GEORGETOWN UNIVERSITY McDonough SCHOOL of BUSINESS

Center for Financial Markets & Policy

Do Auditor-Provided Tax Services Impair Independence or Generate Knowledge Spillover? Evidence from Assessing Tax Accrual Quality

Preeti Choudhary
McDonough School of Business
Georgetown University
pc299@georgetown.edu

Allison Koester
McDonough School of Business
Georgetown University
apk29@georgetown.edu

Robert Pawlewicz
School of Management
George Mason University
rpawlewi@gmu.edu

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Abstract:
This study examines the association between auditor-provided tax services (APTS) and financial reporting quality to determine if APTS impairs auditor independence or generates knowledge spillover. Lower (higher) financial reporting quality is generally viewed as evidence supporting auditor independence impairment (knowledge spillover). We use the quality of the income tax accrual estimate from Choudhary et al. (2013) as our measure of financial reporting quality because the tax account is where spillover should be most evident. We find a negative association between tax accrual quality and APTS, consistent with auditor independence impairment. Cross-sectional tests reveal that engaging an audit expert does not mitigate lower tax accrual quality for firms with APTS. Our findings are consistent with regulatory concerns that APTS have the potential to impair auditor independence.

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1. Introduction

Public accounting firms have a long history of providing non-audit (e.g., advisory, tax, and consulting) services to their audit clients. Many groups have expressed concern that the fees generated from providing non-audit services to audit clients creates a conflict of interest and can impair auditor independence (Frankel et al. 2002; Sarbanes-Oxley Act of 2002; SEC 2003; Srinidhi and Gul 2007). This is concerning because investor confidence in financial reporting depends on the assurance provided by independent auditors (Metcalf Committee 1976; SEC 2003). Others believe that providing non-audit services to audit clients generates knowledge spillover, which improves auditors' understanding of their audit client and leads to higher quality financial reporting (Whisenant et al. 2003; Kinney et al. 2004; Lim and Tan 2008). This study sheds light on this debate by examining the relation between tax accrual quality and the extent of tax services provided by a corporation's audit firm. We focus on the tax accrual because it lies at the intersection of audit and tax services and is where knowledge spillover, if present, is most likely to manifest. Worse tax accrual quality is consistent with tax services impairing auditor independence and decreasing financial reporting quality, while better tax accrual quality is consistent with tax services generating knowledge spillover and improving financial reporting quality.

After the accounting scandals and audit failures of the early 2000s, regulators created restrictions intended to improve financial reporting quality. A number of these regulations addressed concerns about auditor independence,[1] and several specifically addressed the purchase of tax services from a corporation's audit firm. Non-audit services related to tax compliance, tax

[1] For example, Sections 201 and 202 of Title II of the Sarbanes-Oxley Act of 2002 (SOX) explicitly disallows nine types of non-audit services (bookkeeping, financial information systems design and implementation, appraisal or valuations services, actuarial services, internal audit, management functions, broker/dealer, legal services unrelated to the audit, and those not approved by the Board of Directors).

planning, and tax consulting are broadly referred to in the accounting literature as auditor-provided tax services (APTS). In 2006, the SEC approved the Public Company Accounting Oversight Board's (PCAOB) decision to restrict public accounting firms from providing certain types of tax services to their public company audit clients due to perceived auditor independence impairment (PCAOB 2011). For example, the PCAOB restricts accounting firms from providing their audit clients with services related to confidential or aggressive tax position transactions (Rule 3522) and services with contingent fee payment structures (Rule 3521), both of which had been common practices prior to the PCAOB's intervention. The PCAOB also requires audit committee approval for APTS (Rule 3524). These restrictions led to declines in accounting firms providing tax services to their public company audit clients (Maydew and Shackleford 2007).

We investigate whether APTS is associated with auditor independence impairment or knowledge spillover by examining the relation between APTS and a new measure of financial reporting quality specific to the tax account. Financial reporting uses accruals so recognized revenues and expenses more closely reflect a firm's economic performance relative to cash inflows and outflows (Dechow 1994; Dechow et al. 1998). However, "accruals are frequently based on assumptions and estimates that, if wrong, must be corrected in future accruals and earnings" (Dechow and Dichev 2002, p.36). These errors in assumptions and estimation, in addition to the related corrections in future periods, add noise to the beneficial role of accruals. The quality of accruals (and therefore earnings) is decreasing in the magnitude of these errors and corrections. We use a measure of tax accrual quality (TaxAQ) that captures variation in the extent to which the income tax accrual maps into income tax-related cash flows. Lower values indicate more mismapping, representing greater estimation error and therefore lower tax accrual quality.

We focus on the quality of the income tax accrual because the accrual lies at the intersection of audit services and tax services. APTS may be associated with higher financial reporting quality in the tax account due to greater ongoing interaction between the audit engagement team and tax personnel during all phases of the audit (e.g., engagement planning, tests of controls, substantive procedures and audit documentation review). Auditors are likely to have more frequent and in-depth discussions with tax service providers from the same accounting firm, increasing the auditor's understanding of a client's tax decisions and potentially improving the quality of the firm's tax estimates. To the extent that knowledge spillover from APTS exists and improves financial reporting quality, we expect APTS to be associated with better tax accrual quality.

Alternatively, APTS may be associated with worse tax accrual quality for at least two reasons. First, Joe and Vandervelde (2007) note that "group affiliation influences judgment and decision making, leading individuals to attribute more positive traits to members in the same group (in-group) than to members of another group (out-group) (Tajfel and Turner 1986; Turner 1987)" (p.471). This "in-group identification effect" may lead auditors to lower their level of professional skepticism when reviewing work performed by tax professionals from their own accounting firm relative to work performed by tax professionals from another accounting firm. This effect may also induce the audit team to test management's assertions in the tax accounts less rigorously and lead to independence impairment when the audit firm tests estimates made, in part, by the audit firm's tax personnel. Second, an auditor of a firm that purchases APTS may permit more within-GAAP earnings management in order to preserve the firm's willingness to purchase both audit and non-audit services (Antle et al. 2006). We find evidence that APTS is associated with worse tax accrual quality, consistent with APTS impairing auditor independence.

Prior research examining the relation between financial reporting quality and APTS generally finds evidence consistent with tax services improving financial reporting quality, consistent with APTS generating knowledge spillover (Kinney et al. 2004; Robinson 2008; Seetharaman et al. 2011; Gleason and Mills 2011; DeSimone et al. 2013). We believe our research design offers two improvements relative to prior research. First, we explicitly consider endogeneity (i.e., firms that have more difficulty in estimating their tax accrual could be more likely to purchase APTS), while these papers fail to do so. Recent research demonstrates the importance of controlling for potential selection bias when examining outcomes of manager choice variables (Armstrong et al. 2010; Lawrence et al. 2011; McGuire et al. 2012). We address the potential endogeneous nature of the decision to purchase APTS using a Heckit treatment effect regression model in our main analyses and consider propensity score matching in our sensitivity analyses. Our results are robust to both methods of addressing the potential for self-selection bias.

Second, we use a measure of financial reporting quality that captures estimation error present in the specific account where audit and tax services overlap. Other studies have used general measures of financial reporting quality that are not tax-specific (Ashbaugh et al. 2003; Srinidhi and Gul 2007). Some studies focus on financial reporting measures where audit and tax work overlap (Gleason and Mills 2011; Harris and Zhou 2013; DeSimone et al. 2013). We believe our tax accrual quality measure is superior to the measures used in these studies (e.g., tax-related internal control weaknesses, tax-related restatements, and tax reserves for uncertain tax positions) for the following reasons. First, tax accrual quality captures estimation error in all tax sub-accounts (e.g., changes in short-term deferred tax assets and liabilities, the valuation allowance, unrecognized tax benefits, and the designation of foreign earnings as permanently

reinvested, etc.), making the measures we use more comprehensive than a measure which captures only one of these sub-accounts (Gleason and Mills 2011).

Second, our tax accrual quality measure is continuous, meaning it provides information across the full spectrum of financial reporting quality. In contrast, tax-related ICWs and tax-related restatements are binary measures which capture infrequent outcomes at the extreme negative end of the financial reporting quality spectrum and do not reflect the heterogeneity of financial reporting quality within the two classifications (Harris and Zhou 2013; DeSimone et al. 2013). In addition, these binary measures reflect a point-in-time outcome and could be due to *earlier identification* of issues in the tax account, not necessarily the *absence* of issues in the tax account. If tax and audit engagement teams from the same accounting firm are more likely to interact throughout the year, then existing tax issues may be identified and rectified immediately prior to fiscal year-end, such that a firm's internal controls would be deemed effective and a future restatement would not be required. Our tax accrual quality measure captures variation in the extent to which the tax accrual maps into cash taxes paid. Both the tax accrual and cash taxes paid are affected continuously throughout the year as a corporation operates, indicating our measure reflects more than just a single point-in-time outcome.

Our empirical results reveal a negative relation between tax accrual quality and the amount of APTS a corporation purchases. This negative relation is incremental to controlling for firm characteristics related to complexity in the financial reporting of taxes and the presence of greater judgment and estimation related to the tax accrual (Choudhary et al. 2013). We include these control variables to mitigate concerns that the negative association between tax accrual quality and APTS is due to firms choosing APTS when their taxes are more complicated. We also mitigate this concern by using a Heckit model to control for firm characteristics found to be

associated with the selection of APTS (Lassila et al. 2011; McGuire et al. 2012). The presence of lower tax accrual quality is interpreted as consistent with auditor independence impairment, not knowledge spillover. Cross-sectional tests reveal that hiring an expert auditor does not mitigate this lower tax accruals quality, contrary to expectations based on prior research (Gul et al. 2009; Reichelt and Wang 2010).[2]

An alternate explanation for our findings could be that fees for any non-audit services, not just APTS, impair auditor independence. To understand whether this alternate explanation is supported empirically, we examine the relation between tax accrual quality and fees a corporation pays to its audit firm for advisory services unrelated to audit or tax services. We fail to find an association between the fees generated from these advisory services and TaxAQ, consistent with our main finding capturing the unique relation between APTS and tax accrual quality. Further, this result indicates that our main finding of a negative association between APTS and TaxAQ potentially arises due to a lack of independence from the audit firm's role in the tax accrual estimation process, rather than economic dependence based solely on the amount of non-audit fees received. We expect our finding that APTS have the potential to impair auditor independence to be of interest to regulators, investors, and fellow academics.

