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David versus Goliath: The Relation between Auditor Size and Audit Quality for U.K. Private Firms*

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Abstract We examine the relation between auditor size and audit quality for a sample of U.K. private firms. Private firms prioritize tax considerations over reducing information asymmetry in their financial reporting. We find that Big 4's private clients exhibit higher levels of discretionary accruals and lower precision of accrual estimates than non-Big 4's private clients. Although Big 4 auditors are less tolerant of income-increasing earnings management, they leave more room for downward earnings management and their private clients are able to engage in greater tax avoidance. These results are stronger for standalone firms than for business groups as the latter's greater demand for stakeholder communication motivates Big 4 auditors to increase audit quality. Collectively, our evidence suggests that Big 4 auditors adjust audit quality in a more competitive segment of the audit market where client firms generally perceive the benefit from tax minimization to outweigh the cost of reduced earnings informativeness.

Keywords: Big 4; Private firms; Audit quality; Tax planning

JEL Classifications: H26; M41; M42

1. Introduction

We examine the extent of audit quality differentiation in the U.K.'s private client market segment.[1] A large body of research has focused on the Big 4 versus non-Big 4 differences in audit

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[1]In our paper, we use financial reporting quality to proxy for audit quality. According to DeFond and Zhang (2014), financial reporting quality measures are conceptually well suited for measuring audit quality, where higher audit quality

quality for public firms. Most studies conclude that Big 4 auditors provide higher-quality audits than non-Big 4 auditors (Becker et al., 1998; Francis et al., 1999; Francis & Wang, 2008; Jiang et al., 2018; Khurana & Raman, 2004), in line with DeAngelo (1981)'s argument that auditors' incentive and ability to deliver high audit quality increase with their size. However, some studies develop analytical models or present empirical evidence that question this conclusion (Bar-Yosef & Sarath, 2005; Bauwhede & Willekens, 2004; Beyer & Sridhar, 2006; Lawrence et al., 2011; van Raak et al., 2020). Our study is motivated by the continuing interest in the literature on differences between Big 4 and non-Big 4 audit quality and, more importantly, the limited research on the audit of private firms (Vanstraelen & Schelleman, 2017).

Private firms constitute the backbone of the world economy. They represent over 99% of all firms and generate more than 50% of the private sector GDP in the U.S. (Minnis, 2011). The European Commission reports that 99% of all businesses in Europe are private firms that produce two-thirds of private sector jobs and generate more than half of the total value-added created by businesses in the EU (Vanstraelen & Schelleman, 2017). Despite the importance of private firms for the world economy, the existing literature has not paid much attention to the economic factors that drive audit quality differentiation for private firms.[2]

We hypothesize that auditor size is negatively related to audit quality in the private client market segment for two reasons. First, Kim et al. (2003) find that large auditors are more effective than small auditors at constraining public client firms' upward earnings management, but less so at constraining downward earnings management. This is because (1) auditor expected litigation costs are higher when client firms overstate as opposed to when they understate their income and (2) potential litigation costs associated with audit failure are likely to be higher for larger auditors than for smaller auditors (Kim et al., 2003; St. Pierre & Anderson, 1984). Kim et al. (2003) further suggest that, because Big 4 auditors' litigation costs are low when clients engage in income-decreasing accrual choices, they are more likely to cater to client-firm demand for income-decreasing earnings management. Private firms give higher priority to minimizing tax than to reducing information asymmetry in their financial reporting (Ball & Shivakumar, 2005; Burgstahler et al., 2006). If tax minimization is the dominant incentive, private firms are likely to prefer income-decreasing accrual choices. To the extent that client-firm demand for income-decreasing accrual choices is stronger for private client firms than for public client firms and litigation risk is lower in the private client segment (Badertscher et al., 2014; Chaney et al., 2004; Hope et al., 2012; Hope et al., 2013), we expect the differential Big 4 versus non-Big 4 auditor tolerance of income-decreasing accrual choices to be greater for private client firms.

Second, prior research suggests that private firms value auditor advice on many areas including optimizing tax savings (Fontaine & Pilote, 2011, 2012). Big 4 auditors can arguably better leverage their professional expertise and resources to customize audit services to achieve greater tax savings for private clients. However, some tax avoidance strategies are accomplished at the cost of reporting quality (Cloyd et al., 1996; Guenther et al., 1997; Hanlon & Heitzman, 2010; Klassen, 1997; Shackelford & Shevlin, 2001).

We note that the null hypothesis cannot be ruled out *a priori*. Although litigation risk is lower for private firms, it is possible that reputational incentives are still higher for Big 4 auditors than for non-Big 4 auditors in that segment of the audit market. Consequently, we may again detect a Big 4 quality differentiation in the private-firm market, similar to that in the public-firm market. Furthermore, Chaney et al. (2004) suggest that, on average, private client firms do not view Big 4 auditors as superior in terms of the perceived quality of the services provided to

is defined as greater assurance that the financial statements faithfully reflect the firm's underlying economics conditioned on the financial reporting system and innate characteristics.

[2]Some exceptions are Che et al. (2020), Bauwhede and Willekens (2004), and Van Tendeloo and Vanstraelen (2008).

a degree significant enough to warrant a fee premium. Therefore, another plausible scenario is that we observe no differences in the audit quality between Big 4 and non-Big 4 auditors in the private-firm market.

We test our hypothesis using a sample of U.K. private firms that are subject to mandatory audit of their financial statements between 2010 and 2016. Following prior studies, we infer audit quality from accruals quality measures that are designed to detect earnings management and accrual estimation errors (Becker et al., 1998; Kim et al., 2003; Srinidhi & Gul, 2007). Lower audit quality is associated with more flexibility in accrual choices, whereas higher audit quality deters managerial opportunism and mitigates unintentional accrual estimation errors. Following Becker et al. (1998) and Srinidhi and Gul (2007), we use the absolute value of discretionary accruals and the extent to which working capital accruals map into cash flows from operations as main proxies for audit quality.

Consistent with our hypothesis, we find a negative relation between auditor size and audit quality for private client firms. When we partition the sample based on the sign of discretionary accruals, we show that private clients of Big 4 auditors exhibit less income-increasing accruals, but more income-decreasing accruals than do private clients of non-Big 4 auditors. Importantly, the relation between auditor size and income-decreasing discretionary accruals is stronger than the relation between auditor size and income-increasing discretionary accruals, consistent with the accrual choices of Big 4 client firms being dominated by incentives to engage in income-decreasing earnings management. These results are robust to the use of several approaches for addressing self-selection bias in auditor choices.

With tax-motivated financial reporting, Big 4's private clients are less concerned about lower audit quality as long as the benefit from tax savings outweighs the cost of less informative earnings. Using book-tax difference, book-cash tax difference, GAAP effective tax rate, and cash effective tax rate to measure tax avoidance, we confirm that Big 4's private clients indeed engage in more tax avoidance than do non-Big 4's private clients.

In our cross-sectional hypothesis, we investigate whether the relation between auditor size and audit quality varies with client firms' organizational structure. Following Bonacchi et al. (2019), we focus on two types of private firms: standalone firms that are not controlling or controlled by other firms and business groups that own a majority stake in subsidiaries. Bonacchi et al. (2019) find that standalone firms have lower earnings quality and exhibit more downward earnings management than business groups due to standalone firms having weaker demand for earnings quality and stronger tax minimization incentives.[3] We predict that if Big 4 auditors are more responsive to client demand for audit quality than non-Big 4 auditors, then the Big 4 versus non-Big 4 differences in audit quality are less pronounced for business groups than for standalone firms. The results provide strong support for our prediction.

To shed light on a potential channel through which auditors accommodate private client firms' preference for tax minimization over earnings informativeness, we examine the relation between auditor-provided tax service fees and audit quality for private client firms that hire their auditors to provide tax services. We find that these clients are allowed more flexibility to adopt income-decreasing accrual choices when they pay more tax service fees. This result holds for both Big 4 private clients and non-Big 4 private clients. However, we do not find evidence that the relation between auditor-provided tax service fees and audit quality differs systematically between Big 4 and non-Big 4 private clients.[4]

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[3]We note that although business groups have weaker tax minimization incentives, they have greater opportunities to minimize taxation because of their complex business transactions, ownership structures, and presence in foreign jurisdictions that may offer more conducive tax conditions (Beuselinck et al., 2015; Elemes et al., 2021).

[4]One possible explanation is that client firms that purchase Big 4-provided tax services and seek more sophisticated tax planning strategies may not have a stronger preference for using earnings management to achieve tax goals as do

In additional analyses we also compare the Big 4 and non-Big 4 audit quality (tax avoidance) differences between the private and public client segments of the audit market. We find that the negative (positive) relation between auditor size and audit quality (tax avoidance) does not persist for public clients for which Big 4 auditors have stronger incentives to deliver audit quality.

Further analyses reveal that the negative relation between auditor size and audit quality for private firms diminishes when the private client firms have more dispersed ownership, consistent with higher agency costs leading to the Big 4's greater incentive to supply audit effort (Hope et al., 2012). In addition, we find that the negative relation between auditor size and audit quality is weaker for larger, more important private clients, in line with reputation protection incentives playing a more critical role than economic fee dependence in influencing the Big 4's audit quality for these clients. Finally, we examine the out-of-sample validity of our main findings for a sample of six European countries – Belgium, Finland, France, Netherlands, Norway, and Spain – over the same sample period (Bauwhede & Willekens, 2004; Che et al., 2020; Van Tendeloo & Vanstraelen, 2008). We continue to find a strong, negative association between auditor size and audit quality for the alternative sample. Importantly, Big 4 private clients exhibit less income-increasing accruals but more income-decreasing accruals than do non-Big 4 private clients.

Our study makes two important contributions to the literature. First, by examining how tax considerations affect the Big 4 versus non-Big 4 differences in the financial reporting quality of private firms, our study contributes to the auditing literature on the Big 4 effect (i.e. the notion that Big 4 auditors should deliver higher audit quality than non-Big 4 auditors). Vanstraelen and Schelleman (2017) point out that, although empirical evidence supports the notion that private-firm audits affect financial reporting quality, there is less consensus on the extent of audit firm quality differentiation in the private client market segment.[5] Our results suggest that Big 4 private-firm clients have lower audit quality, proxied by common accruals quality measures, than non-Big 4 private-firm clients. Although Big 4 auditors are less tolerant of income-increasing earnings management, they allow more flexibility for tax-motivated income-decreasing earnings management. Kim et al. (2003) purport that, in the absence of reporting incentive conflicts between auditors and managers, large auditors are less likely than small auditors to restrict income-decreasing earnings management. Therefore, our study complements Kim et al. (2003) by extending their conclusion to the private-firm setting. Although from a litigation risk standpoint, auditors have weaker incentives to restrict income-decreasing accrual choices, our findings suggest that audit quality may still be impaired when auditors adopt audit practices that emphasize income-decreasing accrual choices. A direct implication of this observation is that researchers should exercise caution when utilizing measures that infer audit quality by the degree to which firms emphasize income-decreasing as opposed to income-increasing accruals choices, particularly in settings where firms have strong incentives to manage earnings downwards.[6]

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client firms that purchase non-Big 4-provided tax services and seek less sophisticated tax advice. Prior research suggests that sophisticated tax planning strategies are not always faced with more stringent trade-offs between financial and tax reporting and firms adopting such tax strategies are often allowed more financial reporting flexibility (Frank et al., 2009; Hanlon & Heitzman, 2010).

[5]For example, Chaney et al. (2004) find that private clients in the U.K. do not pay an audit fee premium when they hire Big 4 auditors, which casts doubt on the Big 4 effect for private client audits. Bauwhede and Willekens (2004) examine the relation between auditor size and audit quality for a random sample of Belgian private firms. They do not detect evidence of audit quality differentiation based on auditor size. Contrary to Bauwhede and Willekens (2004), Van Tendeloo and Vanstraelen (2008) argue that the Big 4 effect exists in European private firms, however only in high book-tax conformity countries (such as Belgium) where tax authorities are more likely to scrutinize financial statements. More recently, Che et al. (2020) find that audit quality increases for a sample of Norwegian private client firms that follow their auditors who switch affiliation from non-Big 4 to Big 4 audit firms.

