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ORIGINAL ARTICLE

Effects of the tax liability of managers on the relationship between tax infraction notices and tax avoidance

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ABSTRACT

The aim of this research was to assess the moderating role of the joint and several liability of company directors in the relationship between the cumulative value of tax infraction notices and the subsequent level of corporate tax avoidance. Based on agency theory, the literature suggests that penalizing managers is more effective in reducing tax avoidance than penalizing the firm itself. However, this proposition had not been tested in Brazil, where the legislation determines that infraction notices and the consequent penalization of companies are carried out with the joint and several liability of the directors who have acted in excess of their powers or in violation of the law, the articles of incorporation, or the bylaws. The research is relevant because it presents empirical findings on the determinants of tax avoidance in large companies, as well as demonstrating the importance of the establishment of tax liability in controlling tax avoidance. This research has implications for the public debate on the establishment of tax liability, particularly its role in deterring tax avoidance. As a practical implication, it is suggested that the tax authority prioritizes tax audits that provide evidence that could lead to the tax liability of directors. The research consisted of a multiple linear regression analysis using the ordinary least squares (OLS) method on 23,142 observations from 4,560 large companies, covering the period from 2014 to 2020, collected directly from the internal systems of the Brazilian Federal Revenue Office (RFB). The results suggest that the joint and several liability of directors attenuates (intensifies) the positive relationship between the cumulative value of tax infraction notices and tax avoidance, as measured by the book tax difference (BTD) [effective tax rate (ETR)], contributing to the literature by confirming, in relation to current taxes, the theoretical prediction that penalties applied to directors are more effective, from the point of view of the tax authority, in controlling tax avoidance.

Keywords: tax avoidance, tax infraction notices, agency theory, directors' tax liability.

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1. INTRODUCTION

Taxes represent a significant cost to firms, reducing the cash flow available for investment and dividends, so the search for a reduction in the firm's tax burden is something that shareholders desire (Chen et al., 2010). For this reason, firms seek to reduce their tax burden by engaging in a behavior characterized by a variety of transactions, activities, and strategies that the literature refers to as tax avoidance (Hanlon & Heitzman, 2010).

Tax audit, which can lead to an infraction notice, is an external determinant of corporate tax avoidance (Wang et al., 2020) that has received little attention in the literature, which can be explained by the difficulty of obtaining data on infraction notices, which are usually confidential.

When analyzing this phenomenon, it is important to distinguish between the specific deterrent effect associated with an actual infraction notice and the effect associated with taxpayers' perceptions of the likelihood of receiving such a notice. In the international literature, only a few studies, including those by Belnap et al. (2022), DeBacker et al. (2015), and Niu (2011), have analyzed the effects of actual infraction notices on subsequent tax avoidance. In the Brazilian context, no studies have analyzed these effects.

Usually, the infraction notice is the final act of a previous tax audit, during which the tax authority formally communicates with the inspected company to demand documents and clarifications. Federal taxes are inspected by the Special Secretariat of the Federal Revenue Office of Brazil (RFB), which initiates tax audits based on internal and external information, including the financial statements included in the Tax Accounting Bookkeeping (ECF). At the end of the tax audit, if the tax authority finds a violation of the tax legislation, it issues an infraction notice and notifies the company, an act that has become known in Portuguese as an "*autuação fiscal*" or simply "*autuação*." The infraction notice materializes the collection of three different amounts: the tax difference, the ex officio fine, and the interest on arrears. In this context, it is impossible to speak of an infraction notice without a prior audit, so the references to audit in the literature can be considered as theoretical antecedents that are equally applicable to infraction notices.

One stream of the international empirical literature has documented that government action serves to limit aggressiveness by increasing firms' perceptions of risk (Atwood et al., 2012; Hoopes et al., 2012; Niu, 2011). However, another stream of the international literature has documented a positive relationship, that is, consistent with an increase in tax avoidance following an audit (Belnap et al., 2022; DeBacker et al., 2015). This behavior would be related to the firm's perception that it will not be subject to a second audit for a certain period of time after being inspected (DeBacker et al. 2015).

In Brazil, an analysis of the results of infraction notices in recent years suggests that company behavior is consistent with this second trend. According to a report published by the RFB, the value of infraction notices to large companies has increased by about two and a half times in 10 years, from about R$55 billion in 2010 to about R$141 billion in 2020 (RFB, 2021, p. 11). While this increase in infraction notices may indicate an increase in efficiency on the part of the tax authority, it may also signal that the objective of inducing less aggressive behavior on the part of large companies has not been achieved. After all, the fact that the number of infraction notices is increasing indicates that the level of tax avoidance remains high, suggesting that tax avoidance can generally increase after an infraction notice.

