.211	95.414	54	-82.828	-71.019	190.484	720.534	56	-1,329.069	-948.984
odds d.f. 3	833.339	55	-1,556.678	-1,194.162	615.891	55	**-1,121.782**	**-1,109.511**	**-843.409**	943.107	56	**-1,774.213**	**-1,394.129**
odds d.f. 4	904.293	56	**-1,696.586**	**-1,327.479**									
odds d.f. 5	893.054	57	-1672.108	-1296.411									
normal d.f. 1	414.696	53	-723.391	-374.058	-154.330	53	414.660	426.017	682.911	457.236	55	-804.471	-431.174
normal d.f. 2	434.547	54	-761.094	-405.170	-154.101	55	418.202	430.473	696.575	459.596	55	-809.193	-435.896
normal d.f. 3	519.586	55	-929.171	-566.656	321.305	55	-532.610	-520.339	-254.236	664.703	56	-1,217.406	-837.322
normal d.f. 4	547.413	56	-982.825	-613.719									
normal d.f. 5	549.296	57	-984.592	-608.894									
hazard d.f. 1	458.876	53	-811.753	-462.420	10.405	54	87.190	98.999	360.502	563.367	54	-1,018.734	-652.224
hazard d.f. 2	461.055	55	-812.110	-449.595	12.050	56	87.899	100.642	371.334	563.459	55	-1,016.919	-643.622
hazard d.f. 3	542.805	55	-975.610	-613.094	562.284	56	-1,012.567	-999.824	-729.132	842.785	56	-1,573.569	-1,193.485
hazard d.f. 4	546.487	57	-978.974	-603.276									
hazard d.f. 5	559.868	58	-1003.736	-621.448									

Table 67: Comparison of the Information Criterions for the Small Size Category (Interaction Effects)

The table shows a comparison of the information criteria for choosing the best fitted model (bold) with interaction effects or not and the number of knots for the restricted cubic spline function (distribution (*d*): o = odds, h = hazard; *K* knots). It is a parallel chart for the audit, report and total time consumption for the small size category.

	Audit Time						**Report Time**						**Total Time**					
Interaction Effects	***d***	***K***	**ll**	**df**	**AIC**	**BIC**	***d***	***K***	**ll**	**df**	**AIC**	**BIC**	***d***	***K***	**ll**	**df**	**AIC**	**BIC**
without	o	4	742.48	48	-1,388.95	-1,072.57	o	3	434.01	47	-774.02	-536.14	o	3	732.20	47	-1,370.39	-1,051.39
legform#detinc	o	4	788.04	49	-1,478.07	-1,155.11	o	3	458.97	48	-821.94	-579.00	o	3	777.58	48	-1,459.17	-1,133.38
sectorgr#evasion	o	4	778.09	50	-1,456.17	-1,126.61	o	3	441.50	49	-784.99	-536.99	o	3	769.99	49	-1,441.98	-1,109.41
legform#detinc & sectorgr#evasion	o	4	825.36	51	-1,548.71	-1,212.56	o	3	468.94	50	-837.87	-584.81	o	3	818.77	51	-1,535.54	-1,189.39
agenty#agegr	o	4	800.36	52	-1,496.73	-1,153.99	o	3	554.64	51	-1,007.28	-749.15	o	3	823.49	53	-1,540.97	-1,181.25
grade_nm#fow_nm	o	4	758.31	49	-1,418.61	-1,095.64	o	3	452.30	49	-806.61	-558.60	o	3	755.44	49	-1,412.87	-1,080.30
agenty#agegr & grade_nm#fow_nm	o	4	820.11	53	-1,534.23	-1,184.90	o	3	581.64	52	-1,059.27	-796.08	o	3	851.64	52	-1,599.29	-1,246.35
sectorgr#evasion & agenty#agegr & grade_nm#fow_nm	o	4	851.87	55	-1,593.75	-1,231.23	o	3	583.45	54	-1,058.89	-785.58	o	3	886.27	54	-1,664.55	-1,298.04
legform#detinc & sectorgr#evasion & agenty#agegr & grade_nm#fow_nm	o	4	904.29	56	-1,696.59	**-1,327.48**	o	3	615.89	55	-1,121.78	**-843.41**	o	3	943.11	56	-1,774.21	**-1,394.13**

Table 68: Comparison of the Information Criterions for the Medium Size Category

The table shows a comparison of the information criteria for choosing the best fitted model (bold) and the ideal number of knots (underlined) for the restricted cubic spline function. It is a parallel chart for the audit, report and total time consumption for the medium size category.

	Audit Time (10,136 obs)				Report Time (1,995 obs)					Total Time (12,131 obs)			
Model, *K*	**ll(model)**	**df**	**AIC**	**BIC**	**ll(model)**	**df**	**AIC**	**AIC$_c$**	**BIC**	**ll(model)**	**df**	**AIC**	**BIC**
odds d.f. 1	-75.945	58	267.890	686.873	-475.666	58	1,067.333	1,081.048	1,392.040	35.374	58	45.252	**474.656**
odds d.f. 2	-70.197	59	258.394	**684.601**	-410.356	59	938.711	952.928	1,269.017	37.516	59	42.968	479.776
odds d.f. 3	-69.258	60	258.517	691.948	-293.024	60	706.049	720.777	1,041.953	42.660	61	36.679	488.294
odds d.f. 4	-63.722	62	251.444	699.322	-83.874	61	**289.748**	**304.998**	**631.251**	42.348	61	37.303	488.918
odds d.f. 5	-64.116	63	254.232	709.334						53.196	63	**19.607**	486.029
odds d.f. 6	-52.282	63	**230.563**	685.666						52.571	64	22.858	496.683
odds d.f. 7										54.535	65	20.931	502.160
normal d.f. 1	-190.428	58	496.856	915.839	-507.308	58	1,130.615	1,144.330	1,455.322	-50.447	58	216.894	646.298
normal d.f. 2	-184.549	59	487.097	913.305	-443.115	59	1,004.231	1,018.448	1,334.536	-49.092	59	216.183	652.991
normal d.f. 3	-179.776	60	479.551	912.982	-364.985	60	849.969	864.698	1,185.873	-47.928	60	215.856	660.068
normal d.f. 4	-168.064	61	458.128	898.783	-213.245	61	548.490	563.740	889.992	-47.829	62	219.658	678.676
normal d.f. 5	-168.652	63	463.305	918.407						-33.313	62	190.625	649.644
normal d.f. 6	-156.150	63	438.300	893.403						-33.893	64	195.787	669.612
normal d.f. 7										-32.716	65	195.432	676.661
hazard d.f. 1	-158.937	59	435.874	862.082	-449.645	58	1,015.289	1,029.004	1,339.996	-44.623	58	205.245	634.649
hazard d.f. 2	-155.976	59	429.952	856.159	-426.092	59	970.183	984.400	1,300.489	-40.824	60	201.647	645.858
hazard d.f. 3	-155.820	61	433.641	874.295	-369.353	60	858.706	873.434	1,194.610	-27.364	61	176.728	628.343
hazard d.f. 4	-153.859	61	429.718	870.372	-136.965	61	395.930	411.180	737.432	-25.997	62	175.993	635.011
hazard d.f. 5	-153.176	63	432.351	887.454						-20.007	63	166.013	632.435
hazard d.f. 6	-143.726	63	413.451	868.554						-21.130	65	172.259	653.488
hazard d.f. 7										-20.113	66	172.226	660.858

Table 69: Comparison of the Information Criterions for the Medium Size Category (Interaction Effects)

The table shows a comparison of the information criteria for choosing the best fitted model (bold) with interaction effects or not and the number of knots for the restricted cubic spline function (distribution (*d*): o = odds, h = hazard; *K* knots). It is a parallel chart for the audit, report and total time consumption for the medium size category.

	Audit Time						**Report Time**						**Total Time**					
Interaction Effects	***d***	***K***	**ll**	**df**	**AIC**	**BIC**	***d***	***K***	**ll**	**df**	**AIC**	**BIC**	***d***	***K***	**ll**	**df**	**AIC**	**BIC**
without	o	1	-273.98	45	637.96	963.03	o	4	-304.67	48	705.33	974.06	o	1	-148.06	45	386.12	719.28
legform#detinc	o	1	-244.96	48	585.92	932.67	o	4	-290.05	51	682.10	967.62	o	1	-120.71	48	337.42	692.79
sectorgr#evasion	o	1	-251.17	48	598.35	945.09	o	4	-271.10	51	644.20	929.72	o	1	-122.65	48	341.30	696.67
legform#detinc & sectorgr#evasion	o	1	-223.11	51	548.22	916.63	o	4	-252.56	54	613.11	915.42	o	1	-94.48	51	290.96	668.54
agenty#agegr	o	1	-166.70	50	433.40	794.60	o	4	-238.33	53	582.67	879.38	o	1	-55.87	50	211.75	581.92
grade_nm#fow_nm	o	2	-244.24	49	586.47	940.44	o	4	-158.34	51	418.67	704.19	o	5	-103.63	52	311.26	696.24
agenty#agegr & grade_nm#fow_nm	o	2	-107.42	54	322.83	712.92	o	4	-121.33	56	354.67	668.18	o	3	8.46	55	93.09	500.28
sectorgr#evasion & agenty#agegr & grade_nm#fow_nm	o	2	-95.96	57	305.92	717.68	o	4	-104.08	59	326.16	656.47	o	1	9.97	56	92.06	506.66
legform#detinc & sectorgr#evasion & agenty#agegr & grade_nm#fow_nm	o	1	-70.20	59	258.39	**684.60**	o	4	-83.87	61	289.75	**631.25**	o	1	35.37	58	45.25	**474.66**

Table 70: Comparison of the Information Criterions for the Large Size Category

The table shows a comparison of the information criteria for choosing the best fitted model (bold) and the ideal number of knots (underlined) for the restricted cubic spline function. It is a parallel chart for the audit, report and total time consumption for the large size category.

