

Do Auditor-Provided Tax Services Influence Long-Term Effective Tax Rates? New Evidence

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Abstract

The research investigated the temporal association between investment in auditor-provided tax services (APTS) and the long-term effective tax rate (ETR). We used a panel data approach (static and dynamic), quantile analysis, and non-linear and non-parametric models to analyze the relationship between ETR and APTS based on public data from a sample of companies listed on the São Paulo Stock Exchange (B3) from 2013 to 2020. Overall, our results suggest that long-term ETR varies negatively due to the increase in the value of investments in APTS. Our analysis considered a series of controls predicted by the literature and is robust when different econometric specifications and alternative ways of calculating APTS and ETR are applied. In addition, we find that firm-year observations below/above the median ETR have a statistically positive/negative association with APTS, identify the point at which the positive relationship becomes negative, and document some evidence of non-linearity in the relationship between long-term ETR and APTS. Our results contribute to expanding the literature on the determinants of long-term ETR variation, studies investigating the auditor's role in corporate tax strategies and may be of interest to audit committee members when considering the costs and benefits of investing in APTS, to tax authorities, shareholders and regulators interested in understanding how APTS influences companies' ability to avoid paying taxes in the long term by reducing ETR, as well as providing input to the ongoing debate on the regulation of non-audit services that can be provided by the incumbent auditor.

Keywords: Long-Term Effective Tax Rate, Auditor, Tax Services, Panel Data.

1 Introduction

Corporate Effective tax rates (hereafter ETR) have received substantial attention in the political and academic debate in recent decades and have faced increased scrutiny from legislators and tax authorities in several countries (Brooks et al., 2016; Dyreng et al., 2017). As a result, understanding the factors that explain the variation between companies has been the subject of many studies over the years (e.g., Schwab et al., 2021; Christensen et al., 2022; Barbera et al., 2020; Richardson & Lanis, 2007).

Corporate Income taxes can affect many corporate decisions and the company's value (Graham, 2003). Therefore, executives are concerned about ETR (Graham et al., 2017) and use tax planning to influence them (Dyreng et al., 2010; Rego & Wilson, 2012; Graham et al., 2014). However, tax planning practices aimed at reducing effective tax rates are risky, involve significant uncertainty, and can increase risk and impose costs on firms. However, they are expected to benefit the company and its shareholders (Rego & Wilson, 2012). In this context, the choice of auditor as tax service provider can be interpreted as a way for managers to deliberately try to influence the behavior of ETR to achieve specific strategic objectives.

Based on the knowledge spillover argument, some studies have investigated the role of auditor-provided tax services (hereafter APTS) in companies' ability to reduce their effective tax rates in the short term or on an annual basis (e.g., Santos et al., 2021; Cook et al., 2020; Nesbitt et al., 2020; Watrin et al., 2019; McGuire et al., 2012). However, although the existing literature suggests the possibility of APTS decreasing ETR in the short term, it is unclear whether this phenomenon also occurs in the long term. Few studies have addressed the association between long-term ETR and APTS [e.g., Hogan & Noga (2015) and Nesbitt et al. (2020) in the United States, and Watrin et al. (2019) in Germany]. However, the results of these investigations are inconclusive and cannot be generalized to other institutional environments and national contexts. Therefore, whether APTS influences firms' long-term ETR is still an open question.

Understanding the long-term relationship between APTS and ETR is relevant because tax strategies are usually long-term actions (Allen et al., 2016), and ETR influences many corporate decisions. However, annual effective rates are not good predictors of long-term effective rates and are inaccurate indicators of companies' long-term tax behavior (Dyreng et al., 2008). Furthermore, as argued by Hogan and Noga (2015), longer-term analysis can help to understand why companies invest in tax planning, even in the face of short-term resource constraints, and allows for a more informed analysis of the cost-benefit of APTS.

According to Dyreng and Halon (2021), the long-term approach helps mitigate several problems involving the empirical estimation of annual effective rates. For example, given that ETR represents the ratio of income tax expense to pre-tax income and that both measures can be volatile for various reasons, summing over a long enough period allows for eliminating random fluctuations and creating a more stable measurement for effective rates.

Dyreng and Halon (2021) further explain that the long-term ETR uses a cash-based metric (income tax expense paid in cash) as the numerator and an accrual-based metric (pre-tax income) as the denominator. Adding these metrics together over a more extended period improves the match between numerator and denominator since many of the accruals related to pre-tax income tend to be reversed in the long term. Using the income tax expense paid in cash removes the effect of tax accruals that can significantly alter the estimate of this expense, reducing the measurement error arising from the temporal mismatch between tax payments and pre-tax income.

Therefore, this research aims to investigate the temporal association between investment in tax services provided by the incumbent auditor and the effective tax rate on long-term corporate profit, using a sample of companies that traded on the Brazilian Stock Exchange (B3). Brazil has institutional and legal characteristics that distinguish it from most countries where

this problem has already been investigated. Researching the Brazilian context allows us to document additional evidence in a scenario with strong institutional incentives to hire tax services. Companies can still use APTS, even though CVM Resolution No. 23/2021 prohibits independent auditors from providing their audit clients with consulting services that could characterize a loss of their objectivity and independence, including tax services.

Data compiled by the Tax Foundation shows that Brazil has one of the world's highest legal and effective tax rates (Enache, 2022) and a tax system known for being highly complex and litigious. According to the Organization for Economic Co-operation and Development (OECD) (2017), the complexity of tax laws increases the need for taxpayers to devote significant amounts of resources to obtaining the advice they need to understand their obligations and determine their tax liabilities. This certainly makes the tax services market very attractive for audit firms.

In addition, according to the Insper's Tax Research Center (INSPER, 2021), tax disputes totaled 5.44 trillion reais in 2019, equivalent to 75% of Brazil's GDP, with corporate income tax being the tax that causes the most legal disputes. A study by Ernst Young (EY) in 2019 revealed that the conclusion of a tax litigation process in Brazil takes an average of 18 years and 11 months (EY, 2019). This scenario shows how relevant tax issues are in terms of costs and fiscal risk and have a long-term impact on companies, the government, and society.