This paper proceeds as follows. Section 2 provides background for our research question and details relevant literature. Section 3 develops our hypotheses and Section 4 details our research design choices. Sections 5 and 6 discuss our empirical results, and Section 7 concludes.

[2] While many studies find evidence that industry expert audit firms provide higher quality audit, Minutti-Meza (2013) provides evidence that expert auditors do not provide higher quality audits relative to non-expert firms.

2. Background and Related Literature

2.1. Providing Non-Audit Services to Audit Clients

A number of prior studies investigate whether the provision of non-audit services (where non-audit services capture both tax and other services such as consulting) for audit clients results in independence impairment as evidenced by lower financial reporting quality or in knowledge spillover as evidenced by higher financial reporting quality. Empirical findings are mixed. Some studies have documented no association between non-audit services and financial reporting quality using discretionary accruals, meeting earnings benchmarks, and market reactions to earnings releases as financial reporting quality proxies (Reynolds et al. 2004; Chung and Kallapur 2003; Ashbaugh et al. 2003). In contrast, Frankel et al. (2002) document that firms purchasing non-audit services from their audit firms have lower financial reporting quality (measured as higher discretionary accruals and a greater propensity to meet earnings benchmarks). Similarly, Srinidhi and Gul (2007) document that non-audit fees are associated with lower financial reporting quality (measured as working capital accruals quality), consistent with auditor independence impairment. Finally, other research documents evidence of non-audit services enhancing financial reporting quality through less earnings management using loss avoidance as an earnings management proxy (Krishnan and Visvanathan 2011), consistent with knowledge spillover. Many of these studies utilize indirect measures for financial reporting quality. In addition, these papers group together different types of non-audit services, making it unclear whether all or only some types of non-audit services are driving their results.

While several papers focus specifically on tax services provided to audit clients, they use general measures of financial reporting quality in their empirical analyses. These papers generally find evidence consistent with knowledge spillover and measure financial reporting

quality using restatements (Kinney et al. 2004; Seetharaman et al. 2011) and going concern modifications (Robinson 2008).[3] We believe we have a comparative advantage to studies that use general measures of financial reporting quality in that we examine a specific financial statement area (the income tax accrual) where audit and tax services overlap. If knowledge spillover from tax services exists, it would likely be most observable in the properties of the income tax accrual. Specifically, we believe that evidence of knowledge spillover should lead to lower estimation error in the tax accrual.

Donohoe and Knechel (2012) identify knowledge spillover from APTS using an alternate approach. The authors find that the provision of large amounts of APTS (i.e., tax fees as a percentage of total fees paid above the median for a given year) is associated with lower audit fees. They also document that a large amount of APTS alleviates the audit fee premium that tax aggressive audit clients pay prior to FIN 48. They interpret their findings as evidence that "knowledge spillover from the joint provision of services manifests as reduced costs [passed on] to the client" (p.3). A maintained assumption in this interpretation is that lower fees are indicative of increases in efficiencies and not a reduction in financial reporting quality. An alternative interpretation of their finding is that APTS leads to less audit effort because the auditor is willing to rely more heavily on the tax group's work and reduce his own audit effort (Tajfel and Turner 1986; Turner 1987), regardless of whether the work is more accurate. We explicitly test Donohoe and Knechel's (2012) maintained assumption by investigating the quality of a corporation's tax accrual in the presence of APTS.

[3] One exception to the findings of knowledge spillover related to APTS is Srinidhi and Gul (2007), which documents that APTS firms have lower working capital accruals quality compared with those not purchasing non-audit services, consistent with auditor independence impairment.

Other prior research examines the association between APTS and financial reporting quality using settings where audit and tax services are likely to overlap. These studies use low-probability outcomes such as the propensity for a firm to have a tax-related restatement or tax-related ICW as proxies for financial reporting quality, and generally find evidence of knowledge spillover. Seetharaman et al. (2011) and DeSimone et al. (2012) find that tax-related restatements and tax-related ICWs, respectively, are less likely when a firm purchases tax services from its auditor, consistent with knowledge spillover. In contrast, Harris and Zhou (2013) document that the purchase of APTS does not reduce the likelihood of tax-related ICWs after controlling for incidences where tax-related ICWs are concurrently disclosed with non-tax ICWs. While using tax-related restatements and tax-related ICW as proxies for audit quality has the potential to illuminate knowledge spillover or independence impairment due to the overlap of the audit and tax services, we identify several disadvantages of using these two proxies.

First, it is not clear that the presence (absence) of an ICW is a strong proxy for low (high) financial reporting quality. An ICW is defined as "a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the company's annual or interim financial statements will not be prevented or detected on a timely basis" (PCAOB 2007, A7). It is possible for a firm to have an ICW but still have high financial reporting quality. In addition, it is not clear the presence or absence of an ICW is a reflection of audit quality – if a corporation has effective (ineffective) internal controls, an auditor simply exerts less (more) effort performing substantive procedures to conclude the corporation's financial statements are reasonably free from material misstatements. Thus, both financial reporting and audit quality could be the same regardless of

whether a corporation has effective or ineffective internal controls. In addition, the disclosure of an ICW could be viewed as high audit quality if the ICW is discovered by the auditor.

Second, the finding that APTS is associated with fewer tax-related ICWs and restatements could be due to *earlier identification* of issues in the tax account, not necessarily the *absence* of issues in the tax account (DeSimone et al. 2012). Specifically, if tax and audit engagement teams from the same accounting firm are more likely to interact throughout the year (relative to tax and audit engagement teams from different accounting firms), tax issues may be identified and rectified prior to fiscal year-end, such that a firm's tax-related internal controls would be deemed effective as of year-end and a future tax-related restatement would not occur. However, the identification and rectification of an issue immediately prior to year-end is different from the absence of an issue. Our tax accrual quality measure captures variation in mismapping between the tax accrual and cash taxes paid. As both the tax accrual and cash taxes paid have the potential to be affected by nearly every corporate transaction, our measure captures a continuous process and not a single point-in-time outcome. Furthermore, tax-related restatements capture violations of U.S. GAAP but not within-GAAP estimation errors. As a result, APTS may possibly lead to less GAAP violations (i.e., restatements), but poorer within-GAAP estimation. Finally, tax accounts are rarely the primary account involved in a restatement (Badertscher et al. 2009).

Gleason and Mills (2011) also provide evidence of knowledge spillover resulting from APTS. Using a proprietary dataset with 497 firm-years from 2000 through 2002 audited by the IRS, they find that firms purchasing APTS have adequate tax reserves for IRS disputes while non-APTS firms require additional reserves for these disputes. They interpret this result as evidence of knowledge spillover. Our study differs from theirs in at least three ways. First, while

adequate tax reserves encompass an important element of tax estimation, tax reserves represent only a small portion of the tax accrual.[4] We examine the quality of the entire tax accrual. Second, Gleason and Mills (2011) provide evidence on a small number of firms in a time period that precedes important regulatory changes like the Sarbanes-Oxley Act of 2002, suggesting their findings are potentially limited in their generalizability. We use a large sample of firms across a much longer period to expand the generalizability of our findings. Third, we address the potential endogeneous nature of the decision to purchase APTS (i.e., firms that have more difficulty in estimating their tax accrual could be more likely to purchase APTS) using a Heckit treatment effect model while prior research fails to consider this source of potential endogeneity.

2.2. Tax Accrual Quality (TaxAQ and *TaxAQ2)*

Tax services provided by audit firms include tax compliance, tax advice, and tax consulting (Maydew and Shackelford 2007), all of which have implications for the financial reporting for income taxes. We focus on tax accrual quality because a tax-specific accrual is most likely to be impacted by the potential for knowledge spillover from APTS. While accruals aid in timing the recognition of revenues and expenses to better reflect a firm's economic performance relative to cash inflows and outflows, Dechow and Dichev (2002) note that "accruals are frequently based on assumptions and estimates that, if wrong, must be corrected in future accruals and earnings" (p.36). Errors in assumptions and estimates in the tax account manifest as poor mapping of the income tax accrual into income taxes paid, resulting in lower tax accrual quality. We interpret the presence of higher tax accrual quality in the presence of

[4] The annual median value of the absolute value of the change in tax reserve as a percentage of the absolute value of the tax accrual is 9.6 percent during 2007-2012 for which tax reserve data are available on COMPUSTAT.

APTS as consistent with knowledge spillover, while evidence of lower tax accrual quality in the presence of APTS as consistent with independence impairment.

Our empirical tests use a measure of tax accrual quality (TaxAQ) established in Choudhary et al. (2013). Following the framework of Dechow and Dichev (2002), Choudhary et al. (2013) develop an empirical measure of tax accrual quality which measures variation in the extent to which the income tax accrual (defined as total tax expense in *t* less cash taxes paid in *t*) maps into cash taxes paid in *t*-1 through *t*+1, after controlling for known timing differences. TaxAQ is affected by both "GAAP-induced mismapping" and estimation error that arises from judgment and complexity in applying GAAP to estimate the tax accrual. GAAP-induced mismapping arises when transactions affect the tax accrual (due to differences between total tax expense and cash taxes paid in *t*) and are not controlled for by the model's independent variables. Examples of GAAP-induced mapping include (1) changes in the classification of permanently reinvested earnings (PRE),[5] (2) changes in statutory tax rates that affect short-term DTAs and DTLs, (3) employee stock option exercise shortfalls under SFAS 123(R), and (4) changes in tax reserves for uncertain tax positions related to permanent book-tax differences (see Appendix 2 of Choudhary et al. (2013) for additional details).

Estimation error that arises from judgment and complexity in applying GAAP can also affect our measure of TaxAQ. For example, warranty expense recognized for financial reporting in period *t* is not deductible for tax purposes until paid. This gives rise to a temporary book-tax difference, and managers must estimate the amount and reversal date of this short-term deferred tax asset. If a manager's estimate in *t* of the warranty cash payment expected to occur in *t*+1

[5] PRE-related transactions that affect the residual include unclassifying unremitted foreign earnings designated as PRE prior to *t* and not remitting those earnings for tax purposes in *t* or *t*+1, as well as classifying unremitted earnings earned prior to *t*-1 as PRE in *t*.

differs from the amount actually paid in *t*+1, there is estimation error in the tax accrual. Firm characteristics identified in Choudhary et al. (2013) which proxy for items that complicate judgment in the application of GAAP include (1) earnings volatility, (2) the presence of a tax benefit, (3) the presence of discontinued and extraordinary items, and (4) a lack of firm resources available to devote to the tax function.