	Audit Time (31,366 obs)				Report Time (6,081 obs)				Total Time (37,447 obs)			
Model, *K*	**ll(model)**	**df**	**AIC**	**BIC**	**ll(model)**	**df**	**AIC**	**BIC**	**ll(model)**	**df**	**AIC**	**BIC**
odds d.f. 1	-911.054	55	1,932.108	2,391.549	-1,023.391	58	2,162.782	2,552.131	-823.333	56	1,758.665	2,236.383
odds d.f. 2	-837.710	57	1,789.420	2,265.568	-920.080	61	1,962.160	2,371.648	-708.163	56	1,528.326	2,006.044
odds d.f. 3	-802.562	59	1,723.124	2,215.979	-914.014	61	1,950.028	2,359.516	-698.401	56	1,508.801	1,986.519
odds d.f. 4	-806.932	61	1,735.864	2,245.426	-912.634	62	1,949.267	2,365.469	-700.352	57	1,514.704	2,000.953
odds d.f. 5	-781.669	61	1,685.338	2,194.900					-680.630	58	1,477.259	1,972.039
odds d.f. 6	-788.028	61	1,698.056	2,207.619					-681.567	60	1,483.133	1,994.974
odds d.f. 7	-761.830	62	1,647.660	2,165.576					-657.673	61	1,437.345	1,957.717
odds d.f. 8	-721.837	64	1,571.675	2,106.297					-639.872	61	1,401.744	1,922.116
odds d.f. 9	-622.210	66	1,376.421	1,927.750					-620.810	63	1,367.620	1,905.053
odds d.f. 10									-627.598	62	1,379.197	1,908.099
normal d.f. 1	-1,047.712	56	2,207.423	2,675.218	-1,108.553	60	2,337.105	2,739.881	-952.370	54	2,012.739	2,473.396
normal d.f. 2	-972.184	59	2,062.368	2,555.224	-975.567	59	2,069.133	2,465.196	-820.470	58	1,756.941	2,251.720
normal d.f. 3	-921.893	58	1,959.786	2,444.288	-972.281	61	2,066.561	2,476.050	-803.521	58	1,723.041	2,217.821
normal d.f. 4	-926.935	61	1,975.870	2,485.432	-970.603	63	2,067.206	2,490.120	-804.937	59	1,727.874	2,231.185
normal d.f. 5	-900.949	60	1,921.898	2,423.107					-788.156	57	1,690.311	2,176.560
normal d.f. 6	-906.829	63	1,939.658	2,465.927					-788.501	60	1,697.003	2,208.844
normal d.f. 7	-883.254	64	1,894.508	2,429.131					-759.260	60	1,638.521	2,150.362
normal d.f. 8	-844.461	67	1,822.922	2,382.605					-742.208	61	1,606.416	2,126.788
normal d.f. 9	-752.989	64	1,633.979	2,168.601					-724.425	62	1,572.850	2,101.752
normal d.f. 10									-731.198	63	1,588.396	2,125.829
hazard d.f. 1	-992.019	56	2,096.039	2,563.833	-1,150.976	59	2,419.951	2,816.014	-936.018	56	1,984.036	2,461.755
hazard d.f. 2	-764.164	59	1,646.328	2,139.183	-894.933	58	1,905.865	2,295.215	-649.287	57	1,412.573	1,898.822

hazard d.f. 3	-746.669	58	1,609.338	2,093.839	-878.207	61	1,878.414	2,287.902	-646.808	58	1,409.616	1,904.396
hazard d.f. 4	-750.140	60	1,620.280	2,121.489	-875.195	61	**1,872.390**	**2,281.878**	-645.060	57	1,404.121	1,890.369
hazard d.f. 5	-706.525	62	1,537.050	2,054.966					-615.101	61	1,352.203	1,872.574
hazard d.f. 6	-712.999	62	1,549.997	2,067.913					-614.680	61	1,351.360	1,871.732
hazard d.f. 7	-690.853	62	1,505.707	2,023.623					-600.287	64	1,328.575	1,874.538
hazard d.f. 8	-655.939	66	1,443.878	1,995.208					-583.180	60	1,286.359	1,798.200
hazard d.f. 9	-555.764	63	**1,237.527**	**1,763.797**					-565.662	63	**1,257.324**	**1,794.757**
hazard d.f. 10									-569.954	63	1,265.908	1,803.341

Table 71: Comparison of the Information Criterions for the Large Size Category (Interaction Effects)

The table shows a comparison of the information criteria for choosing the best fitted model (bold) with interaction effects or not and the number of knots for the restricted cubic spline function (distribution (*d*): o = odds, h = hazard; *K* knots). It is a parallel chart for the audit, report and total time consumption for the large size category.

	Audit Time						Report Time						Total Time					
Interaction Effects	***d***	***K***	**ll**	**df**	**AIC**	**BIC**	***d***	***K***	**ll**	**df**	**AIC**	**BIC**	***d***	***K***	**ll**	**df**	**AIC**	**BIC**
without	h	9	-658.56	56	1,429.12	1,896.91	h	4	-1,030.78	49	2,159.55	2,488.48	h	9	-672.15	56	1,456.30	1,934.02
legform#detinc	h	9	-649.36	59	1,416.72	1,909.57	h	3	-1,008.31	51	2,118.62	2,460.98	h	9	-666.06	58	1,448.12	1,942.90
sectorgr#evasion	h	9	-653.43	56	1,418.87	1,886.66	h	3	-1,019.07	51	2,140.14	2,482.50	h	9	-671.78	58	1,459.56	1,954.34
legform#detinc & sectorgr#evasion	h	9	-644.01	62	1,412.02	1,929.94	h	3	-992.06	53	2,090.11	2,445.90	h	9	-665.59	62	1,455.18	1,984.08
agenty#agegr	h	9	-622.13	61	1,366.26	1,875.82	h	3	-982.66	54	2,073.32	2,435.82	h	10	-639.24	62	1,402.47	1,931.37
grade_nm#fow_nm	h	9	-589.25	61	1,300.51	1,810.07	o	2	-982.17	51	2,066.34	2,408.70	h	9	-595.96	60	1,311.93	1,823.77
agenty#agegr & grade_nm#fow_nm	h	9	-558.45	65	1,246.90	1,789.88	o	3	-925.76	54	1,959.52	2,322.02	h	9	-565.66	62	1,255.32	**1,784.23**
sectorgr#evasion & agenty#agegr & grade_nm#fow_nm	h	9	-555.76	64	1,239.53	**1,774.15**	h	4	-901.90	60	1,923.79	2,326.57	h	9	-565.58	65	1,261.15	1,815.65
legform#detinc & sectorgr#evasion & agenty#agegr & grade_nm#fow_nm	h	9	-545.12	69	1,228.25	1,804.64	h	4	-875.19	61	1,872.39	**2,281.88**	h	9	-557.41	69	1,252.83	1,841.44

References

Abdolmohammadi, Mohammad J. (1987): Decision Support and Expert Systems in Auditing: A Review and Research Directions: *Accounting and Business Research*: Vol. 17, No. 66, 1987: 173–185.

Abdolmohammadi, Mohammad J. (1999): A Comprehensive Taxonomy of Audit Task Structure, Professional Rank and Decision Aids for Behavioral Research: *Behavioral Research in Accounting*: Vol. 11, 1999: 51–92.

Abdolmohammadi, Mohammad J.; Wright, Arnold (1987): An Examination of the Effects of Experience and Task Complexity on Audit Judgments: *The Accounting Review*: Vol. 62, No. 1, 1987: 1–13.

Akaike, Hirotugu (1973): Information Theory and an Extension of the Maximum Likelihood Principle: in Petrov, B. N.; Caski, F. (eds.): *Proceeding of the Second International Symposium on Information Theory*: Budapest: Akademiai Kiado, 1973: 267–281.

Akaike, Hirotugu (1974): A New Look at the Statistical Model Identification: *IEEE Transactions on Automatic Control*: Vol. 19, 1974: 716–723.

Alissa, Walid; Capkun, Vedran; Jeanjean, Thomas; Suca, Nadja (2014): An empirical investigation of the impact of audit and auditor characteristics on auditor performance: *Accounting, Organizations and Society*: Vol. 39, No. 7, 2014: 495–510.

Allingham, Michael G., Sandmo, Agnar (1972): Income Tax Evasion: A Theoretical Analysis: *Journal of Public Economics*: Vol. 1, No. 3-4, 1972: 323–338.

Allison, Paul D. (1982): Discrete-Time Methods for the Analysis of Event Histories: *Sociological Methodology*: Vol. 13, 1982: 61–98.

Allison, Paul D. (2014): *Event History and Survival Analysis*: 2nd edition: Sage.

Alm, James (2012): Measuring, explaining, and controlling tax evasion: lessons from theory, experiments, and field studies: *International Tax and Public Finance*: Vol. 19, No. 1, 2012: 54–77.

Alm, James (2014): Does an uncertain tax system encourage ‘‘aggressive tax planning’’?: *Economic Analysis and Policy*: Vol. 44, 2014: 30–38.

Alm, James; Cherry, Todd; Jones, Michael; McKee, Michael (2010): Taxpayer information assistance services and tax compliance behavior: *Journal of Economic Psychology*: Vol. 31, No. 4, 2010: 577–586.

Alm, James; Cronshaw, Mark B.; McKee, Michael (1993): Tax Compliance with Endogenous Audit Selection Rules: *Kyklos*: Vol. 46, No. 1, 1993: 27–45.

Alm, James; Erard, Brian; Feinstein, Jonathan S. (1996): The Relationship between State and Federal Tax Audits: in Feldstein, Martin; Poterba, James (eds.): *Empirical Foundations of Household Taxation*: University of Chicago Press: 235–277.

Alm, James; Jackson, Betty R.; McKnee, Michael (1992): Institutional Uncertainty and Taxpayer Compliance: *The American Economic Review*: Vol. 82, No. 4, 1992: 1018–1026.

Alm, James; Jackson, Betty R.; McKnee, Michael (2009): Getting the word out: Enforcement information dissemination and compliance behavior: *Journal of Public Economics*: Vol. 93, 2009: 392–402.

Alm, James; Torgler, Benno (2011): Do Ethics Matter? Tax Compliance and Morality: *Journal of Business Ethics*: Vol. 101, No. 4, 2011: 635–651.

Alstadsæter, Annette; Jacob, Martin (2013a): Who Participates in Tax Avoidance?: CESifo Working Paper: available at https://ssrn.com/abstract=2261637: retrieved 31 August 2017.

Alstadsæter, Annette; Jacob, Martin (2013b): Payout Policies of Privately Held Firms: Flexibility and the Role of Income Taxes: FAccT Center Working Paper No. 12/2013: available at https://www.econstor.eu/handle/10419/88161: retrieved 31 August 2017.

Ampenberger, Markus; Schmid, Thomas; Achleitner, Ann-Kristin; Kaserer, Christoph (2013): Capital structure decisions in family firms: empirical evidence from a bank-based economy: *Review of Managerial Science*: Vol. 7, No. 3, 2013: 247-275.

Anderson, Ronald C.; Reeb, David M. (2003): Founding-family ownership and firm performance: evidence from the S&P 500: *Journal of Finance*: Vol. 58, No. 3, 2003: 1301–1328.

Anderson, Ronald C.; Duru, Augustine; Reeb, David M. (2012): Investment policy in family controlled firms: *Journal of Banking & Finance*: Vol. 36, No. 6, 2013: 1744–1758.

Anderson, Teresa; Zéghal, Daniel (1994): The Pricing of Audit Services: Further Evidence from the Canadian Market: *Accounting and Business Research*: Vol. 24, No. 95, 1994: 195–207.

Andreoni, James (1992): IRS as Loan Shark: Tax Compliance with Borrowing Constraints: *Journal of Public Economics*: Vol. 49, 1992: 35–46.

Andreoni, James; Erard, Brian; Feinstein, Jonathan (1998): Tax Compliance: *Journal of Economic Literature*: Vol. 36, No. 2, 1998: 818–860.

Ang, James S.; Cole, Rebel A.; Lin, James W. (2000): Agency Costs and Ownership Structure: *The Journal of Finance*: Vol. 55, No. 1, 2000: 81–106.

Antle, Rick; Nalebuff, Barry (1991): Conservatism and Auditor-Client Negotiations: *Journal of Accounting Research*: Vol. 29, 1991: 31–54.

Antonioni, David (1998): Relationship between the big five personality factors and conflict management styles: International Journal of Conflict Management: Vol. 9, No. 4, 1998: 336–355.

Aranda-Ordaz, Francisco J. (1981): On Two Families of Transformations to Additivity for Binary Response Data: *Biometrika*: Vol. 68, No. 2, 1981: 357–363.

Atwood, T. J.; Drake, Michael S.; Myers, Lind A. (2010). Book–tax conformity, earnings persistence and the association between earnings and future cash flows: *Journal of Accounting and Economics*: Vol. 50, No. 1, 2010; 111–125.