[6]For instance, Van Tendeloo and Vanstraelen (2008) examine the relation between auditor size and earnings management for private firms, conditional on the level of country-specific book-tax conformity. They use an earnings management

Second, our study extends Bonacchi et al. (2019), who find that private business groups have higher earnings quality than standalone private firms. Bonacchi et al. (2019) argue that business groups have stronger incentives to reduce information asymmetry because of their more dispersed ownership and more severe agency conflicts. Our results indicate that hiring a Big 4 auditor may be an effective means through which business groups fulfill their demand for high-quality financial reporting. Bonacchi et al. (2019) attribute standalone private firms' lower earnings quality to their incentives for tax avoidance. We show that these firms benefit from having Big 4 auditors in terms of tax savings despite reduced earnings informativeness.

In addition to its contribution to the mainstream accounting literature, our study is also relevant to regulators and market participants. Our findings suggest that although Big 4 private-firm clients are more successful in achieving tax minimization, they do so at the cost of reduced earnings informativeness. To the extent that that there exist such tradeoffs, our findings call for more regulatory attention and greater transparency of the type and nature of the audit (and tax services) that large accounting networks administer to clients. Our results are also relevant to stakeholders and practitioners who want to compare the audit quality of Big 4 and non-Big 4 auditors or rely on easily observable auditor characteristics to draw inferences about private firms' earnings quality and, by extension, the decision usefulness of accounting earnings. We show that large accounting firms strategically adjust the level of audit quality and are more willing to cater to private client firms' preference for tax savings. Therefore, it is unlikely that the supply of audit quality is uniform across all clients of large accounting firms. In that regard, our study highlights the importance of understanding private firms' financial reporting incentives in shaping the supply of audit services in private firms and in assessing their choice of hiring large accounting firms.

2. Institutional Setting and Hypotheses Development

2.1. Corporation Tax in the U.K. and the Link between Financial and Tax Reporting

In the U.K., a firm's tax return is primarily made up of Form CT600 and its financial statements. As part of its tax filing, the firm must include a reconciliation schedule to explain how the figures in the tax return are derived from the figures in the firm's accounts (HMRC Company Tax Return Guide to Form CT600). Corporation tax in the U.K. is charged for accounting periods in line with the firm's financial statements and the starting point for calculation of a firm's taxable profit in the U.K. is, in effect, the profit or loss per the firm's financial statements.

To get deeper insights into the link between financial reporting and tax reporting in the U.K., we contacted HMRC, the U.K. government's non-ministerial department responsible for the collection of taxes, and asked whether HMRC would describe the link between financial and tax reporting in the U.K. as weak or strong. HMRC suggested that the link between financial and tax reporting in the U.K. is strong given that (1) financial statements are included in the official documentation that corporations need to submit to the tax authorities when filing their tax return and (2) financial statement income is used as a basis for the calculation of taxable income.

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index that includes the ratio of *small profits to small losses*, a measure that assumes that income-decreasing accrual choices are indicative of lower earnings management (or higher audit quality). Blaylock et al. (2015) also investigate the relation between book-tax conformity and earnings management. They use the same earnings management index as Van Tendeloo and Vanstraelen (2008), except that they use the ratio of *small losses to small profits* rather than the ratio of small profits to small losses to capture the effect of book-tax conformity on earnings management. To the extent that private firms engage in more tax-motivated earnings management, it is reasonable to expect that these firms are more likely to report small losses than small profits.

2.2. Hypotheses Development

Under the economics-based framework, demand and supply forces jointly determine the equilibrium level of audit quality. The demand arises from agency costs and client competency, whereas the supply depends on the auditor's independence and competency (DeFond & Zhang, 2014). A large body of research examines the effect of Big N membership on auditor incentives to provide high audit quality for public client firms, which have wide ownership dispersion and high agency costs, and, therefore, strong demand for high quality public financial information (Hope et al., 2013). The empirical evidence that auditor size is positively associated with audit quality for public client firms is compelling (Becker et al., 1998; DeFond & Zhang, 2014; Francis et al., 1999).

2.2.1. The relation between auditor size and audit quality for private client firms

We focus on the audit market for private client firms, where the demand for audit quality may be shaped by different economic factors. Chen et al. (2011) opine that capital providers often have insider access to corporate information and play an important role in management. Relationship lending, which is common among private firms, focuses on soft information as opposed to information communicated through public channels such as audited financial statements. Furthermore, private firms' financial reporting strategies are more likely to be motivated by objectives other than meeting the information needs of capital providers, such as tax optimization (Ball & Shivakumar, 2005; Burgstahler et al., 2006).

We argue that there could be a negative relation between auditor size and audit quality in the private client segment of the audit market for two reasons. First, private firms face less demand for high-quality financial information from capital providers than public firms do (Ball & Shivakumar, 2005; Burgstahler et al., 2006; Chen et al., 2011; Hope & Langli, 2010; Peek et al., 2010). Instead, they give higher priority to taxes in their financial reporting (Ball & Shivakumar, 2005; Burgstahler et al., 2006). To the extent that maximizing tax savings represents a critical objective in determining financial reporting strategies (Ball & Shivakumar, 2005; Burgstahler et al., 2006), private firms may prefer more income-decreasing accrual choices than income-increasing accrual choices. Kim et al. (2003) find that big audit firms are *less* effective than small audit firms at limiting managers' downward earnings management. The authors suggest that auditor exposure to litigation risk is higher when client firms overstate their earnings than when they understate their earnings. Because (1) a lawsuit is more (less) likely for failure to detect income overstatement (understatement) and (2) potential litigation costs associated with audit failure are higher for large auditors than for small auditors due to large auditors' greater public scrutiny and bigger pockets, large auditors monitor client firms' income-increasing accrual choices more closely than their income-decreasing accrual choices. Based on these arguments, Kim et al. (2003) suggest that, in the absence of reporting incentive conflicts (e.g. both managers and auditors have incentives to understate reported earnings), large auditors are less likely to restrict income-decreasing earnings management. Therefore, if private firms prefer income-decreasing accrual choices and Big 4 auditors allow more flexibility for such behavior, there could be a negative relation between auditor size and audit quality. From this standpoint, the private client firm market offers a specific setting in which Kim et al. (2003)'s argument and results should hold.

Second, while non-Big 4 auditors are likely to attain cost leadership in the private client segment of the audit market, Big 4 auditors may still sustain a high level of profitability by identifying their competitive advantage relative to non-Big 4 auditors, such as the ability to leverage

professional expertise and assist client firms with tax savings.[7] This is because Big 4 auditors have more resources to leverage professional expertise and facilitate greater tax avoidance in order to add value to their audit services and differentiate themselves relative to non-Big 4 auditors. Indeed, several studies have highlighted the importance of value-added services for private client firms.[8] Fontaine and Pilote (2011, 2012) surveyed 306 privately held clients and found that clients want auditors to provide services beyond audit. Manson et al. (2001) surveyed clients and audit firms and found that privately held clients value auditor advice on a number of areas including optimizing tax savings. These findings suggest that offering assurance services while accommodating clients' preference for tax savings is a likely means through which audit firms can add value to their private-firm audit services. Consistent with this argument, Dong et al. (2018) show that auditors in Sweden differentiate their services by facilitating more tax avoidance for private-firm clients that are not subject to mandatory audits.

Prior research finds ample evidence that some tax avoidance strategies are accomplished at the cost of financial reporting quality (Cloyd et al., 1996; Guenther et al., 1997; Hanlon & Heitzman, 2010; Klassen, 1997; Shackelford & Shevlin, 2001).[9] Thus, if Big 4 auditors have greater incentives and ability to assist private-firm clients with maximizing tax savings than their non-Big 4 counterparts, and tax avoidance behavior is associated with lower financial reporting quality, we would observe a negative relation between auditor size and audit quality (proxied by financial reporting quality) for private client firms.

Based on the above discussion, we propose our first hypothesis, in the alternative form, as follows:

H1: *Audit quality is negatively associated with auditor size in the private client segment of the U.K. audit market.*

There are at least two counterarguments to the above hypothesis. First, although litigation risk is low for private firms (Bell et al., 2002; Hope & Langli, 2010; Johnstone & Bedard, 2003; Lys & Watts, 1994; Palmrose, 1986), it is possible that reputational incentives are still higher for Big 4 auditors than for non-Big 4 auditors in that segment of the audit market. If reputation concern plays an important role in driving audit quality, we may again detect a Big 4 quality differentiation in the private-firm market, similar to that in the public-firm market. Second, Chaney et al. (2004), through the lens of audit fees' negotiation, provide evidence that, on average, private client firms do not view Big 4 auditors as superior in terms of the perceived quality of the services provided to a degree significant enough to warrant a fee premium. Thus, we cannot rule out the possibility that audit quality of Big 4 and non-Big 4 auditors is indistinguishable in the private-firm market.

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[7]This argument is consistent with Michael Porter's framework of Generic Competitive Strategies (Porter, 1980, 1985) which predicts that, in the presence of market segments with differing client characteristics (as is the case in private versus public firms), firms establish a sustainable competitive advantage in each of these segments by either differentiating their services or acting as cost/price leaders.

[8]Herda and Lavelle (2013) define value-added audit services as client-service activities resulting from an audit that are not directly related to verifying financial statements. Knechel (2007) suggests that auditors can provide clients with advice and feedback as an outgrowth of the audit. This advice can be 'value added' without being 'fee added' and without sacrificing independence.

[9]Lower levels of *required* book-tax conformity weaken the link between tax and financial reporting. There is, however, evidence that even in the absence of strong book-tax alignment, financial reporting is still affected by tax considerations (Ball & Shivakumar, 2005; Guenther et al., 1997; Hanlon et al., 2014). Moreover, firm-specific incentives, such as ownership level and listing status, play a very important role in shaping the trade-off between tax and financial reporting over and above the level of country-specific book-tax conformity (Goncharov & Werner, 2009; Klassen, 1997).

2.2.2. Auditor size, audit quality and client firms' organizational structure

There are two major types of private firms in the U.K.: standalone firms and business groups. Standalone firms are not controlling or controlled by other firms, whereas business groups own a majority stake in subsidiaries. In the second hypothesis, we examine whether the Big 4 effect on audit quality varies with private client firms' organizational structure. According to Bonacchi et al. (2019), agency problems and tax incentives differ considerably between business groups and standalone firms. Specifically, business groups have larger ownership dispersion and higher leverage and transaction intensity with suppliers than do standalone firms. This implies that the demand for high quality financial information is stronger for business groups than for standalone firms. In contrast, maximizing tax savings is the dominant incentive that drives standalone firms' financial reporting strategies (Bauwhede & Willekens, 2004). Consistent with these arguments, Bonacchi et al. (2019) find that private business groups have higher earnings quality than standalone firms and standalone firms engage in more downward earnings management than business groups.

Building on Bonacchi et al. (2019)'s results, we conjecture that Big 4 auditors and their standalone private client firms have more aligned interests, in the sense that both favor more conservative financial reporting. Because standalone firms are less sensitive to trading off earnings informativeness against tax savings and Big 4 auditors are more tolerant of income-decreasing earnings management, Big 4 auditors with more in-house tax expertise are effective in facilitating greater tax avoidance than their non-Big 4 counterparts, even if that happens at the expense of financial reporting quality. In contrast, in response to the stronger demand for financial information from various stakeholders of business groups, Big 4 auditors will deliver higher audit quality by constraining client firms' tax-motivated earnings management. The above discussion leads to our second hypothesis, stated in the alternative form, as follows:

H2: *The negative relation between auditor size and audit quality in the private client segment of the U.K. audit market is less pronounced for business groups than for standalone firms.*

3. Research Design

Following prior studies, we assume that high quality auditing constrains opportunistic earnings management and reduces accrual estimation errors (Becker et al., 1998; Kim et al., 2003; Srinidhi & Gul, 2007). Lower audit quality is associated with more accounting flexibility, whereas higher audit quality deters managerial opportunism and motivates managers to avoid unintentional estimation errors. Consistent with Becker et al. (1998) and Srinidhi and Gul (2007), we employ two proxies for audit quality: the absolute value of performance-adjusted discretionary accruals (*ADA*) and the extent to which working capital accruals map into cash flows from operations (*AQ*).