On the other hand, as noted by Klassen et al. (2016), as an APTS, the risk of the client having tax positions overturned by the tax authority can represent a threat due to the reputational cost and the risk of litigation. Given the local institutional context, these issues may not have the same weight in the auditor's decision to provide tax services to their audit clients in Brazil compared to countries with higher litigation risk.

Analyzing an unbalanced panel of companies between 2010 and 2020, we found evidence suggesting that, in general, long-term ETR varies negatively as a function of the increase in the relative value of investments in tax services provided by the auditor. Our primary analysis considered a series of controls predicted by the literature, and it is robust when different econometric specifications and alternative ways of calculating APTS and ETR are applied. In further analysis, when we partitioned our sample by the median long-term ETR, we found that company-year observations below/above the median have a statistically positive/negative association with APTS. In addition, we identify the point at which the positive relationship becomes negative and document some evidence of non-linearity in the relationship between long-term ETR and APTS. These results suggest that companies use APTS to manage long-term ETR strategically, since when ETR is high, investment in APTS is used to reduce the amount of taxes paid in cash in the long term and, on the other hand, when long-term ETR is low, APTS are used to increase taxes paid in cash and mitigate more aggressive tax behavior because of reputational concerns, political and litigation risks.

Our findings complement the results of previous studies and broaden the empirical base available in the institutional context of a developing country, contributing to the advancement of research dealing with the explanatory factors of variations in long-term effective tax rates.

By documenting that the association between APTS and ETR changes along the various points of the conditional distribution of the dependent variable, we contribute to studies that use long-run ETR as proxies for tax aggressiveness and tax avoidance because they suggest that audit firms may be reluctant to support more aggressive tax strategies for clients with very low ETR (Nesbitt et al., 2020) and that firms with higher ETR may use tax services to reduce their long-term corporate income tax burdens.

Our study also makes a significant methodological contribution because, to the best of our knowledge, few studies on the research problem have presented results with the same degree of statistical robustness, given that our sample was subjected to tests based on econometric models that formally address issues of selection bias, endogeneity arising from

unobservable time-invariant factors, influential observations, and outliers, as well as non-parametric and non-linear modeling.

Our results also contribute to the ongoing debate by presenting evidence that providing tax services can increase the auditor's economic dependence on their audit client, raising concerns about the threat of self-interest and self-review that can compromise auditor independence. However, they can also favor knowledge spillovers that result in the reduction of long-term effective tax rates.

Finally, our results may be of interest to audit committee members when considering the costs and benefits of hiring tax and accounting audit services from the same firm to tax authorities, shareholders, and regulators interested in understanding how APTS influences companies' ability to avoid paying taxes in the long term by reducing the effective tax rate. In addition, our research signals to academic researchers the need to include quantile analysis in studies dealing with the relationship between APTS and ETR.

2. Related Studies and Hypothesis

The empirical literature generally uses two competing theoretical approaches to analyze the consequences of APTS (Sun & Habib, 2020). On the one hand, the knowledge spillover argument considers that the exchange of knowledge between audit staff and tax specialists in the same firm can bring several benefits to clients who jointly hire these services, including increasing the company's ability to avoid explicit taxes by reducing corporate income tax.

Sun & Habib (2020) explain that an audit firm providing tax services to many clients allows it to accumulate specialized knowledge that will be shared with the personnel involved in the independent audit activity. This knowledge exchange between teams within the same firm can generate production efficiency and indirectly benefit its clients, such as improved assessment of tax accounts and tax positions. In the same vein, Hux et al. (2003) explain that the APTS context involves experienced audit and tax professionals who, throughout their careers, have developed extensive knowledge related to applying the rules of their domains (financial reporting and auditing standards and tax laws and regulations) to client situations.

According to Chyz et al. (2017), APTS influences the ability of companies to reduce their tax burdens by reducing effective tax rates because audit firms can develop more effective tax strategies due to accumulating significant knowledge about their client's businesses, internal processes, systems, and industry, as well as having access to extensive internal financial information. McGuire et al. (2012) also argue that audit firms independently develop knowledge in auditing and taxation by investing in training and serving several clients in the same industry.

On the other hand, under the argument of impairment of independence, the provision of tax services can expand the economic link with the client and compromise professional independence in such a way that the auditor would be more likely to accept the aggressive tax strategies of their clients that can generate adverse effects for companies. According to Sun and Habib (2020), when the auditor provides tax services, concerns may arise related to the threats of self-interest and self-review. The first threat concerns that the additional revenues generated by non-audit services (including APTS) create strong economic ties between the auditor and their client, increasing dependence on these additional revenues. In this scenario, the auditor may be encouraged to accept their client's biased financial reports more easily (Causholli & Payne, 2014). According to Sun and Habib (2020), APTS may be the most important way for clients to influence auditor independence. Dependence on tax services can incentivize auditors to be complacent about their clients' adoption of undesirable tax practices.

In addition, there is the threat of self-review. As Sun and Habib (2020) point out, given that APTS may be related to assessing the company's tax accounts, auditors may have to evaluate the work of colleagues involved in providing tax services. In such cases, the audit team

would be less likely to question the client on complex tax issues advised by their tax colleagues, increasing the chances of approving aggressive tax strategies.

Considering these two perspectives, the academic literature often uses effective tax rates to assess whether APTS generate knowledge spillovers or compromise auditor independence. The central idea in this stream of research is to analyze whether APTS affects companies' ability to pay explicit taxes, using the variation in ETR as an empirical proxy for tax avoidance or tax aggressiveness. According to Hogan and Noga (2015), if the knowledge spillover hypothesis is valid, synergies between the audit and tax functions can help uncover opportunities for tax savings. On the other hand, aggressive tax behavior can signal the impairment of auditor independence.

However, Sun and Habib (2020) point out that it is difficult to separate the effects of knowledge spillover or impairment of independence in this line of research because both perspectives suggest a negative relationship between APTS and ETR. Some studies have documented results along these lines. For example, Cook et al. (2008), McGuire et al. (2012), Chyz et al. (2017), Cook et al. (2020), and Nesbitt et al. (2020), analyzing different research questions and using different research designs, systematically documented that in the United States, higher investments in APTS are associated with lower short-term ETR. However, Watrin et al. (2019) documented a positive relationship in the German context. This result suggests that the relationship between APTS and ETR may vary between countries but is at odds with the hypotheses of knowledge spillover and impairment of auditor independence.