Atwood, T. J.; Drake, Michael S.; Myers, James N.; Myers, Linda A. (2012): Home Country Tax System Characteristics and Corporate Tax Avoidance: International Evidence: *Accounting Review*: Vol. 87, No. 6, 2012: 1831–1860.

Baguley, Thom (2012): *Serious Stats, A Guide to Advanced Statistics for the Behavioral Sciences*: Palgrave Macmillian.

Bame-Aldred, Charles W.: Kida, Thomas (2007): A comparison of auditor and client initial negotiation positions and tactics: *Accounting, Organizations and Society*: Vol. 32, No. 6, 2007: 497–511.

Bazerman, Max H.; Neale, Margaret A.; Valley, Kathleen L.; Zajac, Edward J.; Kim, Yong M. (1992): The effect of agents and mediators on negotiation outcomes: Organizational Behavior and Human Decision Processes: Vol. 53, No. 1, 1992: 55–73.

Beattie, Vivien; Fearnley, Stella; Brandt, Richard (2004): A grounded theory model of auditor-client negotiations: *International Journal of Auditing*: Vol. 8, No. 1, 2004: 1–19.

Beck, Paul J.; Davis, Jon S.; Jung, Woon-Oh (1996): Tax Advice and Reporting under Uncertainty: Theory and Experimental Evidence: *Contemporary Accounting Research*: Vol. 13, No. 1, 1996: 49–80.

Beck, Paul J.; Jung, Woon-Oh (1998): Taxpayers' Reporting Decisions and Auditing Under Information Asymmetry: *The Accounting Review*: Vol. 64, No. 3, 1989: 468–487.

Becker, Gary S. (1968): Crime and Punishment: an Economic Approach: *Journal of Public Economy*: Vol. 76, No. 2, 1968: 169–217.

Bennett, G. Bradley; Hatfield, Richard C.; Stefaniak, Chad (2015): The Effect of Deadline Pressure on Pre-Negotiation Positions: A Comparison of Auditors and Client Management: *Contemporary Accounting Research*: Vol. 32, No. 4, 2015: 1507–1528.

Bergner, Sören M.; Heckemeyer, Jost H. (2017): Simplified Tax Accounting and the Choice of Legal Form: *European Accounting Review*: Vol. 26, No. 3, 2017: 581–601.

Beuselinck, Christof; Deloof, Marc (2014): Earnings Management in Business Groups: Tax Incentives or Expropriation Concealment?: *The International Journal of Accounting*: Vol. 49, No. 1, 2014: 27–52.

Biber, Edmund (2010): *Revenue Administration: Taxpayer Audit — Development of Effective Plans*: Technical Notes and Manuals: International Monetary Fund.

Billari, Francesco C. (2001): A sickle transition-rate model with starting threshold: *Statistical Methods & Applications*: Vol. 10, 2001: 139–155.

Blake, Robert R.; Mouton, Jane S. (1964): *The Managerial Grid*: Gulf Publications, Houston.

Blaufus, Kay; Bob, Jonathan; Lorenz, Daniela; Trinks, Matthias (2016a): How Will the Court Decide? – Tax Experts' versus Laymen's Predictions: *European Accounting Review*: Vol. 26, No. 4, 2016: 771–792.

Blaufus, Kay; Hundsdoerfer, Jochen; Jacob, Martin; Sünwoldt, Matthias (2016b): Does legality matter? The case of tax avoidance and evasion: *Journal of Economic Behavior & Organization*: Vol. 127, 2016: 182–206.

Blaufus, Kay; Mantei, Britta (2014): Taxes, risky investments, and the simultaneous choice of organizational form and financing: *Journal of Business Economics*: Vol. 84, No. 8, 2014: 1111–1141.

Blossfeld, Hans-Peter; Gosch, Katrin; Rohwer, Götz (2009): *Event History Analysis with Stata*: reprinted: Psychology Press, NY.

Bönke, Timm; Joachimsen, Beate; Schröder, Carsten (2015): *Fiscal federalism and tax enforcement*: Discussion Paper, School of Business & Economics: Economics, No. 2015/15: available at http://hdl.handle.net/10419/110236: retrieved 27 May 2017.

Bonner, Sarah E. (1994): A Model of the Effects of Audit Task Complexity: *Accounting, Organizations and Society*: Vol. 19, No. 3, 1994: 213–234.

Bonner, Sarah E.; Lewis, Barry L. (1990): Determinants of Auditor Expertise: *Journal of Accounting Research*: Vol. 28, *Studies on Judgment Issues in Accounting and Auditing*, 1990: 1–20.

Bonner, Sarah E.; Pennington, Nancy (1991): Cognitive Processes and Knowledge as Determinants of Auditor Expertise: *Journal of Accounting Literature*: Vol. 10, 1991: 1–50.

Border, Kim C.; Sobel, Joel (1987): Samurai Accountant: A Theory of Auditing and Plunder: *The Review of Economic Studies*: Vol. 54, No. 4, 1987: 525–540.

Breesch, Diane; Branson, Joël (2009): The Effects of Auditor Gender on Audit Quality: *The IUP Journal of Accounting Research & Audit Practices*: Vol. 8, No. 3-4, 2009: 78–107.

Brett, Jeanne: Thompson, Leigh (2016): Negotiation: *Organizational Behavior and Human Decision Processes*: Vol. 136, 2016: 68–79.

Bright, Jr., Joseph C.; Kadane, Joseph B.; Nagin, Daniel S. (1988): Statistical Sampling in Tax Audits: *Law & Social Inquiry*: Vol. 13, No. 2, 1988: 305–333.

Brodt, Susan E.; Tuchinsky, Marla (2000): Working together but in opposition: An examination of the "good-cop/bad-cop" negotiating team tactic: *Organizational Behavior and Human Decision Processes*: Vol. 81, No. 2, 2000: 155–177.

Brown, Karen B. (2012): *A Comparative Look at Regulation of Corporate Tax Avoidance*: Springer.

Brown, Helen L.; Johnstone, Karla M. (2009): Resolving disputed financial reporting issues: Effects of auditor negotiation experience and engagement risk on negotiation process and outcome: *Auditing: A Journal of Practice & Theory*: Vol. 28, No. 2, 2009: 65–92.

Burnham, Kenneth P.; Anderson, David R. (2002): *Model Selection and Multimodel Inference, A Practical Information-Theoretic Approach*: 2nd edition: Springer, NY.

Burnham, Kenneth P.; Anderson, David R. (2004): Multimodel Inference: Understanding AIC and BIC in Model Selection: *Sociological Methods & Research*: Vol. 33, No. 2, 2004: 261–304.

Caramanis, Constantinos; Lennox, Clive (2008): Audit effort and earnings management: *Journal of Accounting and Economics*: Vol. 45, 2008: 116–138.

Carnevale, Peter J.; Isen, Alice M. (1986): The influence of positive affect and visual access on the discovery of integrative solutions in bilateral negotiation: *Organizational Behavior and Human Decision Processes*: Vol. 37, No. 1, 1986: 1–13.

Carnevale, Peter J.; Pruitt, Dean G. (1992): Negotiation and mediation: *Annual review of psychology*: Vol. 43, No. 1, 1992: 531–582.

Carney, Michael; Gedajlovic, Eric R.; Heugens, Pures P. M. A. R.; van Essen, Marc; van Oosterhout, J. (Hans) (2011): Business Group Affiliation, Performance, Context, and Strategy: A Meta-Analysis: *Academy of Management Journal*: Vol. 54, No. 3, 2011: 437–460.

Chan, Samuel; Chau, Gerald; Leung, Patrick (2013): Tax Audit and Investigation in China and Hong Kong: *International Tax Journal*: Vol. 39, 2013: 31–49.

Chan, K. Hung; Lo, Agnes W. Y.; Mo, Phyllis L. L. (2006): Managerial Autonomy and Tax Compliance: An Empirical Study on International Transfer Pricing: *The Journal of the American Taxation Association*: Vol. 28, No. 2, 2006: 1–22.

Chan, K. Hung; Mo, Phyllis L. L. (2000): Tax Holidays and Tax Noncompliance: An Empirical Study of Corporate Tax Audits in China’s Developing Economy: *The Accounting Review*: Vol. 75, No. 4, 2000: 469–484.

Chan, K. Hung; Mo, Phyllis L. L. (2002): The Impact of Firm Characteristics on Book-Tax-Conforming and Book-Tax-Difference Audit Adjustments: *Journal of the American Taxation Association*: Vol. 24, No. 2, 2002: 18–34.

Charness, Neil; Bosman, Elizabeth A. (1990): Expertise and Aging: Life in the Lab: in Hess, Thomas M. (ed.): *Aging and Cognition: Knowledge Organization and Utilization*: Elsevier Science Publisher: 343–386.

Chen, Shuping; Chen, Xia; Cheng, Qiang; Shevlin, Terry (2010): Are family firms more tax aggressive than non-family firms?: *Journal of Financial Economics*: Vol. 95, No. 1, 2010: 41–61.

Cho, Jennie; Wong, Jilnaught; Wong, Norman (2006): Book-Tax Differences and Inland Revenue Audit Adjustments in New Zealand: *Journal of Business Finance & Accounting*: Vol. 33, No. 9 & 10, 2006: 1650–1667.

Christen, Markus; Iyer, Ganesh; Soberman, David (2006): Job Satisfaction, Job Performance, and Effort: A Reexamination Using Agency Theory: *Journal of Marketing*: Vol. 70, No. 1, 2006: 137–150.

Chung, Janne; Monroe, Gary S. (2001): A Research Note on the Effects of Gender and Task Complexity on an Audit Judgment: *Behavioral Research In Accounting*: Vol. 13, 2001: 111–125.

Chyz, James A.; Ching Leung, Winnie Siu; Zhen Li, Oliver; Meng Rui, Oliver (2013): Labor unions and tax aggressiveness: *Journal of Financial Economics*: Vol. 108, No. 3, 2013: 675–698.

Cleves, Mario; Gould, William W.; Marchenko, Yulia V. (2016): *An Introduction to Survival Analysis Using Stata*: rev. 3rd edition: Stata Press College Station, TX.

Cloyd, C. Brayn (1997): Performance in Tax Research Tasks: The Joint Effects of Knowledge and Accountability: *The Accounting Review*: Vol. 72, No. 1, 1997: 111–131.

Cole, Rebel A.; Sokolyk, Tatyana (2015): How Do Firms Choose Legal Form of Organization? (December 1, 2015): available at SSRN: https://ssrn.com/abstract=1682263: retrieved 18 August 2017.

Cox, David R. (1972): Regression Models and Life-Tables (with Discussion): *Journal of the Royal Statistical Society, Series B (Methodological)*: Vol. 34, No. 2, 1972: 187–220.

Cox, David R.; Oakes, David (1984): *Analysis of Survival Data*: Chapman and Hall, London/NY.

Curhan, Jared R.; Elfenbein, Hillary A.; Eisenkraft, Noah (2010): The objective value of subjective value: A multi-round negotiation study: *Journal of Applied Social Psychology*: Vol. 40, No. 3, 2010: 690–709.

Curhan, Jared R.; Elfenbein, Hillary A.; Xu, Heng (2006): What Do People Value When They Negotiate? Mapping the Domain of Subjective Value in Negotiation. *Journal of Personality and Social Psychology*: Vol. 91, No. 3, 2006: 493–512.

