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# Did the public company oversight board's restrictions on auditor-provided tax services reduce companies' tax avoidance?

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**Abstract:** In 2005, the Public Company Accounting Oversight Board (PCAOB) implemented restrictions on auditor-provided tax services (APTS), which resulted in a major decrease in the provision of these services in 2005 and 2006. The central research question in this study is whether these restrictions have affected tax avoidance after firms reduced their APTS. Using a difference-in-difference design, this paper investigates and finds that reducing APTS leads to a significant decrease in tax avoidance. These results are consistent with the notion that the PCAOB's restrictions, intended chiefly to enhance auditor independence, also led to this significant decrease in tax avoidance.

**Keywords:** auditor-provided tax services; APTS; tax avoidance; Public Company Accounting Oversight Board; PCAOB.

**JEL codes:** H26, M410, M420.

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## 1 Introduction

In 2005, an investigation led by the US Senate reported that audit firms were selling highly aggressive tax services on a contingent fee, which is prohibited under Rule 302 of the American Institute of Certified Public Accountants (AICPA)'s Code of Professional Conduct. Recent tax avoidance research mainly focuses on the determinants of corporate tax avoidance and how it varies across different companies. However, little is known about whether a company's auditor who also provides tax services affects tax avoidance. On July 26, 2005, the Public Company Accounting Oversight Board (PCAOB) introduced restrictions on auditor-provided tax services (APTS) after investigating tax shelter services provided by audit firms. These changes occurred due to concerns regarding the impact of high levels of non-audit fees on auditor independence (Davis and

Hollie, 2008). This phenomenon created a unique possibility to study the association between APTS and tax avoidance. The restrictions that were imposed by the PCAOB consist of bans on contingent fees, bans on selling aggressive tax services to audit clients, and bans on selling tax services to executives holding financial reporting roles. The ban on selling aggressive tax services is expected to result in the largest decrease in APTS, with possibly the most implications for company tax avoidance. I will use this setting of changed regulations to test whether there is a change in tax avoidance after firms reduce the amount of APTS as a result of the new PCAOB's rules.

Whereas the PCAOB aimed to improve the quality of audits and financial statements, with the new rules on APTS, it is unclear whether the restriction on tax services will exacerbate or mitigate tax aggressiveness. According to Cripe and McAllister (2009), separating providers of tax and audit services indicates increased auditor independence and, therefore, reduces tax avoidance. However, separating the tax provider from the audit function could increase tax aggressiveness as there might be greater opportunities for tax advocacy. The reasoning behind this argument is that a separate tax service provider has no concerns about independence and the consequences of a material misstatement, as opposed to an auditor tax service provider. Therefore, the effects of the new regulation on tax avoidance constitute an empirical question.

Lennox (2016) found that the PCAOB's restrictions on auditors' tax services, which were adopted in 2005, resulted in a significant drop in tax services provided by auditors. Klassen et al. (2016) studied the relationship between a firm's tax advisor and tax aggressiveness and found that firms using their auditors as tax advisors have less aggressive tax positions than firms that prepare their own tax returns or hire non-auditors. McGuire et al. (2012) find that the overall expertise of the external auditor influences tax aggressiveness. Furthermore, Cook et al. (2019) investigated whether dismissing a firm's auditor as a tax service provider would have an effect on tax avoidance. They found that firms that benefit from tax consultancy from a new provider decrease their tax avoidance and suggest that this is due to a lack of knowledge about tax planning opportunities and tax avoidance strategies at the new tax service provider.

To examine the effects of the PCAOB's restrictions on tax avoidance, this paper divides the sample into a treatment group of companies that face a significant decrease in tax fees and a control group with relatively unaffected tax fees. The two groups will be compared over a pre-event and post-event window. The pre-event window consists of the fiscal years 2002 to 2004, while the post-event window consists of the fiscal years 2006 to 2009 (as the new PCAOB's rules were adopted on July 26, 2005). The sample consists of 1,414 US SEC registrants because they are obliged to report tax fees and other necessary variables.

Following Hanlon and Heitzman (2010), I used two measures representing effective tax rates (ETR) for this study. The first proxy is the GAAP-effective tax rate (GAAPETR) (Dyreng et al., 2010), and the second one is the cash-effective tax rate (CASHETR) (Dyreng et al., 2008, 2010). Higher effective tax rates indicate a lower tax avoidance.

A difference-in-difference design is used to examine the changes between the pre-and post-event windows for both the control and treatment groups. The results show that a reduction in APTS fees results in higher GAAPETR and CASHETR, indicating a lower tax avoidance. These results remain consistent after using various robustness: adding financial firms, controlling for auditor changes during the sample period, and varying the threshold used to identify the treatment and control groups.

Corporate tax avoidance is an important field of research because it involves multiple parties including the regulators, the company itself, and the tax service providers. This study contributes to research that examine the functioning of the PCAOB in its role as a regulator for the audit profession. Whereas Lennox (2016) studies the effects of the PCAOB's restrictions on audit quality, this research investigates their effects on tax avoidance, and thereby, enhances our understanding about the implications of the implementation of APTS rules in 2005 and 2006. This study, therefore, broadens the view of what drives tax avoidance. Furthermore, it contributes to the existing literature on the role of a company's tax service provider in relation to corporate tax aggressiveness, (e.g., Klassen et al., 2016) and expands Cook et al.'s (2019) research that examined the changes in tax avoidance after an auditor switch resulting from the new Sarbanes-Oxley Act (SOX) regulations. In addition, using difference-in-difference research design allows us to go beyond simple correlations and draw causal conclusions. Finally, given the recent criticisms of non-audit services, a key implication of this study is that it provides new insights on the effective rule of regulation in limiting undesirable practices such as tax avoidance.

The remainder of this paper is organised as follows. Section 2 reviews the existing research and develops hypotheses. Section 3 discusses the method and data used for this study. The results are then presented in Section 4. Section 5 includes information on propensity score matching. Section 6 provides robustness checks. Section 7 concludes the research.