In Brazil, Santos et al. (2021), analyzing a sample of companies between 2010 and 2017, identified that APTS are negatively associated with short-term ETR. In addition, the authors documented that companies that use the tax services of their auditors, compared to those that do not, have a more significant difference between the profit calculated according to accounting rules and the profit calculated using tax rules.

While most existing studies have tested the relationship between APTS and ETR in a short-term context, corporate tax planning is generally a long-term strategy (Allen et al., 2017). Dyreng et al. (2010) documented evidence suggesting that individual executives play a significant role in determining companies' ETR. In addition, Graham et al. (2017) found that ETR matters when managers do tax planning and is often used in financing and investment decisions. Therefore, many corporate decisions are influenced by long-term effective tax rates, according to some evidence already documented in the empirical literature. For example, Lee et al. (2023) found a positive association between long-term ETR and the propensity of companies to issue shares rather than take on debt, suggesting the long-term effect of ETR on capital structure decisions. On the other hand, Goh et al. (2016) and Sánchez-Ballesta and Yagüe (2023) identified a negative association between long-term ETR and the cost of corporate debt.

Given this context, if long-term consequences matter for companies' tax planning and the choice of the auditor as the tax service provider is a means to influence the effective tax rate, it is likely that APTS negatively influences long-term ETR.

The literature presents some observational evidence to support this idea. For example, Hogan and Noga (2015), when analyzing a sample of companies between 2003 and 2009, found that higher levels of APTS are associated with lower long-term ETR. In this same direction, Nesbitt et al. (2020), analyzing a sample of companies over the period from 2002 to 2016, also found evidence that APTS influence companies' ability to avoid paying corporate income tax over long periods, as they documented a negative association between APTS and long-term ETR.

Therefore, based on the available literature and empirical results, the following hypothesis can be formulated when analyzing the case of publicly traded companies operating in the Brazilian market:

H1: The relative value of investments in auditor-provided tax services (APTS) is negatively associated with companies' long-term effective tax rate (ETR).

3. Methodology

3.1 Sample Selection Criteria

The research target population consisted of all active non-financial companies listed on the Brazilian Stock Exchange (B3) between 2010 and 2020. The economic and financial data needed to calculate the variables in the empirical model, except for auditor remuneration, were obtained from the Economatica platform. Information on the amounts paid to auditors was collected manually from the Reference Forms (FR) available on the Brazilian Securities and Exchange Commission (CVM) website. Initially, data was collected from companies with information on auditor remuneration for at least four consecutive years between 2010 and 2020, resulting in a sample of 262 unique companies and 1613 company-year observations. Next, companies that did not have the data to calculate all the variables in the empirical model or had negative pre-tax income for the four years were excluded, resulting in a final sample of 154 unique companies and 815 company-year observations. The measurement of the long-term effective rate begins in 2013 (comprising the years 2010 to 2013), allowing the ETR to be calculated over four years for each year until 2020. The selection period began in 2010 because companies started disclosing their auditors' remuneration information.

3.2 Empirical model and description of variables

3.2.1 Estimation of the association between long-term ETR and APTS

The econometric model was adapted from previous studies (e.g., McGuire et al., 2012; Hogan & Noga, 2015), as described in equation 1.

$$\begin{aligned} \text{LongETR}_{i,t} = & \alpha_0 + \beta_1 \text{APTS}_{i,t} + \beta_2 \text{DAPTS}_{i,t} + \beta_3 \text{OTHERSERV}_{i,t} + \beta_4 \text{DA}_{i,t} \\ & + \beta_5 \text{SIZE}_{i,t} + \beta_6 \text{PPE}_{i,t} + \beta_7 \text{DEP}_{i,t} + \beta_8 \text{ROA}_{i,t} + \beta_9 \text{LEV}_{i,t} + \beta_{10} \text{MTB}_{i,t} \\ & + \beta_{11} \text{CASH}_4_{i,t} + \beta_{12} \text{BIG4}_{i,t} + \beta_{13} \text{INVMILL}_{i,t} \\ & + \beta_{14-21} \text{Industry Fixed Effect}_{i,t} + \beta_{22-28} \text{Year Fixed Effects}_{i,t} \\ & + \varepsilon_{i,t} \end{aligned} \quad (1)$$

The dependent variable, LongETR, represents the measurement of the long-term effective tax rate, as proposed by Dyreng et al. (2008), and corresponds to the sum of the income tax paid over four years divided by the sum of the four-year pre-tax income. To increase the number of observations in our sample, we used four years to calculate the long-term ETR. However, our statistical results do not change qualitatively when we increase the series to five or six years.

The independent variable of interest is APTS, which represents the investment in hiring tax services and assesses whether the long-term ETR varies with the proportion of fees related to tax services. Following previous studies (e.g., Choudhary et al., 2021; Klassen et al., 2016), we measure APTS as the ratio between the value of tax services and all services paid to the audit firm.

Data on auditor remuneration was collected manually from the reference forms submitted by the companies to the CVM. The spreadsheet extracted from the CVM website describes the services contracted and the total remuneration paid to the auditors. We grouped the value of the auditors' remuneration into the following categories: Auditing Services and Issuance of Reports on Individual and Consolidated Financial Statements, Tax and Fiscal Services, and Other Services. In order to characterize the provision of tax and fiscal services,

we considered descriptions in the FR that contained terms such as tax advice, tax planning, review of the filing of the IRPJ return, review of tax procedures, review of tax procedures and review of accounting and tax bookkeeping files, as well as terms that referred to the words tax, tax, fiscal and income tax.

The difficulties in collecting data from the reference forms are worth noting due to the lack of clear and sufficient information to understand the amounts paid in each year analyzed thoroughly. For example, situations were identified where the amount reported involved several financial years and cases where there was information on several payments to different audit firms without specifying which services were contracted in the same financial year. To collect as much information as possible, for cases where it was not clear which year the reported amount was referred to, the date of the reference form was used as a parameter (usually the first day of January). In this way, the amount reported was recorded as an expense for the previous year. For multiple values each year, we chose to identify the value that refers to the year's expense rather than the contract's value. We used the highest value in cases where it was impossible to identify it.