DeAngelo, Linda E. (1981): Auditor Size and Audit Quality: *Journal of Accounting and Economics*: Vol. 3, 1991: 183–199.

DeBacker, Jason; Heim, Bradley T.; Tran, Anh (2015a): Importing corruption culture from overseas: Evidence from corporate tax evasion in the United States: *Journal of Financial Economics*: Vol. 117, No. 1, 2015: 122–138.

DeBacker, Jason; Heim, Bradley T.; Tran, Anh; Yuskavage, Alexander (2015b): Legal Enforcement and Corporate Behavior: An Analysis of Tax Aggressiveness after an Audit: *Journal of Law and Economics*: Vol. 58, 2015: 291–324.

De Dreu, Carsten K. W. (2003): Time pressure and closing of the mind in negotiation: *Organizational Behavior and Human Decision Processes*: Vol. 91, No. 2, 2003: 280–295.

De Dreu, Carsten K.W.; Carnevale, Peter J. D.; Emans, Ben J. M.; van de Vliert, Evert (1994): Effects of gain-loss frames in negotiation: Loss aversion, mismatching, and frame adoption: *Organizational Behavior and Human Decision Processes*: Vol. 60, No. 1, 1994: 90–107.

Deloitte (2010): *German Income Tax Audits Survey on the experiences of inbound investors*: available at http://www.deloitte-tax-news.de/steuern/unternehmensteuer/files/ german-income-tax-audits-en-201010.pdf.

Deloitte (2017): *Tax controversy solutions*: available at https://www2.deloitte.com/global/en/pages/legal/solutions/tax-controversy-solutions.html.

Desai, Mihir A.; Dharmapala, Dhammika (2006): Corporate tax avoidance and high-powered incentives: *Journal of Financial Economics*: Vol. 79, No.1, 2006: 145–179.

Desai, Mihir A.; Dyck, Alexander; Zingales, Luigi (2007): Theft and taxes: *Journal of Financial Economics*: Vol. 84, No. 3, 2007: 591–623.

De Simone, Lisa; Sansing, Richard C.; Seidman, Jeri K. (2013): When are enhanced relationship tax compliance programs mutually beneficial?: *The Accounting Review*: Vol. 88, No. 6, 2013: 1971-1991.

Devlin, Thomas F.; Weeks, Barbara J. (1986): Spline Functions for Logistic Regression Modeling: in *Proceedings of the Eleventh Annual SAS Users Group International Conference*: Cary, NC, 1986: SAS Institute, Inc.: 646–651.

Diekmann, Andreas; Mitter, Peter (1983): The „Sickle-Hypothesis“: A Time Dependent Poisson Model with Applications to Deviant Behavior and Occupational Mobility: *Journal of Mathematical Sociology*: Vol. 9, 1983: 85–101.

Diekmann, Andreas; Mitter, Peter (1984): A Comparison of the „Sickle Function“ with Alternative Stochastic Models of Divorce Rates: in Diekmann, Andreas; Mitter, Peter (eds.): *Stochastic Modelling of Social Processes*: Academic Press: 123–153.

Dubin, Jeffrey A. (2012): *The Causes and Consequences of Income Tax Noncompliance*: Springer.

Durrlemann, Sylvain; Simon, Richard (1989): Flexible Regression Models with Cubic Splines: *Statistics in Medicine*: Vol. 8, 1989: 551–561.

Edwards, Alexander; Schwab, Casey; Shevlin, Terry (2015): Financial constraints and cash tax savings: *The Accounting Review*: Vol. 91, No. 3, 2015: 859-881.

El Ghoul, Sadok; Guedhami, Omrane; Pittman, Jeffrey A. (2011): The role of IRS monitoring in equity pricing in public firms: *Contemporary Accounting Research*: Vol. 28, 2011: 643–674.

Engels, Dieter (2006): President of the German Federal Court of Audit (Bundesrechnungshof) as Federal Delegate in Matters of Administrative Efficiency: *Probleme beim Vollzug der Steuergesetze*: Kohlhammer, Germany.

Erard, Brian (1992): The Influence of Tax Audits on Reporting Behavior: in Slemrod, Joel (ed.): *Why People Pay Taxes*: University of Michigan, Ann Arbor: 95–114.

Erard, Brian (1993): Taxation with representation - An analysis of the role of tax practitioners in tax compliance: *Journal of Public Economics*: Vol. 52, 1993: 163–197.

Erard, Brian (1997): Self-selection with measurement errors: A microeconometric analysis of the decision to seek tax assistance and its implications for tax compliance: *Journal of Econometrics*: Vol. 81, No. 2, 1997: 319–356.

Erard, Brian; Feinstein, Jonathan S. (2010): Econometric models for multi-stage audit processes: an application to the IRS national research program: in Alm, J.; Mártinez-Vazquez, J.; Torgler, B. (eds.): *Developing Alternative Frameworks for Explaining Tax Compliance*: Routledge, New York.

Faccio, M., Lang, L.H. (2002): The ultimate ownership of Western European corporations: *Journal of Financial Economics*: Vol. 65, No. 3, 2002: 365–395.

Feinstein, Jonathan S. (1990): Detection Controlled Estimation: *The Journal of Law and Economics*: Vol. 33, Vol. 1, 1990: 233–276.

Feinstein, Jonathan S. (1991): An econometric analysis of income tax evasion and its detection: *The RAND Journal of Economics*: Vol. 22, No. 1, 1991: 14–35.

Feld, Lars P.; Frey, Bruno S. (2007): Tax Compliance as the Result of a Psychological Tax Contract: The Role of Incentives and Responsive Regulation: *Law & Policy*: Vol. 29, No. 1, 2007: 102–120.

Felix, Jr., William L.; Kinney, Jr., William R. (1982): Research in the Auditor's Opinion Formulation Process: State of the Art: *The Accounting Review*: Vol. 57, No. 2, 1982: 245–271.

Filley, Alan C. (1975): *Interpersonal conflict resolution*: Scott, Foresman.

Fisher, Sandra L.; Ford, Kevin J. (1998). Differential effects of learner effort and goal orientation on two learning outcomes: *Personnel Psychology*: Vol. 51: 397– 420.

Franzoni, Luigi A. (2008): Tax Compliance (July 30, 2008): in Bouckaert, Boudewijn; De Geest, Gerrit (eds.): *Encyclopedia of Law and Economics*: Edward Elgar: available at https://ssrn.com/abstract= 1271168: retrieved 27 May 2017.

Frederick, David M. (1991): Auditors’ Representation and Retrieval of Internal Control Knowledge: *The Accounting Review*: Vol. 66, No. 2, 1991: 240–258.

Frederick, David M.; Libby, Robert (1986): Expertise and Auditors’ Judgments of Conjunctive Events: *Journal of Accounting Research*: Vol. 24, No. 2, 1986: 270–290.

Gibbins, Michael; McCracken, Susan A.; Salterio, Steve E. (2007): The chief financial officer's perspective on auditor-client negotiations. *Contemporary Accounting Research*: Vol. 24, No. 2, 2007: 387–422.

Gibbins, Michael; McCracken, Susan A.; & Salterio, Steve E. (2010): The auditor’s strategy selection for negotiation with management: Flexibility of initial accounting position and nature of the relationship: *Accounting, Organizations and Society*: Vol. 35, No. 6, 2010: 579–595.

Gibbins, Michael; Qu, Sandy Q. (2005): Eliciting Experts’ Context Knowledge with Theory-Based Experiential Questionnaires: *Behavioral Research Accounting*: Vol. 17, 2005: 71–88.

Gibbins, Michael; Salterio, Steve E.; Webb, Alan (2001): Evidence about auditor–client management negotiation concerning client’s financial reporting: *Journal of Accounting Research*: Vol. 39, No. 3, 2001: 535-563.

Gibbins, Michael; Trotman, Ken T. (2002): Audit Review: Managers' Interpersonal Expectations and Conduct of the Review: *Contemporary Accounting Research*: Vol. 19, No. 3, 2002: 411–444.

Glover, Steven M. (1997): The Influence of Time Pressure and Accountability on Auditors’ Processing of Nondiagnostic Information: *Journal of Accounting Research*: Vol. 35, No. 2, 1997: 213–226.

Gómez-Mejía, Luis R.; Haynes, Katalin T.; Núñez-Nickel, Manuel; Jacobson, Kathyrn J. L.; Moyano-Fuentes, José (2007): Socioemotional wealth and business risks in family-controlled firms: Evidence from Spanish olive oil mills: *Administrative Science Quarterly*: Vol. 52, No. 1, 2007: 106–137.

Goode, Richard (1981): Some Economic Aspects of Tax Administration: *Staff Papers (International Monetary Fund)*: Vol. 28, No. 2, 1981: 249–274.

Graham, John R.; Tucker, Alan L. (2006): Tax shelters and corporate debt policy: *Journal of Financial Economics*: Vol. 81, No. 3, 2006: 563–594.

Graetz, Michael J.; Reinganum, Jennifer F.; Wilde, Louis L. (1986): The Tax Compliance Game: Toward an Interactive Theory of Law Enforcement: *Journal of Law, Economics, & Organization*: Vol. 2, No. 1, 1986: 1–32.

Gram, Jørgen P. (1883): Ueber die Entwickelung reeller Functionen in Reihen mittelst der Methode der kleinsten Quadrate: *Journal für die Reine und Angewandte Mathematik*: No. 94, 1883: 41–73.

Green, William H. (2012): *Econometric Analysis*: International Edition: 7th edition: Pearson.

Guedhami, Omrane; Pittman, Jeffrey A. (2008): The importance of IRS monitoring to debt pricing in private firms: *Journal of Financial Economics*: Vol. 90, Vol. 1, 2008: 38–58.

Gul, F. A. (1983): A Note on the Relationship between Age, Experience, Cognitive Styles and Accountants' Decision Confidence: *Accounting and Business Research*: Vol. 14, No. 53, 1983: 85–88.

Gupta, Sanjay; Mills, Lillian F. (2017): Corporate multistate tax planning: benefits of multiple jurisdictions: *Journal of Accounting and Economics*: Vol. 33, No. 1, 2002: 117–139.

Hair, Jr., Joseph F.; Black, William C.; Babin, Barry J.; Anderson, Rolph E. (2013). *Multivariate Data Analysis*: 7th edition: Pearson New International Edition.

Hamerle**,** Alfred (1986): Regression analysis for discrete event history or failure time data: *Statistical Papers*: Vol. 27, 1986: 207–225.

Hanlon, Michelle; Heitzman, Shane (2010): A review of tax research: *Journal of Accounting and Economics*: Vol. 50, No. 2–3, 2010: 127–178.

Hanlon, Michelle; Hoopes, Jeffrey L.; Shroff, Nemit (2014): The Effect of Tax Authority Monitoring and Enforcement on Financial Reporting Quality: *The Journal of the American Taxation Association*: Vol. 36, No. 2, 2014: 137–170.

Hanlon, Michelle; Maydew, Edward L.; Shevlin, Terry (2008): An unintended consequence of book-tax conformity: a loss of earnings informativeness: *Journal of Accounting and Economics*: Vol. 46, 2008: 294–311.

Hanlon, Michelle; Mills, Lillian; Slemrod, Joel (2005): An Empirical Examination of Corporate Tax Noncompliance: *Ross School of Business Working Paper*: No. 1025: available at http://dx.doi.org/10.2139/ssrn.891226: retrieved 14 July 2017.