## **2 Literature review and hypothesis development**

### *2.1 Tax avoidance*

Although ample research has been conducted on tax avoidance, there is no generally accepted definition of the underlying construct, and the term has many equivalents. The terms 'tax avoidance', 'tax sheltering', 'tax evasion' and 'tax aggressiveness' are used interchangeably but differ in meaning in different papers. Therefore, in this paper, I define tax avoidance as the reduction of explicit taxes in any way, which is recognisable by the change in a firm's tax liability. This is a broad definition that ranges from tax avoidance, which is legal, to tax evasion, which is illegal. This definition of tax avoidance is compliant with previous research (see Dyreng et al., 2008; Hanlon and Heitzman, 2010; McGuire et al., 2012; Lisowsky et al., 2013; Lietz, 2013). The IRS (2014) states the following about tax avoidance:

"Taxpayers have the right to reduce, avoid, or minimize their taxes by legitimate means. One who avoids tax does not conceal or misrepresent, but shapes and pre-plans events to reduce or eliminate tax liabilities within the parameters of the law. Tax evasion is some affirmative act to evade or defeat tax, or payment of tax."

Therefore, tax avoidance is, in most cases, legal according to the law, but regulators attempt to minimise it because it is undesirable from their viewpoint.

A few determining factors for companies to decide whether or not to avoid taxes include their reputation, unfavourable media publicity, and the reporting of financial figures (Graham et al., 2013). Gallemore et al. (2014) do not find that avoiding taxes

comes with reputational costs. Furthermore, Cook et al. (2015) find that tax avoidance influences the cost of capital, and that investors assess the benefits of tax avoidance differently for firms that exhibit high and low tax avoidance.

Tax avoidance has a major impact on the US economy. Dyreng et al. (2016) investigated a large sample of US firms with a broad range of tax avoidance measures and demonstrated that they have managed to successfully decrease the ETR by approximately 10% over the last 25 years. This decrease represents roughly \$109 billion for the year 2012. They also found that both multinational and domestic companies engage in tax avoidance and do so successfully. According to previous papers, companies are able to avoid taxes by shifting profits from high-tax countries to low-tax countries, using transfer prices, contract manufacturing, and hybrid instruments to shift intangible assets across different countries (Dyreng et al., 2016; Gravelle, 2015). Dyreng et al. (2016) show that companies with only domestic operations can avoid a similar level of taxes as multinational companies despite having fewer possibilities of tax avoidance at their disposal.

## *2.2 Association of APTS with tax avoidance*

In contrast with studies about tax avoidance by companies (Chen et al., 2010), company owners (Dyreng et al., 2010), and executives (Armstrong et al., 2012), a disregarded field of study is the influence the responsible party for providing tax services has on engaging in tax avoidance (Klassen et al., 2016). The role of the tax service provider is an important aspect to consider because claims of independence issues arise when the financial statement auditor provides tax services to the same company it audits.

Klassen et al. (2016) assume that companies are aware of the role their tax service provider fulfils and consider the advantages and disadvantages accompanied with internally preparing taxes, hiring their own auditor, or hiring another external party (which could also be a random audit firm, but not the auditor working on the financial statements). A disadvantage of hiring the same provider for both audit and tax services is the higher audit fees, resulting from the threats that auditors may face concerning independence and the risks of audit failure (Klassen et al., 2016). These threats restrain the auditor from engaging in more tax avoidance than other tax service providers, who do not have such concerns. Because of the higher risk of exposure a financial statement auditor faces due to risks of litigation, they will charge higher APTS fees. Also, the auditor will prepare a tax filing position that is more accurate because they do not want to be called to account by the IRS or risk reputational damages (Klassen et al., 2016).

Donohoe and Knechel (2014) investigated and found a relationship between tax aggressiveness and audit fee premium for clients that exhibit tax aggressiveness. This implies that auditors charge a higher fee when they face such risks. This finding supports those of Klassen et al. (2016), which state that auditors face higher threats than other tax service providers because of their responsibility for the financial statements, and therefore, charge higher fees.

An advantage of hiring the auditor of financial statements as a tax service provider lies in their knowledge advantage over other tax service providers. By utilising this, the auditor has a better opportunity to lower a client's tax burden. McGuire et al. (2012) studied auditors' knowledge advantage and found that the expertise of an auditor in a certain industry determines the level of the company's tax avoidance. Indeed, greater auditor industry expertise results in higher tax avoidance. This finding supports the

assertion that auditors use their knowledge advantage to help companies avoid taxes. Hogan and Noga's (2012) research supports this statement as they found that firms that reduce APTS pay more taxes in the long term. On the other hand, firms that increase APTS pay fewer taxes in the long term. They argue that knowledge spillover, where knowledge gained from one service spills over to other services, is the key mechanism in place.

Klassen et al. (2016) found that the level of tax avoidance varies based on whether an audit firm that is responsible for providing tax services also acts as the auditor of financial statements. They also found that companies audited by Big 4 auditors and delivering tax services avoid fewer taxes than those that have a tax preparer that is not the same company as the one responsible for auditing financial statements.

### *2.3 SOX and PCAOB regulation concerning APTS*

Following numerous accounting scandals in the early 2000s, the Sarbanes-Oxley Act (SOX) was enacted by the US Congress in 2002 and resulted in strengthened regulations for both companies and audit firms, including extensive restrictions on non-audit services provided by the external auditor to enhance the public's trust in the US market (Knechel and Sharma, 2012). According to Maydew and Shackelford (2005), as a consequence of the changing regulatory environment, APTS fees for S&P 500 companies declined from averaging the same amount as audit fees to 25% of the amount of audit fees over the estimation period of 2001 to 2004. The mean number of non-audit fees significantly dropped as a result of the SOX, and decreased by 31% between 2002 and 2003, whereas the mean number of APTS fees increased by 18% over the same period (Lennox, 2016). This result shows that the Securities and Exchange Commission (SEC) achieved its objective of reducing the amount of non-audit services provided. However, auditors continued to sell extensive tax avoidance services to their clients.