Choudhary et al. (2013) demonstrates the construct validity of their tax accrual quality measure by documenting that their measure is negatively associated with firm characteristics that proxy for GAAP-induced mismapping and estimation error that arises from judgment and complexity in applying GAAP.[6] We use the quality of a firm's tax accrual in our empirical analysis because it is a measure of financial reporting quality specific to the overlap of tax and audit services where knowledge spillover, if present, should manifest.

3. Hypotheses Development

3.1. Association between APTS and TaxAQ

While management is responsible for the information presented in their firm's financial statements, the auditor plays an important role in the estimation and reporting process. The tax expense provision in the financial statements requires a deep understanding of both financial reporting standards and the tax laws that govern the jurisdictions in which a corporation operates. Thus, the tax expense estimate reported on a company's income statement and required to be audited at year-end is a joint product of financial reporting and tax law knowledge. Public accounting firms provide tax services to their audit clients that can assist with the estimation and

[6] These firm characteristics include the presence of foreign operations, industries which grant employee stock options, tax position uncertainty, earnings volatility, the presence of a tax benefit, discontinued operations and extraordinary items, and limited resources available to be devoted to the tax function.,

audit process of the tax account. The SEC specifically requires registrants to disclose tax fees paid to their audit firms for "tax compliance, tax planning, and tax advice for fiscal years ending after December 15, 2003 (SEC 2003). Higher fees for tax-related services suggest an audit firm plays a greater role in shaping a corporation's estimation and reporting of tax-related accounts.

During the course of all audits, regardless of whether a corporation purchases APTS or not, audit engagement professionals regularly enlist tax professionals from their firm to assist with auditing the corporation's tax accounts. For corporations which purchase APTS, the tax professionals assisting the audit likely provide other tax services (e.g., compliance, consulting or advising) to the audit client throughout the year. This joint provision of services can lead to knowledge spillover or independence impairment observable in the quality of the tax accrual. Tax professionals have a better understanding of the client's tax issues relative to the auditor, which could make the audit of the tax estimates more effective and efficient, potentially resulting in better tax accrual quality due to knowledge spillover. Conversely, if professionals from the audit firm provide tax services, "in-group identification" may lead the audit engagement team to overly rely on the tax professionals' assertions. Such an overreliance may result in the audit engagement team reducing the rigor of its procedures related to the tax accounts, leading to due care issues which could result in lower tax accrual quality. For companies that do not purchase APTS, the audit engagement team would likely perform a more thorough review of the tax estimates and accruals because the audit team is not subject to the effects of 'in-group identification."

A positive association between tax fees and TaxAQ would indicate better financial reporting quality from knowledge spillover between the tax services and the audit of the tax provision. A negative association between tax fees and TaxAQ would indicate lower financial

reporting quality due to impairment of the auditor's independence in the tax provision. No association between the tax fees paid and TaxAQ would indicate neither knowledge spillover nor independence impairment. As such, we state our first hypothesis in the null form as follows:

> *H1: The amount of fees paid for APTS is not associated with a corporation's tax accrual quality.*

3.2. Association between Auditor Expertise and TaxAQ

We consider auditor expertise as a cross-sectional determinant of the relation between tax accrual quality and APTS. Audit firm offices invest in specialized training, technology, and research for their auditors to attract and retain personnel and clients in a specific industry. As such, some firms achieve economies of scale and production efficiencies that improve audit quality for clients in those industries. Recent studies have documented evidence that city-level industry expertise is associated with improved audit and financial reporting quality. For example, Reichelt and Wang (2010) provide evidence that office-level industry expertise is associated with higher audit quality, and Gul et al. (2009) find evidence that corporations that hire industry specialist auditors have higher accruals quality.[7] If we find evidence consistent with knowledge spillover, we expect the spillover to be even greater in the presence of auditor expertise. Conversely, if we find evidence consistent with independence impairment, we expect the impairment to be mitigated in the presence of auditor expertise. As such, our second hypothesis is presented as follows:

> *H2: A corporation that purchases APTS from an audit expert has higher tax accrual quality than a corporation that purchases APTS from a non-audit expert.*

[7] One exception to these papers' general finding of a positive association between industry specialization and higher audit quality is findings by Minutti-Meza (2013), who documents no difference in audit quality between industry expert audit firms and non-expert audit firms after using propensity score matching.

3.3. Association between Management Advisory Services and TaxAQ

Some prior research has been unable to connect the provision of any non-audit service (e.g., both tax and non-tax services) with a reduction in financial reporting quality that would signal auditor independence impairment (Frankel et al. 2002; Ashbaugh et al. 2003; Srinidhi and Gul 2007; Lim and Tan 2008). We are interested in the relation between financial reporting quality and APTS, not the relation between financial reporting quality and any type of non-audit services. We have no reason to expect independence impairment or knowledge spillover would be present specifically where audit and tax services overlap (i.e., the tax accrual) due to the purchase of non-audit/non-tax services. Thus, we examine the relation between non-tax advisory services (such as IT consulting, benefits consulting, etc.) and tax accrual quality as a discriminant validity test to cast doubt on the possibility that purchasing any non-audit service is related to firm characteristics that are correlated but omitted from the model. A positive (negative) association between advisory service fees and tax accrual quality would indicate that any non-audit service provides knowledge spillover (independence impairment due to economic dependence). In contrast, a finding of no association between advisory service fees and tax accrual quality strengthens our confidence that our main finding of a relation between APTS and tax accrual quality is capturing something unique to the tax accrual estimation process and not simply economic dependence due to any type of non-audit fees. Since we do not expect advisory services to be associated with the quality of the tax accrual, we present our third hypothesis in null form as follows:

> *H3: The amount of fees paid for management advisory services to an audit firm is not associated with a corporation's tax accrual quality.*

4. Research Design

4.1. Measuring Tax Accrual Quality (TaxAQ)

Tax accrual quality refers to variation in the extent to which the income tax accrual in *t* maps into tax-related cash flows in *t*-1, *t*, and *t*+1 after controlling for known timing differences between book income and taxable income. Following Choudhary et al. (2013), we use the following equation to estimate TaxAQ:

$$\mathbf{TaxACC_{jt} = \beta_0 + \beta_1 CTP_{jt-1} + \beta_2 CTP_{jt} + \beta_3 CTP_{jt+1} + \beta_4 \Delta DTL\_LT_{jt} + \beta_5 \Delta DTA\_LT_{jt} + \varepsilon_{jt}} \quad \mathbf{[1a]}$$

The dependent variable TaxACC is the current period income tax accrual, or the difference between total tax expense and cash taxes paid in *t*. The change in long-term deferred tax liabilities (ΔDTL_LT) and long-term deferred tax assets (ΔDTA_LT) are included as control variables to remove the portion of deferred tax liabilities (assets) that does not map into cash taxes paid in *t*+1 (*t*-1) due to known timing differences between financial reporting and tax reporting.[8] We predict β_1, β_3, and $\beta_4 > 0$ and β_2 and $\beta_5 < 0$. All variables are scaled by total assets and defined in detail in the Appendix. Tax accrual quality (TaxAQ) is the standard deviation of the residuals from firm-level estimates of Equation 1a, measured over eight-year rolling windows (similar to the Dechow and Dichev (2002) and Francis et al. (2005) approach to measuring working capital accruals quality). We multiply values by negative one, such that higher values represent better tax accrual quality and lower estimation error.

Our additional control variables in Equation 1a (ΔDTL_LT and ΔDTA_LT) are not perfect proxies for known timing differences expected to reverse outside of periods *t*-1 through *t*+1. Unlike other assets and liabilities, DTAs and DTLs are classified as current or non-current

[8] Including these control variables also limits the possibility that TaxAQ captures tax avoidance through temporary differences. Choudhary et al. (2013) empirically document low correlations between TaxAQ (TaxAQ2) and common measures of tax avoidance.

based on the current or non-current classification of the asset or liability to which the DTA or DTL relates. If a DTA (DTL) does not relate to an underlying asset (liability), the DTA (DTL) is classified according to its expected reversal date. Because DTAs and DTLs are not classified solely on their expected reversal dates, the inclusion of ΔDTA_LT and ΔDTL_LT in Equation 1a removes some of the potential estimation error we would like to retain in the residual.

Given this limitation, we follow Choudhary et al. (2013) and construct a second measure of tax accrual quality that relies on control variables which proxy for the most common and economically significant components of long-term deferred tax liabilities and assets. Raedy et al. (2011) show that the largest components of annual deferred tax expense relate to timing differences from (1) depreciating plant, property, and equipment, (2) amortizing intangible assets, (3) expensing employee benefits, and (4) establishing and utilizing tax net operating losses. We proxy for the first component with cash outflows related to capital expenditures (CAPX) and the fourth component with the change in net operating losses (ΔNOL);[9] proxies for the second and third components are unavailable in machine-readable format. Modifying Equation 1a to include these two components of deferred taxes yields the following:

$$\mathbf{TaxACC_{jt} = \beta_0 + \beta_1 CTP_{jt-1} + \beta_2 CTP_{jt} + \beta_3 CTP_{jt+1} + \beta_4 CAPX_{jt} + \beta_5 \Delta NOL_{jt} + \varepsilon_{jt}} \quad \textbf{[1b]}$$

We predict β_1, β_3, and $\beta_4 > 0$ and β_2 and $\beta_5 < 0$. All variables are scaled by total assets and defined in detail in the Appendix. This alternate measure of tax accrual quality, which we refer to as TaxAQ2, is the standard deviation of the residuals from firm-level estimates of Equation 1b measured over eight-year rolling windows. We multiply values by negative one so higher values indicate better tax accrual quality and lower estimation error.

[9] We would like to capture the difference between financial reporting (expenses) and tax reporting (deductions, which generally correspond to cash payments) for these two items. However, there are no Statement of Cash Flow variables in COMPUSTAT that capture current period expenditures on intangible assets or defined benefit plan cash contributions.