ADA and *AQ* may be affected by client firms' tax planning strategies. For instance, the implementation of strategies aimed at reducing pre-tax income is likely to manifest in income-decreasing discretionary accruals (Bonacchi et al., 2019). Hanlon et al. (2014) argue that manipulation of the contingent tax reserve will result in this accrual being less likely to map into cash flows and more likely to manifest as an outlier in a discretionary accruals model. It is also consistent with Balakrishnan et al. (2019) who argue that aggressive tax planning impairs the ability of accrual accounting to resolve timing and matching problems with cash flows. When the auditor becomes lax enough to allow more tax-saving strategies or plays a direct role in facilitating greater income tax avoidance, audit quality – measured by *ADA* and *AQ* – is likely to be lower even if the auditor is competent to detect the accrual estimation errors.

3.1. Absolute Value of Performance-Adjusted Discretionary Accruals (ADA)

We estimate performance-adjusted discretionary accruals following Kothari et al. (2005). Specifically, we perform annual cross-sectional regressions of the following model for each two-digit SIC industry and fiscal year, with at least 20 observations per regression (Hope et al., 2013):

$$TA_{i,t} = a_0 + a_1(1/ASSETS_{i,t-1}) + \alpha_2 \Delta SALES_{i,t} + \alpha_3 TANG_{i,t} + \alpha_4 NIBE_{i,t} + \varepsilon_{i,t} \quad (1)^{10}$$

We scale *TA*, *ΔSALES*, *TANG*, and *NIBE* by total assets in year *t*-1 and winsorize them at the 1% and 99% levels. *ADA* is the absolute value of the firm-specific residuals estimated from equation (1), multiplied by -1, so that higher values of *ADA* indicate less earnings management and higher audit quality.[11]

3.2. Mapping between Working Capital Accruals and Cash Flows from Operations

We measure the extent to which working capital accruals map into past, present, and future cash flows from operations using the following model of Dechow and Dichev (2002), as modified by McNichols (2002):

$$\begin{aligned} WCA_{i,t} = {} & \beta_0 + \beta_1 CFO_{i,t-1} + \beta_2 CFO_{i,t} + \beta_3 CFO_{i,t+1} \\ & + \beta_4 \Delta SALES_{i,t} + \beta_5 TANG_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (2)^{12}$$

We scale all variables by total assets in year *t*-1 and winsorize them at the 1% and 99% levels. We estimate equation (2) for each 2-digit SIC industry and fiscal year and require a minimum of 20 observations per regression. Following Francis et al. (2005), we calculate *AQ* as the five-year standard deviation (from year *t*-4 to year *t*) of the estimated firm-year residuals from equation (2), multiplied by -1, so that higher values of *AQ* indicate more precise accrual estimations and higher audit quality.[13]

3.3. Empirical Models

H1 predicts a negative relation between audit quality and auditor size in the private client segment. We estimate the following model using OLS to test this hypothesis:

$$Audit\ Quality_{i,t} = \gamma_0 + \gamma_1 B4_{i,t} + CONTROLS + YEAR\_FE + INDUSTRY\_FE + \varepsilon_{i,t}, \quad (3)$$

where $Audit\ Quality_{i,t}$ is either $ADA_{i,t}$ or $AQ_{i,t}$, and *B4* is an indicator that equals 1 if the client firm is audited by a Big 4 auditor, and 0 otherwise. If Big 4's private clients exhibit lower audit quality than non-Big 4's private clients, γ_1 should be negative.

H2 posits that the negative relation between auditor size and audit quality is less pronounced for business groups than for standalone firms. To test H2, we augment equation (3) as

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[10] $TA_{i,t}$: Total accruals of firm i in year *t*, calculated as change in current assets less change in current liabilities less change in cash plus change in short-term debt less depreciation ($STA_{i,t} = \Delta CUAS_{i,t} - \Delta CULI_{i,t} - \Delta CASH_{i,t} + \Delta STDB_{i,t} - DEPR_{i,t}$); $\Delta SALES_{i,t}$: Change in sales of firm i from year *t*-1 to year *t*; $TANG_{i,t}$: Property, plant, and equipment of firm i in year *t*; $NIBE_{i,t}$: Net income before extraordinary items of firm i in year *t*.

[11] In untabulated analyses we estimate discretionary accruals by controlling for firm profitability in year *t*-1 rather than in year *t*. We also calculate discretionary accruals using the Jones (1991) and modified Jones (Dechow et al., 1995) models. Inferences are unaffected by the way we calculate discretionary accruals.

[12] $WCA_{i,t}$: Working capital accruals of firm i in year *t*, calculated as change icurrent assets less change in current liabilities less change in cash plus change in short-term debt ($WCA_{i,t} = \Delta CUAS_{i,t} - \Delta CULI_{i,t} - \Delta CASH_{i,t} + \Delta STDB_{i,t}$); $CFO_{i,t}$.: Cash flow from operations of firm i in year *t*, calculated as $NIBE_{i,t} - TA_{i,t}$.

[13] We require non-missing residuals for at least the last 4 consecutive years (i.e., years *t*, *t*-1, *t*-2, and *t*-3) when we calculate the standard deviation of residuals.

follows:

$$\begin{aligned} \textit{Audit Quality}_{i,t} = {} & \delta_0 + \delta_1 B4_{i,t} + \delta_2 GROUP_{i,t} + \delta_3 B4_{i,t} \times GROUP_{i,t} \\ & + CONTROLS + YEAR\_FE + INDUSTRY\_FE + \varepsilon_{i,t}, \end{aligned} \tag{4}$$

where $GROUP = 1$ if the private client firm is the parent company of a business group (i.e. it directly owns subsidiaries with a stake higher than 50%), and 0 if it is a standalone firm (i.e. it does not control and is not controlled by other firms). In equation (4), $\delta_0$represents the audit quality of the benchmark group, which contains non-Big 4's standalone private client firms, $(\delta_0 + \delta_1)$ represents the audit quality of Big 4's standalone private client firms, $(\delta_0 + \delta_2)$ represents the audit quality of non-Big 4's business group private client firms, and $(\delta_0 + \delta_1 + \delta_2 + \delta_3)$ represents the audit quality of Big 4's business group private client firms. According to Bonacchi et al. (2019), business groups, on average, have higher financial reporting quality than standalone firms. If the Bonacci et al. result holds for private client firms of both Big 4 and of non-Big 4 auditors, then the coefficients $(\delta_2 + \delta_3)$ and δ_2 should be positive. Our hypothesis testing focuses on δ_3. If Big 4 auditors are more likely than non-Big 4 auditors to increase audit quality for business group private client firms relative to standalone private client firms, we should observe a positive δ_3.

We identify control variables in equation (3) that prior research finds are associated with *AQ* and *ADA* (Burgstahler et al., 2006; Chaney et al., 2004; Francis, 1984; Francis & Yu, 2009; Hope et al., 2013). Specifically, we control for firm size (*LNASSETS*), leverage (*LEV*), current ratio (*CURR*), profitability (*ROA*), and incidence of losses (*LOSS*). We include asset turnover ratio (*ATURN*) in the model because it provides useful information about earnings management behavior (Jansen et al., 2012). Many studies suggest that sales growth is a strong predictor of earnings manipulation (Beneish, 1999; Dechow et al., 2011). Accordingly, we include sales growth (*GROWTH*) as a control variable. The two areas that are often considered difficult to audit are inventory and receivables (Ashton et al., 1989; Simunic, 1980). We use the combination of inventory and receivables scaled by lagged total assets (*REC & INV*) as a proxy for inherent risk in an audit engagement (Hay et al., 2006). We expect audit effort to increase in inherent risk.

To remove the impact of operational volatility on accruals estimation errors, we control for the standard deviation of sales (*STDSALES*) (Hribar & Nichols, 2007). Auditors face higher litigation concerns for distressed client firms, so they may exert more audit effort to mitigate audit risk (Elemes & Chen, 2020). We measure financial distress using Altman's Z-score (*Z-SCORE*). Firms with larger accruals have a higher level of uncertainty and, hence, are subject to larger accrual estimation errors. Therefore, we include total accruals scaled by lagged total assets (*TA*) as a control variable in the models of audit quality. We also control for the amount of auditor-charged tax fees (*LNTAX_FEES*) to ensure that our findings are not driven by the link between auditor-provided tax services and audit quality. To isolate the effect of ownership structure on audit quality (Hope et al., 2012), we include *DISP*, which equals 1 if no known single shareholder owns more than 50% of the firm (BvD Independence Indicator = 'A' or 'B'), and 0 otherwise (BvD Independence Indicator = 'C' or 'D'), as another control. We control for business group membership using *GROUP* (defined earlier). We include *TENURE*, an indicator variable that equals 1 if auditor tenure is three years or less, and 0 otherwise (Francis & Yu, 2009), as a control variable, because many studies find that longer tenure is associated with higher audit quality despite the concern about independence (Chen et al., 2008; Gul et al., 2007; Myers et al., 2003). We control for the ratio of sales of a client firm in a given year to the total amount of sales of all client firms of the audit firm in that year (*IMPORTANCE*) because economic dependence on the client firm is another factor that influences auditors' incentive to maintain independence and supply audit effort (Bonner et al., 1998; Francis & Yu, 2009; Reynolds & Francis, 2000).

Lastly, we include industry and year fixed effects to ensure that our results are not driven by industry characteristics and changes in macro-economic conditions over our sample period. We identify industries using their 2-digit SIC code. We present detailed definitions of all variables in the Appendix. In all regression analyses, we calculate heteroscedasticity and autocorrelation robust standard errors, clustered at the client-firm level.

4. Sample Selection and Descriptive Statistics

4.1. Sample Selection

We obtain financial statement data for private firms in the U.K. from the Amadeus database, compiled by *Bureau van Dijk*. Amadeus provides standardized financial statement data for public and private firms in Europe and is a common data source for academic research (see, for example, Van Caneghem (2004), Burgstahler et al. (2006), and Van Tendeloo and Vanstraelen (2008)). Financial data in Amadeus are retained for a rolling period of ten to twelve years. When a new year of data is added, the earliest year is dropped. This means that only the most recent data are available for each company. To overcome this restriction and create a longer time-series of data to calculate our audit quality measures over a sufficiently long time-window, we merge the March 2019 and October 2015 versions of Amadeus. Amadeus contains auditor data that correspond only to the most recent year for each covered firm. We therefore retrieve historical auditor data from the FAME database, which also provides audit service fee and auditor-provided tax service fee data.[14]

Our initial sample consists of 392,844 private-firm-year observations that are subject to a mandatory audit of annual financial statements between 2010 and 2016.[15] To be included in the sample, we require that the firm has (1) a 12-month reporting period, (2) only one registered auditor in the fiscal year, and (3) non-missing values of total assets in years t and t-1. We delete financial firms (one-digit SIC code = 6) and firms without an industry classification code (77,530 firm-year observations). Following Bonacchi et al. (2019) we drop all subsidiary firms (165,116 firm-year observations). We further delete observations without enough data to calculate our audit quality proxies (124,542 firm-year observations) and observations with missing values for the control variables in equation (3) (3,867 firm-year observations). The final sample includes 21,789 private-firm-year observations in the U.K. and spans from 2010 to 2016.[16,17] Table 1 summarizes the sample selection process.

4.2. Descriptive Statistics and Correlations

Table 2 Panel A presents the descriptive statistics for the sample. We find that 22% of our sample private firms are audited by Big 4 auditors. The descriptive data suggest that our sample private firms are, on average, financially healthy. For example, the mean and median *ROA* are 0.086 and

[14] BvD Amadeus uses FAME as its source for U.K. financial statement data.

[15] Because the mandatory audit threshold changed during the sample period, we apply multiple size criteria depending on the mandatory audit criteria valid at the time the corresponding financial statement was issued (https://www.gov.uk/audit-exemptions-for-private-limited-companies).