With the implementation of the SOX, there already were discussions at the US Congress to also prohibit APTS designed to avoid corporate taxes (Omer et al., 2006). However, this was never accomplished because it was argued that elaborating rules on APTS could harm companies through a reduction of earnings and a higher cost of capital. Therefore, the SOX only prohibited transactions that were exclusively intended to avoid taxes, unless these transactions were allowed by tax laws (Purcell and Lifson, 2003). However, the SOX resulted in additional requirements to enhance the transparency of tax services provided by the auditor. Therefore, from the SOX onwards, companies have been needing approval from the audit committee for APTS, thus increasing its responsibilities. In addition, companies have to publish these tax fees when filing their financial statements, which makes these figures publicly available, and thereby, enhances transparency. Another important consequence of the SOX was the creation of the PCAOB "to oversee the audit of public companies that are subject to the securities laws, and related matters, in order to protect the interests of investors and further the public interest in the preparation of informative, accurate, and independent audit reports" (Palmrose, 2013).

On July 26, 2005, the PCAOB adopted three new rules that limit the opportunities for audit firms to deliver APTS, as a consequence of an investigation on tax shelter services they provide. These new rules were introduced following concerns about auditor

independence relating to high profit and high margins on APTS compared to audit services (Omer et al., 2006).

First, Rule 3521, which is a ban on contingent fees, was imposed because companies utilised contracts that stated that fees would only be paid if the auditor achieved tax reductions to a certain low level, which, in turn, created incentives for tax avoidance. Auditors were selling these tax services on a contingent basis, although they had already been prohibited by existing regulations. The reason for banning contingent fees is that they threaten auditor independence by creating an economic motivation for the auditor to stay in business with the client.

Second, Rule 3522 prohibits selling aggressive tax services to audit clients. This rule includes confidential transactions and transactions considered to be tax aggressive. The PCAOB defines aggressive tax services as “a transaction that was initially recommended, directly or indirectly, by the firm and a significant purpose of the transaction is tax avoidance” (PCAOB, 2005). This rule implies that auditors are no longer allowed to sell tax services related to marketing, planning, or expressing an opinion in favour of tax avoidance for their clients.

Third, Rule 3523 prohibits selling tax services to executives holding financial reporting roles or the immediate family members of these executives to prevent an alignment of incentives between the executives of the client and the audit firm, which could impair the appearance of the auditor’s independence (Albring et al., 2014).

## *2.4 Hypothesis development*

A significant advantage of APTS is that they can generate knowledge spillovers that improve audit services provided by the auditor and, thereby, the quality of financial reports (Simunic, 1984; Kinney et al., 2004; Gleason and Mills, 2011). Kinney et al. (2004) found that APTS fees are associated with fewer accounting misstatements. Gleason and Mills (2011) investigated the association between APTS and tax reserves and found that companies hiring an auditor for APTS have more accurate tax reserves. Paterson and Valencia (2011) found a negative association between providing APTS and financial misstatements. Harris and Zhou (2013) found an association between APTS and lower internal control weaknesses within companies, which they explain with the knowledge spillover theory. However, other studies found that APTS reduce audit quality (Choudhary et al., 2015; Cook et al., 2008).

Whereas the PCAOB aimed to improve audit quality, the effects on company tax avoidance are unclear. According to Cripe and McAllister (2009), separating providers of tax and audit services could indicate auditors’ increased independence. However, this could also increase tax aggressiveness. A separate provider for tax services might offer greater opportunities for tax advocacy because they are not concerned about independence and the consequences of a material misstatement, which an auditor is exposed to when providing tax services (Klassen et al., 2016). The results from research focusing on the relationship between APTS and tax avoidance are mixed. Therefore, it is interesting to study the results from new regulations on tax avoidance, given that these new regulations have a major effect on the level of APTS.

Cook et al. (2019) investigated whether dismissing a company’s auditor as a tax service provider would impact tax avoidance. They found that firms that benefit from tax consultancy from a new provider decrease their tax avoidance, which suggests that this is due to the new provider’s lack of knowledge about tax planning opportunities and tax

avoidance strategies. Even when the new tax service provider has equivalent know-how to the previous provider's, a decrease in tax avoidance remains possible because of a lack of knowledge in the particular segment of the business. Seetharaman et al. (2011) found that companies with an auditor as a tax service provider benefit from decreased possibilities of tax-related restatements.

Fortin and Pittman (2008) found that paying more tax fees to the auditor tax service provider is valued by bondholders, resulting in lower yield spreads for new company bond issues. Krishnan et al. (2012) found that investors view auditor tax providers as value-adding. Besides concerns about audit quality and independence, Albring et al. (2014) found that firms with more independent boards, audit committees with greater accounting financial expertise, higher stock ownership by directors and institutions, that separate the CEO and chairman of the board positions, and with higher tax to audit fee ratios are more likely to switch to a non-auditor provider (i.e., a separate provider). Lassila et al. (2010) found that companies with powerful corporate governance and audit committee effectiveness are more likely to retain their auditors as tax service providers.

There is still no consensus about the relation between the auditor as a tax service provider and tax avoidance. This appeared to be clear in the 2004 debate on Auditor Independence Tax Services Roundtable that was convened by the PCAOB (2004). An AICPA representative illustrates this by opining that tax services provided by another provider than the financial statement auditor will result in more aggressive tax positions. The argument here is that these tax service providers do not bear responsibility for the financial statements. Therefore, they can exhibit more tax aggressiveness than an auditor tax service provider would allow their own employees in their own tax department [PCAOB, (2004), p.94]. Maydew and Shackelford (2005) share the same opinion as they state that "it is possible that the financial statement auditor has become the single most effective deterrent against aggressive tax avoidance strategies".