3.2.2 Control variables and correction of selection bias

The control variables are defined as follows:

- DAPTS - is the indicator variable that takes on a value of 1 when the company invests any amount in hiring tax services and 0 otherwise and serves to capture the average difference in ETR in the group of company-year observations with APTS compared to the group of company-year observations without APTS. Given that we are interested in the amount invested in tax services, including DAPTS in the model allows us to calculate the marginal effect of APTS more accurately without the influence of companies not contracting tax services from their auditors.
- OTHERSERV - natural logarithm of the remuneration paid for non-audit services (except tax services) and serves to control for other sources of economic dependence on the auditor.
- DA - is a measure of discretionary accrual measured according to the model proposed by Kothari et al. (2005).
- SIZE - company size represented by the natural logarithm of total assets.
- LEV - degree of operating leverage (total company debt divided by total assets).
- PPE - the value of the company's fixed assets scaled by lagged total assets.
- ROA - return on assets, calculated by dividing pre-tax income by lagged total assets.
- CASH - represents cash and equivalents held by the firm at the end of the year divided by total assets at the start of the year.
- DEP - depreciation expenses scaled by lagged total assets.
- BIG4 - dummy variable where 1 indicates whether the company is audited by firms classified as one of the Big Four international auditing firms and 0 otherwise.
- MTB - ratio of the company's current market value to its book value.

As widely discussed in previous studies (e.g., Lassila et al., 2010; McGuire et al., 2012), hiring an auditor as a tax service provider is a non-random decision. Therefore, companies with APTS must be fundamentally different from those that do not hire tax services from their auditor. This phenomenon could lead to a problem of selection bias in our sample, making the estimate of the coefficient of the variable of interest biased. To minimize the effect of this potential endogeneity problem, we adopted the Selection Model strategy proposed by Heckman (1979). In the first stage, we estimated the probability of a company hiring APTS using the following probit regression, based on previous studies (e.g., McGuire et al., 2012; Chyz et al., 2021):

$$\begin{aligned}
 \text{PR(DAPTS)} = & \beta_0 + \beta_1 \text{INDEPAUDIT}_{i,t} + \beta_2 \text{LNAUDIT}_{i,t} + \beta_3 \text{CASH}_{i,t} + \beta_4 \text{DA}_{i,t} \\
 & + \beta_5 \text{SIZE}_{i,t} + \beta_6 \text{PPE}_{i,t} + \beta_7 \text{MTB}_{i,t} + \beta_8 \text{ROA}_{i,t} + \beta_9 \text{LEV}_{i,t} + \beta_{10} \text{BIG4}_{i,t} \quad (2) \\
 & + \beta_{(11-19)} \text{Year Fixed Effects}_{(i,t)} + \beta_{20-27} \text{Industry Fixed Effect}_{i,t(i,t)}
 \end{aligned}$$

Where:

- INDEPAUDIT represents the auditor’s independence from the client, calculated by the remuneration for non-audit services minus the remuneration for tax services divided by the total remuneration for audit services.

- LNAUDIT is the natural logarithm of the amounts paid for audit services.

INDEPAUDIT and LNAUDIT serve as exclusion variables (they do not appear in the second-stage regression). The others were defined previously.

Next, we used the coefficients from equation 2 (not tabulated) to calculate the Inverse Mill’s Ratio (INVMILL), which serves as a control in equation 1, representing the selection bias correction term that controls for the influence of unobservable factors on firms’ decision to hire tax services from their incumbent auditors.

4. Results (Analysis and Discussion)

4.1 Descriptive statistics and correlations

Table 01 shows the descriptive statistics of the variables separated into three groups: total sample, sample with only company-year observations with APTS, and sample with only company-year observations without APTS.

Table 01
Descriptive Statistics

Samples	Variables	Average	Median	Standard deviation	95% percentile	5% percentile
COMPLETE (n = 815)	LongETR	0.244	0.198	0.276	1.993	0.000
	APTS	0.019	0.000	0.058	0.329	0.000
	DAPTS	0.190	-	-	-	-
	OTHERSERV	0.092	0.000	0.170	0.729	0.000
	DA	0.002	0.000	0.069	0.397	-0.162
	SIZE	15.701	15.928	1.724	19.184	9.479
	PPE	0.327	0.313	0.233	0.929	0.000
	DEP	0.032	0.030	0.024	0.141	0.000
	ROA	5.895	5.438	5.156	21.074	-8.516
	LEV	1.723	1.669	2.299	14.372	-9.135
	MTB	2.364	1.714	2.087	10.870	0.252
APTS (n = 155)	CASH	0.107	0.077	0.114	0.708	0.001
	BIG4	0.852	-	-	-	-
	LongETR	0.287	0.231	0.357	1.993	0.000
	APTS	0.102	0.061	0.095	0.329	0.010
	OTHERSER	0.133	0.037	0.187	0.699	0.000
	DA	-0.006	-0.001	0.045	0.079	-0.094
	SIZE	16.494	16.440	1.249	18.407	14.048
	PPE	0.412	0.380	0.203	0.783	0.012
DEP	0.034	0.033	0.014	0.064	0.008	
ROA	5.380	5.298	4.214	13.498	-2.763	

	LEV	1.877	1.657	2.229	4.798	-0.058
	MTB	2.428	1.738	1.999	8.340	0.396
	CASH	0.099	0.089	0.072	0.260	0.008
	BIG4	1.000	-	-	-	-
	LongETR	0.234	0.187	0.252	1.733	0.000
	OTHERSER	0.083	0.000	0.165	0.729	0.000
	DA	0.004	0.000	0.074	0.397	-0.162
	SIZE	15.515	15.796	1.767	19.184	9.479
	PPE	0.308	0.293	0.236	0.929	0.000
	DEP	0.032	0.029	0.026	0.141	0.000
	ROA	6.016	5.516	5.349	21.074	-8.516
NO APTS (n = 660)	LEV	1.687	1.669	2.315	14.372	-9.135
	MTB	2.349	1.707	2.108	10.870	0.252
	CASH	0.108	0.074	0.122	0.708	0.001
	BIG4	0.817	-	-	-	-

Note: Because they represent indicator variables, the statistics of the DAPTS and BIG4 variables were not tabulated.