4.2. Multivariate Model

We test our hypotheses using the following equation:

$$\begin{aligned}\textbf{TaxAQ}_{jt}\textbf{ (or TaxAQ2)} = {} & \alpha_{jt} + \alpha_{year} + \alpha_{industry} + \beta_1\textbf{TAX\_FEES}_{jt} + \beta_2\textbf{FOREIGN}_{jt} \\ & + \beta_3\textbf{ESO\_INDUSTRY}_{jt} + \beta_4\textbf{UTB\_EST}_{jt} + \beta_5\textbf{PTBI\_VOL}_{jt} + \beta_6\textbf{TAX\_BENEFIT}_{jt} \\ & + \beta_7\textbf{DISC\&EXTRA}_{jt} + \beta_8\textbf{SIZE} + \beta_9\textbf{AUDIT\_FEES}_{jt} + \beta_{10}\textbf{BIG4}_{jt} + \beta_{11}\textbf{TIER2}_{jt} \\ & + \beta_{12}\textbf{AUD\_EXPERT}_{jt} + \beta_{13}\textbf{TAX\_FEES}_{jt}\textbf{*AUD\_EXPERT}_{jt} + \beta_{14}\textbf{OTHER\_FEES}_{jt} + \varepsilon_{jt}\end{aligned} \quad \textbf{[2]}$$

Our main variable of interest and our measure of APTS is TAX_FEES, or the proportion of total fees a corporation pays its audit firm for tax-related services (Maydew and Shackelford 2007).[10] The TAX_FEES coefficient provides empirical results related to our first hypothesis. If APTS impairs auditor independence and results in worse tax accrual quality, we expect $\beta_1 < 0$. If APTS generates knowledge spillover in the tax account and results in better tax accrual quality, we expect $\beta_1 > 0$.

Many recent studies test for knowledge spillover from APTS using indicator variables that capture the presence of any amount of tax fees paid (Gleason and Mills 2011; McGuire et al. 2012; DeSimone et al. 2012), high amounts of APTS (Donohoe and Knechel 2012), or the natural logarithm of tax fees paid (Omer et al. 2006; DeSimone et al. 2012). We employ a continuous measure (the proportion of tax fees paid to the audit firm as a percentage of total fees paid) for two reasons. First, we expect the benefits of knowledge spillover or extent of independence impairment to vary directly with the proportion of total fees related to tax services. In addition, we believe that relatively small amounts paid for tax services lack the economic significance that would be required to induce independence impairment or knowledge spillover. A binary measure implicitly assumes that any amount of tax-related services provided by a corporation's audit firm has a similar effect on auditor independence and knowledge spillover,

[10] Fees paid for the review and/or audit of a firm's tax provision are included in a firm's audit fees (Maydew and Shackelford 2007).

and we believe that $5,550 (the amount of tax fees a firm who purchases APTS pays at the 5th percentile in our sample) vs. $1,549,000 (the amount of tax fees a firm who purchases APTS pays at the 95th percentile in our sample) should have differential effects on these two constructs.[11]

Our second hypothesis examines whether the relation between tax accrual quality and APTS varies in the presence of an audit expert. Following Reichelt and Wang (2010), AUD_EXPERT is an indicator variable set equal to one if a corporation's auditor has a market share greater than 30 percent of the total audit fees paid in the corporation's two-digit SIC and Metropolitan Statistical Area (MSA) for the year, and set equal to zero otherwise. If we observe APTS impairs audit independence ($\beta_1 < 0$), we expect audit expertise to mitigate this impairment, which suggests $\beta_{13} > 0$. If APTS generates knowledge spillover related to the tax account ($\beta_1 > 0$), we expect audit expertise to enhance the effect of knowledge spillover, which also suggests $\beta_{13} > 0$. We do not make a formal prediction regarding the relation between TaxAQ and AUD_EXPERT (β_{12}), although prior research suggests audit expertise improves financial reporting quality.

Our third and final hypothesis considers the relation between tax accrual quality and advisory fees, or fees a corporation pays to its audit firm for services unrelated to audit or tax services. We capture these fees with the variable OTHER_FEES, which is measured as non-audit and non-tax fees as a percentage of total fees paid to a corporation's audit firm. We predict OTHER_FEES is unrelated to tax accrual quality, or $\beta_{14} = 0$. Empirical evidence consistent with this prediction provides us with greater confidence that our main finding regarding the relation between tax accrual quality and APTS is capturing a tax-specific result.

[11] We consider various binary measures in the sensitivity analyses discussed in Section 6.

Our control variables include the seven firm characteristics Choudhary et al. (2013) use as proxies for GAAP-induced mismapping and estimation error that arises from judgment and complexity in applying GAAP, both of which affect the tax accrual. See Appendix 2 of Choudhary et al. (2013) for more details regarding these items affect the tax accrual. We include these firm characteristics as controls to mitigate concerns that the relation between APTS and tax accrual quality is driven by firms choosing APTS when their tax accrual is more difficult to estimate. We use three proxies to capture GAAP-induced mismapping that affect TaxAQ: (1) the presence of foreign operations, (2) the presence of employee stock options, and (3) the magnitude of uncertain tax positions. We expect tax accrual quality to be decreasing in these three constructs.

U.S. firms are allowed to defer payment of U.S. taxes on foreign earnings until remittance, and Accounting Principles Board (APB) No. 23 allows firms to not accrue income tax expense for financial reporting purposes on unremitted foreign earnings considered permanently reinvested (PRE). Changes in the designation of earnings as permanently reinvested without remitting these earnings affect the tax accrual because income tax expense is affected but cash taxes paid is not. The independent variables in Equations 1a and 1b do not control for this change in PRE designation, so this item affects our tax accrual quality measures. The presence of foreign operations can also increase estimation error. U.S. multinationals are required to understand both the tax statutes and financial reporting for income taxes for every jurisdiction in which they operate, which adds judgment and complexity in estimating the tax accrual. We proxy for this construct with FOREIGN (defined as an indicator equal to one if TXFO is non-missing and not equal to zero).

ESO exercise shortfalls under SFAS 123(R) when there is no excess APIC to offset the unrealized portion of the associated DTA also affects the tax accrual and is not controlled for in Equations 1a or 1b such that this transaction affects our tax accrual quality measures. In addition to GAAP induced mismapping, ESOs can lead to estimation error because the financial reporting expense occurs in a period prior to the tax return deduction (generating a DTA), and judgment is required when estimating whether this DTA will be realized. We proxy for this construct with ESO_INDUSTRY, which captures industries which are likely to issue employee stock options (defined as an indicator equal to one for SIC codes 30-39 and 70-89 following Lev and Nissim 2004).[12]

Changes in unrecognized tax benefits (UTB) related to permanent differences between financial and tax reporting also affect the tax accrual because income tax expense is affected but cash tax paid is not. These changes are not controlled for in Equations 1a and 1b, so they affect our tax accrual quality measures. In addition to GAAP induced mismapping, UTBs also represent the potential for estimation error. The presence of uncertain tax positions reflects the inherent uncertainty managers face when applying tax statutes and case law to estimate their firms' taxable income, the jurisdiction and time period in which the income is taxable, and the applicable tax rate. UTB_EST proxies for the magnitude of uncertain tax positions and is estimated following Equation 1 in Rego and Wilson (2012). An estimate is required because UTB data are not available until 2007.

We use four proxies for items that complicate judgment in the application of GAAP: (1) earnings volatility, (2) the presence of a tax benefit, (3) the presence of discontinued and

[12] Choudhary et al. (2013) use an industry indicator to capture firms likely to issue stock option grants because COMPUSTAT data on grants does not begin until 2005 and does not cover all firms in our sample. They select SIC codes 30-39 and 70-89 following Lev and Nissim (2004) based on their interpretation of Table 1 in Huson et al. (2001).

extraordinary items, and (4) a lack of firm resources available to devote to the tax function. Firms file their tax returns subsequent to their Form 10-K, meaning managers must estimate their tax obligations in advance of their finalized tax return for the corresponding period. As pre-tax earnings volatility increases, the potential for estimation error in the tax accrual increases. PTBI_VOL (defined as the standard deviation of PI/AT measured from *t*-7 to *t*) captures pre-tax earnings volatility. The presence of a tax benefit (i.e., negative tax expense) is expected to increase estimation error because there is significant uncertainty regarding the timing and magnitude of future realizations of the tax benefit. TAX_BENEFIT is defined as an indicator equal to one if TXT is less than 0.

Discontinued operations and extraordinary items are both atypical and complicated, and the timing and amount of their tax effects can be difficult to assess. We proxy for the presence of large discontinued operations and extraordinary items with DISC&EXTRA (defined as an indicator equal to one if |XIDOC| > 1 percent of revenues (REVT)). Finally, we consider firm resources available to devote to the tax function. While larger firms are more likely to engage in more sophisticated transactions and operate in a greater number of taxing jurisdictions (increasing the difficulty in estimating the income tax accrual), they are also more likely to have a dedicated tax staff (or funds to hire an external expert) with experience in understanding how transactions differentially affect financial reporting and tax reporting. Thus, we expect firms with fewer resources to devote to the tax function to have greater difficulty in estimating the tax accrual. SIZE (defined as the natural log of AT) proxies for the magnitude of firm resources available to devote to the tax function.

All data items referenced in parentheses are obtained from COMPUSTAT. We estimate Equation 2 using eight-year rolling window estimates of TaxAQ (TaxAQ2). We calculate each

firm characteristic at time *t* (e.g., FOREIGN is calculated as an indicator variable in year *t* if foreign tax expense (TXFO) is non-missing and not equal to zero in year *t*). Following Choudhary et al. (2013), we predict β_2 through $\beta_7 < 0$ and $\beta_8 > 0$.

We also include three control variables that relate to the audit engagement. AUDIT_FEES controls for the audit firm's expectation of the total cost of the audit, including both the audit production and expected legal liability costs (Simunic 1980). The BIG4 indicator variable controls for higher overall audit quality found to be associated with the Big 4 firms (Deloitte, Ernst & Young, KPMG, and PricewaterhouseCoopers), while the TIER2 indicator variable controls for lower overall audit quality found to be associated with the second tier audit firms BDO Seidman, Crowe Horwath, Grant Thornton, and McGladrey & Pullen (Hogan and Martin 2009). We winsorize variables that require estimation or are not bound between 0 and 1 at the 1st and 99th percent levels. Equation 2 is estimated at the firm level using an OLS regression specification with industry (two-digit SIC codes) and year fixed effects, and we cluster standard errors by firm.

