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Tax Aggressiveness and Big4 Audit Firms[1]

Agressividade fiscal e as empresas de auditoria Big4

Agresividad fiscal y las empresas de auditoría Big4

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KEYWORDS
Tax Aggressiveness, Big4, Independent audit

Abstract: This study examines the influence of external audits by Big4 or non-Big4 firms on the tax aggressiveness of listed Brazilian companies. Also, the research analyzes the impact on tax aggressiveness in the case of audit firm rotation, particularly when a company moves from Big4 to non-Big4 audit firms and vice versa. The sample was composed of 340 non-financial Brazilian companies, with shares traded in the Brazilian stock exchange B3, in the period between 2010 and 2016, and using two metrics to assess tax aggressiveness. The first is the book-tax difference (BTD) that reflects the difference between book income and taxable income. The second metric is the effective tax rate (ETR), which is calculated by dividing the total tax expenses by the earnings before taxes (EBT). The findings show that companies audited by non-Big4 firms are more aggressive than those audited by Big4 firms. As for moving from Big4 to non-Big4 firms, the results are not sufficiently clear to state whether companies become more or less tax aggressive.

PALAVRAS-CHAVE
Agressividade fiscal, Big4, Auditoria independente

Resumo: Este estudo examina a influência de auditorias externas realizadas por empresas Big4 ou não Big4 na agressividade fiscal de empresas brasileiras cotadas em bolsa. Além disso, a pesquisa analisa o impacto sobre a agressividade fiscal no caso de rotação de empresas de auditoria, particularmente quando uma empresa muda de Big4 para empresas de auditoria não-Big4 e vice versa. A amostra foi composta por 340 empresas brasileiras não financeiras, com ações negociadas na bolsa de valores brasileira B3, no período entre 2010 e 2016, e utilizando duas métricas para avaliar a agressividade fiscal. A primeira é a diferença de imposto contábil (BTD), que reflete a diferença entre a renda contábil e a renda tributável. A segunda métrica é a taxa efetiva de imposto (ETR), que é calculada dividindo o total das despesas tributárias pelo lucro antes dos impostos (EBT). Os resultados mostram que as empresas auditadas por empresas não-Big4 são mais agressivas do que aquelas auditadas por empresas Big4. Quanto à mudança de empresas Big4 para empresas não-Big4, os resultados não são suficientemente claros para afirmar se as empresas se tornam mais ou menos agressivas em termos fiscais.

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PALABRAS CLAVE
Agresividad fiscal, Big4, Auditoría independiente

Resumen: Este estudio examina la influencia de las auditorías externas de las empresas Big4 o no Big4 en la agresividad fiscal de las empresas brasileñas que cotizan en bolsa. Además, la investigación analiza el impacto en la agresividad fiscal en el caso de la rotación de las firmas de auditoría, en particular cuando una empresa se mueve de las Big4 a las firmas de auditoría que no son Big4 y viceversa. La muestra se compuso de 340 empresas brasileñas no financieras, con acciones negociadas en la bolsa de valores brasileña B3, en el período comprendido entre 2010 y 2016, y utilizando dos métricas para evaluar la agresividad fiscal. La primera es la diferencia de impuesto contable (BTD) que refleja la diferencia entre el ingreso contable y el ingreso imponible. La segunda es la tasa efectiva de impuestos (TEF), que se calcula dividiendo el total de los gastos fiscales por los beneficios antes de impuestos (TEF). Los resultados muestran que las empresas auditadas por empresas que no son Grandes 4 son más agresivas que las auditadas por las Grandes 4. En cuanto al paso de las empresas Big4 a las que no lo son, los resultados no son lo suficientemente claros como para determinar si las empresas se vuelven más o menos agresivas desde el punto de vista fiscal.

Introduction

This study examined the relationship between Brazilian listed companies' tax aggressiveness and external audit by Big4 (PWC, EY, KPMG, and DTT) and non-Big4 firms (other auditing companies), as well as the impact on tax aggressiveness in case of audit firm rotation.

The quest for profitability in demanding market scenarios marked by the expansion of the global trade and increased competition, lead businesses to act aggressively and work hard to reduce costs – including tax expenses. Thus, according to Lima and Duarte (2007), the greater the reduction in tax payment, the more aggressive the company.