[16] 635 firm-year observations out of the full sample of 21,789 firm-year observations pertain to firms that follow IFRS (as opposed to U.K. GAAP). Out of these 635 firm-year observations, 370 firm-year observations relate to group firms, whereas the remaining 265 firm-year observations relate to standalone firms. Our findings are unaffected if we exclude firms that prepare their financial statements under IFRS.

[17] We use consolidated financial data for all our business group firms.

Table 1. Sample selection.

All U.K. private firms subject to mandatory audit with non-missing total assets in year *t* and year *t*-1 and one registered auditor (2010–2016)	392,844
Less:	
Financial firms (one-digit SIC code 6) and firms with missing industry classification	(*77,530*)
Subsidiaries of publicly listed and private firms	(*165,116*)
Firms with missing data to calculate *AQ* and *ADA*	(*124,542*)
Firms with missing data to calculate various control variables	(*3,867*)
Final sample	21,789

0.065, respectively. Only 10.8% of firms report a loss. Sales growth amounts to 10.3% on a year-to-year basis. Most firms have a controlling shareholder (mean of $DISP = 0.388$), suggesting that concentrated ownership is a common phenomenon among private firms. Finally, slightly more than half of the firms belong to a business group (mean of $GROUP = 0.521$).

Table 1 Panel B presents Pearson correlations of the variables. We find that *B4* is negatively associated with *AQ* (-0.18) and *ADA* (-0.09), suggesting that accrual estimation errors are larger for Big 4's private client firms than for non-Big 4's private client firms. Among all client-firm characteristics, *LNASSETS* has the largest correlation coefficient with *B4* (0.41), indicating that firm size is still the dominant factor that determines auditor choices in the private client-firm segment of the audit market. The positive correlation between *B4* and *BTD* (0.01) reveals that Big 4's private client firms are more effective in implementing tax-avoidance strategies than non-Big4's private client firms. We also find that *ADA* and *AQ* are both negatively correlated with *BTD*, indicating that firms with more active tax avoidance strategies exhibit larger accrual estimation errors. *GROUP* is positively associated with *AQ* (0.09) and *ADA* (0.08), consistent with private firms that belong to a group having higher audit quality than standalone firms.

5. Main Results

5.1. Relation between Auditor Size and Audit Quality for Private Client Firms

We report the results of estimating equation (3) using *AQ* and *ADA* as the dependent variable in the first two columns of Table 3 Panel A. Consistent with H1, we find that the coefficient on *B4* is significantly negative in both columns ($\gamma_1 = -0.006$, *t-stat* $= -8.54$ in the *AQ* model; $\gamma_1 = -0.014$, *t-stat* $= -6.08$ in the *ADA* model).[18] These results suggest that Big 4's private client firms have higher estimation errors in working capital accruals and engage in more earnings management than non-Big4's private client firms.[19] Because our control variables in equation (3) are likely to control for the 'innate' estimation errors (Francis et al., 2005), the incremental *B4* effect on *AQ* and *ADA* is likely to capture managerial opportunism or intentional estimation errors in working capital accruals.

Turning to the control variables, we find that audit quality increases in client-firm size (*LNASSETS*), financial health (*Z-SCORE*), business group membership (*GROUP*), and dispersed ownership (*DISP*), and decreases in client-firm leverage (*LEV*), return on assets (*ROA*), asset turnover (*ATURN*), current ratio (*CURR*), a loss shock (*LOSS*), sales volatility (*STDSALES*), and

[18]The value of variance inflation factor (VIF) is less than two for *B4* in both the *AQ* model and the *ADA* model, suggesting that *B4* is not highly collinear with the control variables.

[19]The coefficient on *B4* in the *ADA* model suggests that Big 4's private clients report *ADA* that is greater than non-Big 4's private clients by an average of 1.4 percent of lagged assets. This gap represents 17 percent of the mean value of *ADA* for an average sample firm (the mean value of *ADA* is -0.081 in Table 2 Panel A).

Table 2. Descriptive statistics and correlation matrix.

Panel A: Descriptive statistics Variables	Mean	St. Deviation	25%	Median	75%
AQ	− 0.044	0.038	− 0.055	− 0.033	− 0.020
ADA	− 0.081	0.093	− 0.102	− 0.052	− 0.023
B4	0.220	0.414	0.000	0.000	0.000
GROUP	0.521	0.500	0.000	1.000	1.000
LNASSETS	16.760	1.205	15.910	16.500	17.340
LEV	0.216	0.250	0.026	0.141	0.322
ROA	0.086	0.116	0.026	0.065	0.125
ATURN	1.961	1.368	1.012	1.675	2.558
CURR	2.118	2.254	1.100	1.510	2.360
REC & INV	0.413	0.279	0.185	0.402	0.604
LOSS	0.108	0.310	0.000	0.000	0.000
GROWTH	0.103	0.367	− 0.035	0.053	0.210
STDSALES	0.253	0.313	0.071	0.157	0.319
Z-SCORE	3.916	2.046	2.691	3.753	4.850
TA	− 0.021	0.129	− 0.079	− 0.025	0.026
LNTAX_FEES	0.776	1.322	0.000	0.000	1.609
DISP	0.388	0.487	0.000	0.000	1.000
TENURE	0.229	0.420	0.000	0.000	0.000
IMPORTANCE	0.101	0.213	0.000	0.007	0.078
GAAP_ETR	− 0.211	0.094	− 0.261	− 0.213	− 0.193
CASH_ETR	− 0.203	0.147	− 0.277	− 0.169	− 0.111
BTD	0.000	0.019	− 0.004	− 0.001	0.002
CTD	0.001	0.011	− 0.006	0.001	0.007

(*Continued*).

Table 2. Continued.

Panel B: Correlation matrix

Variables	*AQ*	*ADA*	*B4*	*GROUP*	*LNASSETS*	*LEV*	*ROA*	*ATURN*	*CURR*	*REC & INV*	*LOSS*	*GROWTH*	*STDSALES*	*Z-SCORE*	*TA*	*LNTAX_FEES*	*DISP*	*TENURE*	*IMPORTANCE*	*BTD*
AQ	1.00																			
ADA	**0.37**	1.00																		
B4	**−0.18**	**−0.09**	1.00																	
GROUP	**0.09**	**0.08**	−0.01	1.00																
LNASSETS	−0.01	0.00	**0.41**	**0.27**	1.00															
LEV	**−0.10**	**−0.11**	**0.13**	−0.01	**0.20**	1.00														
ROA	**−0.13**	**−0.13**	−0.01	**−0.06**	**−0.04**	**−0.19**	1.00													
ATURN	**−0.05**	**−0.12**	**−0.11**	**−0.06**	**−0.26**	**−0.10**	**0.13**	1.00												
CURR	**−0.05**	−0.01	**0.03**	**−0.04**	**0.04**	**−0.25**	**0.11**	**−0.20**	1.00											
REC & INV	**0.03**	**−0.08**	**−0.13**	0.00	**−0.16**	**−0.08**	**0.10**	**0.50**	**−0.02**	1.00										
LOSS	**−0.16**	**−0.02**	**0.10**	**0.04**	**0.05**	**0.16**	**−0.45**	**−0.10**	**−0.05**	**−0.11**	1.00									
GROWTH	−0.01	**−0.11**	**−0.03**	−0.01	0.01	**0.04**	**0.21**	**0.38**	**−0.09**	**0.28**	**−0.14**	1.00								
STDSALES	**−0.28**	**−0.22**	−0.01	**−0.07**	**−0.13**	−0.01	**0.07**	**0.54**	**−0.10**	**0.25**	0.00	**0.17**	1.00							
Z-SCORE	**0.05**	**0.01**	**−0.14**	**−0.09**	**−0.21**	**−0.49**	**0.30**	**0.41**	**0.48**	**0.22**	**−0.22**	**0.09**	**0.20**	1.00						
TA	**−0.05**	**−0.09**	0.01	**−0.04**	**0.03**	**0.11**	**0.13**	**0.05**	**0.11**	**0.22**	**−0.10**	**0.06**	**0.06**	**0.09**	1.00					
LNTAX_FEES	**−0.03**	0.01	**0.35**	**0.24**	**0.43**	**0.05**	−0.01	**−0.04**	**−0.02**	**−0.03**	**0.05**	0.00	**−0.05**	**−0.07**	**−0.02**	1.00				
DISP	**0.15**	**0.11**	**−0.16**	**0.12**	**−0.05**	**−0.10**	−0.01	0.01	0.00	**0.02**	**−0.05**	0.00	**−0.06**	**0.07**	**−0.03**	**−0.01**	1.00			
TENURE	**−0.02**	**−0.02**	**−0.09**	0.00	**−0.08**	0.00	**0.02**	**0.03**	0.00	**0.02**	0.00	0.00	**0.03**	0.01	**0.02**	**−0.07**	0.00	1.00		
IMPORTANCE	**0.07**	**0.02**	**−0.25**	**−0.12**	**−0.12**	**−0.05**	**0.02**	**0.13**	**−0.02**	**0.09**	**−0.05**	**0.04**	**0.06**	**0.10**	0.01	**−0.18**	**0.07**	**−0.05**	1.00	
BTD	**−0.03**	**−0.02**	**0.01**	**−0.02**	**0.02**	**−0.04**	**0.34**	**−0.03**	**0.07**	0.01	**−0.20**	**0.02**	−0.01	**0.07**	**0.12**	**−0.02**	**0.02**	**0.02**	0.00	1.00

Panel A presents summary statistics for all key variables. Panel B presents the Pearson correlation matrix. Bold values indicate significance at the two-tailed 5% level or better. See the Appendix for variable definitions.

total accruals (*TA*). However, the relation between audit quality and sales growth (*GROWTH*) appears to be sensitive to the measure of audit quality. Influential private clients exhibit better audit quality as the coefficient on *IMPORTANCE* is significantly positive. This is consistent with Reynolds and Francis (2000), who argue that larger and more influential clients pose greater reputation risk, so their auditors have greater incentives to deliver high audit quality.

To provide further evidence on whether the negative relation between *B4* and *ADA* is conditional on whether discretionary accruals are income-increasing or income-decreasing, we conduct analyses after partitioning the sample into two groups based on the sign of discretionary accruals (*DA*). Table 3 Panel A, columns 3 and 4 report regression results estimated separately for the income-increasing discretionary accruals (*DA*+) and the income-decreasing discretionary accruals (*DA*-) subsamples. We find a negative relation between *DA*+ and *B4*, suggesting that, similar to public client firms, Big 4 auditors are more effective at constraining income-increasing earnings management than non-Big 4 auditors for private client firms ($\gamma_1 = -0.006$, *t-stat* $= -2.87$). Importantly, we also find a negative coefficient on *B4* in the *DA*- subsample ($\gamma_1 = -0.011$, *t-stat* $= -6.26$). The difference in $\gamma_1$between the *DA*+ and *DA*- subsamples is significant at the 10% level (*t-stat* $= 1.71$). These results are consistent with Big 4's private client firms having more flexibility to adopt income-decreasing accrual choices than their non-Big 4 counterparts. Accordingly, we view our results based on *ADA* to be primarily driven by the *DA*- subsample.[20]

5.2. *Relation between Auditor Size and Audit Quality Conditional on Client Firm's Organizational Structure*

To the extent that client firms' tax incentives play a significant role in the negative relation between auditor size and audit quality, we should observe stronger results for standalone firms than for business groups. We test H2 using equation (4) and report the results in the first two columns of Table 3 Panel B where we measure audit quality using *AQ* and *ADA*, respectively. The coefficient on *B4* continues to be significantly negative ($\delta_1 = -0.010$, *t-stat* $= -9.85$ in the *AQ* model; $\delta_1 = -0.025$, *t-stat* $= -7.16$ in the *ADA* model), suggesting that, among standalone firms, Big 4's private clients have more accrual estimation errors and engage in more earnings management than non-Big 4's private clients. Consistent with Bonacchi et al. (2019), we find that business group private clients have higher audit (accruals) quality than their standalone private-firm counterparts regardless of whether they hire non-Big 4 auditors or Big 4 auditors, as evidenced by the positive coefficient on *GROUP* and the positive sum of coefficients on *GROUP* and *B4* $\times$ *GROUP* in both columns ($\delta_2 = 0.002$, *t-stat* $= 2.82$ and $(\delta_2 + \delta_3) = 0.010$, *t-stat* $= 7.90$ in the *AQ* model; $\delta_2 = 0.005$, *t-stat* $= 3.09$ and $(\delta_2 + \delta_3) = 0.027$, *t-stat* $= 6.99$ in the *ADA* model). We show that the coefficient on *B4* $\times$ *GROUP* is significantly positive, consistent with H2 ($\delta_3 = 0.008$, *t-stat* $= 6.10$ in the *AQ* model; $\delta_3 = 0.022$, *t-stat* $= 5.32$ in the *ADA* model).[21] Columns 3 and 4 in Panel B demonstrate that the results of H2 hold only in

[20]In untabulated analyses we examine the relation between auditor size and audit quality separately for each Big 4 accounting firm. Regardless of which Big 4 audit firm we keep in the sample, we continue to find a significantly negative association between *B4* and our proxy for audit quality (*AQ, ADA*, *DA*+ or *DA*-) with the exception of the *DA*+ specifications of E&Y and KPMG where we find a negative and insignificant coefficient on *B4*.