4.3. Correcting for Potential Endogeneity

Selection bias occurs in archival work because managers' decisions are not random and researchers cannot observe the outcomes of choices not made (Tucker 2010). Prior research finds that a manager's decision to purchase tax services from his firm's audit firm (i.e., the presence of APTS) is a non-random choice, which introduces the potential for self-selection bias into our analysis. For example, if firms with greater difficulty in estimating the tax accrual are more likely to purchase APTS, the finding of a significant relation between TaxAQ and TAX_FEES could be mis-attributed as evidence of knowledge spillover or independence impairment.

The decision to purchase APTS may be determined by observable factors (Lassila et al. 2010) but also may be influenced by unobservable factors (e.g., the differential skill set of possible tax service providers, the pricing of tax services across different providers, the quantity of tax services desired, etc.). Both observable and unobservable factors have the potential to affect the relation between TaxAQ and APTS, so we correct for the unobservable aspects of this self-selection bias by estimating a Heckit treatment effect regression. Specifically, we use a simultaneous equations procedure that models the selection process (e.g., whether or not a firm purchases APTS) and uses the conditional probability of a firm-year receiving the treatment to control for potential bias induced by selection in the outcome analysis (e.g., the relation between TaxAQ and TAX_FEES). We use the following probit model to estimate the probability a corporation purchases APTS:

$$\begin{aligned}\mathbf{Prob(APTS_{jt}) = \alpha_{jt} + \alpha_{year} + \alpha_{industry} + \beta_1 TENURE_{jt} + \beta_2 INST\_OWN_{jt} + \beta_3 MERGER_{jt}} \\ \mathbf{+ \beta_4 OTHER\_FEES_{jt} + \beta_5 AUDIT\_FEES_{jt} + \beta_6 OPPORTUNITY_{jt} + \beta_7 SIZE_{jt}} \\ \mathbf{+ \beta_8 NOL_{jt} + \beta_9 FOREIGN_{jt} + \beta_{10} BTM_{jt} + \beta_{11} TIER2_{jt} + \beta_{13} ESO\_INDUSTRY_{jt}} \\ \mathbf{+ \beta_{14} UTB\_EST_{jt} + \beta_{15} PTBI\_VOL_{jt} + \beta_{16} TAX\_BENEFIT_{jt} + \beta_{17} DISC\&EXTRA_{jt}} \\ \mathbf{+ \beta_{18} BIG4_{jt} + \varepsilon_{jt}}\end{aligned} \quad [3]$$

Our first five control variables (TENURE, INST_OWN, MERGER, OTHER_FEES, and AUDIT_FEES) are based on the variables found to be significantly associated with APTS in Lassila et al. (2010), and our next six control variables (OPPORTUNITY, SIZE, NOL, FOREIGN, BTM, and TIER2) are based on the variables found to be significantly associated with APTS in McGuire et al. (2012). The remaining variables (ESO_INDUSTRY, UTB_EST, PTBI_VOL, TAX_BENEFIT, and DISC&EXTRA) are the TaxAQ control variables from Equation 2 not already included in the Equation 3 model. We also include an indicator variable to capture firm-years with a Big-4 auditor ($BIG4_{jt}$), as well as industry and year fixed effects. Standard errors are clustered by firm and continuous variables that require estimation (TAXAQ

and UTB_EST) or are not bound between 0 and 1 (PTBI_VOL, SIZE, and AUDIT_FEES) are winsorized at the 1st and 99th percentile (pooled). All variables are defined in detail in the Appendix. The coefficients from estimating this equation are used to construct the Inverse Mills Ratio (IMR), which is then included as an additional explanatory variable in Equation 2. The IMR controls for the effect of observable and unobservable determinants of a manager's decision to purchase APTS, mitigating the selection bias that can affect inferences regarding the relation between tax accrual quality and APTS (Guo and Fraser 2010, p.85-125).

5. Empirical Results

5.1. Sample Selection

Table 1 describes our sample selection procedure. Tax-related fees paid to a corporation's audit firm are required to be disclosed for fiscal years ending after December 15, 2003 (SEC 2003) so we begin our sample in fiscal year 2003.[13] Our dependent variables of interest, TaxAQ and TaxAQ2, require input data from fiscal years *t*-8 through *t*+1.[14] This long time-series requires us to end our sample in 2011 to allow for *t*+1 data from 2012 and make an assumption regarding whether firms used their audit firm for tax services prior to 2003. Maydew and Shackelford (2007) report that prior to the revelation of several high-profile accounting scandals in 2001 and the enactment of the Sarbanes-Oxley Act in 2002, most publicly traded firms used

[13] Firms were required to provide fees data for the year prior to the initial year of disclosure (i.e., fiscal year 2002). Many firms were early adopters of this disclosure in 2002 and therefore provided fees data for as early as fiscal year 2001. However, prior research finds that 2001 and 2002 fees data in Audit Analytics are not well-populated and subject to serious errors (Cook and Omer 2012).

[14] We acknowledge that requiring such a long time-series of data induces survivorship bias in our sample. We do not expect survivorship bias to affect our inferences, as we have no priors as to why the relation between tax accrual quality and APTS would be affected by survivorship bias. While firms with long-time series of data may seem more prone to steady relationships with their audit firms which could lead to independence impairment, there is little empirical support for the notion that long auditor tenure is associated with lower audit quality (Myers et al. 2003; Carcello and Nagy 2004; Ghosh and Moon 2005; Gul et al. 2009).

their audit firm for both audit and tax services. Based on this finding we assume that firms used their audit firm for tax services prior to 2003. This research design choice allows us to use COMPUSTAT data from 1994 through 2012 to estimate TaxAQ/TaxAQ2 values over eight-year rolling windows for fiscal periods 2003 through 2011 (22,504 firm-year observations). We lose 6,832 firm-year observations when we require non-missing values for control variables from COMPUSTAT and Audit Analytics databases required to estimate Equations 2 and 3. Our empirical tests are conducted on a final sample of 15,672 firm-years related to 3,019 unique firms.

5.2. Descriptive Statistics and Correlations

We report descriptive statistics in Panel A of Table 2. Mean and interquartile tax accrual quality (TaxAQ and TaxAQ2) values are the same as reported in prior research (Choudhary et al. 2013, their Panel A of Table 6). We find that 76 percent of corporations retain their audit firm for tax-related services (mean value of APTS_INDICATOR). This is qualitatively similar to the 72 percent reported in concurrent research (DeSimone et al. 2012, their Panel A of Table 1). For all firm-years included in our sample, mean (median) tax fees are 10.4 (6.3) percent of the total fees a corporation pays to its audit firm. Conditional on a corporation purchasing tax services from its audit firm (i.e., APTS_INDICATOR=1), mean tax fees are 13.8 percent of total fees paid to the corporation's audit firm (untabulated). Mean and median values for the TaxAQ determinants (FOREIGN, ESO_INDUSTRY, UTB_EST, PTBI_VOL, TAX_BENEFIT, DISC&EXTRA, and SIZE) are qualitatively similar to prior research (Choudhary et al. 2013, their Panel A of Table 6). Forty one percent of the firm-years in our sample are audited by an expert audit firm

(AUD_EXPERT). Nearly three-fourths of the firm-years in our sample are audited by a Big 4 audit firm and an additional 11 percent are audited by a Tier 2 audit firm.

Panel B of Table 2 presents the correlations for the variables used in our regression analysis; we discuss the Spearman correlations for brevity. We find that TaxAQ (TaxAQ2) is negatively correlated with TAX_FEES, consistent with tax accrual quality declining as the amount of APTS increases ($p<0.05$). TaxAQ (TaxAQ2) is positively correlated with AUD_EXPERT ($p<0.05$), consistent with better tax accrual quality in the presence of auditor expertise. We find no relation between TaxAQ and OTHER_FEES ($p>0.10$), consistent with our prediction that non-audit/non-tax fees should be unrelated to tax accrual quality. Turning to our control variables, we find that TaxAQ (TaxAQ) is negatively associated with FOREIGN, ESO_INDUSTRY, UTB_EST, PTBI_VOL, and TAX_BENEFIT and positively associated with SIZE ($p<0.05$), consistent with the correlations reported by Choudhary et al. (2013). We also find that TaxAQ and TaxAQ2 are higher (lower) when a firm is audited by a Big 4 (Tier 2) audit firm ($p<0.05$).

5.3. Multivariate Analyses

Before we can examine the relation between TaxAQ and APTS (Equation 2), we must address the potential endogeneity that arises from firms choosing to purchase APTS. Table 3 reports the regression results from our Heckit treatment model regression (Equation 3) which we use to address this potential endogeneity. Consistent with McGuire et al. (2012) and Lassila et al. (2010), we find that firms are more likely to purchase APTS when non-audit/non-tax fees are lower (OTHER_FEES), audit fees are higher (AUDIT_FEES), the firm is larger (SIZE), and the firm has foreign operations (FOREIGN). Consistent with McGuire et al. (2010), we also find that

APTS is more likely when auditor tenure is longer (TENURE) and the firm is not audited by a Tier 2 auditor (TIER2) ($p<0.05$). Further, we find that APTS firms have larger predicted values of unrecognized tax benefits (UTB_EST) and less volatile earnings (PTBI_VOL) ($p<0.05$). The model's pseudo R^2 of 0.10 and ROC curve of 0.72 suggest our treatment model has reasonable explanatory power.[15]

Table 4 reports the results from estimating our TaxAQ determinants model (Equation 2). In Columns 1 and 2 we present regression results from simultaneously estimating the treatment model (Equation 3) and our outcome model (Equation 2). We omit the variables AUD_EXPERT and OTHER_FEES in Columns 1 and 2 as to focus on our first hypothesis, which examines the relation between tax accrual quality and APTS. Column 1 shows that TaxAQ and TAX_FEES are negatively associated ($p<0.05$), consistent with lower tax accrual quality in the presence of APTS, which suggests auditor independence impairment. The variables found to be associated with TaxAQ in Choudhary et al. (2013) control for the complexity and difficulty in estimating the tax accrual, and four of the seven variables (ESO_INDUSTRY, PTBI_VOL, TAX_BENEFIT, and SIZE) are associated with TaxAQ in the predicted direction incremental to the other variables in the model ($p<0.01$).[16] These seven variables are included to mitigate concerns that a firm might choose APTS because its taxes are complex. The model's high log pseudo-likelihood suggests the model has reasonable explanatory power. Column 2 reports similar inferences using TaxAQ2 as our dependent variable. We find that TaxAQ is negatively associated with TAX_FEES ($p<0.05$), and five of the seven variables that control for complexity

[15] McGuire et al. (2012) report a ROC value of similar magnitude (0.73) in the first stage of their Heckman model.
[16] The UTB_EST coefficient is not significantly different from zero. This lack of a relation could be because pre-FIN 48 it is unclear whether and at what dollar value firms were recording reserves for uncertain tax positions. The model used to estimate UTB_EST (Rego and Wilson 2012, Equation 1) implicitly assumes the tax reserve is estimated and recorded similarly pre- and post-FIN 48. If this assumption is violated, the predicted relation between TaxAQ and UTB_EST may not hold empirically.

are associated with TaxAQ in the predicted direction ($p<0.10$). In sum, we find lower tax accrual quality in the presence of APTS using either tax accrual proxy, which is consistent with auditor independence impairment.