On the other hand, a California Public Employees' Retirement System's representative questions the double role an auditor holds when auditing financial statements while also influencing financial statement figures by providing tax services. The argument here is that an auditor cannot be independent when criticising the financial statements if they are also responsible for the realisation of certain figures in these financial statements by executing a certain tax strategy [PCAOB, (2004), p.111]. APTS draws a significant political attention, for example the EU Commission has been outspoken about splitting the Deloitte, KPMG, PWC, and EY offices into separate audit and consulting parts (including tax services) to prevent risks of conflicts of interest. As of today, the auditor of financial statements is still allowed to provide tax services to the same company.<sup>1</sup>

The implementation of the SOX and the adoption of the new PCAOB's rules in 2005 had a major effect on the tax service provider environment. Lennox (2016) finds that there is a significant drop in tax services provided by auditors as a consequence of the new PCAOB's restrictions. This effect is similar to the shock that the SOX regulations had on non-audit services in 2002 and 2003, whereby non-audit fees declined significantly. The direction of the association between APTS and tax avoidance as a consequence of the new PCAOB's rules is unclear, as the differing results from research and the quotes above illustrate. Therefore, the hypothesis does not predict a certain direction and is stated in the null form:



Hypothesis There is no change in tax avoidance after firms reduce the amount of APTS as a result of the new PCAOB's rules.

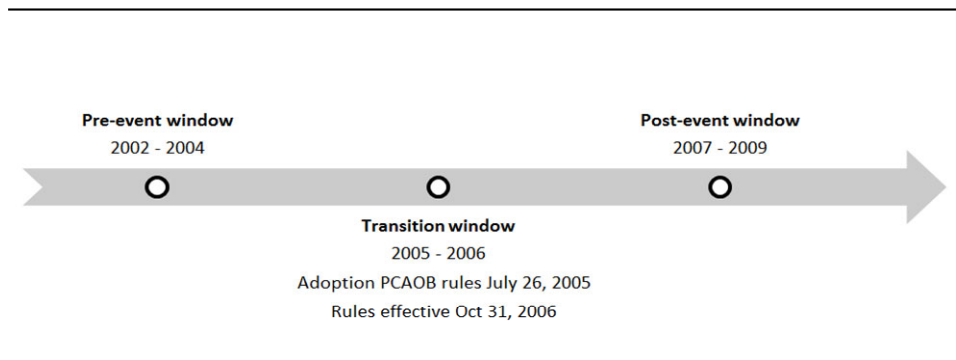
### 3 Research method

#### 3.1 Sample

The sample period is based on the adoption of the new PCAOB's rules on July 26, 2005, and those implemented on October 31, 2006. Based on these events, I established a wide transition window that consists of the fiscal years 2005 and 2006. The reason for this is that it stretches to before the adoption of the PCAOB's rules on July 26, 2005, since the PCAOB had already discussed, in 2004, whether or not to restrict auditor tax services. By using a wider transition window, I wanted to circumvent the missing effects from the reductions in APTS fees before July 26, 2005.

To test the main hypothesis, the sample will be divided into pre-and post-event periods. The pre-event period consists of the fiscal years 2002, 2003, and 2004, while the post-event window consists of the fiscal years 2007, 2008, and 2009. We lack information about APTS fees prior to 2002 as the disclosure of APTS fees was voluntary, and thus, limited in 2000 and 2001. Therefore, the pre-event window begins in 2002 and ends in 2004, the year preceding the transition window. The post-event window begins in 2007, after the transition window, and ends in 2009 to ensure that the post-and pre-event periods have the same time span. Figure 1 gives an overview of the sample period.

**Figure 1** Timeline sample period



I gathered data for APTS fees and data necessary for the control variables from Datastream/Worldscope. Companies with zero APTS fees in 2004 will be deleted from the sample because they cannot further decrease their APTS fees if these are already zero. Also, observations with negative pre-tax income will be deleted because tax avoidance is unlikely to occur when facing losses.<sup>2</sup>

The sample consists of US SEC registrants because they are obliged to report tax fees and other variables necessary to perform controls. Consistent with prior research on tax avoidance, the observations from the firms in the financial sector are excluded due to different regulations. Companies with missing values are removed from the sample. As a

consequence of these restrictions on the data, the final sample consists of 5,391 firm-year observations and 1,414 unique firms.

### *3.2 Variable measurement*

#### *3.2.1 Treated vs. control groups*

To examine the relationship between tax services provided by auditors and tax avoidance, the sample will be divided into:

- a a treatment group of companies that face a significant decrease in tax fees
- b a control group with relatively unaffected tax fees.

The groups will be compared over a pre-event and post-event window since the purpose of this research is to study the effects of the new PCAOB's regulations.

Before the adoption of the new PCAOB's rules, audit firms were involved in widespread tax avoidance by selling aggressive tax services to their clients. The adoption of the PCAOB's Rules 3521, 3522, and 3523 in 2005 resulted in APTS fees' massive drop. APTS fees indeed declined by 21.5% in 2005 and 24.7% in 2006, before subsequently stabilising after these major drops (Lennox, 2016).

To divide the sample into treatment and control groups, a new variable, TREAT, will be constructed to equal 1 if the company significantly reduces APTS fees between the fiscal years 2004 and 2006. The reduction is assumed to be significant if the decrease in APTS fees is 75% or more, measured as the difference between the fiscal years 2004 and 2006.

#### *3.2.2 Tax avoidance variables*

Hanlon and Heitzman (2010) created an overview of the measures of tax avoidance, whereby they list twelve different variables that are often used in the literature about tax avoidance. I will use two proxies to measure tax avoidance activities. The first measure of tax avoidance, measured over a one-year period, is the GAAP effective tax rate (GAAPETR). It is calculated as total income tax expense divided by total pre-tax accounting income (Hanlon and Heitzman, 2010) and is a frequently used measure for tax avoidance that displays activities directly affecting income (Dyreng et al., 2010; Rego and Wilson, 2012; McGuire et al., 2012). However, one of its downsides is that it does not reflect companies' activities that transfer taxes to a later period (Hanlon and Heitzman, 2010). According to Rego (2003), lower levels of GAAPETR signal greater tax avoidance.