Companies' practices to reduce tax expenses are not necessarily abusive (Martinez, 2017). However, even though tax planning may be considered a lawful way to reduce the tax burden – by using loopholes and exemptions provided for in Brazilian legislation for this purpose – there is also a risk that this reduction occurs through abusive practices, contrary to the legal norm (Martinez, 2017).

Given the possibility of abusive practices and false statements, the external audit is essential for stakeholders to confirm the accuracy of the figures disclosed. Therefore, it is also essential to observe the quality and training of the audit firms to analyze the application of earnings management (considering its impact on cost reduction and, consequently, tax aggressiveness) (Santana, Bezerra, Teixeira, & Cunha, 2014).

The size of the audit firm – usually measured by its revenues – suggests a better quality service. Consequently, the larger the audit firm, the lower the propensity for practices that are contrary to legal provisions in the audited company because auditors are more likely to be technically prepared and have more independence from their clients (Santana et al., 2014).

Thus, the objective of this study is to confirm whether the quality of external audit firms affects tax aggressiveness.

Many companies are tax aggressive to increase competitiveness or to survive in business. This study explores this issue in the Brazilian market, characterized by high tax burden and tax complexity. The research analyzed a sample of 340 Brazilian non-financial and profitable (i.e., paying taxes) companies listed on the Brazilian stock exchange B3, using data from 2010 to 2016. It examined the relationship between tax aggressiveness and external audit by Big4 or non-Big4 audit firms, as well as the effects on tax aggressiveness when there is audit firm rotation, especially a company move from a Big4 to a non-Big4 audit firm and vice versa.

The hypotheses tested were:

1: Companies audited by Big4 firms (an indicator of audit quality) tend to be more (or less) tax aggressive when compared to those audited by non-Big4 firms.

2: Companies that were audited by Big4 and moved to a non-Big4 audit firm tend to be more aggressive.

Theoretical Elements of Research

Tax Aggressiveness

Tax aggressiveness is a phenomenon that has gained attention worldwide, but, paradoxically, it has been relatively little researched (Bird & Karolyi, 2017). In Brazil, a country with a significant tax burden, the first studies are in an embryonic phase (Araújo & Leite Filho, 2017).

It is possible to say that a company is more tax aggressive when it actively works to guarantee the calculation and payment of a lower tax burden for its operations. The organization's behavior aims to avoid or reduce its real tax burden (Martinez & Martins, 2016). It is an active effort toward cost reduction, and this is a primary goal in operational decision-making (Klassen, Lisowsky, & Mescall, 2016).

The companies' focus on avoiding or reducing tax expenses has become the center of attention in business, particularly for tax authorities who have been demanding the disclosure of more business information related to tax activities in order to prevent abusive practices. Authorities have requested more than the usual internal information, and propose reporting standards per country (country-by-country reporting), seeking to curb abuse in international tax planning (Towery, 2017).

The criterion around the legality of tax aggressiveness is grounded on the difference between the understanding of tax evasion and the adoption of legitimate tax planning, considering the legal provisions and potentially abusive practices (Schoueri & Freitas, 2010).

The international literature shows that the increase in the company's performance can be obtained through the application of efficient tax planning (Desai & Dharmapala, 2006; Minnick & Noga, 2010). It points out that the lower the tax burden, the more profits will be generated, which can be distributed or reinvested by the shareholders, resulting in the appreciation of their shares (Bankman, 1999; Scholes, Wolfson, Erickson, Maydew, & Shevlin, 2005).

In Brazil, the savings that large companies obtain through tax planning is a topic widely discussed, including tax savings, related to taxes calculated on profits - Income Tax (25%) and Social Contribution on Net Income (9%). Such expenses have a significant weight in the organizations' competitiveness in the global market (Utzig, Dal Magro, Zanella, Freitas, & Dittadi, 2014).

Finally, it is worth mentioning that anti-avoidance norms are not yet fully regulated in Brazil. Thus, tax authorities still do not count on effective mechanisms to combat and suppress tax evasion and improper and abusive tax planning (Martinez, 2017).

Summarizing, according to Martinez (2017),tax aggressiveness does not necessarily imply tax abuse. However, there is a risk that the active reduction of explicit tax obligations incurs in measures that abuse the law, fraus legis, or that the legal substance is contradicting the legal framework (MARTINEZ, 2017, p. 111, our translation).