We test for endogeneity by examining RHO, which represents the correlation between the error terms of Equations 2 and 3. A RHO value significantly different from zero indicates endogeneity. We find that RHO is not significantly different from zero in both Columns 1 and 2, as indicated by a Wald chi-square test of independent equations p-value>0.10 in both columns. Thus, we fail to find evidence that firms with worse tax accrual quality are more likely to purchase APTS, suggesting that endogeneity is not confounding our inferences regarding the relation between TaxAQ and TAX_FEES.[17] Our subsequent regression results are presented without correcting for endogeneity.[18]

Columns 3 and 4 presents the results from estimating the same regression presented in Columns 1 and 2 but without an endogeneity correction. We note no change in inferences relative to Columns 1 and 2. The TAX_FEES coefficient is negative and significant in both Columns 3 and 4 ($p<0.05$). This finding is consistent with APTS resulting in lower financial reporting quality, which suggests auditor independence impairment rather than knowledge spillover.

We next examine whether the association between tax accrual quality and tax-related fees paid to a corporation's audit firm varies as a function of whether the audit firm is an audit expert,

[17] McGuire et al. (2012) also find evidence consistent with endogeneity not being a concern in their research design. In contrast to our treatment effect model regression, McGuire et al. (2012) use a Heckman model because they are estimating a censored regression (e.g., they cannot observe 3,650 observations because these firm-years have APTS_INDICATOR=0).

[18] While our analysis indicates endogeneity is not a concern in examining the relation between APTS and TaxAQ, this finding has no bearing on whether endogeneity is a concern in prior research that uses a different proxy for financial reporting quality. Prior research finds it is important to address endogeneity when considering various measures of financial reporting quality (Armstrong et al. 2010; Lawrence et al. 2011).

as well as whether tax accrual quality is related to non-audit/non-tax fees paid to a corporation's audit firm. Table 5 reports the results from estimating Equation 2 including AUD_EXPERT and OTHER_FEES, and we note the negative association between TaxAQ and TAX_FEES is present in all four columns ($p<0.05$). Column 1 shows that TaxAQ is marginally positively related to AUD_EXPERT ($p<0.10$), consistent with higher financial reporting quality in firms who engage audit experts. However, we find no evidence of a statistically significant relation between TaxAQ2 and AUD_EXPERT in Column 4 ($p>0.10$). When we interact TAX_FEES and AUD_EXPERT in Columns 2 and 4, we find no evidence that the presence of an audit expert moderates the negative relation between TAX_FEES and TaxAQ or TaxAQ2 ($p>0.10$). Thus, our second hypothesis is unsupported.

Table 5 also allows us to examine the relation between tax accrual quality and non-audit/non-tax fees (OTHER_FEES). The OTHER_FEES variable captures the fees a corporation pays to its audit firm for non-audit and non-tax services as a percentage of total fees paid to its audit firm. We do not expect to observe a relation between tax accrual quality and OTHER_FEES, and we find evidence consistent with this prediction in all four columns ($p>0.10$). This result provides us with greater confidence that the relation between TaxAQ and TAX_FEES is capturing a tax-specific result and not a general correlation between tax accrual quality and non-audit fees.

6. Sensitivity Analyses (untabulated)

6.1. Alternate econometric approach to correcting for potential endogeneity.

We address the potential endogeneity that arises due to APTS being a choice variable (e.g., the possibility that firms that choose purchase APTS are simply more likely to have worse

tax accrual quality) using a Heckit treatment effect model in our tabulated analyses. This econometric approach assumes that (1) the potential bias can arise from observable characteristics as well as the unobservable portion of a firm's decision to purchase APTS and (2) the Equations 2 and 3 residuals are normally distributed. In contrast, propensity score matching (PSM) assumes that the potential bias arises only from the observable portion of a firm's decision to purchase APTS and makes no explicit assumptions regarding the distribution of regression residuals.

We apply PSM as an alternative econometric approach to correcting for potential endogeneity in our sensitivity analysis. We use PSM to determine which control firm-years (i.e., APTS_INDICATOR=0) are matched with our treatment firm-years (i.e., APTS_INDICATOR=1) based on all significant variables from McGuire et al. (2012). We permit multiple matches and use a caliper of 0.03 following Lawrence et al. (2011). Applying PSM reduces the absolute value of the bias from 17 (standard deviation of 15) to 1.9 (standard deviation of 1.8). While applying PSM reduces the bias, the matching procedure is not able to return perfect matches. Specifically, the pseudo R-square remains at 4.7%, with the TENURE, INSTOWN, SIZE, FOREIGN, and MFRATIO variables still explaining APTS ($p<0.10$) in the post-match sample. Inferences using this alternate method of correcting for self-selection bias are qualitatively similar to those from tabulated analyses. However, we caution the reader regarding the robustness of the PSM results because the PSM algorithm was unable to find perfect matches.

6.2. Alternate specifications of APTS.

We use a continuous measure of APTS (TAX_FEES, which captures the extent to which a corporation purchases tax services from its audit firm) in our tabulated analyses. We also consider an alternate specification of APTS. Following Donohoe and Knechel (2012), we capture the effect of high proportions of APTS by creating an indicator variable set equal to one for observations with APTS above the median value (0.11 in our sample). We also create an indicator variable set equal to one for observations with APTS above the mean value (0.138 in our sample). Inferences using either alternate measures are qualitatively similar to our tabulated analyses.

7. Conclusion

In the past decade regulators have increased scrutiny of public accounting firms that provide tax services to their audit clients and created rules limiting and requiring greater oversight for APTS. Proponents of these changes believe that providing non-audit services to audit clients potentially impairs auditor independence (SEC 2003; Srinidhi and Gul 2007), suggesting limitations and restrictions on APTS should improve financial reporting quality. In contrast, opponents of these changes believe that APTS generates knowledge spillover, improving financial reporting quality through the improved understanding of a corporation's tax positions. We evaluate the association between APTS and the quality of a firm's tax accrual to consider whether APTS is associated with auditor independence impairment or knowledge spillover. We assess tax accrual quality using a novel measure which captures estimation error in the tax accrual (Choudhary et al. 2013). We document a negative association between the extent of APTS and tax accrual quality, and interpret this finding as consistent with APTS resulting in

auditor independence impairment, not knowledge spillover. Cross-sectional tests reveal that audit expertise does not mitigate the negative relation between tax accrual quality and APTS. We also find no evidence of a relation between tax accrual quality and non-audit/non-tax fees, which demonstrates that our tax accrual quality measure captures a unique setting where audit and tax services overlap and not simply economic dependence due to any type of non-audit fees.

Our results contrast with prior research in this area which typically finds evidence consistent with APTS creating knowledge spillover (e.g., Kinney et al. 2004; Gleason and Mills 2011; DeSimone et al 2012; Donohoe and Knechel 2012; Harris and Zhou 2013). Our research design improves on prior literature by using a measure which is a direct outcome of the financial reporting, auditing, and APTS processes. Our tax accrual quality measure lies at the intersection of audit and tax services where the potential knowledge spillover should be most pronounced. In addition, we also directly address methodological issues related to endogeneity, while most studies in this area fail to address the potential selection bias that arises from managers choosing to engage in APTS. We use several econometric techniques (e.g., the use of a Heckit treatment effect regression model and propensity score matching) to mitigate the possibility that firms with lower tax accrual quality are more likely to hire their audit firm for tax services. Both of these research design improvements could contribute to why our findings consistent with potential auditor independence impairment differ from findings in previous studies which are consistent with knowledge spillover. We expect our finding that APTS have the potential to impair auditor independence to be of interest to regulators, investors, and fellow academics.

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Appendix: Variable Definitions

Variable	Definition
Dependent Variables	
TaxAQ	Standard deviation of the residuals from firm-specific estimates of Equation 1a ($TaxACC_t = \beta_0 + \beta_1 CTP_{t-1} + \beta_2 CTP_t + \beta_3 CTP_{t+1} + \beta_4 \Delta DTL\_LT_t + \beta_5 \Delta DTA\_LT_t + \varepsilon_t$), multiplied by -1 so larger values indicate better tax accrual quality. A minimum of eight residuals per firm is required to estimate TaxAQ.
TaxAQ2	Standard deviation of the residuals from firm-specific estimates of Equation 1b ($TaxACC_t = \beta_0 + \beta_1 CTP_{t-1} + \beta_2 CTP_t + \beta_3 CTP_{t+1} + \beta_4 CAPX_t + \beta_5 \Delta NOL_t + \varepsilon_t$), multiplied by -1 so larger values indicate better tax accrual quality. A minimum of eight residuals per firm is required to estimate TaxAQ2.
Independent Variables	
AUD_EXPERT	Indicator variable set equal to one if a corporation's auditor has a market share greater than 30% of the total audit fees (AA 'MATCHFY_SUM_AUDFEES') paid in the corporation's two-digit SIC and Metropolitan Statistical Area (MSA) for year *t*, and set equal to zero otherwise (following McGuire et al. (2012)).
AUDIT_FEES	Natural log of audit fees a corporation pays to its auditor (AA 'MATCHFY_SUM_AUDFEES').
BIG4	Indicator variable set equal to one if a corporation is audited by one of the "Big 4" audit firms (i.e., AA 'AUDITOR_FKEY" equal to 1, 2, 3 or 4, for PricewaterhouseCoopers, Ernst & Young, Deloitte, or KPMG, respectively), and set equal to zero otherwise.
DISC&EXTRA	Indicator variable set equal to one when a firm reports a large discretionary/extraordinary item (defined as discontinued and extraordinary items from the Statement of Cash Flows ($XIDOC_t$) > one percent of revenue ($REVT_t$)), and set equal to zero otherwise.
ESO_INDUSTRY	Indicator variable set equal to one if a firm operates in an industry in year *t* with potentially large tax benefits from the exercise of options (defined as industry SIC codes 30-39 and 70-89), and set equal to zero otherwise.
FOREIGN	Indicator variable set equal to one when a firm reports non-zero foreign tax expense ($TXFO_t$), and set equal to zero otherwise
OTHER_FEES	The sum of benefits fees (AA 'MATCHFY_SUM_BENFEES'), IT fees (AA 'MATCHFY_SUM_ITFEES'), and other fees (AA 'MATCHFY_SUM_OTHER') as a percentage of total fees paid to a corporation's audit firm.
PTBI_VOL	Standard deviation of pre-tax book income ($PTBI_t$) scaled by total assets (AT_t), measured from years *t*-7 through *t*.
SIZE	Natural log of total assets (AT_t).
TAX_BENEFIT	Indicator variable set equal to one when total tax expense (TXT) is less than zero in year *t*, and set equal to zero otherwise.
TAX_FEES	Fees a corporation pays its audit firm for tax-related services divided by total fees a corporation pays to its audit firm (AA 'MATCHFY_SUM_TAXFEES' ÷ 'MATCHFY_SUM_TOTAL')
TIER2	Indicator variable set equal to one if a corporation is audited by a "second tier" audit firms (i.e., AA 'AUDITOR_FKEY" equal to 6, 7, 8 or 10, for Grant Thornton, BDO Seidman, Crowe Horwath, or McGladrey & Pullen, respectively), and set equal to zero otherwise.