The second measure of tax avoidance is the cash effective tax rate (CASHETR), which will also be measured over a one-year period. It is calculated as cash taxes paid divided by pre-tax accounting income (Hanlon and Heitzman, 2010). Unlike the GAAPETR, the CASHETR also reflects companies' activities that transfer taxes to a later period and is therefore a complementary tax avoidance measure. The CASHETR is not influenced by changes in the accounting numbers of tax expenses. According to Dyreng et al. (2008), lower levels of CASHETR signal greater tax avoidance.

Two other measures that have been used in prior research and are not used in this study are the total book-tax difference (BTD) and the discretionary permanent differences (DTAX). Prior research documented some issues related to these measures. A downside

to using BTD is that taxable income can only be estimated due to the unavailability of public IRS information about company taxable income. According to Manzon and Plesko (2001), the use of BTD comes with accuracy issues as a result of companies' consolidations and activities involving the accounting of loss carried forward. The DTAX measure is intended to measure tax avoidance reflecting highly aggressive tax positions because previous research has shown that DTAX is connected to tax sheltering (Frank et al., 2009). Statutory auditors are less likely to engage in significantly highly aggressive tax activities.

### 3.3 *Research design*

To test my hypothesis, I will use the following regression model:

$$\text{TAXAVOID} = \beta_0 + \beta_1 \text{TREAT} \times \text{POST} + \beta_2 \text{SIZE} + \beta_3 \text{LEV} + \beta_4 \text{NOL} + \varepsilon$$

The dependent variable TAXAVOID represents one of the measures of tax avoidance, which are GAAP ETR and CASH ETR. Both variables are multiplied by  $-1$  to ease their interpretation. The variable of interest is the interaction term TREAT  $\times$  POST. To examine my hypothesis, I used the dummy variable TREAT. This variable takes the value of 1 if a company reduced its APTS by more than 75% (treatment group) between 2004 and 2006, and the value of 0 otherwise (control group). POST is another dummy variable and takes the value of 1 in the post-event window, and 0 in the pre-event window. Following Lennox's (2016) work, observations in the transition window are dropped. In all regressions, we control for firm fixed effects. Also, to account for interdependence among observations, we cluster standard errors at the firm level.

### 3.4 *Control variables*

When identifying the characteristics of long-run tax avoidance by measuring the CASHETR, Dyreng et al. (2008) found a positive association between size and tax avoidance. They indeed found that smaller companies, based on market capitalisation, pay higher taxes than larger ones. Porcano's (1986) study confirms this relation by also finding a negative relation between company size and ETR. On the contrary, Zimmerman (1983) and Rego (2003) found contradicting results, which they explain by using the political cost hypothesis stating that larger companies face higher costs that increase the ETR. Other studies (e.g., Gupta and Newberry, 1997; Mills et al., 1998) found no significant relation between tax avoidance and a company's size. Because of prior researches' mixed results, I included a control variable for size (SIZE) but did not predict the sign of the relationship. The size (SIZE) is measured as the natural logarithm of the market value of equity at the beginning of the year.

Graham and Tucker (2006) found that leverage is an important aspect due to the usability of the tax shield of debt as a substitute for tax shelter. They found that companies with lower debt compared to assets evidence more tax shelter activities. This result was confirmed by Lisowsky's (2010) study. Therefore, I expect that leverage will have a negative impact on tax avoidance since it is a substitute for tax avoidance. I measured this by including the control variable LEV, which will be measured as a long-term debt scaled by assets at the end of the year.

Rego (2003) and Graham (1996) draw attention to the importance of measuring net operating losses (NOL) when determining the ETR. Companies with NOL have fewer incentives to avoid taxes because they do not have to pay taxes if they can carry forward their losses in the upcoming years. Chen et al.'s (2010) study confirms this result and states that companies with more losses carried forward have a lower ETR compared to companies with lower opportunities to do so. Additionally, McGuire et al. (2012) found that companies that have higher NOL to carry forward more often buy APTS. To control NOL, I added the dummy variable NOL in the regression model, which takes the value of 1 if the company has losses carried /to carry forward and 0 otherwise. I predicted a negative relation between NOL and tax avoidance because NOL will presumably result in companies avoiding paying less taxes as they can use their NOL instead. All control variables are winsorised at the 1st and 99th percentiles, following McGuire et al.'s (2012) work. Table 2 on industry distribution gives an overview of the different industries used. A description of all the variables can be found in Appendix.

## 4 Results

### 4.1 Descriptive statistics

Table 1 reports the descriptive statistics of all variables used in the regression model. The means and medians of tax avoidance measures are consistent with prior literature. The mean of GAAPETR is  $-0.31$ , while the mean of CASHETR is  $-0.25$ . Furthermore, the mean of GAAPETR is lower than the mean of CASHETR, which is also consistent with prior literature (e.g., Chen et al., 2010; McGuire et al., 2012). This result can be explained by the pretax income in the financial statements being higher than the income, according to the tax authorities. Additionally, the standard deviation of the GAAPETR is 0.17, whereas the standard deviation of the CASHETR is 0.22. This implies that the CASHETR is more volatile than the GAAPETR and might cause measurement problems. Table 2 shows the distribution of firm years across the industry's classification. This table shows that the sample is generally representative of the main industries.