[21]When we examine the sum of *B4* and *B4* $\times$ *GROUP* we find that it is significantly different from zero (column 2 of Table 3, Panels A and B). This sum reflects the difference in audit quality between *Big 4*'s business group private clients and *non-Big 4*'s business group private clients. Since both the coefficient on *B4* and the sum of the coefficients on *B4* and *B4* $\times$ *GROUP* are significantly negative, we conclude that we continue to find a negative relation between auditor size and audit quality for private clients regardless of whether they are business group or standalone clients.

Table 3. The relation between auditor size and audit quality for private client firms.

Panel A: Differences in audit quality between Big 4 and non-Big 4 private client firms

	(1)		(2)		(3)		(4)	
	Dep. Var. = AQ		*Dep. Var. = ADA*		*Dep. Var. = DA+*		*Dep. Var. = DA-*	
Variables	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*
B4	−0.006***	−8.54	−0.014***	−6.08	−0.006***	−2.87	−0.011***	−6.26
GROUP	0.003***	6.11	0.009***	6.23	−0.002	−1.18	0.004***	3.58
LNASSETS	0.001***	4.92	0.002**	2.06	0.001	0.59	−0.000	−0.44
LEV	−0.005***	−4.52	−0.043***	−8.36	0.076***	12.86	0.027***	5.72
ROA	−0.042***	−20.25	−0.129***	−12.18	−0.081***	−4.71	−0.180***	−23.77
ATURN	−0.001*	−1.70	−0.003***	−2.71	−0.001	−1.26	−0.001	−0.86
CURR	−0.001***	−6.51	−0.004***	−4.87	0.001	1.37	−0.003***	−3.71
REC & INV	0.000	0.18	−0.006	−1.50	−0.039***	−9.73	−0.025***	−7.52
LOSS	−0.014***	−20.45	−0.020***	−7.74	0.013***	4.93	−0.007***	−3.38
GROWTH	0.002***	3.96	−0.011***	−3.99	0.002	0.79	−0.017***	−6.98
STDSALES	−0.020***	−25.37	−0.050***	−13.37	0.021***	5.67	−0.021***	−6.50
Z-SCORE	0.001***	5.83	0.004***	5.10	0.000	0.06	0.002***	2.74
TA	−0.002*	−1.77	−0.024*	−1.71	1.101***	70.58	1.169***	88.70
LNTAX_FEES	−0.000	−0.10	0.001	1.56	−0.000	−0.34	0.000	0.19
DISP	0.004***	7.86	0.010***	7.21	0.002**	2.02	0.005***	5.12
TENURE	−0.001	−1.25	−0.003	−1.64	0.002	1.45	0.001	1.10
IMPORTANCE	0.002**	2.34	0.006*	1.90	−0.003	−1.12	0.002	0.85
Constant	−0.054***	−12.44	−0.084***	−5.42	0.022	1.49	0.044***	3.34
Year FE	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
# of obs.	21,789		21,789		10,490		11,299	
R-squared	0.255		0.125		0.642		0.661	

(*Continued*).

Table 3. Continued.

Panel B: Differences in audit quality between Big 4 and non-Big 4 private client firms – Business group versus standalone firms

	(1)		(2)		(3)		(4)	
	Dep. Var. = AQ		*Dep. Var. = ADA*		*Dep. Var. = DA+*		*Dep. Var. = DA-*	
Variables	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*
B4	−0.010***	−9.85	−0.025***	−7.16	−0.005*	−1.65	−0.018***	−6.83
GROUP	0.002***	2.82	0.005***	3.09	−0.001	−0.88	0.002	1.23
B4 × GROUP	0.008***	6.10	0.022***	5.32	−0.002	−0.50	0.014***	4.29
LNASSETS	0.001***	4.94	0.002**	2.08	0.001	0.59	−0.000	−0.40
LEV	−0.005***	−4.33	−0.043***	−8.27	0.076***	12.86	0.027***	5.76
ROA	−0.042***	−19.94	−0.129***	−12.15	−0.081***	−4.71	−0.180***	−23.75
ATURN	−0.001*	−1.71	−0.003***	−2.71	−0.001	−1.26	−0.001	−0.88
CURR	−0.001***	−6.41	−0.003***	−4.80	0.001	1.36	−0.003***	−3.65
REC & INV	−0.000	−0.27	−0.008*	−1.84	−0.039***	−9.62	−0.025***	−7.71
LOSS	−0.014***	−20.28	−0.020***	−7.62	0.013***	4.92	−0.007***	−3.31
GROWTH	0.002***	4.06	−0.010***	−3.94	0.002	0.78	−0.017***	−7.00
STDSALES	−0.020***	−25.08	−0.049***	−13.27	0.021***	5.67	−0.020***	−6.41
Z-SCORE	0.001***	5.77	0.004***	5.04	0.000	0.07	0.002***	2.71
TA	−0.002	−1.57	−0.023*	−1.66	1.101***	70.63	1.168***	88.85
LNTAX_FEES	−0.000	−0.95	0.001	0.85	−0.000	−0.27	−0.000	−0.32
DISP	0.003***	7.24	0.009***	6.56	0.002**	2.06	0.005***	4.59
TENURE	−0.001	−1.26	−0.003	−1.64	0.002	1.45	0.001	1.10
IMPORTANCE	0.002*	1.90	0.005	1.49	−0.003	−1.08	0.001	0.51
Constant	−0.053***	−12.15	−0.080***	−5.21	0.021	1.47	0.046***	3.50
Year FE	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
# of obs.	21,789		21,789		10,490		11,299	
R-squared	0.260		0.127		0.642		0.662	

This table presents the OLS regression results of testing H1 (Panel A) and H2 (Panel B). *AQ* is the Dechow and Dichev (2002) accrual quality measure, modified by McNichols (2002), multiplied by −1; *ADA* is the absolute value of discretionary accruals as in Kothari et al. (2005), multiplied by −1; *DA+* (*DA-*) represents income-increasing (income-decreasing) discretionary accruals. Higher values of *AQ* and *ADA* indicate higher audit quality. *GROUP* equals 1 if a client firm is the parent company of a business group, and 0 if it is a standalone firm. T-statistics are calculated based on heteroscedasticity and autocorrelation robust standard errors clustered at the client-firm level. ∗, ∗∗, and ∗∗∗ indicate significance at the two-tailed 10%, 5%, and 1% levels, respectively. See the Appendix for variable definitions.

the *DA*- subsample, which is not surprising if negative discretionary accruals are more likely to reflect tax avoidance activities.[22]

5.3. Addressing Self-Selection of Auditor Choices

Endogeneity represents an important concern in our study because auditors and client firms are not randomly paired with each other. In this section, we use several approaches to alleviate self-selection concerns.

5.3.1. Switching between large and small auditors

Our first approach is to re-estimate equation (3) using an auditor switching model specification. Specifically, we regress the change in audit quality (*ΔAudit Quality*) on the change in auditor type (*ΔB4*), controlling for changes in client-firm characteristics. We identify 99 Big 4 to non-Big 4 switches ($\Delta B4 = B4_t - B4_{t-1} = -1$) and 90 non-Big 4 to Big 4 switches ($\Delta B4 = B4_t - B4_{t-1} = 1$) in our sample. To the extent that any omitted correlated variables in equation (3) remain unchanged before and after the client firm switches to (from) a Big 4 auditor from (to) a non-Big 4 auditor, the switching model will effectively remove any bias in our coefficient estimates.

Table 4 Panel A reports the results of estimating the switching model. In the first two columns, the treatment group contains the 99 client firms that switch from a Big 4 auditor to a non-Big 4 auditor ($\Delta B4 = -1$) and the benchmark group contains all client firms without auditor changes in year *t*.[23] We find a significantly negative relation between *ΔAQ* and *ΔB4*, consistent with clients that switch from a Big 4 auditor to a non-Big 4 auditor having lower accrual estimation errors (or better audit quality). The coefficient on *ΔB4* is insignificant when we measure audit quality using *ADA*. In the next two columns, we use the same benchmark group but change the treatment group to client firms that switch from a non-Big 4 auditor to a Big 4 auditor ($\Delta B4 = 1$). Using both measures of *ΔAudit Quality*, we find a significantly negative coefficient on *ΔB4*, consistent with clients that switch from a non-Big 4 to a Big 4 auditor having lower audit quality. In the last two columns, we restrict the sample of the changes regression analyses to the 90 non-Big 4 to Big 4 switches (treatment group) and the 99 Big 4 to non-Big 4 switches (benchmark group). We continue to find a significantly negative relation between *ΔAQ* and *ΔB4*, as expected. However, although the coefficient on *ΔB4* is negative in the *ΔADA* model, it is not statistically significant.[24]

Taken together, our findings suggest that switching from a non-Big 4 auditor to a Big 4 auditor is associated with a decrease in audit quality and switching from a Big 4 auditor to a non-Big 4 auditor is associated with an increase in audit quality. Thus, our main conclusion holds in both directions of auditor switches.

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[22] Bonacchi et al. (2019) predict and find that standalone private firms engage in more income-decreasing earnings management than business groups do. Bonacchi et al. (2019) make no explicit prediction about the relation between group membership and income-increasing accruals. We show that Bonacchi et al. (2019)'s result for (signed) *DA* is driven by the *DA*- subsample and does not hold for the *DA* + subsample in our setting.

[23] For the purpose of this test, we delete all firms that change auditors from one Big 4 auditor to another Big 4 auditor and all firms that change auditors from one non-Big 4 auditor to another non-Big 4 auditor. The findings reported in this section are not sensitive to the inclusion of these observations.

[24] In untabulated analyses, we find that the results in Table 4 Panel A are driven by the *DA*- subsample.

Table 4. Addressing self-selection of auditor choice.

Panel A: Auditor changes

	Changes from Big 4 to non-Big 4 relative to no auditor changes				Changes from non-Big 4 to Big 4 relative no auditor changes				Changes from Big 4 to non-Big 4 relative to changes from non-Big 4 to Big4			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Dep. Var. $= \Delta AQ$		*Dep. Var.* $= \Delta ADA$		*Dep. Var.* $= \Delta AQ$		*Dep. Var.* $= \Delta ADA$		*Dep. Var.* $= \Delta AQ$		*Dep. Var.* $= \Delta ADA$	
Variables	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*
Δ *B4*	-0.003^{*}	-1.95	0.001	0.05	-0.003^{**}	-2.05	-0.020^{*}	-1.73	-0.003^{**}	-2.03	-0.008	-0.67
Δ*Controls*	Yes		Yes		Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	13,201		13,201		13,192		13,192		189		189	
R − squared	0.026		0.044		0.026		0.044		0.391		0.286	

Panel B: Controlling for firm fixed effects

	(1)		(2)		(3)		(4)	
	Dep. Var. $= \Delta AQ$		*Dep. Var.* $= \Delta ADA$		*Dep. Var.* $= \Delta AQ$		*Dep. Var.* $= \Delta ADA$	
Variables	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*
B4	-0.002^{*}	-1.88	-0.013^{**}	-2.26	0.010	1.36	-0.007	-1.13
Controls	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Firm FE	Yes		Yes		Yes		Yes	
# of obs.	21,789		21,789		10,490		11,299	
R − squared	0.837		0.540		0.806		0.805	

Table 4. Continued.