UTB_EST	Predicted value of unrecognized tax benefits. We first estimate Equation 1 in Rego and Wilson (2012) using data from 2007 through 2011, which yields the following coefficients: UTB_{jt} = -0.00010072+ 0.00648*$PTROA_{jt}$ + 0.00078288*$ASSETS_{jt}$ + 0.00601*$FOREIGN_{jt}$ + 0.06494*RD_{jt} + 0.00080232*LEV_{jt} + 0.00521*SGA_{jt} +0.0000003193495*MTB_{jt} - 0.00176*$SALES\_GROWTH_{jt}$ UTB is unrecognized tax benefits ($TXTUBEND_t \div AT_{t-1}$), PTROA is pre-tax return on assets ($PI_t \div AT_{t-1}$), ASSETS is the natural log of total assets ($\log(AT_t)$), FOREIGN is an indicator variable for the presence of foreign operations ($PIFO_t$ ne . and ne 0), RD is research and development expenses ($XRD_t \div AT_{t-1}$), LEV is leverage calculated as debt to assets (($DLC_t+DLTT_t) \div AT_{t-1}$), SGA is selling, general, and administrative expenses ($XSGA_t \div AT_{t-1}$), MTB is the market-to-book ratio (($PRCC\_F_t * CHSO_t) \div CEQ_t$), and SALES_GROWTH is the annual percentage changes in sales (($SALE_t - SALE_{t-1}) \div SALE_{t-1}$). DLC and XRD are reset to zero when missing. UTB_EST is calculated by applying the above regression coefficients to firm-years with non-missing independent variable values from 2002 through 2011.
First Stage Treatment Model (Heckit) Regression Variables	
APTS_INDICATOR	Indicator variable set to one if the firm reports nonzero TAX_FEES, and set equal to 0 otherwise.
BTM	Book value of equity (CEQ) divided by market value of equity (PRCC_F * CSHO) at the end of year *t*.
INST_OWN	Number of shares held by institutions (from Thompson Reuters s34 Master File) divided by shares outstanding (CSHO * 1,000,000) at the beginning of the calendar year.
MERGER	Indicator variable set equal to one if acquisitions (AQC) is nonzero, and zero otherwise.
NOL	Indicator variable set equal to one if there is a tax loss carryforward (TLCF > 0) in year *t*, and zero otherwise.
OPPORTUNITY	Market value of equity (PRCC_F*CSHO) of an audit client divided by the sum of the market value for all audit clients in the same MSA and two-digit SIC in year *t*.
TENURE	Length of the audit firm's tenure (number of year) with the client as of year *t*.

All variable source names in parentheses refer to COMPUSTAT unless otherwise stated. AA refers to variables in Audit Analytics Audit Fees database.

Table 1: Sample Selection

Universe of firm-year observations with COMPUSTAT data ($TaxACC_t$, $CTP_{t-1,t,t+1}$, ΔDTL_LT_t, ΔDTA_LT_t, $CAPX_t$, and ΔNOL_t) between 2003 – 2011)	46,643
Less: Firm-year observations with at least 8 years of consecutive data necessary to compute TaxAQ (TaxAQ2)	(24,139)
	22,504
Less: Firm-year observations with missing COMPUSTAT data for the control variables used in Equations 2 and 3	(3,183)
	19,321
Less: Firm-year observations with missing data in Audit Analytics data used in Equations 2 and 3	(3,268)
	16,053
Less: Firm year observations with missing Metropolitan Statistical Area data to compute the variable OPPORTUNITY	(381)
Final number of firm-year observations	**15,672**
Final number of unique firms (2003 – 2011)	**3,019**

Table 2: Descriptive Analyses

Panel A: Descriptive Statistics

Variables	N	Mean	P25	P50	P75	S.D.
TaxAQ	15,672	-0.010	-0.012	-0.007	-0.004	0.012
TaxAQ2	15,672	-0.012	-0.014	-0.007	-0.004	0.013
APTS_INDICATOR	15,672	0.756	1.000	1.000	1.000	0.429
TAX_FEES	15,672	0.104	0.002	0.063	0.163	0.122
FOREIGN	15,672	0.457	0.000	0.000	1.000	0.498
ESO_INDUSTRY	15,672	0.507	0.000	1.000	1.000	0.500
UTB_EST	15,672	0.011	0.007	0.010	0.015	0.005
PTBI_VOL	15,672	0.114	0.036	0.067	0.129	0.140
TAX_BENEFIT	15,672	0.166	0.000	0.000	0.000	0.372
DISC&EXTRA	15,672	0.030	0.000	0.000	0.000	0.170
SIZE	15,672	6.132	4.620	6.199	7.646	2.211
AUDIT_FEES	15,672	13.542	12.588	13.626	14.467	1.371
AUD_EXPERT	15,672	0.411	0.000	0.000	1.000	0.492
OTHER_FEES	15,672	0.016	0.000	0.000	0.002	0.057
BIG4	15,672	0.725	0.000	1.000	1.000	0.447
TIER2	15,672	0.109	0.000	0.000	0.000	0.312
TENURE	15,672	11.686	5.000	9.000	16.000	9.059
INST_OWN	15,672	0.362	0.000	0.246	0.739	0.370
MERGER	15,672	0.374	0.000	0.000	1.000	0.484
OPPORTUNITY	15,672	0.440	0.017	0.244	1.000	0.432
NOL	15,672	0.430	0.000	0.000	1.000	0.495
BTM	15,672	0.557	0.293	0.503	0.785	0.816

Table 2: Descriptive Analyses (continued)

Panel B: Pearson\Spearman Correlation

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
[1]	TaxAQ	–	**0.82**	**-0.03**	**-0.09**	**-0.20**	**-0.10**	**-0.44**	**-0.15**	-0.01	**0.27**	**0.15**	**0.09**	0.01	**0.13**	**-0.12**
[2]	TaxAQ2	**0.78**	–	**-0.02**	**-0.08**	**-0.19**	**-0.07**	**-0.48**	**-0.19**	-0.01	**0.24**	**0.12**	**0.09**	0.01	**0.12**	**-0.10**
[3]	TAX_FEES	-0.01	0.00	–	**0.08**	**0.06**	**0.11**	**-0.06**	**-0.02**	-0.01	**0.07**	**0.02**	**0.05**	**0.03**	**0.14**	**-0.09**
[4]	FOREIGN	0.00	-0.01	0.05	–	**0.24**	**0.59**	0.00	**-0.02**	-0.00	**0.25**	**0.40**	**0.12**	**0.02**	**0.23**	**-0.04**
[5]	ESO_INDUSTRY	**-0.16**	**-0.15**	**0.05**	**0.24**	–	**0.34**	**0.25**	**0.02**	-0.02	**-0.24**	**-0.06**	**-0.03**	0.01	**-0.09**	**0.08**
[6]	UTB_EST	**-0.05**	**-0.04**	**0.06**	**0.55**	**0.35**	–	**0.11**	**-0.07**	**-0.05**	**0.19**	**0.37**	**0.12**	**0.03**	**0.20**	**-0.05**
[7]	PTBI_VOL	**-0.29**	**-0.30**	**-0.08**	**-0.08**	**0.15**	**0.13**	–	**0.21**	0.01	**-0.51**	**-0.34**	**-0.17**	**-0.05**	**-0.31**	**0.11**
[8]	TAX_BENEFIT	**-0.14**	**-0.16**	-0.02	**0.02**	**0.02**	**-0.03**	**0.11**	–	**0.05**	**-0.11**	**0.07**	**-0.03**	-0.01	**-0.07**	**0.04**
[9]	DISC&EXTRA	-0.00	-0.01	0.00	0.00	-0.02	**-0.04**	**0.02**	0.05	–	0.01	**0.02**	**0.01**	0.01	-0.00	0.01
[10]	SIZE	**0.29**	**0.25**	**0.03**	**0.26**	**-0.24**	**0.09**	**-0.48**	**-0.10**	0.01	–	**0.86**	**0.36**	**0.08**	**0.62**	**-0.24**
[11]	AUDIT_FEES	**0.20**	**0.15**	**-0.05**	**0.40**	**-0.06**	**0.28**	**-0.33**	**-0.06**	**0.02**	**0.87**	–	**0.37**	**0.36**	**0.58**	**-0.19**
[12]	AUD_EXPERT	**0.11**	**0.09**	**0.03**	**0.12**	**-0.03**	**0.08**	**-0.15**	**-0.03**	0.01	**0.37**	**0.37**	–	**0.37**	**0.36**	**-0.17**
[13]	OTHER_FEES	**-0.02**	**-0.01**	**-0.04**	**-0.06**	**-0.00**	**-0.04**	0.01	0.01	0.01	**-0.07**	**-0.11**	**-0.05**	–	**0.07**	**-0.08**
[14]	BIG4	**0.18**	**0.15**	**0.10**	**0.23**	**-0.09**	**0.13**	**-0.32**	**-0.07**	-0.00	**0.61**	**0.58**	**0.36**	**-0.05**	–	**-0.57**
[15]	TIER2	**-0.10**	**-0.08**	**-0.07**	**-0.04**	**0.08**	**-0.03**	**0.03**	**0.04**	0.01	**-0.21**	**-0.17**	**-0.17**	-0.01	**-0.57**	–

Notes: All variables are defined in the Appendix and continuous variables are winsorized at the 1st and 99th percentiles (pooled). In Panel B, correlations significant at the five percent level (using two-tailed p-values) are in **bold**.