**Table 1** Summary statistics

	<i>Mean</i>	<i>Standard deviation</i>	<i>p25</i>	<i>p50</i>	<i>p75</i>
GAAPETR	-0.312	0.174	-0.386	-0.350	-0.250
CASHETR	-0.252	0.220	-0.349	-0.231	-0.078
TREAT x POST	0.149	0.356	0.000	0.000	0.000
lnMVE	5.638	1.885	4.345	5.647	6.866
LEV	0.183	0.531	0.000	0.074	0.261
NOL	0.702	0.458	0.000	1.000	1.000

Notes: This table presents descriptive statistics for all variables. Variable descriptions are included in Appendix.

Table 3 presents correlations for both the tax avoidance measures and the control variables. As expected, the GAAPETR and CASHETR are positively correlated. Control variables are correlated, which is consistent with prior research.

**Table 2** Industry distribution

<i>Industry</i>	<i>Control</i>	<i>Treated</i>
Consumer non-durables – food, tobacco	298	119
Consumer durables – cars, TV’s, furniture	159	48
Manufacturing – machinery, trucks, pla	518	180
Oil, gas, and coal extraction and product	86	105
Chemicals and allied products	116	36
Business equipment – computers, software	849	424
Telephone and TeLEVision transmission	119	52
Utilities	45	33
Wholesale, retail, and some services	571	321
Healthcare, medical equipment, and drug	441	197
Other – mines, constr, BldMt, Trans, H	503	171

Note: This table shows the distribution of sample firm-year observations across Fama-French 12 industry classification.

**Table 3** Correlation matrix

	<i>GAAPETR</i>	<i>CASHETR</i>	<i>INTER</i>	<i>lnMVE</i>	<i>LEV</i>	<i>NOL</i>
GAAPETR	1.000					
CASHETR	0.292*** (0.000)	1.000				
TREAT x POST	-0.002 (0.896)	-0.021* (0.075)	1.000			
lnMVE	-0.075*** (0.000)	0.032*** (0.007)	-0.022** (0.022)	1.000		
LEV	-0.021* (0.081)	0.017 (0.154)	-0.012 (0.215)	0.026*** (0.007)	1.000	
NOL	0.128*** (0.000)	0.154*** (0.000)	0.039*** (0.000)	-0.033*** (0.001)	0.027*** (0.004)	1.000

Notes: This table shows pairwise correlations between all variables. Variable definitions are available in Appendix.

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

#### 4.2 Univariate analyses comparing means

Table 4 distinguishes firms in the treatment group (TREAT = 1) from firms that experience a decrease of APTS fees of 75% or more, and a control group (TREAT = 0). These are presented as univariate tests of differences in means across subsamples. Table 4 compares means for the full sample and shows that the tax avoidance measures significantly differ for the treatment and control groups. Furthermore, Table 4 shows that significant differences in control variables exist between these two groups for SIZE and LEV. This implies that the composition of the groups may not be random, which could lead to a measurement error in the regression. I will deal with this issue in Section 5.

**Table 4** Two-sample t test with equal variances

	Mean_Treated	Mean_Control	dif	t_value	p_value
GAAPETR	-0.315	-0.305	-0.009	-2.2	0.029
CASHETR	-0.255	-0.245	-0.009	-1.6	0.111
lnMVE	5.76	5.394	0.365	9.5	0.000
LEV	0.195	0.16	0.035	3.3	0.001
NOL	0.704	0.699	0.005	0.55	0.597

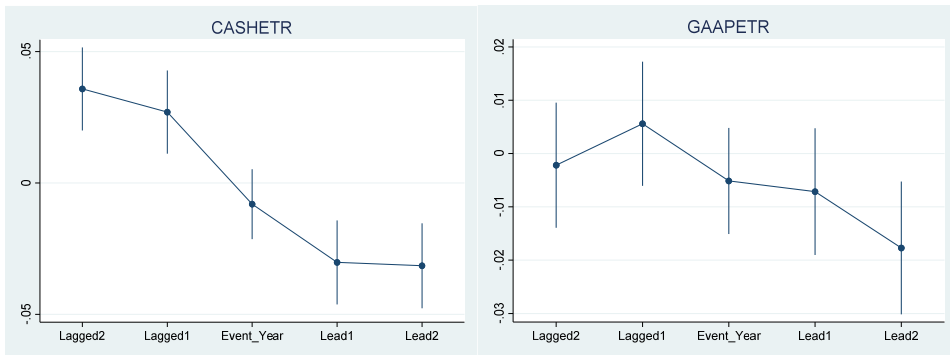
Notes: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

This table shows the variable means for treated and untreated firms.

### 4.3 Multivariate analyses

We start the analysis by looking at the variation in the  $GAAP(CASH)ETR_{it}$  over time. Figure 2 shows results from a regression relating the  $GAAP(CASH)ETR_{it}$  to a set of dummy variables indicating transition years, as well as dummies for the two years before and after the transition. We can see that the  $GAAP(CASH)ETR$  started to decline the year prior to the transition and continued to do so up to a year after the transition period. This descriptive evidence is consistent with lower levels of tax avoidance due to the PCAOB's rules.

**Figure 2** PCAOB regulation and tax avoidance (see online version for colours)



Notes: This figure plots the coefficients and 95% confidence intervals from a regression of  $GAAP(CASH)ETR_{it}$  on dummy variables indicating transition years, as well as dummies for the two year before and POST transition. The specification also controls for firm fixed effects and the log of firm market value.

Table 5 reports the regression results using both tax avoidance measures as dependent variables, respectively, the GAAPETR and CASHETR. Higher values of GAAPETR and CASHETR indicate higher tax avoidance. The coefficients of the interaction variable (TREAT x POST), which represent the difference-in-difference result, are negative for both the GAAPETR and CASHETR. In column (1), the coefficient estimate on TREAT x POST equals  $-0.017$  ( $t$ -value =  $-1.76$ ). In column (2), the coefficient estimate on TREAT x POST equals  $-0.057$  ( $t$ -value =  $-4.37$ ). This suggests a significant decrease in tax avoidance for the treatment group compared to the control group because a lower GAAPETR/CASHETR indicates less tax avoidance. Together, these findings support the

idea that an exogenous reduction in APTS has a significantly negative effect on corporate tax avoidance.