Relationship between Tax Aggressiveness and External Audit Firms

The essence of accounting is to provide information to stakeholders such as investors, governments, creditors, suppliers, and employees, through financial statements and other instruments (Iudicibus, 2005). The role of audit firms, in turn, is to express their opinion on financial statements, following the Generally Accepted Accounting Principles (GAAP) or, in Brazil, with the Comitê de Pronunciamentos

Contábeis (CPC) (Brazilian accounting practice committee).

Notwithstanding, the primary purpose of accounting firms is to generate information that helps decision-making processes, reducing the possibility of a conflict of interests and asymmetry of accounting information. The information generated through accounting practices are under the responsibility of the companies' administrators and disclosed in financial statements (CPC, 2008).

Although it is not usual practice, administrators may use their privilege to manipulate the accounting results according to individual needs (Martinez, 2001), such as abusively pursuing tax reduction to guarantee bonuses on meeting goals.

This abusive practice is a piece of information that audited companies tend to hide (Kanagareretnam et al., 2016). An auditor needs to be qualified to identify these irregularities (Arruñada, 1997), eliminating such practices of the company's tax planning.

According to Carson (2009), the elements that indicate technical capacity are the level of the auditors' specialization and training, in addition to the applied methodologies, risk management, the use of systems, and, even with less significance, the fees charged (Watkins, Hillison, & Morecroft, 2004).

In parallel and concomitantly with the auditor's technical quality, the independence of the audit firm must be taken into account. The auditor may discover an existing non-conformity and not report it. Statistically, this independence is directly related to the auditor's technical competence and the fees charged for the service (Santana et al., 2014).

For Santana et al. (2014) and Watts and Zimmerman (1983), the auditor is more likely to report non-conformity depending on the quality of the audit firm. For Braunbeck (2010), successful audit firms inform the issues pertinent to their work, without losing their independence.

Another characteristic indicating independence is the size of the audit firm. In this context, two groups stand out, separated based on a significant difference in terms of revenues. The first group comprises the four largest companies in the world, known as the Big4. The second is formed by the other independent audit firm (called non-Big4) (Boynton, Johnson, & Kell, 2002). Big4 audit firms, considering their size and visibility, are encouraged to rigorously preserve their independence and reputation, avoiding litigation risks (Hindo, 2003).

In contrast, the study by Lennox, Lisowsky, & Pittman (2013) suggests that the audit company's tax aggressiveness does not directly pose risks to the audit firm's reputation. The authors consider that more tax aggressive clients are less likely to commit accounting fraud, presumably because tax aggressiveness could lead to greater oversight of the accounting transactions carried out and, therefore, clients are less likely to manipulate their results.

These initial definitions and the systematic review carried out in the study by Kanagaretnam, Lee, Lim, & Lobo (2016), "Relation between Auditor Quality and Tax Aggressiveness," suggest that there is little evidence of how the auditor's quality relates to tax aggressiveness, which corroborates the importance of this research. Table 1 lists some studies on tax aggressiveness and audit, showing an overview of how the topic has been currently discussed.

Table 1 - Synthesis of the Studies on Tax Aggressiveness and Auditing

Title	Author	Conclusion	Year
Tax Haven Networks and the Role of Big4 Accountancy Firms	Chris Jonesa; Yama Temouria; and Alex Cobhamb	The article examined the relationship between Big4 accountancy firms and the degree to which multinational enterprises (MNE) build, manage, and maintain their networks of tax haven subsidiaries. The results suggest a strong correlation and causal link between the size of the MNE's network and its use of Big4. The study supports the conclusion that the auditors' work significantly influences the MNE's tax planning	2018
Mediating Effects of Audit Quality on the Relationship between Audit Firm Rotation and Tax Avoidance: Evidence from China	Noheed Khan; Songsheng Chen	The study identifies the effect of the modified auditor opinion's (audit quality) mediation on the relationship between audit firm rotation and tax avoidance. The findings suggest that mandatory rotation of audit firms does not indirectly influence the temporary and permanent book-tax differences via modified auditor opinion. Also, the voluntary and no-audit firm rotation has an indirect relationship with temporary book-tax differences via modified auditor opinion.	2017
Relation between Auditor Quality and Tax Aggressiveness: Implications of Cross Country Institutional Differences	Kiridaram Kanagaretnam; Jimmy Lee; Chee Yeow Lim; and Gerald Lobo	The research finds strong evidence that auditor quality is negatively associated with the likelihood of tax aggressiveness. Also, the negative relation between the auditor quality and the likelihood of tax aggressiveness is more pronounced in countries of stronger investor protection, higher risk of auditor litigation, better tax environment, and higher capital market pressure. The authors stress in their conclusions that firms	2016