The measurement of long-term ETR has an average of 0.244 and is compatible with the results of previous Brazilian and international studies (e.g., Chiachio & Martinez, 2019; Hogan & Noga, 2015). When we analyze this metric for the separate subsamples, we document that the mean in the group with APTS is higher (0.287) than in the group without APTS (0.234). The t-test for difference in means (p-value = 0.017) suggests a statistically significant difference between the sub-samples. Concerning the other control variables, the means are statistically different only about investment in assets (PPE), contracting other non-audit services (OTHERSER), and size (SIZE), suggesting that the sub-samples are relatively homogeneous, but that companies with APTS, as well as being larger, use more other non-audit services. The descriptive analysis also shows that in the total sample, approximately 85% of the observations are audited by one of the Big Four auditing firms (BIG4). This percentage is 100% and 82% in the sub-samples with and without APTS, respectively.

The correlations between the variables are shown in Table 02. As can be seen, except for APTS and DAPTS, the correlations are low, anticipating the absence of multicollinearity in the econometric model we used to test our hypothesis. This preliminary analysis detected no statistically significant correlation between the LongETR and APTS variables. The results show that LongETR positively and significantly correlated with DAPTS, DEP, and CASH and negatively and significantly correlated with ROA.

Table 02
Correlations Between the Variables of the Empirical Model

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13
(V1) LongETR	1	0.006	0.076 *	-0.013	-0.064	0.06	0.015	0.119 **	-0.336 **	-0.006	-0.009	0.098 **	-0.005
(V2) APTS	0.006	1	0.696 **	0.029	-0.036	0.080 *	0.113 **	0.016	-0.056	-0.006	0.008	0.012	0.141 **
(V3)DAPTS	0.076 *	0.696 **	1	0.117 **	-0.057	0.223 **	0.175 **	0.035	-0.048	0.032	0.015	-0.03	0.202 **
(V4)OTHERSER	-0.013	0.029	0.117 **	1	-0.049	0.151 **	0.120 **	0.092 **	-0.027	-0.017	0.008	-0.04	0.178 **
(V5)AD	-0.064	-0.036	-0.057	-0.049	1	-0.067	-0.073 *	-0.217 **	-0.077 *	-0.047	-0.077 *	0.056	-0.146 **
(V6)SIZE	0.06	0.080 *	0.223 **	0.151 **	-0.067	1	0.197 **	0.137 **	-0.235 **	0.101 **	0.077 *	-0.311 **	0.531 **
(V7)INVT	0.015	0.113 **	0.175 **	0.120 **	-0.073 *	0.197 **	1	0.543 **	-0.004	-0.018	0.118 **	-0.067	0.083 *
(V8)DEP	0.119 **	0.016	0.035	0.092 **	-0.217 **	0.137 **	0.543 **	1	-0.022	-0.023	0.198 **	0	0.165 **
(V9)ROA	-0.336 **	-0.056	-0.048	-0.027	-0.077 *	-0.235 **	-0.004	-0.022	1	0.134 **	0.224 **	-0.029	-0.035
(V10)ALAV	-0.006	-0.006	0.032	-0.017	-0.047	0.101 **	-0.018	-0.023	0.134 **	1	0.097 **	-0.055	0.051
(V11)MTB	-0.009	0.008	0.015	0.008	-0.077 *	0.077 *	0.118 **	0.198 **	0.224 **	0.097 **	1	0.102 **	0.177 **
(V12)VCX	0.098 **	0.012	-0.03	-0.04	0.056	-0.311 **	-0.067	0	-0.029	-0.055	0.102 **	1	-0.175 **
(V13)BIG 4	-0.005	0.141 **	0.202 **	0.178 **	-0.146 **	0.531 **	0.083 *	0.165 **	-0.035	0.051	0.177 **	-0.175 **	1

Note: i) *, ** indicate statistical significance at 5% and 1%, respectively (two-tailed)

4.2 Results of the Hypothesis Test

Our hypothesis states that the long-term effective tax rate (LongETR) is negatively associated with the tax services provided by the auditor (APTS). We, therefore, expect the angular coefficient b_1 in equation 1 to be negative and statistically significant. Table 03 shows the results of our estimates using three different regression models.

Table 03
Association between LongETR and APTS

Variables	Pooled -MQO	Fixed Effect	Dynamic Sys-GMM	VIF
APTS	-0.505*** (0.160)	-0.880*** (0.117)	-2.433*** (0.943)	1.99
DAPTS	0.110*** (0.0201)	0.144*** (0.0215)	0.487*** (0.182)	2.19
OTHERSERV	-0.0540 (0.0379)	-0.0255 (0.0232)	0.642 (0.484)	1.16
DA	-0.270 (0.191)	-0.165 (0.138)	-0.118 (0.797)	1.08
SIZE	0.000345 (0.00279)	-0.207*** (0.0347)	0.00873 (0.0327)	2.29
PPE	-0.0890* (0.0492)	0.0226 (0.0696)	0.0309 (0.279)	2.08
DEP	1,137*** (0.254)	-0.247 (0.214)	-1740 (2.673)	1.73
ROA	-0.0180*** (0.00408)	-0.0148*** (0.00281)	-0.0262*** (0.00784)	1.21
LEV	0.00228 (0.00344)	0.00519 (0.00322)	-0.00412 (0.0185)	1.06
MTB	0.00232 (0.00355)	-0.0113** (0.00569)	0.0171 (0.0133)	1.18
CASH	0.182*** (0.0346)	0.239*** (0.0660)	0.162 (0.553)	1.17
BIG4	-0.0403*** (0.00570)	-0.0597** (0.0254)	-0.0275 (0.117)	1.56
INVMILLS	-0.0266 (0.0189)	-0.00823 (0.0138)	0.206 (0.250)	2.65
Constant	0.271** (0.120)	3.492*** (0.526)	-0.394 (1.009)	
N	815	815	593	
Fixed Effect	Industry/Year	Year	Industry/Year	
R2	0.198	-	-	
Within R2	-	0.169	-	
Durbin -Watson	0.975	1,396	-	
Wooldridge Test for Autocorrelation in Panel Data / t (p-value)	4.75(0.00)	12.46(0.00)	-	
Pesaran's CD test for cross-sectional dependence/Z (p-value)	5.047(0.00)	8.069(0.00)	-	
Arellano-Bond test for autocorrelation of first difference residuals:				
First-order autocorrelation / Z (p-value)			-2.4148(0.012)	
Second-order autocorrelation / Z (p-value)			0.347(0.729)	
Sargan -Hansen test of overidentification restriction:				
2-step weighting matrix / Chi2 (p-value)			8.146(0.998)	
3-step weighting matrix / Chi2 (p-value)			11.418(0.978)	

Notes: i) standard errors in parentheses; ii) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; iii) continuous variables are measured at 1% and 99%; and iv) the Pooled and Fixed Effect models have the standard errors of the coefficients robustly estimated using the Driscoll-Kraay estimator.