**Table 5** Tax avoidance POST PCAOB restrictions

	(1)	(2)
VARIABLES	GAAPETR	CASHETR
TREAT x POST	-0.017*	-0.057***
	(-1.76)	(-4.37)
lnMVE	-0.002	0.016**
	(-0.40)	(2.42)
LEV	-0.013	0.015
	(-0.46)	(0.40)
NOL	0.046***	0.039***
	(4.58)	(2.65)
Observations	5,176	5,391
R-squared	0.559	0.466
Firm FE	Yes	Yes

Notes: Robust t-statistics in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

This table presents the diff-in-diff regression results examining the effect of PCAOB APTS restrictions on tax avoidance. Variable definitions are available in Appendix.

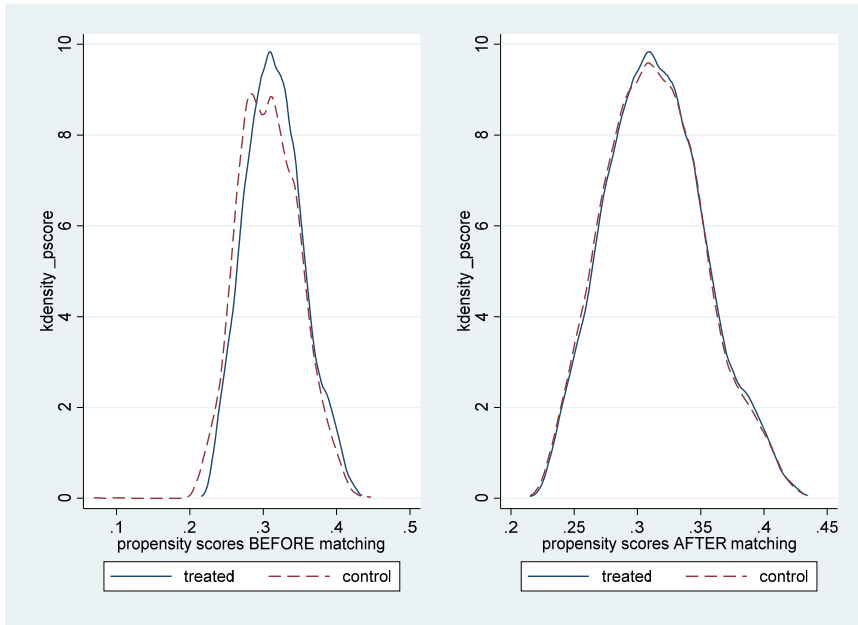
## 5 Propensity score matching

As previously discussed, the results in Table 4 showed that the composition of the treatment and control groups may not be random, which could lead to a measurement error in the regression. To overcome this problem, we followed Lennox's (2016) approach by using a matched sample design. Every observation from the treatment group is matched to an observation of the control group based on the nearest propensity score per observation. The propensity score is estimated by using logit models for the pre-event and post-event windows based on the dependent variable TREAT and the independent variables SIZE, NOL, and LEV.

Figure 3 shows the differences between the treatment and control groups before and after matching. It is clear, from this figure, that the differences between the two groups for the matched sample are significantly smaller than for the unmatched control group. Therefore, the matched sample design contributes to streamlining the differences between the treatment group and the control group. While using a matched sample presents its own caveats (King and Nielsen, 2019), it provides a better view of the robustness of the results.

Table 6 repeats the analysis showed in Table 5 using the matched sample. We kept finding a significantly negative coefficient on the interaction term. The result in column (1) is now stronger in terms of both magnitude and power. In column (1), the coefficient estimate on TREAT x POST equals  $-0.028$  (t-value =  $-2.25$ ). In column (2), it equals  $-0.045$  (t-value =  $-2.77$ ).

**Figure 3** Kernel density propensity scores (see online version for colours)



Note: This graph shows the propensity of scores of treated group and the group that is untreated (i.e., control) before and after matching.

**Table 6** PSM tax avoidance POST PCAOB restrictions

	(1)	(2)
VARIABLES	GAAPETR	CASHETR
TREAT x POST	-0.028** (-2.25)	-0.045*** (-2.77)
lnMVE	0.006 (0.64)	0.024** (2.24)
LEV	-0.001 (-0.02)	0.071 (1.20)
NOL	0.033** (2.07)	-0.003 (-0.12)
Observations	4,212	4,659
R-squared	0.647	0.578
Firm FE	Yes	Yes

Notes: Robust t-statistics in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

This table presents the diff-in-diff regression results examining the effect of PCAOB APTS restrictions on tax avoidance using the matched sample. Variable definitions are available in Appendix.



## 6 Robustness checks

### 6.1 Including financial firms

So far, throughout the analysis, we have removed financial firms as they are subject to a difference in the regulatory system. However, since the PCAOB's regulations apply to both financial and nonfinancial firms, we repeated the analysis in Table 5, after including financial firms. The results are presented in Table 7 and suggest that our inferences remain qualitatively similar.

**Table 7** Including financial firms

VARIABLES	(1)	(2)
	GAAPETR	CASHETR
TREAT x POST	-0.017** (-2.17)	-0.052*** (-4.45)
lnMVE	-0.005 (-1.07)	0.017*** (2.78)
LEV	-0.023 (-0.97)	0.016 (0.48)
NOL	0.045*** (4.77)	0.039*** (2.73)
Observations	6,395	6,448
R-squared	0.679	0.515
Firm FE	Yes	Yes

Notes: Robust t-statistics in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

This table presents the diff-in-diff regression results examining the effect of PCAOB APTS restrictions on tax avoidance including financial firms in the sample. Variable definitions are available in Appendix.