		audited by industry specialist auditors show a lower likelihood of tax aggressiveness, corroborating their arguments that high-quality auditors are associated with lower corporate tax aggressiveness.	
	Kenneth Klassen; Petro Lisowsky; and Devan Mescall	Clients of Big4 tax preparers are linked to lower levels of tax aggressiveness. The study suggests that there are costs imposed on tax aggressiveness in tax return clients when the tax preparer is also the auditor, at least for those company's using Big4 preparers.	2016

Source: Elaborated by the authors

Methodology

Audit Firm Rotation

The Securities and Exchange Commission of Brazil (CVM) requires audit firm rotation. However, Brazil started a transition to adopt the International Accounting Standards, from 2009 to 2011 (which is part of the period covered in this work, 2010-2016), and CVM relaxed this requirement in those years. Therefore, this study analyzed the companies' behavior regarding changing their audit firm without emphasizing the possibility of mandatory rotation.

Several studies have analyzed the reasons for changing external auditors. There are several factors around this practice, such as the auditor's reputation and dissatisfaction with the auditors' quality (Williams, 1988), and permissiveness and flexibility of auditors regarding the clients' needs and, consequently, the non-application of reservations (Johnson & Lys, 1990). Also, changing auditors is related to change in management (Hudaib & Cooke, 2005; Nazri, Smith, & Ismail, 2012), or the fact that the previous auditor is better than the current one (Gómez-Aguilar & Ruiz-Barbadillo, 2003), and in case the audited company is undergoing significant growth (Johnson & Lys, 1990; Deangelo, 1981). Conversely, Nazri, Smith, and Ismail (2012) show that the auditor's opinion does not influence the change of audit firms, and Carcello, Hermanson, Neal, & Riley Jr (2002) found that large companies do not tend to replace their external auditors.

Finally, a study in Brazil by Bortolon et al. (2016) found that the disclosure of a modified audit report, the company's growth, and the organization's listing on the Novo Mercado or Nível 2 segments of BM&FBovespa, increase the probability of changing its audit firm.

Measuring Tax Aggressiveness

In a review of tax research, Hanlon and Heitzman (2010) presented different ways of measuring the level of tax aggressiveness. Based on this work, the research adopted two metrics to assess tax aggressiveness: book-tax differences (BTD), and the effective tax rate (ETR). BTD and ETR are understood as follows:

a) BTD is the difference between tax income and taxable income, where BTD = EBIT - (tax income/0.34%)(Firth, 2011), observing that, in Brazil, the rate of corporate tax income (called IRPJ) is 25%, and the rate of social contribution on net profit (called CSLL, levied on the profit before income tax and intended for the financing of social security) is 9%. BTD occurs due to several factors. The primary explanation is that the systems for calculating profit do not have the same purposes; therefore, they adopt a set of different rules (Hanlon & Heitzman, 2010); and

b) ETR represents the effective tax rate in the long-term, calculated by dividing the sum of IRPJ and CSLL by the EBIT (Silva & Martinez, 2017).

Assessing the Quality of Auditors

As shown in the previous section, the literature has consistently separated audit firms in two groups, the Big4, and the non-Big4 audit firms, recognizing that the Big4 are more likely to detect and report relevant distortions in the company's financial statements than non-Big4 audit firms.

Based on previous studies, the research adopted the fact that a company is audited by one of the Big4 firms as a proxy for auditor quality (Teoh & Wong, 1993; Becker, Defond, Jiambalvo, & Subramanyam, 1998; Fan & Wong, 2005; Choi & Wong, 2007; Behn, Choi, & Kang, 2008). For classification purposes, the following independent auditing companies were considered part of the Big4: EY, PWC, Delloite, and KPMG.

Control Variables

The control variables added to the proposed model were identified in existing research that impacted the level of tax aggressiveness of the companies analyzed. They are: total assets (TotalAssets), financial leverage (FinLev), and return on assets (ROA).