Panel C: Entropy − balanced sample

	(1)		(2)		(3)		(4)	
	Dep. Var. = AQ		*Dep. Var. = ADA*		*Dep. Var. = DA+*		*Dep. Var. = DA−*	
Variables	Coeff.	*t − stat*	Coeff.	*t − stat*	Coeff.	*t − stat*	Coeff.	*t − stat*
B4	−0.006**	−2.02	−0.010*	−1.94	0.005	1.26	−0.008***	−2.89
Controls	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
# of obs.	21,789		21,789		10,490		11,299	
R − squared	0.336		0.209		0.667		0.708	

Panel A presents the OLS regressions of changes in accruals quality (ΔAQ) and changes in absolute discretionary accruals (ΔADA) on contemporaneous changes in the Big 4 indicator ($\Delta B4$) and changes in all control variables of equation (3). We present three alternative specifications: changes from Big 4 to non-Big 4 ($\Delta B4 = -1$) relative to no auditor changes ($\Delta B4 = 0$) (column 1), changes from non-Big 4 to Big 4 ($\Delta B4 = 1$) relative no auditor changes ($\Delta B4 = 0$) (column 2), and changes from non-Big 4 to Big 4 ($\Delta B4 = 1$) relative to changes from Big 4 to non-Big 4 ($\Delta B4 = -1$) (column 3). Panel B presents the OLS regression results of re-estimating model (3) after including client-firm fixed effects. Panel C presents the OLS regressions of re-estimating equation (3) for an entropy-balanced sample. We use the control variables of equation (3) as well as industry and year fixed effects as covariates to create the balanced sample. T-statistics are calculated based on heteroscedasticity and autocorrelation robust standard errors clustered at the client-firm level. ∗, ∗∗, and ∗∗∗ indicate significance at the two-tailed 10%, 5%, and 1% levels, respectively. See the Appendix for variable definitions.

5.3.2. Controlling for client-firm fixed effects

In Table 4 Panel B, we report the results of estimating equation (3) with client-firm fixed effects. If the unobservable client-firm-level factors are time-invariant, controlling for client-firm fixed effects is a powerful tool for removing omitted variable bias. This approach exploits within-client-firm variation over time, as the client-firm fixed effect coefficients control for across-client-firm average differences. We continue to find a significantly negative association between *Audit Quality* and *B4*, regardless of how we measure audit quality. However, when we separate client firms into two subsamples based on the sign of discretionary accruals, we fail to detect a significant coefficient on *B4* in either subsample.

5.3.3. Entropy balancing

Next, we use entropy balancing to draw shaper inferences. Entropy balancing ensures covariate balance, thus avoiding the problem of any potentially biased estimates from propensity-score matching (Shipman et al., 2017). This approach exactly adjusts differences in representation with respect to all moments of the covariate distributions. Table 4 Panel C presents the results of estimating equation (3) for the entropy-balanced sample.[25] We continue to detect a significantly negative coefficient on *B4* regardless of how we measure audit quality. Subsample analyses further reveal that the negative association between *B4* and *ADA* is primarily driven by client firms that engage in income-decreasing earnings management.[26,27]

5.4. Difference in Tax Avoidance Between Big 4's and Non-Big 4's Private Client Firms

An important financial reporting incentive for private firms is to minimize tax (Ball & Shivakumar, 2005; Burgstahler et al., 2006). Relative to public firms, private firms are less dependent on financial reporting to communicate firm performance, so they will find it less costly to sacrifice earnings informativeness in the process of minimizing tax. Although we find that audit quality is lower for Big 4's private client firms, it will be less of a concern to them if the benefit from tax minimization outweighs the cost of less informative earnings. In this section, we provide evidence to support the argument that Big 4's private client firms engage in more tax avoidance

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[25] We perform entropy balancing on covariate means, variances, and skewness, using all control variables of model (3) as covariates and a tolerance level of 0.015 (STATA default value).

[26] In untabulated analyses we also adopt propensity-score matching (PSM) and coarsened exact matching (CEM) techniques to examine the relation between auditor size and audit quality. Specifically, we propensity-score match (probit first-stage model; caliper distance: 0.001; no replacement) and coarsened exact match on *LNASSETS* and *LEV*, *ROA*, and *LOSS* for firms in the same industry-year. We repeat our estimations on a coarsened exact-matched sample because coarsened exact matching is not subject to PSM's random matching problem, which sometimes results in the PSM-matched sample having a worse covariate balance than the unmatched sample (DeFond et al., 2017). The results in both specifications (PSM and CEM) are qualitatively the same as those based on the entropy-balanced sample, except that we also detect a significantly negative relation between *DA* + and *B4* in in both specifications.

[27] The two-stage procedure of Heckman (1979) offers an alternative approach to control for self-selection; however, prior research (Clatworthy et al., 2009; Lennox et al., 2012) has criticized attempts to implement the two-stage procedure of Heckman (1979) to address auditor-client self-selection. While we acknowledge the limitations of two-stage models in our setting, in untabulated analyses we examine whether our main findings are robust to the Chaney et al. (2004) two-stage approach to control for self-selection. Specifically, in the first-stage probit model, we regress *B4* on firm size, asset turnover, debt-asset ratio, current assets scaled by total assets, quick ratio, ROA, interaction between ROA and a loss indicator, sales outside of U.K. scaled by total sales, and year and industry fixed effects. We then calculate the inverse-Mills ratio (IMR) based on the selection model and include it as a control variable in our second-stage model of *ADA* and *AQ*. We continue to find significantly negative relations between *B4* and our audit quality measures. The negative relation between *B4* and *ADA* appears to be driven by firms with *DA*-. IMR is significant in all second-stage models, highlighting the importance of controlling for self-selection in our analyses.

than non-Big 4's private client firms. Specifically, we estimate the following regression model:

$$Tax\ Avoidance_{i,t} = \lambda_0 + \lambda_1 B4 + CONTROLS + YEAR\_FE + INDUSTRY\_FE + \varepsilon \quad (5)$$

Following Hjelström et al. (2019), we use four measures of tax avoidance in equation (5). The first two measures are GAAP effective tax rate (*GAAP_ETR*) and cash effective tax rate (*CASH_ETR*). We calculate these two effective tax rates for all private firms with positive pre-tax income. We multiply *GAAP_ETR* and *CASH_ETR* by -1 so that larger values of these measures indicate more tax avoidance behavior. The other two measures are book-tax difference (*BTD*) and book-cash tax difference (*CTD*).[28] Prior research finds that firms with larger *BTD* are more likely to receive an IRS audit, undertake larger proposed audit adjustments, and are positively associated with the incidence of tax sheltering (Mills, 1998; Wilson, 2009). While *BTD* captures only permanent book-tax differences, *CTD* reflects both permanent and temporary book-tax differences (Hjelström et al., 2019). Larger values of *BTD* and *CTD* reflect more tax avoidance behavior. In equation (5), we include a set of control variables that prior research has shown to be related to corporate tax avoidance (Atwood et al., 2012; Dyreng et al., 2008, 2010).[29]

Table 5 Panel A reports the results of estimating equation (5). We find that, across all measures of tax avoidance, the coefficient on *B4* is significantly positive ($\lambda_1 = 0.005$, *t-stat* $= 2.67$ for *GAAP_ETR*; $\lambda_1 = 0.010$, *t-stat* $= 2.62$ for *CASH_ETR*; $\lambda_1 = 0.000$, *t-stat* $= 3.51$ for *BTD*; $\lambda_1 = 0.001$, *t-stat* $= 2.13$ for *CTD*). These results are consistent with Big 4's private clients having greater incentives to minimize tax and the notion that these firms' greater flexibility in (downward) earnings management is at least partially motivated by their tax incentives.

In Panel B, we further examine whether the differential tax avoidance behavior between Big 4's and non-Big 4's private client firms is affected by the client firm's organizational structure. Specifically, we augment equation (5) by allowing the relation between *Tax Avoidance* and *B4* to differ between business groups and standalone firms. When we measure *Tax Avoidance* using *GAAP_ETR* and *BTD*, we find strong evidence that Big 4's standalone clients engage in more tax avoidance activities than non-Big 4's standalone clients, but the gap diminishes for business group clients.[30]

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[28] In line with Hjelström et al. (2019), we retain loss client firms in the specifications in which we use *BTD* or *CTD* as our dependent variable.

[29] The control variables include firm size (*LNASSETS*), leverage (*LEV*), return on assets (*ROA*), whether the firm experiences a loss (*LOSS*), cash holdings (*CASH*), asset turnover (*ATURN*), volatility of sales (*STDSALES*), ratios of tangible assets (*TANG*) and intangible assets (*INTAN*) to lagged total assets, ownership dispersion (*DISP*), and auditor-charged tax service fees (*LNTAX_FEES*). In addition, we control for the level of earnings management (*ADA*) because Frank et al. (2009) find that managers can manage book income upward and taxable income downward in the same period. Lastly, we include year and industry fixed effects in equation (5).

[30] Hanlon and Heitzman (2010) note that, unlike tax avoidance measures that rely on cash taxes paid (e.g., *CASH_ETR*, *CTD*), tax avoidance measures that rely on the tax expense (e.g., *GAAP_ETR*, *BTD*) are affected by changes in tax accounting accruals. The results of Table 5 Panel A suggest that, relative to standalone firms, business groups engage in more tax avoidance when we measure tax avoidance using *CASH_ETR* and *CTD* but less tax avoidance when we measure tax avoidance using *BTD*. To the extent that *BTD* and *GAAP_ETR* are more likely to capture tax avoidance strategies that affect accruals choices, these findings are consistent with business groups having a stronger preference for tax avoidance strategies that are less likely to have financial reporting consequences. In that regard, the significantly negative coefficient on *B4* $\times$ *GROUP* in the specifications of Table 5 Panel B when we measure tax avoidance using *GAAP_ETR* and *BTD* is consistent with Big 4 auditors restricting tax avoidance strategies that are likely to affect the accruals quality of their business group clients.

Table 5. The relation between auditor size and tax avoidance for private client firms.

Panel A: Differences in tax avoidance between Big 4 and non-Big 4 private client firms

	(1)		(2)		(3)		(4)	
	Dep. Var. = GAAP_ETR		*Dep. Var. = CASH_ETR*		*Dep. Var. = BTD*		*Dep. Var. = CTD*	
Variables	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*
B4	0.005***	2.67	0.010***	2.62	0.000***	3.51	0.001**	2.13
GROUP	0.001	0.91	0.012***	4.35	−0.000**	−2.02	0.001***	3.81
LNASSETS	−0.000	−0.12	0.006***	2.94	−0.000	−0.61	0.001***	5.77
LEV	0.005	1.35	0.025***	3.75	−0.000	−0.06	0.003***	4.98
ROA	0.079***	7.58	0.453***	27.53	0.008***	17.00	0.081***	46.88
LOSS					−0.004***	−24.39	−0.006***	−15.12
CASH	−0.017***	−3.98	−0.020**	−2.35	−0.002***	−5.28	−0.000	−0.49
ATURN	−0.007***	−10.32	0.000	0.32	−0.000***	−11.09	0.000**	2.45
STDSALES	0.006**	2.10	−0.017***	−3.45	0.001***	3.16	−0.002***	−4.06
INTAN	−0.098***	−11.05	−0.103***	−6.17	−0.009***	−16.43	−0.007***	−5.68
TANG	0.008**	2.21	0.036***	5.47	0.001***	3.30	0.005***	8.50
ADA	−0.030***	−3.95	0.009	0.58	−0.001	−1.53	−0.004***	−2.83
LNTAX_FEES	−0.000	−0.83	0.002	1.40	−0.000***	−4.97	−0.001*	−1.93
DISP	−0.002	−1.15	0.002	0.84	0.000	1.54	0.000	1.54
Constant	−0.241***	−13.58	−0.390***	−11.89	0.001	1.24	−0.022***	−7.90
Year FE	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
# of obs.	19,442		14,384		21,789		15,800	
R-squared	0.097		0.111		0.124		0.242	

(*Continued*).