### 6.2 Classification of treatment and control groups

Following Lennox's (2016) research design, companies were divided into a treatment or control group based on whether or not they decreased APTS fees by 75% or more. To assess whether the results from Table 5 would be the same when using other cut-off points, I divided companies into groups based on 50% and 100% APTS fee reduction, instead of the 75% threshold. Tables 8(a) and 8(b) show the regression results for the 50% and 100% threshold samples, respectively. Table 8(a) shows that the coefficients on the TREAT x POST variable remain qualitatively similar for both the GAAPETR and CASHETR. The results from the 100% threshold in Tables 8(b) show consistent evidence for the coefficient on TREAT x POST for the CASHETR  $-0.057$  (t-value =  $-6.42$ ), but the coefficient on the GAAPETR is marginally insignificant  $-0.010$  (t-value =  $-1.50$ ).

**Table 8** Different classification for treatment and control groups

<i>Panel 8A: Reducing fees by 50%</i>		
	(1)	(2)
VARIABLES	GAAPETR	CASHETR
TREAT x POST	-0.016*	-0.060***
	(-1.93)	(-5.39)
lnMVE	-0.002	0.017**
	(-0.37)	(2.52)
LEV	-0.012	0.019
	(-0.42)	(0.51)
NOL	0.047***	0.041***
	(4.58)	(2.79)
Observations	5,176	5,391
R-squared	0.559	0.468
Firm FE	Yes	Yes
<i>Panel 8B: Reducing fees by 100%</i>		
	(1)	(2)
VARIABLES	GAAPETR	CASHETR
TREAT x POST	-0.010	-0.057***
	(-1.50)	(-6.42)
lnMVE	-0.002	0.020***
	(-0.31)	(2.86)
LEV	-0.011	0.028
	(-0.38)	(0.78)
NOL	0.046***	0.045***
	(4.52)	(3.06)
Observations	5,176	5,391
R-squared	0.558	0.470
Firm FE	Yes	Yes

Notes: Robust t-statistics in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

This table presents the diff-in-diff regression results examining the effect of PCAOB APTS restrictions on tax avoidance using different classification for treatment and control groups. Variable definitions are available in Appendix.

## 7 Conclusions

The new PCAOB's rules on APTS resulted in a major decrease of the average APTS fee during 2005 and 2006. This created a perfect opportunity to test whether a change in tax avoidance would occur after firms reduced the amount of APTS, allowing us to shed light on the implications of the new PCAOB's rules. The motivation behind this study is

relevant because of the conflicting opinions about the relation between tax avoidance and APTS.

Opponents of APTS doubt whether an auditor can independently audit a company's financial statements while also providing reliable tax services due to independence issues. On the other hand, supporters of APTS claim that an auditor can do so, as the auditor has greater incentives to prepare reliable tax figures than other tax service providers due to litigation threats.

By comparing a treatment group that faced a significant decrease in APTS fees in 2005 and 2006 to a control group with relatively unaffected APTS fees, the analysis revealed that treated companies show less tax avoidance than the control group after the new PCAOB's rules on APTS. This result holds in many of the sensitivity tests, and thus, appears to be robust.

The outcomes of this study shed more light on the relation between APTS and tax avoidance and the implications of the PCAOB's regulation. It also extends Lennox's (2016) research findings by investigating other dimensions of the PCAOB's rules implemented in 2005 and 2006. Furthermore, it contributes to the existing literature that studies the role of a company's tax service provider in relation to corporate tax aggressiveness (Klassen et al., 2016) and expands Cook et al.'s (2019) research on the changes in tax avoidance after an auditor switch, as a result of the new SOX regulations.

While our findings are generalisable to a diverse range of industries and firms by using publicly available data, there are also limitations to using this data. The reason for this is that the tax avoidance measures I used are based on estimations of tax levels within companies, which are an approximation but could be more accurate. A better way to divide companies into treatment and control groups would be to use the IRS' actual data. Indeed, using more accurate data would make it possible to provide more reliable results.

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## Notes

- 1 However, the Financial Reporting Council in the UK has made a recent move by asking Big4 to split their audit operations from the rest of their business.
- 2 This is consistent with McGuire et al.'s (2012) work. Untabulated robustness tests, including observations with negative pre-tax income, show the same directions for variables.

## Appendix

**Table A1** Variable definitions

<i>Variable</i>	<i>Definition</i>
GAAPETR	Effective tax rate, defined as total tax expense ( <i>TXT</i> ) divided by pre-tax book income ( <i>PI</i> ) less special items ( <i>SPI</i> ). ETRs with negative denominators are deleted. The remaining non-missing ETRs are winsorised (reset) so that the largest observation is equal to 1 and the smallest is equal to 0.
CASHETR	Cash effective rate, defined as cash taxes paid ( <i>TXP</i> ) divided by pre-tax book income ( <i>PI</i> ) less special items ( <i>SPI</i> ). CASHETRs with negative denominators are deleted. The remaining non-missing CASHETRs are winsorised (reset) so that the largest observation is equal to 1 and the smallest is equal to 0.
TREAT	Equals 1 if a company substantially reduces APTS fees during the transition window (2004–2006) and 0 otherwise. The reduction is presumed to be substantial if a company's APTS fees fall by at least 75% during the transition window.
POST	POST = 1 for fiscal years 2002, 2003 and 2004 representing the post-event window and POST = 0 for fiscal years 2007, 2008 and 2009 representing the pre-event window.
TREAT x POST	Captures the difference-in-difference effect.
lnMVE	Natural log of market value of equity ( $\text{PRCC\_F} \times \text{CSHO}$ ) for at the beginning of year $t$ , winsorised at the 1st and 99th percentiles.
NOL	Indicator variable equal to 1 if there is a tax loss carry forward (TLCF is positive) during year $t$ ; 0 otherwise.
LEV	Long-term-debt-to-asset ratio at the end of year $t$ (DLTT) scaled by total assets at the end of the year (AT), winsorised at the 1st and 99th percentiles.