Although recognizing the work by Silva and Rezende (2017), who did not find a relationship between the company's size and tax aggressiveness, the study includes the company's size in the model, using the variable 'total assets' (TotalAssets). This decision is supported by the research by Araújo and Leite Filho (2017), Martins (2016), and Martinez (2015), who argue that the company's size indicates tax aggressiveness.

The variable financial leverage (FinLev) was included in the model based on the studies by Martinez and Martins (2016) and Jalan, Kale, and Meneghetti (2013), who demonstrate that more aggressive companies are more likely to be leveraged.

Finally, the variable return on assets (ROA) was included because the higher the ROA, the greater the profit - which is the basis for taxation. Along this line, the study by Kassai et al., (2000, p. 177, our translation) stated: "This index [...] reveals the return produced by the total of

investments a firm made in its assets, quantifying the operating result the firm produced in its operational activities, that is, before financial income and expenses."

For Reinders and Martinez (2016) and Brigham and Houston (2001), ROA reflects the results of the application of various policies and decisions regarding the company's operation. Such return reveals the combined effects of asset management, liquidity, and debt on operating results, including debts related to taxes.

Sample Delimitation

This research used a sample of Brazilian companies listed on the Brazilian stock exchange B3. Financial companies were eliminated because they are subject to special regulations and tax framework. The study eliminated from the sample the non-profitable companies and those with null, incomplete, or absent data, as well as those that did not present financial statements to the Securities and Exchange Commission of Brazil (CVM). Companies that presented extreme values of BTD and ETR were also excluded from the sample.

The companies' data were collected from the database 'Economática.' Data about the external audit firm of each company were not available in the database and were collected from the B3's website. The data collected were ordered and treated in a single database and submitted to statistical analysis.

The analysis used scientific and statistical criteria, reducing the possibility of judging values.

Initially, the study adopted descriptive statistics to expose each of the variables to be used in the model. The discrete variables [variables of type 0 (absence) and 1 (presence)] were classified only with their binary values, and the continuous variables are indicated by the minimum, maximum, mean, and standard deviation values.

Also, the research performed two different analyses, the multiple linear regression, and logistic regression.

Multiple linear regression seeks to coordinate a dependent variable, calculated continuously (therefore a variable measured by a number containing non-integers) with a set of two or more independent variables, which may or may not be continuous.

Logistic regression aims to associate a dichotomous dependent variable (absence/presence of a characteristic) with a set of two or more independent variables, which may or may not be continuous.

Therefore, the study performed four regressions: tax aggressiveness and continuous ETR; tax aggressiveness and continuous BTD; tax aggressiveness and ETR in the dichotomous form; and tax aggressiveness and BTD in the Dichotomous form.

Presentation and discussion of results

This section presents and discusses the results of the study, explaining the variables, and presenting the proposed models.

Descriptive Analysis

The model proposed uses a set of four variables. The variable 'Big4' characterizes the firms auditing the companies analyzed. It is classified as Big4 (1) or non-Big4 (0) and is an essential variable to test the research hypotheses presented in the first section of this study.

Table 2 - Descriptive Analysis – Companies Audited by Big4 e Non-Big4 Audit Firms

		N	Average	Standard Deviation
Non-Big4	BTD_staggered	667	-1.32	12.82
	ETR_current	549	0.25	0.68
	ROA	667	-135.32	1325.34
	FinLev	667	2.78	101.26
	TotalAsset	667	5.03	1.49
Big4	BTD_staggered	1493	-0.22	5.19
	ETR_current	1258	0.55	3.65
	ROA	1490	14.59	1576.92
	FinLev	1489	-5.48	264.45
	TotalAsset	1493	6.33	1.13

Source: Elaborated by the authors

Dummy variables indicate the presence or absence of the following characteristics: if the company operates in the electric sector, if it operates in construction, or if it operates in the commercial sector. These sectors were selected given their importance and representativeness in the Brazilian economy.

The variables 'total assets,' 'ROA,' and 'financial leverage' are continuous variables, and their minimum, maximum, average, and standard deviation values are highlighted above.

Analysis of the Correlation of Variables

Table 3 shows the correlation between continuous variables. Variables less significant than (or equal to) 0.05 indicate a correlation between two variables that can be extrapolated to the population data.