Due to problems of heteroscedasticity, serial autocorrelation, and cross-sectional dependence, the Pooled-MQO and fixed effect models estimate the standard errors of the coefficients robustly using the Driscoll-Kraay estimator, as proposed by Driscoll and Kraay (1998).

In Table 03, column 1 shows estimates made using Pooled-MQO panel data regressions, and column 2 shows the estimated results using the fixed-effect panel data method. Unlike the MQO, the fixed effect model is appropriate for dealing with unobserved heterogeneity between companies. However, both models can have limitations because they fail to address some potential sources of endogeneity, such as variable measurement error, omission of relevant variables in the empirical model, and the simultaneous determination of the dependent and independent variables. In our research, endogeneity can arise if APTS are determined simultaneously with long-term ETR. For example, the literature suggests that more tax-complex companies are more likely to contract APTS (e.g., Lassila et al., 2010), but at the same time, more complex companies tend to have lower effective tax rates. In addition, there may be errors in measuring the APTS variable due to possible inconsistencies in the amounts of auditors' remuneration disclosed by the companies.

The 3 column presents the results with the Generalized Momentum Method (GMM), which, together with the instrumental variable method, is the predominant estimation technique for panel data models with unobserved heterogeneity and endogenous variables when working with short panels ($T < N$) (Kripfganz, 2019). We use GMM because the fixed effect model has the limitation of assuming that all unobserved heterogeneity is fixed over time. However, there may be unobserved features that vary over time. For example, Klassen et al. (2016) found evidence that companies' tax departments influence the ETR and the APTS hiring decisions. In this case, the experience and capacity of this workforce, which can be directly observed and differs between companies, may vary over time, so its omission may bias our estimates. Using dynamic panel data estimated using the GMM allows us to control for bias related to the omission of relevant variables and possible measurement errors related to explanatory variables (Wansbeek, 2001), including APTS. However, it should be noted that the GMM model adopted in this study depends heavily on the assumption that the instruments used are valid and that there is no second-order autocorrelation in the residuals. If these limitations are observed, our estimates may be biased.

In Table 3, the coefficient of the APTS variable is negative and significant (p -value < 0.01) in all models, indicating that more significant investments in hiring the auditor's tax services reduce companies' long-term ETR on average. These results are consistent with our hypothesis and are compatible with the findings documented by Hogan and Noga (2015) and Nesbitt et al. (2020) for the American market, but diverge from the results of Watrin et al. (2019), who, in Germany, found a positive and statistically significant association between long-term ETR and APTS.

On the other hand, the coefficient of the DAPTS indicator variable is positive and significant, indicating that, in our sample, hiring the auditor's tax services is associated with higher long-term ETR, on average. Although the difference in signs seems counterintuitive, the coefficients of the DAPTS and APTS variables should be interpreted differently. In the first case, the coefficient shows that the average value of long-term ETR is significantly higher in the group of observations with APTS than those without APTS. In turn, the result of the coefficient of the APTS variable shows that the amount invested in tax services varies negatively relative to the long-term effective tax rate. In other words, for companies that hire APTS, the amount invested reduces the long-term ETR.

About the DAPTS variable, there are no comparative studies for this result because, as far as we know, the available research involving long-term ETR only uses continuous variables to measure tax services. However, in Brazil, the study by Santos et al. (2021) used an indicator variable (DAPTS) and identified a negative and significant association with both the Cash ETR and the annual GAAP ETR. We carried out the same analysis (untabulated) for our sample and period. We identified a negative and significant association between the short-term ETR and DAPTS forms. However, the association between Cash ETR and the continuous variable APTS is positive and non-significant, and the association between GAAP ETR and APTS is positive and significant.

Regarding the other control variables, only the ROA coefficient was significant in all three models. The coefficient of the BIG4 variable was not significant in the Sys-GMM model. The VCX variable has a statistically significant coefficient in the MQO and fixed effect models. INVAT was significant in the MQO model. In turn, DEP was only significant in the MQO model. The coefficients of TAM and MTB are significant in the fixed effect model. Overall, these results, in terms of signs, are compatible with those of other studies that have analyzed the determinants of long-term ETR (e.g., Barbera et al., 2020). The coefficient of the INVMILLS variable was insignificant in all models, indicating that selection bias is not a severe issue in our estimates.

Regarding the diagnosis of the sys-GMM model, the Arrelano test indicates first-order autocorrelation in the first-difference equations at a significance level of 5%. As this is a dynamic panel, this is expected because this model includes the ERTlong variable with a lag as an explanatory variable. However, the most important diagnostic is the absence of second-order serial correlation. Therefore, we have evidence that the long-term ETR has a dynamic behavior, indicating that its relationship with APTS changes over time. Sargan's overidentification test has high p-values, indicating no problems with the model's instrumentation and signaling that the instruments used are valid. These results suggest that endogeneity is not a relevant issue in our estimates.

4.3 Additional Analysis and Robustness

4.3.1 Other ways of measuring APTS and long-term ETR

The literature uses different ways to calculate APTS that capture various aspects related to other research problems, and it is not yet clear which measure has the most significant explanatory power in a specific research environment. To analyze the sensitivity of our results, we tested the following proxies: APTS2 = tax services ÷ total assets; APTS3 = tax services ÷ revenue; APTS4 = tax services ÷ audit fees; and APTS5 = log of tax services. The estimates were made using the same models as in the primary analysis. We also examined whether our results change if the long-term GAAP ETR (Total Income Tax divided by pre-tax income) and the long-term Current ETR (Current Income Tax divided by pre-tax income) are used.