Table 5. Continued.

Panel B: Differences in tax avoidance between Big 4 and non-Big 4 private client firms – Business group versus standalone firms

	(1)		(2)		(3)		(4)	
	Dep. Var. = GAAP_ETR		*Dep. Var. = CASH_ETR*		*Dep. Var. = BTD*		*Dep. Var. = CTD*	
Variables	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*
B4	0.010***	3.86	0.007	1.02	0.001***	5.37	0.000	0.36
GROUP	0.003**	1.97	0.012***	3.98	− 0.000	− 0.10	0.001***	3.29
B4 × GROUP	− 0.010***	− 2.80	0.004	0.56	− 0.001***	− 4.11	0.001	0.99
LNASSETS	− 0.000	− 0.32	0.006***	2.95	− 0.000	− 0.72	0.001***	5.76
LEV	0.004	1.23	0.025***	3.75	− 0.000	− 0.18	0.003***	4.99
ROA	0.079***	7.56	0.453***	27.52	0.008***	16.98	0.081***	46.87
LOSS					− 0.004***	− 24.47	− 0.006***	− 15.11
CASH	− 0.017***	− 3.93	− 0.020**	− 2.36	− 0.002***	− 5.19	− 0.000	− 0.50
ATURN	− 0.007***	− 10.23	0.000	0.32	− 0.000***	− 10.90	0.000**	2.44
STDSALES	0.005**	2.05	− 0.017***	− 3.46	0.001***	3.05	− 0.002***	− 4.06
INTAN	− 0.097***	− 10.90	− 0.103***	− 6.17	− 0.009***	− 16.18	− 0.008***	− 5.70
TANG	0.008**	2.30	0.036***	5.46	0.001***	3.47	0.005***	8.50
ADA	− 0.029***	− 3.82	0.009	0.56	− 0.001	− 1.34	− 0.004***	− 2.86
LNTAX_FEES	− 0.000	− 0.46	0.002	1.36	− 0.000***	− 4.67	− 0.001*	− 1.92
DISP	− 0.001	− 0.92	0.002	0.81	0.000*	1.89	0.000	1.49
Constant	− 0.239***	− 13.46	− 0.390***	− 11.89	0.001	1.18	− 0.022***	− 7.86
Year FE	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
# of obs.	19,442		14,384		21,789		15,800	
R-squared	0.098		0.111		0.125		0.242	

Panel A (B) presents the OLS regression results of estimating the relation between auditor size and tax avoidance for private firms (auditor size and tax avoidance for group versus standalone private firms). We measure tax avoidance using the GAAP effective tax rate multiplied by − 1 (*GAAP_ETR,* column 1), the cash effective tax rate multiplied by − 1 (*CASH_ETR*, column 2), the level of book-tax differences (*BTD*, column 3), and the level of book-cash tax differences (*CTD*, column 4). Higher values of these measures indicate greater tax avoidance. *GROUP* equals 1 if a client firm is the parent company of a business group, and 0 if it is a standalone firm. T-statistics are calculated based on heteroscedasticity and autocorrelation robust standard errors clustered at the client-firm level. ∗, ∗∗, and ∗∗∗ indicate significance at the two-tailed 10%, 5%, and 1% levels, respectively. See the Appendix for variable definitions.

6. Additional Analyses

6.1. Implications of Auditor-Provided Tax Services for Audit Quality

We focus on the extent to which private firms rely on auditor-provided tax services to shed light on a potential channel through which auditors accommodate private firms' preference for tax savings over earnings informativeness. Specifically, we examine the relation between auditor-provided tax service fees and audit quality separately for Big 4 and non-Big 4 private-firm clients that purchase tax services from their auditors. We limit our analyses to private client firms with *LNTAX_FEES* $>$ 0 to mitigate potential concerns that client firms may self-select into purchasing auditor-provided tax services. We present our analyses in Table 6 Panels A and B.

Table 6 Panel A (B) presents the results of estimating the relation between auditor-provided tax services and audit quality for Big 4 (non-Big 4) clients only. We find that auditor-provided tax services impair audit quality, measured by *AQ* and *DA*-, consistent with the expectation that, as auditors generate more tax service fees, they are likely to be more tolerant of tax-motivated, earnings management. Specifically, we find a significantly negative coefficient on *LNTAX_FEES* when we measure audit quality using *AQ*, *ADA* or *DA*- in the subsample of Big 4 auditees (Panel A). Furthermore, we find a significantly negative coefficient on *LNTAX_FEES* when we measure audit quality using *AQ* and *DA*- in the subsample of non-Big 4 auditees (Panel B).[31] While these results provide evidence supporting the notion that auditor independence may be impaired by allowing more flexibility in tax-motivated earnings management as *LNTAX_FEES* increases, we do not detect significant differences (untabulated) in the audit quality-*LNTAX_FEES* relation between the Big 4 and the non-Big 4 client firms regardless of how we measure audit quality.[32]

6.2. Differences in Audit Quality and Tax Avoidance Between Private and Public Client Firms

In this section, we investigate whether the relation between auditor size and audit quality varies between the two segments of the audit market. On the demand side, public client firms rely more on high-quality financial reporting to communicate with capital providers, whereas private client firms are more concerned about the tax implications of financial reporting (Ball & Shivakumar, 2005; Burgstahler et al., 2006). On the supply side, public client firms have more dispersed ownership and severe agency conflicts between managers and shareholders, so they are more susceptible to litigation than private client firms are (Badertscher et al., 2014; Chaney et al., 2004; Hope et al., 2012; Hope et al., 2013). In a less litigious environment, auditors reduce audit effort or audit quality (Simunic, 1980). We estimate the following regression model using a propensity-score matched sample (probit first-stage model; caliper distance: 0.001; no

[31] While the relation between *LNTAX_FEES* and *DA* $+$ is insignificant in the Big 4 subsample, it is significantly negative in the non-Big 4 subsample.

[32] While higher *LNTAX_FEES* causes concerns about auditor independence, it also reflects client firms' demand for more sophisticated tax planning strategies, especially when they hire Big 4 tax consultants. Prior research suggests that sophisticated tax planning strategies are not always faced with more stringent trade-offs between financial and tax reporting and firms adopting such tax strategies are often allowed more financial reporting flexibility (Frank et al., 2009; Hanlon & Heitzman, 2010). Thus, client firms that purchase more Big 4-provided tax services and seek more sophisticated tax planning strategies may not have a stronger preference for using earnings management to achieve tax goals as do client firms that purchase more non-Big 4-provided tax services and seek less sophisticated tax advice. To the extent that this conjecture is true, our results are reconcilable with Kim et al. (2003)'s argument that the Big 4 auditors are less likely than non-Big 4 auditors to restrict income-decreasing earnings management *only* when both auditors and clients prefer income-decreasing accrual choices. On a related note, McGuire et al. (2012) suggest that auditors that have high levels of tax expertise (such as the Big 4) offer paid tax services that can benefit clients from both a tax and a financial statement perspective.

Table 6. Implications of auditor-provided tax services for audit quality.

Panel A: Auditor-provided tax services and audit quality – Limiting the sample to Big 4 clients with LNTAX_FEES > 0

	(1)		(2)		(3)		(4)	
	Dep. Var. = AQ		*Dep. Var. = ADA*		*Dep. Var. = DA+*		*Dep. Var. = DA-*	
Variables	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*
LNTAX_FEES	−0.002**	−2.27	−0.005*	−1.91	0.002	0.86	−0.001*	−1.92
Controls	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
# of obs.	2,556		2,556		1,153		1,403	
R-squared	0.276		0.150		0.650		0.650	

Panel B: Auditor-provided tax services and audit quality – Limiting the sample to non-Big 4 clients with LNTAX_FEES > 0

	(1)		(2)		(3)		(4)	
	Dep. Var. = AQ		*Dep. Var. = ADA*		*Dep. Var. = DA+*		*Dep. Var. = DA-*	
Variables	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*
LNTAX_FEES	−0.002***	−2.86	−0.001	−0.45	−0.005**	−2.21	−0.002**	−2.57
Controls	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
# of obs.	4,274		4,274		1,990		2,284	
R-squared	0.262		0.117		0.655		0.686	

Panel A (B) presents the OLS regression results of estimating the relation between auditor-provided tax service fees and audit quality for Big 4 (non-Big 4) client firms that buy tax services from their auditor. *AQ* is the Dechow and Dichev (2002) accrual quality measure, modified by McNichols (2002), multiplied by −1; *ADA* is the absolute value of discretionary accruals as in Kothari et al. (2005), multiplied by −1; *DA+* (*DA-*) represents income-increasing (income-decreasing) discretionary accruals. Higher values of *AQ* and *ADA* indicate higher audit quality. T-statistics are calculated based on heteroscedasticity and autocorrelation robust standard errors clustered at the client-firm level. *, **, and *** indicate significance at the two-tailed 10%, 5%, and 1% levels, respectively. See the Appendix in the manuscript for variable definitions.

replacement) of private- and public-client-firm observations between 2010 and 2016: [33]

$$\begin{aligned} Audit\ Quality_{i,t} = {} & \pi_0 + \pi_1 B4_{i,t} + \pi_2 LISTED_{i,t} + \pi_3 B4_{i,t} \times LISTED_{i,t} \\ & + CONTROLS + YEAR\_FE + INDUSTRY\_FE + \varepsilon_{i,t}, \end{aligned} \tag{6}$$

where *LISTED* equals 1 if the client firm is publicly listed, and 0 otherwise. The control variables in equation (6) are the same as those used in equation (3).[34] If the auditor size-audit quality relation varies systematically between public and private client firms, the coefficient on *B4* × *LISTED* (π_3) should be significantly different from zero.

Table 7 Panel A reports the results of estimating equation (6). In columns 1 and 2, we measure audit quality using *AQ* and *ADA*, respectively. We again find a significantly negative π_1, confirming H1 that Big 4's private client firms exhibit lower audit quality than non-Big 4's private

[33] Our analysis of the expanded sample consists of 24,154 client-firm observations before we perform propensity-score matching. There are 2,365 publicly listed client-firm observations.

[34] We propensity-score match private and public firms on *B4* and all control variables in equation (3) for firms in the same industry-year. The sample for estimating equation (6) contains 2,256 observations.

client firms. However, we find that the difference in audit quality between Big 4 and non-Big 4 is mitigated for public client firms, as we detect a significantly positive $\pi_3$in both columns. This result is consistent with our prediction that, in the public client-firm segment of the audit market where litigation risk is higher and capital market demand for financial reporting quality is stronger, large auditors are more likely to deliver high audit quality. Further analyses based on the sign of discretionary accruals indicate that the effect of listing status on the auditor size-audit quality relation is more significant in the *DA-* subsample (column 4).[35,36]

In Table 7 Panel B, we estimate an expanded version of equation (5) by allowing the relation between *Tax Avoidance* and *B4* to differ between public (*LISTED* = 1) and private (*LISTED* = 0) client firms.[37] Across all tax avoidance measures, we find consistent evidence that Big 4's private client firms engage in more tax avoidance activities than non-Big 4's private client firms (the coefficient on *B4* is significantly positive). We observe no significant difference in tax avoidance between Big 4 and non-Big 4 public client firms (the sum of the coefficients on *B4* and *B4* × *LISTED* is not reliably different from zero in all columns). Additionally, the coefficient on *B4* × *LISTED* is significantly negative for all four tax avoidance measures, consistent with the differences in tax avoidance between Big 4 and non-Big 4 auditees being weaker in the public-firm market than in the private-firm market.