Hanlon, Michelle; Mills, Lillian F.; Slemrod, Joel (2007): An empirical examination of corporate tax non-compliance: in Auerbach, A.; Hines, Jr., J. R.; Slemrod; J. (eds.): *Taxing Corporate Income in the 21st Century*: Cambridge University Press, Cambridge: 171–210.

Hanlon, Michelle; Slemrod, Joel (2009): What does tax aggressiveness signal? Evidence from stock price reactions to news about tax shelter involvement: *Journal of Public Economics*: Vol. 93, No. 1–2, 2009: 126–141.

Hardies, Kris; Breesch, Diane; Branson, Joël (2011): Male and female auditors' overconfidence: *Managerial Auditing Journal*: Vol. 27, No. 1, 2011: 105–118.

Harhoff, Dietmar; Stahl, Konrad; Woywode, Michael (1998): Legal Form, Growth and Exit of West German Firms—Empirical Results for Manufacturing, Construction, Trade and Service Industries: The Journal of Industrial Economics: Vol. 46, No. 4, 1998: 453–488.

Harrell, Jr., Frank E. (2015): *Regression Modeling Strategies, With Applications to Linear Models, Logistic and Ordinal Regression, and Survival Analysis*: 2nd edition: Springer.

Hasseldine, John; Hite, Peggy; James, Simon; Toumi, Marika (2007): Persuasive Communications: Tax Compliance Enforcement Strategies for Sole Proprietors: *Contemporary Accounting Research*: Vol. 24, No. 1, 2007: 171–194.

Hatfield, Richard C.; Agoglia, Christopher P.; Sanchez, Maria H. (2008): Client Characteristics and the Negotiation Tactics of Auditors: Implications for Financial Reporting: *Journal of Accounting Research*: Vol. 46, No. 5, 2008: 1183–1207.

Hauptman, Lidija; Horvat, Mirjana; Korez-Vide, Romana (2014): Improving Tax Administration's Services as a Factor of Tax Compliance: The Case of Tax Audit: *Journal of Local Self-Government*: Vol. 12, No. 3, 2014: 481–501.

Herndon II, James E.; Harrell, Jr., Frank E. (1990): The restricted cubic spline hazard model: *Communications in Statistics - Theory and Methods*: Vol. 19, No. 2, 1990: 639–663.

Herndon II, James E.; Harrell, Jr., Frank E. (1995): The restricted cubic spline as baseline hazard in the proportional hazards model with step function time-dependent covariables: *Statistics in Medicine*: Vol. 14, 1995: 2119–2129.

Herzig, Norbert (2008): Tax and the Separation of Ownership and Control – Comment on the paper by Steven Bank and Brian R. Cheffins: in Schön, Wolfgang (ed.): *Tax and Corporate Governance*: 3rd edition: Springer: 171–176.

Hilty, John A., & Carnevale, Peter J. (1993): Black-hat/white-hat strategy in bilateral negotiation: *Organizational Behavior and Human Decision Processes*: Vol. 55, No. 3, 1993: 444–469.

Hite, Peggy A.; Hasseldine, John (2003): Tax Practitioner Credentials and the Incidence of IRS Audit Adjustments: *Accounting Horizons*: Vol. 17, No. 1, 2003: 1–14.

Ho, Daniel; Lau, Peter (1999): Tax Audits in Hong Kong: *The International Tax Journal*: Vol. 25, 1999: 61–71.

Holmström, Bengt (1999): Managerial Incentive Problems: A Dynamic Perspective: *The Review of Economic Studies*: Vol. 66, No. 1, 1999: 169-182.

Hoopes, Jeffrey L.; Mescall, Devan; Pittman, Jeffrey A. (2012): Do IRS Audits Deter Corporate Tax Avoidance?: *The Accounting Review*: Vol. 87, No. 5, 2012: 1603–1639.

Hubert, Peter J. (1967): The behavior of maximum likelihood estimates under nonstandard conditions: *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability*: 221–223.

Hutchinson, Douglas (1988): Event history and survival analysis in the social sciences, I. Background and introduction: *Quality & Quantity*: Vol. 22, 1988: 203–219.

Internal Revenue Service (2012): *IRS Releases New Tax Gap Estimates; Compliance Rates Remain Statistically Unchanged From Previous Study*: IR-2012-4, Jan. 6, 2012.

Joe, Jennifer; Wright, Arnold; Wright, Sally (2011): The Impact of Client and Misstatement Characteristics on the Disposition of Proposed Audit Adjustments: *Auditing: A Journal of Practice & Theory*: Vol. 30, No. 2, 2011: 103–124.

Johnson, Eric N. (1995): Effects of information order, group assistance, and experience on auditors' sequential belief revision: *Journal of Economic Psychology*: Vol. 16, 1995: 137–160.

Jones, Larry (2013): Negotiating with the IRS at the Audit Level: *Journal of Tax Practice & Procedure*: Vol. 15, No. 2, 2013-2014: 5–8.

Kahn, Charles M.; Silva, Emilson C. D.; Ziliak, James P. (2001): Performance-based wages in tax collection: The Brazilian tax collection reform and its effects: *The Economic Journal*: Vol. 111, No. 468, 2001: 188–205.

Kalbfleisch, John D.; Prentice, Ross L. (2002): *The Statistical Analysis of Failure Time Data*: 2nd edition: John Wiley & Sons, Inc., Hoboken, New Jersey.

Kahneman, Daniel; Tversky, Amos (1979): Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society*: Vol. 47, No. 2, 1979: 263–292.

Kersten, Gregory E. (2001): Modeling distributive and integrative negotiations. Review and revised characterization: *Group Decision and Negotiation*: Vol. 10, No. 6, 2001: 493–514.

Kim, Jeong-Bon; Li, Yinghua; Zhang, Liandong (2011): Corporate tax avoidance and stock price crash risk: Firm-level analysis: *Journal of Financial Economics*: Vol. 100, No. 3, 2011: 639–662.

Kirchler, Erich; Hoelzl, Erik; Wahl, Ingrid (2008): Enforced versus voluntary tax compliance: The ''slippery slope'' framework: *Journal of Economic Psychology*: Vol. 29, 2008: 210–225.

Kirchler, Erich; Kogler, Christoph; Muehlbacher, Stephan (2014): Cooperative Tax Compliance: From Deterrence to Deference: *Current Directions in Psychological Science*: Vol. 23, No. 2, 2014: 87–92.

Klassen, Kenneth J. (2016): Auditing the Auditors: Tax Auditors' Assessments and Incentives: available at https://ssrn.com/abstract=2765134.

Klassen, Kenneth J.; Lisowsky, Petra; Mescall, Devan (2017): Transfer Pricing: Strategies, Practices, and Tax Minimization: *Contemporary Accounting Research*: Vol. 34, No. 1, 2017: 455–493.

Klepper, Steven; Mazur, Mark; Nagin, Daniel (1991): Expert Intermediaries and Legal Compliance: The Case of Tax Preparers: *The Journal of Law & Economics*: Vol. 34, No. 1, 1991: 205–229.

Kleven, Henrik J.; Knudsen, Martin B.; Kreiner, Claus T.; Pedersen, Søren; Saez, Emmanuel (2011): Unwilling or Unable to Cheat? Evidence from a Tax Audit Experiment in Denmark: *Econometrica*: Vol. 79, No. 3, 2011: 651–692.

Krause, Kate (2000): Tax Complexity: Problem or Opportunity?: *Public Finance Review*: Vol. 28, No. 5, 2000: 395–414.

Kubeck, Jean E.; Delp, Norma D.; Haslett, Tammy K.; McDaniel, Michael A. (1996): Does Job-Related Training Performance Decline With Age?: *Psychology and Aging*: Vol. 11, No. 1, 1996: 92–107.

Lai, Ming Ling; Yaacob, Zalilawati; Omar, Normah; Aziz, Norashikin Abdul; Yap, Bee Wah (2013): Examining Corporate Tax Evaders: Evidence from the Finalized Audit Cases: *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*: Vol. 7, No. 6, 2013: 1378–1382.

Lambert, Paul C.; Royston, Patrick (2009): Further development of flexible parametric models for survival analysis: *The Stata Journal*: Vol. 9, No. 2, 2009: 265–290.

Lambert, Tamara A.; Jones, Keith L.; Brazel, Joseph F.; Showalter, D. Scott (2016): Audit Time Pressure and Earnings Quality: An Examination of Accelerated Filings (October 14, 2016): *Accounting, Organizations and Society*: in press: https://doi.org/10.1016/j.aos.2017.03.003: available at SSRN: https://ssrn.com/abstract=963402: retrieved 27 May 2017.

Law, Kelvin K. F.; Mills, Lillian F. (2015): Taxes and financial constraints: Evidence from linguistic cues: *Journal of Accounting Research*: Vol. 53, No. 4, 2015: 777–819.

Lawler, Edward J.; MacMurray, Bruce K. (1980): Bargaining Toughness: A Qualification of Level-of-Aspiration and Reciprocity Hypotheses: *Journal of Applied Social Psychology*: Vol. 10, No. 5, 1980: 416–430.

Lennox, Clive; Lisowsky, Petro; Pittman, Jeffrey (2013): Tax Aggressiveness and Accounting Fraud: *Journal of Accounting Research*: Vol. 51 No. 4, 2013: 739–778.

Leon, Steven J.; Björck, Åke; Gander, Walter (2013): Gram–Schmidt orthogonalization: 100 years and more: *Numerical Linear Algebra with Applications*: Vol. 20, 2013: 492–532.

Leventis, Stergios; Caramanis, Constantinos (2005): Determinants of audit time as a proxy of audit quality: *Managerial Auditing Journal*: Vol. 20, No. 5, 2005: 460–478.

Li, Si (2013): Corporate Financial Fraud: An Application of Detection Controlled Estimation: available at https://ssrn.com/abstract=1698038.

Libby, Robert; Frederick, David M. (1990): Experience and the Ability to Explain Audit Findings: *Journal of Accounting Research*: Vol. 28, No. 2, 1990: 348–367.

Libby, Robert; Luft, Joan (1993): Determinants of Judgement Performance in Accounting Settings: Ability, Knowledge, Motivation, and Environment: *Accounting, Organization and Society*: Vol. 18, No. 5, 1993: 425–450.

Lim, Youngdeok (2011): Tax avoidance, cost of debt and shareholder activism: Evidence from Korea: *Journal of Banking & Finance*: Vol. 35, No. 2, 2011: 456–470.

Macho-Stadler, Inés; Pérez-Castrillo, J. David (2002): Auditing with Signals: *Economica*: Vol. 69, No. 273, 2002: 1–20.

Maddala, G. S. (1999). *Limited-dependent and qualitative variables in econometrics*: 3rd edition, Cambridge University Press.

McCracken, Susan A.; Salterio, Steve E.; Gibbins, Michael (2008). Auditor–client management relationships and roles in negotiating financial reporting: *Accounting, Organizations and Society*: Vol. 33, No. 4, 2008: 362–383.

McDaniel, Linda S. (1990): The Effects of Time Pressure and Audit Program Structure on Audit Performance: *Journal of Accounting Research*: Vol. 28, No. 2, 1990: 267–285.

Meyers-Levy, Joan (1989): Gender Differences in Information Processing: A Selectivity Interpretation: in Cafferata, Patricia; Tybout, Alice M. (eds.): *Cognitive and Affective Responses to Advertising*: Lexington Books: 219–260.