Table 3 - Correlation of Continuous Variables

		ETR	BTD	TotalAsset	ROA
BTD	Pearson Correlation	.113**			
	Sig. (2-tailed)	.000			
	N	1734			
TotalAsset	Pearson Correlation	.415**	.210**		
	Sig. (2-tailed)	.000	.000		
	N	1734	2160		
ROA	Pearson Correlation	.074**	.814**	.087**	
	Sig. (2-tailed)	.002	.000	.000	
	N	1732	2157	2157	
FinLev	Pearson Correlation	-.026	-.001	-.007	.000
	Sig. (2-tailed)	.286	.970	.761	.995
	N	1731	2156	2156	2156

**. Correlations are significant at 1% level

Source: Elaborated by the authors

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Positive correlations indicate that an increase in one of the variables is also accompanied by an increase in another. Those that are significant are highlighted. It is possible to observe that the variable financial leverage does not correlate with any of the other variables. The strongest correlation occurred between ROA and BTD, with a value of 0.814 (on a scale where the maximum is 1).

Models of Tax Aggressiveness

Model with Continuous ETR

In this case, the model was significant (p = .000) and with an adjusted R2 of 18.6%, indicating that 18.6% of the variability present in the ETR variable is explained by the set of independent variables (Table 4).

It is observed that, when the total asset (size) increases, the ETR increases (which shows that the variable 'total asset' is positive). It is known that the higher the ETR, the less aggressive the company. Therefore, when there is an increase in total assets, the company tends to be less aggressive.

Table 4 - Coefficients of the continuous ETR Model

	Nonstandard Coefficients			
Model	B	Std. Error	T	Sig.
(Constant)	-.053	.015	-3.641	.000
Big4	-.004	.009	-0.479	.632
TotalAsset	4.598E-02	.003	16.843	.000
ROA	3.647E-06	.000	1.728	.084
FinLev	-1.514E-05	.000	-1.066	.287
Dummy_Electricity	0.008	0.010	0.821	.412
Dummy_ Construction	-0.054	0.015	-3.685	.000
Dummy_Commercial	0.037	0.015	2.550	.011

Source: Elaborated by the authors
a. dependent variable: ETR
Adjusted R2 = 18.1%
Significance of the model = 0.000

Considering that the higher the ETR, the less aggressive the company is, the results in Table 4 indicate that companies in the construction sector are more aggressive, considering that the ETR decreased. Note that the Dummy 'construction' coefficient is negative.

This result is in line with the study by Gomes (2011) who concluded that the ETR of the companies listed on São Paulo's (Brazil) stock exchange Bovespa is related to the rates of taxes levied on corporate profits, with only a few economic sectors suggesting the presence of tax management among them the construction sector.

In the commercial sector, the relationship is reversed. Considering the ETR coefficient, the sector is less aggressive, and the variable is positive.

As for companies audited by Big4 audit firms, contrary to existing studies, the results did not show a continuous relationship between tax aggressiveness and ETR.

Continuous BTD Model

In this case, the model was significant (p = .000) and a better fit than the previous model. Table 5 shows the set of independent variables, which explain BTD variability by 68.4%. It is more likely that companies that are audited by Big4 have a lower BTD (given the negative coefficient). In other words, the more tax aggressive the company is, taking BTD into account, the less likely it is to have been audited by a Big4 audit firm.

The tests reflected that large corporations – measured based on their total assets - are more aggressive. Thus, if there is an increase in total assets (size), there is also an increase in BTD (positive coefficient).

The results also suggest that companies with the highest ROA are more likely to be aggressive. Note that when ROA increases, the BTD increases (positive coefficient).

Table 5 - Coefficients of the Continuous BTD MODEL

	Nonstandard Coefficients			
Model	B	Std. Error	T	Sig.
(Constant)	-5.548	.447	-12.407	.000
Big4	-.827	.244	-3.391	.001
TotalAsset	9.584E-01	.082	11.688	.000
ROA	4.451E-03	.000	65.975	.000
FinLev	-1.760E-05	.000	-.039	.969
Dummy_Electricity	0.043	0.278	0.155	.877
Dummy_Construction	0.050	0.402	0.123	.902
Dummy_Commercial	0.155	0.436	0.354	.723

Source: Elaborated by the authors
a. dependent variable: BTD
Adjusted R2 = 68.4 %
Model significance = 0.000

From the documented statistics, it is possible to infer that only the BTD value in its continuous form was significant. Note that BTD is sensitive not only to tax aggressiveness but also to earnings management.