Table 3: First-Stage Model (Probability of Purchasing Auditor-Provided Tax Services)

$$\text{Prob}(APTS_{jt}) = \alpha_{jt} + \alpha_{year} + \alpha_{industry} + \beta_1 TENURE_{jt} + \beta_2 INST\_OWN_{jt} + \beta_3 MERGER_{jt} + \beta_4 OTHER\_FEES_{jt} + \beta_5 AUDIT\_FEES_{jt} + \beta_6 OPPORTUNITY_{jt} + \beta_7 SIZE_{jt} + \beta_8 NOL_{jt} + \beta_9 FOREIGN_{jt} + \beta_{10} BTM_{jt} + \beta_{11} TIER2_{jt} + \beta_{13} ESO\_INDUSTRY_{jt} + \beta_{14} UTB\_EST_{jt} + \beta_{15} PTBI\_VOL_{jt} + \beta_{16} TAX\_BENEFIT_{jt} + \beta_{17} DISC\&EXTRA_{jt} + \beta_{18} BIG4_{jt} + \varepsilon_{jt}$$

	Pred.	Coefficient	Z-statistic
Intercept	+/–	-0.833**	-2.148
TENURE	+	0.013***	4.741
INST_OWN	+	0.151**	2.323
MERGER	+	0.045	1.208
OTHER_FEES	–	-1.219***	-5.122
AUDIT_FEES	+	0.079**	2.152
OPPORTUNITY	+	0.058	1.030
SIZE	+	0.057**	2.318
NOL	+	0.005	0.132
FOREIGN	+	0.087*	1.668
BTM	–	-0.025	-1.148
TIER2	–	-0.171**	-2.193
ESO_INDUSTRY	+/–	0.048	0.334
UTB_EST	+/–	10.061**	1.976
PTBI_VOL	+/–	-0.340**	-2.054
TAX_BENEFIT	+/–	-0.007	-0.196
DISC&EXTRA	+/–	-0.111	-1.574
BIG4	+	0.098	1.303
Fixed Effects		Industry & Year	
Pseudo R-square		0.10	
Area under ROC		0.72	
N[19]		15,650	

Notes: All variables are defined in the Appendix and continuous variables are winsorized at the 1st and 99th percentiles (pooled). We use a probit regression specification with industry and year indicators and standard errors are clustered by firm. Z-statistics are presented next to each coefficient. ***, **, and * indicate significance at the 1%, 5%, and 10% respectively using two-tailed p-values.

[19] The 22 firm-year reduction in sample size in Table 3 (N=15,650) relative to Table 4 (N=15,672) is due to industries that do not have variation in the dependent variable APTS (i.e., industries that perfectly predict APTS) being dropped from the regression presented in Table 3.

Table 4: Regression Analyses (H1)

$$TaxAQ_{jt} \text{ (or } TaxAQ2_{jt}) = \alpha_{jt} + \alpha_{year} + \alpha_{industry} + \beta_1 TAX\_FEES_{jt} + \beta_2 FOREIGN_{jt} + \beta_3 ESO\_INDUSTRY_{jt} + \beta_4 UTB\_EST_{jt} + \beta_5 PTBI\_VOL_{jt} + \beta_6 TAX\_BENEFIT_{jt} + \beta_7 DISC\&EXTRA_{jt} + \beta_8 SIZE + \beta_9 AUDIT\_FEES_{jt} + \beta_{10} BIG4_{jt} + \beta_{11} TIER2_{jt} + \varepsilon_{jt}$$

		[1]		[2]		[3]		[4]	
		Y = TaxAQ		Y = TaxAQ2		Y = TaxAQ		Y = TaxAQ2	
Variables	Pred	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept	+/–	0.002	0.642	-0.003	-0.451	0.003	0.768	-0.003	-0.372
TAX_FEES	+/–	-0.003**	-2.426	-0.004**	-2.399	-0.003**	-2.183	-0.003**	-2.185
FOREIGN	–	-0.001	-0.966	-0.001*	-1.701	-0.001	-1.066	-0.001*	-1.724
ESO_INDUSTRY	–	-0.003***	-3.095	-0.003***	-2.935	-0.003***	-3.100	-0.003***	-2.933
UTB_EST	–	0.032	0.496	0.151**	2.273	0.055	0.889	0.168***	2.625
PTBI_VOL	–	-0.013***	-4.686	-0.019***	-5.864	-0.014***	-4.904	-0.020***	-6.168
TAX_BENEFIT	–	-0.003***	-8.463	-0.004***	-9.774	-0.003***	-8.395	-0.004***	-9.640
DISC&EXTRA	–	0.000	0.814	0.000	0.238	0.000	0.797	0.000	0.197
SIZE	+	0.002***	7.511	0.001***	5.736	0.002***	7.443	0.001***	5.609
AUDIT_FEES	+/–	-0.001***	-3.735	-0.001***	-3.766	-0.001***	-3.692	-0.001***	-3.647
BIG4	+	-0.000	-0.231	-0.001	-0.759	-0.000	-0.110	-0.000	-0.578
TIER2	–	-0.002**	-2.093	-0.002**	-2.190	-0.002**	-2.151	-0.002**	-2.270
APTS_INDICATOR	+/–	0.001	1.129	0.001	1.422				
RHO	+/–	-0.035	-1.099	-0.055	-1.398				
Ln(sigma)	+/–	-4.505***	-134.953	-4.406***	-160.642				
Wald χ^2 p-value		0.272		0.162		n/a		n/a	
Fixed Effects		Industry & Year		Industry & Year		Industry & Year		Industry & Year	
Adjusted R-Square		n/a		n/a		0.162		0.169	
Log-Psuedo Likelihood		40,557		39,003		n/a		n/a	
N		15,672		15,672		15,672		15,672	

Notes: All variables are defined in the Appendix and continuous variables are winsorized at the 1st and 99th percentiles (pooled). We use a treatment regression specification with industry and year and standard errors are clustered by firm. T-statistics are presented next to each coefficient. ***, **, and * indicate significance at the 1%, 5%, and 10% respectively using two-tailed p-values (one-tailed for directional predictions).

Table 5: Regression Analyses (H2 and H3)

$$TaxAQ_{jt} \text{ (or } TaxAQ2_{jt}) = \alpha_{jt} + \alpha_{year} + \alpha_{industry} + \beta_1 TAX\_FEES_{jt} + \beta_2 FOREIGN_{jt} + \beta_3 ESO\_INDUSTRY_{jt} + \beta_4 UTB\_EST_{jt} + \beta_5 PTBI\_VOL_{jt} + \beta_6 TAX\_BENEFIT_{jt} + \beta_7 DISC\&EXTRA_{jt} + \beta_8 SIZE + \beta_9 AUDIT\_FEES_{jt} + \beta_{10} BIG4_{jt} + \beta_{11} TIER2_{jt} + \beta_{12} AUD\_EXPERT_{jt} + \beta_{13} TAX\_FEES_{jt} * AUD\_EXPERT_{jt} + \beta_{14} OTHER\_FEES_{jt} + \varepsilon_{jt}$$

		[1]		[2]		[3]		[4]	
		Y = TaxAQ		Y = TaxAQ		Y = TaxAQ2		Y = TaxAQ2	
Variables	Pred	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept	+/–	0.003	0.897	0.004	0.974	-0.002	-0.307	-0.002	-0.243
TAX_FEES	+/–	-0.003**	-2.170	-0.004**	-2.074	-0.003**	-2.187	-0.005**	-2.363
FOREIGN	–	-0.000	-0.907	-0.000	-0.911	-0.001	-1.628*	-0.001*	-1.634
ESO_INDUSTRY	–	-0.003***	-3.071	-0.003***	-3.070	-0.003***	-2.897	-0.003***	-2.897
UTB_EST	–	0.033	0.517	0.031	0.489	0.153**	2.321	0.150**	2.285
PTBI_VOL	–	-0.014***	-4.754	-0.014***	-4.767	-0.019***	-5.967	-0.019***	-5.985
TAX_BENEFIT	–	-0.003***	-8.418	-0.003***	-8.410	-0.004***	-9.708	-0.004***	-9.698
DISC&EXTRA	–	0.000	0.749	0.000	0.742	0.000	0.160	0.000	0.149
SIZE	+	0.002***	7.586	0.002***	7.568	0.001***	5.834	0.001***	5.818
AUDIT_FEES	+/–	-0.001***	-3.772	-0.001***	-3.782	-0.001***	-3.725	-0.001***	-3.741
BIG4	+	-0.000	-0.326	-0.000	-0.295	-0.001	-0.763	-0.001	-0.714
TIER2	–	-0.002**	-2.143	-0.002**	-2.136	-0.002**	-2.273	-0.002**	-2.262
AUD_EXPERT	+/–	0.001*	1.840	0.000	0.854	0.000	1.166	0.000	0.084
TAX_FEES * AUD_EXPERT	+			0.002	1.081			0.003	1.513
OTHER_FEES	n/a	-0.001	-0.541	-0.001	-0.553	-0.001	-0.71	-0.001	-0.728
Fixed Effects		Industry & Year		Industry & Year		Industry & Year		Industry & Year	
Adjusted R-Square		0.161		0.161		0.167		0.167	
N		15,672		15,672		15,672		15,672	

Notes: All variables are defined in the Appendix and continuous variables are winsorized at the 1st and 99th percentiles (pooled). We use an OLS regression specification with industry and year indicators and standard errors are clustered by firm. T-statistics are presented next to each coefficient. ***, **, and * indicate significance at the 1%, 5%, and 10% respectively using two-tailed p-values (one-tailed for directional predictions)