Mikesell, John L.; Birskyte, Luicija (2007): The Tax Compliance Puzzle: Evidence from Theory and Practice: *International Journal of Public Administration*: Vol. 30, 2007: 1045–1081.

Mills, Lillian F. (1996): Corporate Tax Compliance and Financial Reporting: *National Tax Journal*: Vol. 49, No. 3, 1996: 421–435.

Mills, Lillian F. (1998): Book-Tax Differences and Internal Revenue Service Adjustments: *Journal of Accounting Research*: Vol. 36, No. 2, 1998: 343–356.

Mills, Lillian F.; Newberry, Kaye J. (2001): The Influence of Tax and Nontax Costs on Book-Tax Reporting Differences: Public and Private Firms: *Journal of the American Taxation Association*: Vol. 23, No. 1, 2001: 1–19.

Mironov, Maxim (2013): Taxes, Theft, and Firm Performance: *The Journal of Finance*: Vol. 68, No. 4, 2013: 1441–1472.

Modlin, Steve (2012): County government finance practice: what independent auditors are finding and what makes local government susceptible: *Journal of Public Budgeting, Accounting & Financial Management*: Vol. 24, No. 4, 2012: 558–578.

Mössbauer, Heinz (2005): *Steuerliche Außenprüfung*: 2nd edition: Oldenburg, München.

Moreno, Jacob L. (1953): *Who shall survive?*: *Foundations of Sociometry, Group Psychotherapy and Sociodrama*: Beacon House Inc. Beacon, N.Y.

Mosterd, Igor; Rutte, Cristel G. (2000): Effects of time pressure and accountability to constituents on negotiation: *International Journal of Conflict Management*: Vol. 11, No. 3, 2000: 227–247.

Muehlbacher, Stephan; Kirchler, Erich; Schwarzenberger, Herbert (2011): Voluntary versus enforced tax compliance: empirical evidence for the “slippery slope” framework: *European Journal of Law and Economics*: Vol. 32, No. 1, 2011: 89–97.

Muehlbacher, Stephan; Mittone, Luigi; Kastlunger, Barbara; Kirchler, Erich (2012): Uncertainty resolution in tax experiments: Why waiting for an audit increases compliance: *The Journal of Socio-Economics*: Vol. 41, 2012: 289–291.

Murphy, Kevin R. (1989): Is the Relationship Between Cognitive Ability and Job Performance Stable Over Time?: *Human Performance*: Vol. 2, No. 3, 1989: 183–200.

Murray, Matthew N. (1995): Sales Tax Compliance and Audit Selection: *National Tax Journal*: Vol. 48, No. 4, 1995: 515–530.

Neale, Margaret A.; Bazerman, Max H. (1985): The effects of framing and negotiator overconfidence on bargaining behaviors and outcomes: *Academy of Management Journal*: Vol. 28, No. 1, 1985: 34–49.

O'Donnell, Ed; Johnson, Eric N. (2001): The Effects of Auditor Gender and Task Complexity on Information Processing Efficiency: *International Journal of Auditing*: Vol. 5, 2001: 91–105.

OECD (2006): Organisation for Economic Co-Operation and Development: *Strengthening Tax Audit Capabilities: Auditor Workforce Management—Survey Findings and Observations*.

OECD (2015): Organisation for Economic Co-Operation and Development: *Tax Administration 2015: Comparative Information on OECD and Other Advanced and Emerging Economies*: OECD Publishing, Paris: available at http://dx.doi.org/10.1787/tax_admin-2015-en: retrieved 22 August 2017.

Osgood, Charles E. (1962). *An alternative to war or surrender* (Vol. 19): Urbana: University of Illinois Press.

Perreault, Stephan; Kida, Thomas (2011): The relative effectiveness of persuasion tactics in auditor–client negotiations: *Accounting, Organizations and Society*: Vol. 36, No. 8, 2011: 534–547.

Perreault, Stephan; Kida, Thomas; Piercey, M. David (2017): The Relative Effectiveness of Simultaneous versus Sequential Negotiation Strategies in Auditor-Client Negotiations: *Contemporary Accounting Research*: Vol. 34, No. 2, 2017: 1048–1070.

Pickhardt, Michael; Prinz, Aloys (2014): Behavioral dynamics of tax evasion – A survey: Journal of Economic Psychology: Vol. 40, 2014: 1–19.

Prentice, Ross L.; Hsu, Li (1997): Estimating Functions in Failure Time Data Analysis: *Lecture Notes-Monograph Series, Selected Proceedings of the Symposium on Estimating Functions*: Vol. 32, 1997: 293–303.

Prentice, Ross L.; Kalbfleisch, John D.; Peterson, Jr., Arthur V.; Flournoy, Nancy; Farewell, Vernon T.; Breslow, Norman E. (1978): The Analysis of Failure Times in the Presence of Competing Risks: *Biometrics*: Vol. 34, No. 4, 1978: 541–554.

PricewaterhouseCoopers (2004): *Tax risk management*: available at http://www.pwc.eo.za /en/assets/pdf/pwc-tax-risk-management-guide.pdf.

PricewaterhouseCoopers (2017): *Tax audit support*: available at http://www.pwc.de /en/steuern/beratung-bei-der-betriebsprufung.html.

Pruitt, Dean G. (1981): *Negotiation behavior*: Academic Press.

Pruitt, Dean G. (1983): Strategic choice in negotiation: *American Behavioral Scientist*: Vol. 27, No. 2, 1983: 167–194.

Pruitt, Dean G.; Drews, Julie Latané (1969): The Effect of Time Pressure, Time Elapsed, and the Opponent's Concession Rate on Behavior in Negotiation: *Journal of Experimental Social Psychology*: Vol. 5, No. 1, 1969: 43–60.

PStat (2011): Statistical Office Staff at Senate Administration for Finance Berlin (Statistikstelle Personal bei der Senatsverwaltung für Finanzen Berlin): *Beschäftigte im unmittelbaren Landesdienst Berlin im März 2011*: available at https://www.berlin.de/sen/ finanzen/personal/personalstatistik/personalbestand_2011.pdf: retrieved 21 April 2017.

Quick, Reiner; Wolz, Matthias (1999): Concentration on the German Audit Market—An Empirical Analysis of the Concentration on the German Market for Stock Corporation Audits: *International Journal of Auditing*: Vol. 3, 1999: 175–189.

Rabe-Hesketh, Sophia; Skrondal, Anders (2012): *Multilevel and Longitudinal Modeling Using Stata, Volume I: Continuous Responses* and *Volume II: Categorical Responses, Counts, and Survival*: 3rd edition: Stata Press College Station, TX.

Ränsch, Ulrich (2002): Tax Audits in Germany: How to Minimize German Tax Exposure by Properly Preparing for and Managing Tax Controversies: *Taxation of Global Transactions*: Vol. 2, 2002/2003: 55–64, 83–84.

Ratto, Marisa; Thomas, Richard; Ulph, David (2013): The Indirect Effects of Auditing Taxpayers: *Public Finance Review*: Vol. 41, No. 3, 2013: 317–333.

Ravikumar, B.; Zhang, Yuzhe (2012): Optimal auditing and insurance in a dynamic model of tax compliance: *Theoretical Economics*: Vol. 7, 2012: 241–282.

Reckase, Mark D. (2009): *Multidimensional Item Response Theory*: Vol. 150: New York, NY: Springer.

Reid, Nancy (1994): A Conversation with Sir David Cox: *Statistical Science*: Vol. 9, No. 3, 1994: 439–455.

Reinganum, Jennifer F.; Wilde, Louis L. (1991): Equilibrium Enforcement and Compliance in the Presence of Tax Practitioners: *Journal of Law, Economics, & Organization*: Vol. 7, No. 1, 1991: 163–181.

Rhines, Rosemarie A.; Bennett, Scott M.; Bacht, Silke (2003): Tax Audits in Germany: a Primer and a Plan: *The International Lawyer*: Vol. 37, No. 4, 2003: 997–1008.

Rice, Eric M. (1992): The Corporate Tax Gap: Evidence on Tax Compliance by Small Corporations: in Slemrod, Joel (ed.): *Why People Pay Taxes*: University of Michigan, Ann Arbor: 125–161.

Richard, Chrystelle (2006): Why an auditor can't be competent and independent: A french case study: *European Accounting Review*: Vol. 15, No. 2, 2006: 153–179.

Roberts, Michael L. (1995): The Influence of Contextual Factors on IRS Agents' Assessments of Taxpayer Negligence: *Journal of the American Taxation Association*: Vol. 17, Supplement, 1995: 62–77.

Roginske, Charles J.; Collins, James T. (1982): Controlling the State Income Tax Audit: *Journal of State Taxation*: Vol. 1, No. 2, 1982/1983: 141–154.

Rosen, Ned A.; Williams, Lawrence K.; Foltman, F. F. (1965): Motivational constraints in an industrial retraining program: *Personnel Psychology*: Vol. 18, No. 1, 1965: 65–79.

Rosenthal, Robert; DePaulo, Bella M. (1979): Sex Differences in Accommodation in Nonverbal Communication: in Rosenthal, Robert (ed.): *Skill in Nonverbal Communication: Individual Differences*: Oelgeschlager, Gunn & Hain: 68–103.

Royston, Patrick; Lambert, Paul C. (2011): *Flexible Parametric Survival Analysis Using Stata, Beyond the Cox Model*: Stata Press College Station, TX.

Royston, Patrick; Parmar, Mahesh K. B. (2002): Flexible parametric proportional-hazards and proportional-odds models for censored survival data, with application to prognostic modelling and estimation of treatment effects: *Statistics in Medicine*: Vol. 21, 2002: 2175–2197.

Royston, Patrick; Sauerbrei, Willi (2008): *Multivariable Model-Building, A pragmatic approach to regression analysis based on fractional polynomials for modelling continuous variables*: John Wiley & Sons Ltd, England.

Rubin, Jeffrey Z.; Sander, Frank E. A. (1988): When should we use agents? Direct vs. representative negotiation: *Negotiation Journal*: Vol. 4, No. 4, 1988: 395–401.

Ruble, Thomas L.; Thomas, Kenneth W. (1976): Support for a two-dimensional model of conflict behavior. *Organizational Behavior and Human Performance*: Vol. 16, No. 1, 1976: 143–155.

Salthouse, Timothy A. (1990): Cognitive Competence and Expertise in Aging: in Birren, James E.; Schaie, K. Warner (eds.): *Handbook of The Psychology of Aging*: 3rd edition: Academic Press, San Diego: 310–319.

Sanchez, Maria H.; Agoglia, Christopher P.; Hatfield, Richard C. (2007): The Effect of Auditors' Use of a Reciprocity-Based Strategy on Auditor-Client Negotiations: *The Accounting Review*: Vol. 82, No. 1, 2007: 241–263.

Santoro, Alessandro; Fiorio, Carlo V. (2011): Taxpayer Behavior When Audit Rules Are Known: Evidence from Italy: *Public Finance Review*: Vol. 39, No. 1, 2011: 103–123.

Schmidt, Erhard (1907): Zur Theorie der linearen und nichtlinearen Integralgleichungen, I. Teil: Entwicklung willkürlicher Funktionen nach Systemen vorgeschriebener: *Mathematische Annalen*: Vol. 63, No. 4, 1907: 433–476.

Schwarz, Gideon (1978): Estimating the Dimension of a Model: *The Annals of Statistic*: Vol. 6, No. 2, 1978: 461–464.