Model with ETR Dichotomous

When a discrete metric model replaces tax aggressiveness, ETR with value '1' is first used for the lowest quartile, first quartile (more aggressive), and value 0 for the others.

The results found in this regression show that a company audited by a Big4 audit firm has a 28% (100-71.9) chance of being less aggressive than those audited by a non-Big4. Tests also reveal that a company with larger total assets is 58% (100-42) less aggressive than smaller companies.

Table 6 - Coefficients of Dictonomous ETR Model

	B	S.E.	Wald	Sig.	Exp(B)
Big4	-.330	.150	4.862	**.027**	**.719**
TotalAsset	-.876	.067	168.910	**.000**	**.417**
ROA	-.001	.001	1.413	.235	.999
FinLev	.002	.001	1.529	.216	1.002
Dummy_Electricity	-0.573	.214	7.145	**.008**	**.564**
Dummy_Construction	0.510	0.250	4.270	**.039**	**1.661**
Dummy_Commercial	-0.700	0.300	5.380	**.020**	**.496**
Constant	4.120	0.360	133.060	.000	61.797

Source: Elaborated by the author – Odds ratio
Based on Hosmer-Lemeshow: p = .176 (adjusted model, based on the proposed model).
Dependent variable = ETR (Dichotomous)

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The results show that companies in the electricity sector are 44% (100-56) less aggressive than businesses from another sector. Also, a company in the construction sector is 66% more aggressive than a business in any other sector, and, finally, that a company in the commercial sector is 50% (100-50) less aggressive than one from any other sector.

Model with Dichotomous BTD

In the dichotomous BTD regression, '1' was reported for the quartile with higher values (more aggressive) and '0' for the others. For the logistic regression model to be accepted as valid, its adequacy measure - Hosmer and Lemeshow - must be within the established parameters ($p > .05$). The p-value found was .000 and, therefore, the model cannot be adjusted. Therefore, for the dichotomous BTD variable, the model was not significant and was rejected.

Results for moving from Big4 to non-Big4 audit firms

The year 2011 is used as an example to facilitate understanding. In that year, 328 companies were analyzed. Of these, four were audited by a Big4 firm in 2010 and by a non-Big4 in 2011. Additionally, twenty companies were audited by non-Big4 firms in 2010 and were audited by Big4 firms in 2011.

Table 7 - Audit Firm Rotation (Years Consolidated)

		Change		Change 1		Change 2	
Year	Obs.	Occurrences	Occurrence/ Total sample (%)	Occurrences	Occurrence / Total sample (%)	Occurrences	Occurrence/ Total samp. (%)
2011	328	304	92.68	4	1.22	20	6.10
2012	345	319	92.46	15	4.35	11	3.19
2013	347	340	97.98	5	1.44	2	0.58
2014	356	346	97.19	4	1.12	6	1.69
2015	351	343	97.72	7	1.99	1	0.28
2016	345	329	95.36	12	3.48	4	1.16

Source: Elaborated by the authors

Regression Model Including Audit Firm Rotation

As discussed above, continuous models are evaluated using multiple linear regression, and dichotomous models are evaluated using the logistic regression odds ratio.

The only significant variable in the continuous ETR model was total assets; i.e., this is the only variable able to explain changes in tax aggressiveness. As the coefficient is positive (0.046), an increase in total assets leads to an increase in continuous ETR. A higher ETR, according to the definition, is related to a less aggressive company. The other variables are not significant.

In the dichotomous ETR model, in addition to total assets, the variables 'Big4' and 'Change 1' were also significant. An increase in total assets reduces the chance of being an aggressive company by about 58% (100-41.62), which is a result also observed in the continuous model). When the company changes its audit firm from a Big4 to a non-Big4, the chances of being aggressive are reduced by 77% (100-23). When the company is audited by a Big4 firm, the chance of being aggressive reduces by 38% (100-62.61).