Table 04

Additional test results using new proxies for APTS and long-term ETR

Models	APTS2	APTS3	APTS4	APTS5	Original APTS changing the way ETR is measured	
					ETR GAAP	ETR Current
Pooled -MQO	-0.416** (0.193)	-0.486*** (0.143)	-0.086*** (0.027)	-0.003 (0.004)	-0.445*** (0.122)	-0.7002*** (1.999)
Fixed Effect	-1.004*** (0.296)	-0.793*** (0.193)	-0.116** (0.033)	-0.051*** (0.012)	-0.848*** (0.000)	-1.497*** (0.201)
	-5.857**	-3.954**	-0.742**	-0.0795**	-2.038**	-3.591**

Dynamic Sys- GMM	(2.791)	(1.970)	(0.350)	(0.039)	(0.019)	(1.754)
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Notes: i) standard errors in parentheses; ii) *** p<0.01, ** p<0.05, *p<0.10; iii) the other variables were not tabulated.

The data in Table 04 shows that the coefficient of the APTS variable is negative and significant in all the models tested, except for the Pooled-MQO model when tax services are measured as a natural logarithm. In addition, the coefficient of the APTS variable remains negative and statistically significant when the GAAP ETR and Current ETR are used. This indicates that, in general, the main results are not sensitive to how APTS is calculated or the effective tax rate. In addition, there is evidence that investment in APTS influences the ETR rate in any context involving long-term tax strategy.

4.3.2 Quantile analysis and comparison of the tax behavior of companies with higher and lower ETR

Following Nesbitt et al. (2020), we carried out a quantile analysis (untabulated). We found that the relationship is positive up to the 18th percentile, with most of this region of the conditional distribution showing statistical significance (4th to 15th percentile). From the 20th percentile onwards, the relationship changes and becomes negative but shows significance between the 49th and 56th, 83rd, 86th and 92nd, and 96th and 99th percentiles, indicating that the effects of APTS vary throughout the distribution of the dependent variable, especially around the median. We also found that the coefficients of the LongETR and DAPTS variables always showed an inverse sign.

Furthering this analysis, we partitioned our sample by the median of the LongETR variable and re-estimated equation 1 in the two sub-samples (50% below and 50% above the median). The results for the APTS and DAPTS variables (the others were not tabulated) are shown in Table 05.

Table 05
median-decomposed LongETR subsamples

		Pooled - MQO	Fixed Effect	Dynamic Panel
50% lower	APTS	0.1009*** (0.043)	0.105*** (0.014)	0.201** (0.094)
	DAPTS	-0.019*** (0.003)	-0.017*** (0.005)	-0.055*** (0.0938)
50% higher	APTS	-1.031*** (0.314)	-1.565*** (0.257)	-2.444** (1.179)
	DAPTS	0.179*** (0.047)	0.204*** (0.026)	0.537*** (0.249)

Notes: i) standard errors in parentheses; ii) *** p<0.01, ** p<0.05; iii) the other variables were not tabulated.

The results in Table 05 corroborate the findings of the percentile analysis and document the positive/negative association between the LongETR variable and APTS/DAPTS in the sub-sample with the 50% values below the median of the LongETR variable, as well as the negative/positive association between the LongETR variable and APTS/DAPTS in the sub-sample with the 50% values above the median of the LongETR variable. These findings support the idea that long-term tax behavior changes depending on the level of companies' ETR.

In the band below the median, where low long-term ETR can be interpreted as more aggressive tax behavior, companies with APTS have, on average, lower long-term ETR than companies without APTS. Therefore, it is understandable that APTS can be used to make the

company more efficient in complying with tax regulations. According to Institutional Theory, this strategy is adopted intentionally to convince stakeholders that the company complies with the rules to which it is subject and acts in line with the set of beliefs and values prevailing in the environment in which it operates. Thus, the greater the perception of risk derived from a lack of tax compliance and aggressive tax behavior, which may attract a loss of institutional legitimacy or tax penalties, it is to be expected that APTS will contribute to raising the effective long-term corporate income tax rate.

Nesbitt et al. (2020) interpret this phenomenon as the result of actions that audit firms take to reduce their exposure to tax-aggressive clients since these clients can expose an auditor to legal, regulatory, and reputational costs (Donohoe & Knechel, 2013). In the high litigation risk scenario, auditors will impose a stricter audit standard on aggressive tax planning activities, indirectly affecting companies' tax behavior (Kanagaretnam et al., 2016).

On the other hand, in the band above the median, companies with APTS have, on average, higher long-term ETR than those without APTS. In this scenario, investments in APTS may be aimed at reducing the tax burden paid in cash, allowing savings of resources that can be reinvested in activities that generate value for shareholders.

Our findings suggest that companies' tax behavior, on average, differs strategically between situations of higher and lower long-term ETR in the APTS situation and helps explain the divergent results documented earlier in the American and German contexts.

4.3.3 Relaxing the assumption of linearity in the relationship between long-term ETR and APTS

Given that our main estimates use models that, to some degree, assume linearity in the relationship between LongETR and APTS, depending heavily on the assumption that the parametric functional form is well specified, we re-estimated equation 1 using a non-parametric regression based on the Gaussian kernel function with local linear estimator and the cross-validation method. A priori, this regression model makes no specific assumptions about the functional form of the relationship between the LongETR variable and the explanatory variables. In addition, we report the results of a quadratic regression (we include the quadratic term APTS² in equation 1) to check whether our main results are sensitive to changes in the shape of the relationship between APTS and long-term ETR. The quadratic regression was estimated to have the same conditions as the main regressions. The results for APTS and APTS² are shown in table 06.

Table 06

Regression models that do not assume linearity in the relationship between ETR and APTS

Variables	Non-parametric	Quadratic		
		(Pooled - MQO)	Fixed Effect	Dynamic Sys-GMM
APTS	-0.473*** (0.198)	-0.066 (0.766)	-0.867*** (0.318)	-2.739 (4.743)
APTS ²	- -	-1.413 (1.929)	-0.039 (0.779)	0.610 (15.96)

Notes: i) standard errors in parentheses; ii) *** p<0.01, ** p<0.05, * p<0.10; iii) the other variables were not tabulated.