6.3. Additional Cross-Sectional Analyses

6.3.1. Client-firm ownership dispersion

Hope et al. (2012) argue that, because agency costs are higher, auditors supply more effort for firms with more dispersed ownership. Building on Hope et al. (2012), we examine whether private firms' ownership dispersion affects the relation between auditor size and audit quality. We estimate an expanded version of model (3) by adding an interaction term between *DISP* and *B4*. We present the results in our online Appendix. We find that the coefficient on *B4* × *DISP* is significantly positive when we measure audit quality using *AQ*, *ADA*, and *DA-*, suggesting that the negative relation between auditor size and audit quality is mitigated when the Big 4 auditors have stronger incentives to supply effort and mitigate agency costs.

6.3.2. Client-firm importance

Larger clients create greater economic fee dependence and a threat to auditor independence. However, Reynolds and Francis (2000) provide evidence that larger auditors deliver higher audit quality for larger, more important clients. The authors explain that these clients attract more scrutiny and larger auditors suffer a greater loss in reputation for audit failures (DeFond & Zhang, 2014). In supplemental analyses, we estimate the relation between auditor size and audit quality conditional on client importance. We find a significantly positive (negative) coefficient on *B4*

[35]Surprisingly, we fail to find a significant π_3 in the *DA+* subsample. Further analyses indicate that this no-result is sensitive to how we measure total accruals (*TA*) in equation (6). If we use the absolute value of *TA* as opposed to the signed *TA* as a control variable, we are able to detect a significantly negative $\pi_3$in both *DA+* and *DA-* subsamples.

[36]In untabulated sensitivity analyses we propensity-score match private and public firms on *B4, LNASSETS,* and *LEV* (instead of all control variables in equation (3)) for firms in the same industry-year. Inferences remain unchanged.

[37]For this test, we propensity-score match (probit first-stage model; caliper distance: 0.001; no replacement) private and public firms on *B4* and all control variables in equation (5) for firms in the same industry-year. The number of observations ranges from 1,094 to 1,704 in this panel, depending on the measure of tax avoidance. Inferences remain unchanged when we propensity-score match private and public firms on *B4, LNASSETS,* and *LEV* for firms in the same industry-year.

Table 7. The relation between auditor size and audit quality and tax avoidance for private and public client firms – Using a propensity-score matched sample.

Panel A: Auditor size and audit quality – Matching private and public firms on *B4* and all control variables

	(1)		(2)		(3)		(4)	
	Dep. Var. = *AQ*		*Dep. Var.* = *ADA*		*Dep. Var.* = *DA+*		*Dep. Var.* = *DA-*	
Variables	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*
B4	−0.004***	−3.43	−0.010**	−2.09	−0.005*	−1.91	−0.008***	−2.80
LISTED	−0.001	−0.78	0.000	0.03	−0.000	−0.17	0.001	0.17
B4 × *LISTED*	0.006***	3.44	0.016**	2.42	0.005	1.55	0.012***	2.97
Controls	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
# of obs.	2,256		2,256		1,089		1,167	
R-squared	0.347		0.099		0.461		0.434	

Panel B: Auditor size and tax avoidance – Matching private and public firms on B4 and all control variables

	(1)		(2)		(3)		(4)	
	Dep. Var. = *GAAP_ETR*		*Dep. Var.* = *CASH_ETR*		*Dep. Var.* = *BTD*		*Dep. Var.* = *CTD*	
Variables	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*
B4	0.017**	2.05	0.042***	3.63	0.001*	1.69	0.002**	2.00
LISTED	0.056***	6.66	0.088***	7.72	0.004***	6.73	0.004***	4.69
B4 × *LISTED*	−0.028**	−2.38	−0.053***	−3.21	−0.002***	−2.61	−0.003**	−2.47
Controls	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
# of obs.	1,346		1,094		1,704		1,364	
R-squared	0.159		0.211		0.305		0.523	

Panel A (B) presents the OLS regressions of estimating the relation between auditor size and audit quality (tax avoidance) for a sample of propensity-score matched private and public firms. In Panel A (B), we propensity-score match private and public firms on *B4* and all control variables in equation (3) (equation (5)). *AQ* is the Dechow and Dichev (2002) accrual quality measure, modified by McNichols (2002), multiplied by −1; *ADA* is the absolute value of discretionary accruals as in Kothari et al. (2005), multiplied by −1; *DA+* (*DA-*) represents income-increasing (income-decreasing) discretionary accruals. *GAAP_ETR* is the GAAP effective tax rate, multiplied by −1; *CASH_ETR* is the cash effective tax rate, multiplied by −1; *BTD* is the level of book-tax differences; *CTD* is the level of book-cash tax differences. Higher values of *AQ* and *ADA* (*GAAP_ETR, CASH_ETR, BTD, CTD*) indicate higher audit quality (greater tax avoidance). T-statistics are calculated based on heteroscedasticity and autocorrelation robust standard errors clustered at the client-firm level. ∗, ∗∗, and ∗∗∗ indicate significance at the two-tailed 10%, 5%, and 1% levels, respectively. See the Appendix for variable definitions.

× *IMPORTANCE* in the models of *AQ*, *ADA* and *DA-* (*DA+*), consistent with reputation considerations incentivizing Big 4 auditors to increase audit quality for their larger, more important private clients. We present these analyses in our online Appendix.

6.4. Extended Analyses Using Data from Other European Countries

Our results are consistent with large auditors allowing more flexibility in tax-motivated, income-decreasing accrual choices for private client firms than small auditors in the U.K. To examine whether the results hold outside the U.K., we replicate our tests using a sample of six European countries – Belgium, Finland, France, Netherlands, Norway, and Spain – over the same sample period (Bauwhede & Willekens, 2004; Che et al., 2020; Van Tendeloo & Vanstraelen, 2008). We adopt the sample selection criteria described in section 4.1 and the most recent mandatory

audit threshold in each country during our sample period (2010–2016), resulting in a cross-country sample of 38,238 firm-year observations.[38] We estimate equation (3), controlling for country fixed effects, and find qualitatively the same results as those based on the U.K. sample, suggesting that our main results are not unique to the U.K. setting. We present these analyses in our online Appendix.

7. Conclusion

In this study, we examine the Big 4 versus non-Big 4 differences in audit quality for a sample of U.K. private firms. Private firms' financial reporting is oriented more to minimizing tax and less to reducing information asymmetry (Ball & Shivakumar, 2005; Burgstahler et al., 2006). We find that Big 4's private clients have higher levels of discretionary accruals and more errors in estimating accruals than their non-Big 4's counterparts. Further analyses reveal that Big 4 auditors are more effective at constraining upward earnings management but are more tolerant of downward earnings management for private clients. These results are consistent with Big 4 auditors adjusting the supply of audit quality in a more competitive segment of the audit market where client firms perceive the benefit from tax savings to outweigh the cost of reduced earnings informativeness. Using a battery of alternative tax avoidance measures, we confirm that Big 4's private clients engage in more tax avoidance than do non-Big 4's private clients.

We find that the relation between auditor size and audit quality (tax avoidance) varies with client firms' organizational structure. Business groups firms have weaker tax minimization incentives and a stronger demand for earnings quality than standalone firms (Bonacchi et al., 2019). Our results indicate that the Big 4 versus non-Big 4 audit quality (tax avoidance) differences are reduced for business groups.

In supplemental analyses we find that auditor-provided tax services impair audit quality for both Big 4 and non-Big 4 auditors consistent with tax considerations affecting audit quality in our setting. We also find that the negative (positive) relation between auditor size and audit quality (tax avoidance) disappears in the public-firm market when Big 4 auditors have stronger incentives to deliver high audit quality. Lastly, we show that the negative link between auditor size and audit quality is significantly weaker for clients with dispersed ownership structure and for larger, more important clients, consistent with the demand for high quality audits and auditor reputation considerations being important drivers of the Big 4 versus non-Big 4 differences in audit quality for private firms.

Our study is subject to several potential limitations. First, although we use several approaches to address the self-selection bias, this issue is inherent in the stream of research that examines differences in audit quality between Big 4 and non-Big 4 auditors and cannot be fully resolved empirically. Second, although our results are consistent with Big 4 auditors emphasizing tax planning for their private-firm audit clients, we cannot completely rule out that Big 4 auditors' innate conservatism, incentives to mitigate litigation risk. or incentives to meet the demand from various stakeholders (e.g. dividend smoothing) at least in part account for our findings. Third, if tax minimization incentives are the dominant factor that shapes the financial reporting choices of private firms and the audit services administered to private-firm clients by the Big 4, we should expect Big 4 client firms that buy tax services from their auditor to have lower audit quality than non-Big 4 client firms that buy tax services from their auditor. However, we do not find empirical evidence consistent with this expectation. One possible explanation is that the paid tax planning services offered by auditors that are both audit and tax experts (in our setting, the Big 4) are not

[38] https://www.accountancyeurope.eu/wp-content/uploads/1605_Audit_exemption_thresholds_update.pdf

always accompanied by more stringent trade-offs between financial and tax reporting (McGuire et al., 2012). We leave it to future research to better understand how the implementation of tax planning strategies affects private firms' financial reporting choices and the mechanisms through which paid tax services shape the trade-off between financial and tax reporting.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Supplemental Data

Supplemental data for this article can be accessed https://doi.org/10.1080/09638180.2021.1986090.

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Appendix: Variable Definitions

ADA	The absolute value of performance-adjusted discretionary accruals, as in Kothari et al. (2005), multiplied by −1;
AQ	The Dechow and Dichev (2002) accruals quality measure, as modified by McNichols (2002), multiplied by −1;
ATURN	The ratio of sales to lagged total assets;
B4	An indicator variable that equals 1 if a firm is audited by a Big 4 auditor in a specific fiscal year, and 0 otherwise;
BTD	The level of book-tax differences calculated as pre-tax income times the statutory tax rate less tax expense. We scale this variable by the level of lagged total assets. Higher values of *BTD* indicate more book-tax differences;
CASH	The ratio of cash to lagged total assets;
CASH_ETR	The ratio of cash taxes paid to pre-tax income. We multiply *CASH_ETR* by −1, so that higher values of this measure indicate more tax avoidance;
CTD	The level of book-cash tax differences calculated as pre-tax income times the statutory tax rate less cash taxes paid. We scale this variable by the level of lagged total assets. Higher values of *CTD* indicate more book-cash tax differences;
CURR	The ratio of current assets to current liabilities;
DA+	Income-increasing performance-adjusted discretionary accruals;
DA-	Income-decreasing performance-adjusted discretionary accruals;
DISP	An indicator variable that equals 1 if no shareholder owns more than 50% of the firm (BvD Independence Indicator = 'A' or 'B'), and 0 otherwise (BvD Independence Indicator = 'C' or 'D');
GAAP_ETR	The ratio of tax expense to pre-tax income. We multiply *GAAP_ETR* by −1, so that higher values of this measure indicate more tax avoidance;
GROUP	An indicator variable that equals 1 if a client firm is the parent company of a business group, and 0 if it is a standalone firm;
GROWTH	The percentage change in sales in year *t* relative to year *t*-1;
IMPORTANCE	The ratio of sales of a client firm in a given year to the total amount of sales of all client firms of the audit firm in that year;
INTAN	The ratio of intangible assets to lagged total assets;
LEV	The ratio of long-term debt to lagged total assets;
LISTED	An indicator variable that equals 1 if a firm is publicly listed, and 0 otherwise;
LNASSETS	The natural logarithm of total assets;
LNTAX_FEES	The natural logarithm of tax fees;
LOSS	An indicator variable that equals 1 if the firm reports negative pre-tax income in a specific year, and 0 otherwise;
REC & INV	The ratio of receivables and inventory to lagged total assets;
ROA	The ratio of pre-tax income to lagged total assets;
STDSALES	The five-year standard deviation of sales;
TA	The ratio total accruals to lagged total assets;
TANG	The ratio of PPE to lagged total assets;
TENURE	An indicator variable that equals 1 if auditor tenure is three years or less, and 0 otherwise (Francis & Yu, 2009);
Z-SCORE	Altman's Z-score calculated as 1.2 × (net working capital/total assets) + 1.4 × (retained earnings/total assets) + 3.3 × (EBIT/total assets) + 0.6 × (book value of equity/book value of total liabilities) + sales/total assets;
ΔVARIABLE	The difference between the value of a given variable in year *t* relative to its value in year *t*-1.