Table 8 - Regression – Audit Firm Rotation

Model	ETR Contin.	ETR Dichot.	BTD Contin.	BTD Dichot.
Constant	-0.060	63.1069	-1.8246	0.1897
Big4	0.002	0.6261***	(-0.3646)***	2***
Change	0.007	0.9851	0.0296	0.6403***
Change 1 (B4 p NB4)	0.040	0.2309**	-0.1688	1.8328
Change 2 (NB4 p B4)	-0.00700000	1.0048	(-0.6504)***	0.966
ROA	0.00000131	0.9994	0.0073***	1.003***
FinLev	0.0000000	1.0018	0.0000	1.000
TotalAsset	0.046***	0.4162***	0.3251***	1.039
R2 (adjusted)	17.70%	38%	79.50%	6.30%

*Significance level 10%; **Significance level 5%; ***Significance level 1%
Continuous – simple linear regression model
Dichotomous – logistic regression model
Source: Elaborated by the author

The continuous BTD model has four significant variables. In the case of BTD interpretation, the higher the value, the more aggressive the company. Being audited by a Big4 firm reduces the value of continuous BTD, concluding that the trend points to a less aggressive company. When the company changes from a non Big4 to a Big4 audit firm, there is a drop in aggressiveness (negative coefficient). An increase in total assets leads to an increase in the company's aggressiveness.

Table 9 - Consolidation of Results

ETR	
Higher ETR (-) Aggressive	
Dichotomous	Continuous
Larger Assets Reduce the chance of being less aggressive by 58% More Change 1 Reduce the chance of being less aggressive by 77% More Big4 Reduce the chance of being less aggressive by 38%	Larger Assets Less Aggressive
BTD	
Higher BTD (+) Aggressive	
Dichotomous	Continuous
More Big4 Increase the chance of aggressiveness by 100% More Change Reduce the chance of aggressiveness Higher ROA Increase the chance of aggressiveness	More Big4 Reduce the chance of aggressiveness More Change 2 Reduce the chance of aggressiveness Larger Total Assets Increase the chance of aggressiveness

Source: Elaborated by the authors

In the dichotomous BTD model, the variables: Big4, Change, and ROA are significant. Being audited by a Big4 firm increases the company's chance of being aggressive by 100%. Audit firm rotation ('Change' variable), reduces the chance

of the company being aggressive by 36% (100-64.03). Changing the audit firm leads companies to be less aggressive. Finally, an increase in ROA results in a 0.3% (100.3-100) chance of the company being aggressive.

Conclusion

The development of this study about the influence of Big4 audit firms on tax aggressiveness takes into consideration important elements from the context: Companies face great market competition, continuously seeking to reduce costs, and Big4 audit firms are more prepared to identify abusive practices and in a better position to exercise their independence. In addition, existing research is still emerging.

Although there is no clear definition for the concept of 'tax aggressiveness,' the research found support in the literature to use BTD and ETR as metrics to assess the companies' tax aggressiveness.

The results of the regressions show that companies audited by Big4 firms tend to be less aggressive, which is compatible with the literature. Therefore, when they want to be more aggressive, they seek non-Big4 audit companies.

A direct relationship between aggressiveness and audit quality was not identified. However, in the dichotomous variation in the case of ETR, more aggressive companies are less likely to be audited by Big4 firms, or less aggressive companies tend to be audited by Big4 firms. ETR was reported '1' in the quartile with lower values (more aggressive) and '0' in the others.

This study also sought to verify whether audit firm rotation in listed companies would reveal more aggressiveness. The results were not strong enough to conclude that companies that are audited by Big4 firms, when switching to a non-Big4 audit company, become more aggressive. A possible explanation to consider is the fact that companies audited by Big4 firms are larger and in a better position to hire qualified tax consultants to develop aggressive strategies. Therefore, they manage to be tax aggressive even though they are audited by qualified auditors. It should be noted that the results obtained can only be applied to the study's sample, and cannot be generalized to all companies. The relationship observed when companies change audit firms, therefore, may present variations when studying privately or publicly traded companies.

Due to the scarcity of empirical studies in the literature, there are still many opportunities for future research, further investigating the relationship between tax aggressiveness and independent auditing. The independent auditors are, in essence, gatekeepers of the financial statements' quality standards, and their modus operandi limit the managers' ability to adopt more aggressive tax practices. Therefore, it is crucial to develop more research on the associations between auditing and tax aggressiveness, comparing findings obtained from studies in different countries.

In addition, future research could produce additional tests using other proxies for tax aggressiveness, preferably associated with ETR. Also, future studies could test other variables pointed out in the literature, and verify the effect of audit firm rotation, for example, in privately held companies.

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