Scotchmer, Suzanne (1987): Audit Classes and Tax Enforcement Policy: *The American Economic Review*: Vol. 77, No. 2, Papers and Proceedings of the Ninety-Ninth Annual Meeting of the American Economic Association, 1987: 229–233.

Scotchmer, Suzanne (1989a): Who Profits from Taxpayer Confusion?: *Economics Letters*: Vol. 29, 1989: 49–55.

Scotchmer, Suzanne (1989b): The Effect of Tax Advisor on Tax Compliance: in Roth, Jeffrey A; Scholz, John T. (eds.): *Taxpayer Compliance Volume 2: Social Science Perspectives*: University of Philadelphia Press: 182–199.

Scotchmer, Suzanne; Slemrod, Joel (1989): Randomness in Tax Enforcement: *Journal of Public Economics*: Vol. 38, 1989: 17–32.

Senate Report (2013): Senate Report of Administration for Finance Berlin for the committee of inquiry: available at https://www.parlament-berlin.de/ados/17/UAPHPW/vorgang/uph17-0102-v.pdf: retrieved 3 June 2017.

Siebels, Jan-Folke; Knyphausen-Aufseß, Dodo zu (2012): A Review of Theory in Family Business Research: The Implications for Corporate Governance: *International Journal of Management Reviews*: Vol. 14, No. 3, 2012: 280–304.

Siegel, S.; Fouraker, L. E. (1960): *Bargaining and group decision making: Experiments in bilateral monopoly*.

Simnett, Roger (1996): The Effect of Information Selection, Information Processing and Task Complexity on Predictive Accuracy of Auditors: *Accounting, Organizations and Society*: Vol. 21, No. 7/8, 1996: 699–719.

Sinaceur, Marwan; Neale, Margaret A. (2005): Not all threats are created equal: How implicitness and timing affect the effectiveness of threats in negotiations: *Group Decision and Negotiation*: Vol. 14, No. 1, 2005: 63–85.

Sinaceur, Marwan; Van Kleef, Gerben A.; Neale, Margaret A.; Adam, Hajo; Haag, Christophe (2011): Hot or cold: Is communicating anger or threats more effective in negotiation?: *Journal of Applied Psychology*: Vol. 96, No. 5, 2011: 1018.

Sinha, Praveen (2007): An Examination of Tax Audit Productivity: *Journal of State Taxation*: Vol. 25, No. 2, 2006/2007: 29–36.

Sinha, Praveen (2010): An econometric analysis of skewed productivity outcomes: *Empirical Economics*: Vol. 38, No. 2, 2010: 347–360.

Slemrod, Joel (2004): The Economics of Corporate Tax Selfishness: Ross School of Business Working Paper Series Working Paper, No. 918, September 2004: available at http://ssrn.com/abstract =898870: retrieved 17 June 2017.

Slemrod, Joel (2005): The Etiology of Tax Complexity: Evidence from U.S. State Income Tax System: *Public Finance Review*: Vol. 33, No. 3, 2005: 279–299.

Slemrod, Joel (2007): Cheating Ourselves: The Economics of Tax Evasion: *The Journal of Economic Perspectives*: Vol. 21, No. 1, 2007: 25–48.

Slemrod, Joel (2016): Tax Compliance and Enforcement: New Research and Its Policy Implications: Ross School of Business Working Paper Working Paper, No. 1302, January 2016: available at https://ssrn.com/abstract=2726077: retrieved 17 June 2017.

Slemrod, Joel; Blumenthal, Marsha; Christian, Charles (2001): Taxpayer response to an increased probability of audit: evidence from a controlled experiment in Minnesota: *Journal of Public Economics*: Vol. 79, 2001: 455–483.

Slemrod, Joel; Yitzhaki, Shlomo (2002): Tax Avoidance, Evasion, and Administration: in Auerbach, A. J.; Feldstein, M. (eds.): *Handbook of Public Economics*: *Volume 3*: Elsevier Science B.V.: 1423–1470.

Smith, Kent W. (1992): Reciprocity and Fairness: Positive Incentives for Tax Compliance: in Slemrod, Joel (ed.): *Why People Pay Taxes*: University of Michigan, Ann Arbor: 223–250.

Snow, Arthur; Warren, Jr., Ronald S. (2007): Audit Uncertainty, Bayesian Updating, and Tax Evasion: *Public Finance Review*: Vol. 35, No. 5, 2007: 555–571.

Spahn, Paul B.; Föttinger, Wolfgang (1997): Germany: in Ter-Minassian, Teresa (ed.): *Fiscal Federalism in Theory and Practice*: International Monetary Fund, Washington: 226–248.

Spicer, Michael W.; Hero, Rodney E. (1985): Tax Evasion and Heuristics: *Journal of Public Economics*: Vol. 26, 1985: 263–267.

Spicer, Michael W.; Thomas, J. Everett (1982): Audit Probabilities and the Tax Evasion Decision: An Experimental Approach: *Journal of Econometric Psychology*: Vol. 2, 1982: 241–245.

Srinivasan, T.N. (1973): Tax evasion: A model: *Journal of Public Economics*: Vol. 2, No. 4, 1973: 339–346.

Stöwhase, Sven; Traxler, Christian (2005): Tax Evasion and Auditing in a Federal Economy: *International Tax and Public Finance*: Vol. 12, 2005: 515–531.

Stone, Charles J. (1986): Comment of Hastie, T. and Tibshirani, R.: Generalized Additive Models: *Statistical Science*: Vol. 1, No. 3 1986: 312–314.

Stone, Charles J.; Koo, Cha-Yong (1985): Additive Splines in Statistics: in *Proceeding of the Statistical Computing Section / American Statistical Association*, 1985: 45–48.

Strangmeier, Reinhard (2000): *Die steuerliche Betriebsprüfung und die Unbestimmtheit des ökonomischen Erfolges*: Erich Schmidt, Bielefeld.

Strebulaev, Ilya A.; Yang, Baozhong (2013): The mystery of zero-leverage firms: *Journal of Financial Economics*: Vol. 109, No. 1, 2013: 1–23.

Streck, Michael (1993): *Die Aussenprüfung*: 2nd edition: Dr. Otto Schmidt, Köln.

Stuhlmacher, Alice F.; Champagne, Matthew V. (2000): The Impact of Time Pressure and Information on Negotiation Process and Decisions: *Group Decision and Negotiation*: Vol. 9, No. 6, 2000: 471–491.

Sundgren, Stefan; Svanström, Tobias (2014): Auditor-in-Charge Characteristics and Going-concern Reporting: *Contemporary Accounting Research*: Vol. 31, No. 2, 2014: 531–550.

Sugiura, Nariaki (1978): Further Analysts of the Data by Akaike's Information Criterion and the Finite Corrections: *Communications in Statistics - Theory and Methods*: Vol. 7, No. 1, 1978: 13–26.

Sweeney, Breda; Pierce, Bernard (2004): Management control in audit firms: A qualitative examination: *Accounting, Auditing & Accountability Journal*: Vol. 17, No. 5, 2004: 779–812.

Tan, Fangfang; Yim, Andrew (2012): Can strategic uncertainty help deter tax evasion? An experiment on auditing rules: *Journal of Economic Psychology*: Vol. 40, 2014: 161–174.

Tang, Tanya Y.H. (2014): Does Book-Tax Conformity Deter Opportunistic Book and Tax Reporting? An International Analysis: *European Accounting Review*: Vol. 24, No. 3, 2015: 441–469.

Taylor, Ronald N. (1975): Age and Experience as Determinants of Managerial Information Processing and Decision Making Performance: *Academy of Management Journal*: Vol. 18, No. 1, 1975: 76–81.

Tedds, Lindsay M. (2006): Tax Non-compliance and Corporate Governance: A Comparative Study (May 2006): available at http://economics.ca/2006/papers/0365.pdf: retrieved 15 July 2017.

Tedds, Lindsay M. (2010): Keeping it off the books: an empirical investigation of firms that engage in tax evasion: Applied Economics: Vol. 42, No.19, 2010: 2459–2473.

TGPG (2016): FISCALIS 2020 Tax Gap Project Group by the European Commission Directorate-General for Taxation and Customs Union: *The Concept of Tax Gaps: Report on VAT Gap Estimations* (March 2016): EU, Brussels, FPG/041: available at https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/common/publications/studies/tgpg_report_en.pdf: retrieved 27 August 2017.

Trotman, Ken T.; Wright, Arnold M.; Wright, Sally (2009): An examination of the effects of auditor rank on pre-negotiation judgments: *Auditing: A Journal of Practice & Theory*: Vol. 28, No. 1, 2009: 191–203.

Tutz, Gerhard; Schmid, Matthias (2016): *Modeling Discrete Time-to-Event Data*: Springer.

Ulbricht, Alexander (2008): The decentralization of tax administration in Germany: consequences: in Bosch, Núria; Durán, José M. (eds.): *Fiscal Federalism and Political Decentralization, Lessons from Spain, Germany and Canada*: Edward Elgar: 193–208.

Valliant, Richard; Dever, Jill A.; Kreuter, Frauke (2013): *Practical Tools for Designing and Weighting Survey Samples*: Springer.

Van der Hel, E. C. J. M. (2011). *Intra-community Tax Audit*. IBFD.

Van Kleef, Gerben A.; De Dreu, Carsten K.; Manstead, Antony S. R. (2004): The interpersonal effects of emotions in negotiations: a motivated information processing approach: *Journal of personality and social psychology*: Vol. 87, No. 4, 2004: 510–528.

Walters, Amy E.; Stuhlmacher, Alice F.; Meyer, Lia L. (1998): Gender and negotiator competitiveness: A meta-analysis: *Organizational Behavior and Human Decision Processes*: Vol. 76, No. 1, 1998: 1–29.

Walton, Richard E.; McKersie, Robert B. (1965): *A Behavioral Theory of Labor Negotiations: An Analysis of a Social Interaction System*: Cornell University Press.

Wang, Karl J.; Tuttle, Brad M. (2009): The impact of auditor rotation on auditor–client negotiation: *Accounting, Organizations and Society*: Vol. 34, No. 2, 2009: 222–243.

Watkins, Ann L.; Hillison, William; Morecroft, Susan E. (2004): Audit Quality: A Synthesis of Theory and Empirical Evidence: *Journal of Accounting Literature*: Vol. 23, 2004: 153–193.

Wei, Lee-Jen (1992): The accelerated failure time model: a useful alternative to the Cox regression model in survival analysis: *Statistics in Medicine*: Vol. 11, 1992: 1871–1879.

Weingart, Laurie R. (2006): Impact of Group Goals, Task Component Complexity, Effort, and Planning on Group Performance: in Levine, John M.; Moreland, Richard L. (eds.): *Small Groups: Key Reading*: Psychology Press, NY and Hove: 309–325.

Welch, Ronald B. (1954): Measuring the Optimum Size of a Field Audit Staff: *National Tax Journal*: Vol. 7, No. 3, 1954: 210–221.

Wertz, Kenneth L. (1979): Allocation by and Output of a Tax-Administering Agency: *National Tax Journal*: Vol. 32, No. 2, 1979: 143–156.

White, Halbert (1980): A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity: *Econometrica*: Vol. 48, No. 4, 1980: 817–838.

Wright, Arnold; Wright, Sally (1997): An Examination of Factors Affecting the Decision to Waive Audit Adjustments: *Journal of Accounting, Auditing & Finance*: Vol. 12, No. 1, 1997: 15–36.