The result of the non-parametric regression is like that of the main regressions. The angular coefficient of the APTS variable remains negative and statistically significant (p<0.01). However, for the quadratic regression, this same coefficient is negative and non-significant, as is the case for the quadratic term variable in the Pooled-MQO and Sys-GMM models. These results suggest that the functional form of the relationship between long-term ETR and APTS

may not be quadratic, which is not a problem for our main estimates. It should also be noted that the coefficient of the DAPTS variable was significant and positive in all models (this data was not tabulated).

However, when we use the log of APTS (table 04), we transform equation 1 into a Level-log model, thus assuming a non-linear relationship between long-term ETR and APTS. In this case, the result of the negative and statistically significant APTS variable in the fixed-effect and Sys-GMM regression models supports the idea that the relationship between APTS and long-term ETR has a decreasing growth rate. These results represent evidence of possible non-linearity in the relationship between these variables but do not compromise the inferences made in our primary analysis.

4.3.4 Discussion

Due to the relevance that the topic has gained over the last few decades, many studies have tried to identify the various factors that explain the variation in ETR between companies (e.g. Gomes et al., 2022; Schwab et al., 2022; Marques et al., 2022; Barbera et al., 2020; Martinez & Rodrigues, 2020), but so far, most of the research that has investigated the relationship between APTS and long-term ETR has focused on institutional and regulatory environments that are pretty different from the Brazilian reality, in which, not infrequently, economic agents can exert significant influence over tax policies. For this reason, any sign of the effect of APTS on long-term ETR, whether positive or negative, should merit the attention of society, regulators, and companies.

Gal-Or et al. (2024) warn that, in some countries, regulators have banned them altogether, while others have imposed or proposed restrictions on APTS. However, the authors report that in the United States, at least, a large proportion of the growth in audit firm revenues stems from a persistent and significant increase in revenues derived from tax services. According to the authors, regulators and governance bodies claim that the marketing of tax services by auditors to devise aggressive tax strategies contributes to the growth of these services, but that the Securities and Exchange Commission (SEC) has been investigating potential conflicts of interest caused by excessive APTS.

In the case of Brazil, the Securities and Exchange Commission (CVM), through CVM Resolution No. 23/2021, prohibits the provision of non-audit services (including APTS) by the incumbent auditor if it could characterize a loss of independence and objectivity. However, from a practical point of view, audit firms continue to provide tax services to their audit clients, although the Federal Accounting Council, through its NBC PA 400/2021, recognizes that some tax services (e.g., tax planning and tax consulting) can create a threat of self-review or defense of the client's interest. Therefore, by documenting evidence suggesting that companies strategically use APTS to manage their long-term tax burdens, our research helps understand why companies continue to engage these services and strive to consider that APTS do not compromise auditor independence and objectivity.

Our research is not intended to serve as a policy prescription. However, we believe its results can be interpreted as a signal to regulators of the need to strengthen oversight and standards dealing with the provision of non-audit services by the incumbent auditor, mainly when it involves tax services.

At the same time, our results can be used by the government to understand better the tax strategies adopted by companies and assess the need to change tax legislation and tax incentive policies in order to promote the perception of fairness and tax justice since not all companies and taxpayers can count on the help of specialized auditors in their tax planning, and to remedy the distortions that affect the efficiency of the Brazilian tax system.

Furthermore, since ETR serves as a way to assess the level of tax aggressiveness, our results can be used by company managers and audit committees to evaluate the cost-benefit of

APTS, broadening the understanding of how incumbent auditors influence their long-term tax strategies, effective tax rates, tax compliance and risk, and the potential risk of compromising auditor independence.

Finally, as can be seen, whatever the result of a study of this nature, we believe that it cannot be adequately interpreted without considering the context in which the companies under investigation operate. In this specific case, it is imperative to consider, for example, the characteristics of the institutional environment, the lobbying power of the economic sectors involved, the complexity of the tax rules to which the participants in the sample are subject, regulatory inertia, the incentive structure for taking tax risks, among other factors.

5 Conclusions

This study examined the relationship between the tax services provided by the incumbent auditor and the long-term effective tax rate in the Brazilian context and documented evidence that, in general, the long-term ETR decreases when the relative amount invested in APTS increases but that the association is positive for situations in which ETR are lower, suggesting that companies have reputational concerns or fear increases in political costs when their effective tax rates are too low. In addition, we find some evidence that the relationship between long-term ETR and APTS may not be linear. Our main results persist even when we use different long-term ETR, APTS, and econometric specifications metrics, which deal with potential endogeneity problems, influential observations, and unobserved time-varying or non-time-varying factors.

These results are significant because they help form a more informative picture of the role of APTS in firms' effective tax rates and long-term tax strategies, contributing in many ways to the literature and the ongoing debate on providing non-audit services by incumbent auditors.

However, our study has some limitations that need to be considered and that serve as an opportunity for future research. For example, our operational proxies for the effective tax rate and tax services provided by auditors were calculated from data extracted from the company's published financial statements and Reference Forms. It is possible that this data is not accurate and could lead to measurement errors in the LongETR and APTS variables. Another limitation concerns the need to exclude companies with negative pre-tax income for the 4-year period, which could lead to selection and survival bias, even considering the efforts we made through our econometric approaches. Furthermore, in the context of our problem, econometric specifications tend to be complex because of potential problems of omitted variables, reverse causality, and specification of the appropriate functional form to study the relationship between long-term ETR and APTS. We have tried to address these issues through the selection, dynamic GMM model, and non-parametric and quantile regressions. However, we cannot guarantee that our estimates are, to some extent, error-free.

Another limitation concerns that companies may concurrently hire other non-audit firms to assist in their tributary planning. If this is the case, we do not know if there is any interactive effect with the APTS and what influence this has on the companies' effective rates. Also, the tributary service type (planning or compliance) is essential in the relationship between APTS and ETR (Chyz et al., 2021). In our research, it has not been possible to study this distinction because companies in Brazil do not detail this information publicly. Finally, the audit committee may influence the decision to hire tax services and the relationship between the auditor and the audited company. In our estimates, we have not controlled for this factor, and we do not know to what extent the inclusion of this control could affect our primary results. Further studies may attempt to address these issues.

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