Yamaguchi, Kazuo (1990): Logit and multinomial logit models for discrete-time event-history analysis: a causal analysis of interdependent discrete-state processes: *Quality & Quantity*: Vol. 24, 1990: 323–341.

Yeo, Gillian B.; Neal, Andrew (2004): A Multilevel Analysis of Effort, Practice, and Performance: Effects of Ability, Conscientiousness, and Goal Orientation: *Journal of Applied Psychology*: Vol. 89, No. 2, 2004: 231–247.

Yitzhaki, Shlomo (1994): Income Tax Evasion: A Theoretical Analysis: Journal of Public Economics: Vol. 3, No. 2, 1974: 201–202.

Zimmermann, Jerold L. (1983): Taxes and Firm Size: *Journal of Accounting and Economics*: Vol. 5, 1983: 119–149.

Appendix H

Table 72: Classification into Size Categories according to German Law

	attribute for assessment in €	Micro Firms	Small Firms	Medium Firms	Large Firms (L3)	Large Firms (L2)	Large Firms (L1)
		Size categories for individual business and corporate incomes (year 2010)					
Trading Firms	sales or	≤160,000	>160,000	>840,000	>6,900,000	≥10,000,000	≥39,000,000
	taxable income	≤34,000	>34,000	>53,000	>265,000	-	-
Manufacturing Firms	sales or	≤160,000	>160,000	>480,000	>4,000,000	≥10,000,000	≥39,000,000
	taxable income	≤34,000	>34,000	>53,000	>235,000	-	-
Self-Employed	sales or	≤160,000	>160,000	>790,000	>4,300,000	≥10,000,000	≥39,000,000
	taxable income	≤34,000	>34,000	>123,000	>540,000	-	-
Other	sales or	≤160,000	>160,000	>710,000	>5,300,000	≥10,000,000	≥39,000,000
	taxable income	≤34,000	>34,000	>59,000	>305,000	-	-
Banks and Credit Institutions	assets	≤10,000,000	>10,000,000	>33,000,000	-	>128,000,000	≥1,000,000,000
	taxable income	≤43,000	>43,000	>180,000	-	>530,000	-
Insurance Enterprises, Pension Funds	annual amount of insurance premium	≤1,700,000	>1,700,000	>4,600,000	-	>28,000,000	≥100,000,000
Benevolent Funds		-	all	-	-	-	-
Agriculture and Forest Enterprises	value of self-cultivation area or	≤44,000	>44,000	>100,000	>210,000	-	-
	taxable income	≤34,000	>34,000	>60,000	>116,000	-	-

Appendix I

Tax Auditor Survey – Questionnaire (Translated Extract, Original: German)

*Please think of your **last two** completed audit cases. Please answer the following questions.*

Case 1

Size group: ❑ Micro ❑ Small ❑ Medium ❑ L3 ❑ L2 ❑ L1 ❑ Other

Legal form: ❑ sole proprietorship ❑ civil law partnership ❑ general partnership ❑ limited partnership ❑ partnership limited by shares
❑ GmbH & Co. KG ❑ non-typical silent partnership ❑ stock corporation ❑ corporation ❑ cooperative
❑ association ❑ foundation ❑ partnership ❑ ____________

Listed company / part of a listed group of affiliated companies: ❑ yes ❑ no ❑ not specified

Family firm (majority shareholding of one family): ❑ yes ❑ no ❑ not specified

Controlling owner-manager: ❑ yes ❑ no ❑ not specified

Determination of taxable income: ❑ cash accounting ❑ financial balance sheet = tax balance sheet ❑ independent tax balance sheet ❑ § 60 II Income Tax Implementing Ordinance

Type of income: ❑ commercial business ❑ self-employment income ❑ agriculture and forestry ❑ non-business

Industry:

❑ construction ❑ banking and insurance ❑ accommodation and food services
❑ retail trade ❑ wholesale trade ❑ other services
❑ manufacturing ❑ information and communication ❑ transportation
❑ freelancer ❑ food industry and semi-luxury industry ❑ public utilities

Does the taxpayer belong to a group of affiliated companies?

❑ no ❑ yes, to a: ❑ national group ❑ multinational group
❑ as subsidiary company ❑ as controlling company ❑ as both

Represented in tax matters: ❑ yes ❑ no taxpayer has an own accounting department: ❑ yes ❑ no
and a separate tax department: ❑ yes ❑ no

Place of the field audit: ❑ in the company ❑ at the tax advisor's office ❑ in the tax office

Period of auditing: from ____________ to ____________

Follow-up audit: ❑ yes ❑ no Number of examinations by you: ❑ 1x ❑ 2x ❑ 3x ❑ __ x

Highest sales in the audit period (€):

❑ < 155k ❑ 155k-450k ❑ 450k-800k ❑ 800k-2M ❑ 2M-3.5M ❑ 3.5M-6.5M
❑ 6.5M-8M ❑ 8M-15M ❑ 15M-20M ❑ 20M-32M ❑ > 32M ❑ not specified

Highest taxable income in the audit period (€):

❑ loss ❑ 0 < 32k ❑ 32k-50k ❑ 50k-115k ❑ 115k-250k ❑ 250k-500k
❑ 500k-1M ❑ 1M-5M ❑ 5M-10M ❑ 10M-20M ❑ > 20M ❑ not specified

Was the participation of other revenue agents or their support needed? ❑ yes ❑ no

❑ specialist for foreign relations ❑ specialist for reorganization ❑ specialist for auditing software
❑ specialist for valuation ❑ building expert ❑ actuary

Which result could you achieve in the audit?

❑ without result ❑ additional tax assessment approx.: ____________ ❑ tax credit approx.: ____________
❑ reduction accumulated losses brought forward approx.: ____________ ❑ increase accumulated losses brought forward approx.: ____________

If specialized revenue agents took part in the auditing, which share is allotted to their audit?

❑ < 10% ❑ 10 < 25% ❑ 25 < 33% ❑ 33 < 50% ❑ 50 < 66% ❑ 66 < 75% ❑ 75 < 90% ❑ 100%

How high would you estimate the share of the audit adjustments that merely result in temporary income shifting? ca._____ %

If audit adjustments result in temporary income shifting, will these reverse within 5 years after the last audited year?

❑ yes ❑ no, but: ❑ within ___ years ❑ not at all

How many days for auditing and reporting were required? auditing:___ reporting:___

How long did the audit approximately last (from the preparation up to completion of the audit report)?

❑ < 1 month ❑ 2 to 3 month ❑ 4 to 6 month ❑ 7 to 9 month

❑ 10 month to 1 year ❑ 1 to 1.5 years ❑ 1.5 to 2 years ❑ > 2 years

How many weeks ago did you complete your tax audit report? _________ weeks ago.

Which were the key issues of the audit?

1. ______________________ 2. ________________________ 3. ________________________

4. ______________________ 5. ________________________ ❑ none

Which of them led to adjustments?

❑ no. 1 ❑ no. 2 ❑ no. 3 ❑ no. 4 ❑ no. 5 ❑ not one

If further adjustments were made, please indicate them:

6. ______________________ 7. ________________________ 8. ________________________

9. ______________________ 10. _______________________ 11. _______________________

Has tax evasion been suspected and if yes, in which case?

❑ no ❑ yes: ❑ no. 1 ❑ no. 2 ❑ no. 3 ❑ no. 4 ❑ no. 5

❑ no. 6 ❑ no. 7 ❑ no. 8 ❑ no. 9 ❑ no. 10 ❑ no. 11

Did a final audit conference take place? ❑ yes ❑ no

If yes, did the section head take part in it? ❑ yes ❑ no

How many participants were there altogether? tax office: ____ taxpayer: ____ tax advisor: ____

Did you come to an agreement on the adjustments? ❑ yes ❑ no

How did you agree on adjustments?

❑ I waived small adjustments in favor of one large adjustment
❑ No agreement on all adjustments.
❑ Agreement on all adjustments.
❑ I waived adjustments because the firm's "pain threshold" was reached.
❑ I waived uncertain adjustments to avoid the risk of litigation.
❑ I waived adjustments because the other side has convinced me.

How would you describe the atmosphere?

❑ friendly ❑ cooperative ❑ unfriendly ❑ objective ❑ emotional
❑ constructively ❑ entrenched ❑ reproachful ❑ non-factual ❑ ___________

Which statements describe the behavior of the taxpayer and the tax advisor? Please put a cross on yes or no!

		yes	no			yes	no
1. Appealed to the economic situation of the company	Taxp.:	❑	❑	2. Set deadlines, but did not adhere to them	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
3. Threatened with Tax court, disciplinary complaint, etc.	Taxp.:	❑	❑	4. Kept you waiting or disrupted meetings	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
5. Imposed time pressure	Taxp.:	❑	❑	6. Was authoritarian	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
7. Referred to an established system	Taxp.:	❑	❑	8. Was particularly friendly	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
9. Information was withholded/filtered	Taxp.:	❑	❑	10. Referred to actions of other auditors	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
11. Information was manipulated/extenuated	Taxp.:	❑	❑	12. Appeared self-confident	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
13. Permanently interrupted you	Taxp.:	❑	❑	14. Offered agreement on minor assessments	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
15. Said what you want to hear	Taxp.:	❑	❑	16. Offered agreement on major assessments	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑

Finally, you are asked to answer a few questions regarding yourself, personal valuation as well as training course A24a.					
Please indicate on each scale to what extent the following statements apply to you!					
	disagree				agree
I felt exposed to a strong statistical pressure during my auditing.	❑	❑	❑	❑	❑
There is a statistical pressure which, however, does not affect me since I regularly achieve my target.	❑	❑	❑	❑	❑
Due to the statistical pressure I consider the audit target to be achieved by reaching the de minimis level.	❑	❑	❑	❑	❑
Taxpayer aim to declare everything correctly.	❑	❑	❑	❑	❑
Nearly every taxpayer would cheat on their tax declaration if there was no control by the tax authority.	❑	❑	❑	❑	❑
Taxpayer without a tax department/tax advisor are overburdened by their tax obligations.	❑	❑	❑	❑	❑
Taxpayer seek to minimize their tax burden by all permitted means.	❑	❑	❑	❑	❑
Tax advice abates taxpayer´s material and formal deficiencies reducing the number and amount of adjustments.	❑	❑	❑	❑	❑
Tax advice accelerates audit procedures.	❑	❑	❑	❑	❑
Supporting the audit, the tax advisor promotes the opportunity to settle an agreement.	❑	❑	❑	❑	❑
Fact-finding measures provided by the tax advisor are hindered.	❑	❑	❑	❑	❑

You are:	❑ female		❑ male			
You work at a:	❑ tax office for individuals		❑ tax office for corporations			
Your salary level is:	___________					
Highest education qualification:	❑ University	❑ University of applied science	❑ university-entrance diploma	❑ General Certificate of Secondary Education	❑ Certificate of Secondary Education	❑ other
Age (in years):	❑ 20-30	❑ 30-40	❑ 40-50	❑ 50-60	❑ over 60	
revenue agent since (in years):	❑ < 5	❑ 5-10	❑ 10-15	❑ 15-20	❑ over 20	
Working in the tax authority (in years):	❑ < 5	❑ 5-10	❑ 10-15	❑ 15-20	❑ over 20	
You examine mainly:	❑ micro/small/medium companies	❑ large companies	❑ groups			
	❑ associations/nonprofit limited liability companies	❑ public-law institutions	❑ cooperatives			