However, infraction notices may differ in their potential to change the subsequent behavior of companies. Specifically, Brazilian tax law determines that a company should receive an infraction notice with the joint and several liability of the directors who have acted in excess of their powers or in violation of the law, the articles of incorporation, or the bylaws. This situation is provided for in Articles 124 and 135, item III, of the Brazilian National Tax Code (CTN) (Law no. 5,172 of October 25, 1966). For example, the tax authority may attribute joint and several liability to directors who, in exercising their managerial powers, sign the articles of incorporation of a company that does not actually exist, to be used in simulated operations. The attribution of liability to directors does not arise from the mere default of the legal entity; on the contrary, it must always describe the individual and intentional conduct of the directors in relation to the tax offense committed (Moretti & Costa, 2016).

The establishment of tax liability is aimed at guaranteeing tax credits and exists in several countries, such as Spain and Germany (Paulsen, 2009). A jointly and severally liable person can be subject to administrative or judicial collection of the taxes owed even before the main debtor (the company). Liability is usually accompanied by a doubling of the percentage of the fine imposed on the company and referral to the Public Prosecutor's Office

to initiate criminal proceedings against the managers for the crime of tax evasion. It may also be accompanied by the threat of seizure of the directors' assets, through an inventory of assets procedure known in Portuguese as "*Arrolamento de Bens.*" In addition, if no assets can be found in the name of the main debtor, the authorities may redirect the tax enforcement against the directors to whom the tax liability has been attributed (Moretti & Costa, 2016). Thus, infraction notices that identify the practice of acts that make managers jointly and severally liable for the taxes owed by the company have more severe legal consequences than those that do not identify such a situation and, therefore, it is expected that their impact on tax avoidance will be different from notices that do not assign liability.

In light of this, company directors face conflicting incentives: on the one hand, the interest of shareholders in increasing tax avoidance and, on the other hand, the risk associated with the possibility of joint and several liability. On the one hand, the interest of shareholders' encourages managerial decisions aimed at reducing the firm's tax burden, and the compensation contract is one of the main instruments used to align the interests of the agent with those of the principal (Jensen & Meckling, 1976; Santos et al., 2015). The compensation structure, especially when it is based on after-tax profits, can compensate for the additional risk assumed by the agent and act as an incentive to increase the firm's tax avoidance. However, the agency conflict leads to incomplete compensation contracts, especially when compensation is affected by the size of the tax burden, as in the case of linking to after-tax profits, regardless of the possible detection of evasion by the tax authorities (Chen & Chu, 2005).

On the other hand, the possibility of liability may make it difficult for managers to adopt more aggressive tax practices. In general, managers are more risk averse than shareholders, either because they are less diversified, as they cannot diversify their jobs while shareholders can diversify their investments (Eisenhardt, 2015), or because they can be held personally liable for uncollected corporate taxes. In addition, managers have private information about tax reduction opportunities and can use this information to determine the level of the firm's tax burden in a way that best suits their compensation contract. Thus, the combination of different risk perceptions and information asymmetries may lead managers to make tax decisions that are not always optimal from a shareholder perspective (Chen & Chu, 2005; Crocker & Slemrod, 2005).

Given the existence of incentives that act in opposite directions, it is up to empirical research to identify which of them, and under what circumstances, has the greatest influence on tax avoidance. The premise of this research is that in order to assess the influence of infraction notices on tax avoidance, it is necessary to consider the establishment of the joint and several liability of managers, treating it as a qualitative characteristic that can moderate the relationship between infraction notices and tax avoidance.

Considering the incompleteness of compensation contracts, Crocker and Slemrod (2005) argue that the penalties imposed on managers are more effective in curbing tax aggression than those imposed on the company, since the compensation contract, because it cannot deal with illegal activities, among which tax planning can be considered, is unable to pass on to managers the penalty imposed on the company, i.e., it is unable to reduce their compensation. Thus, in the Brazilian context, it is possible that the joint and several liability of managers for the taxes owed by the company negatively moderates the positive relationship between infraction notices and corporate tax avoidance. Given this scenario, this study aimed to answer the following research question: Does the joint and several liability of company directors attenuate the positive relationship between the cumulative value of infraction notices and corporate tax avoidance? So, the objective of the study was to assess the moderating role of the joint and several liability of directors in the relationship between the cumulative value of infraction notices and the level of corporate tax avoidance.

The literature has highlighted the need for research on tax avoidance in developing countries (Martinez, 2017; Wang et al., 2020). Hanlon and Heitzman (2010) defend the need for empirical research designed to test the theories, especially those that focus on the interactions between the tax authority and the corporate governance system of firms. By describing the effects of infraction notices with and without joint and several liability of managers on corporate tax compliance, this study contributes to the understanding of how agency theory can explain the relationships between shareholders, managers, and the tax authority. By testing Crocker and Slemrod's (2005) theoretical prediction, it becomes clear that research on corporate tax avoidance cannot adopt the premises of studies on the tax avoidance of individuals, but must take into account the crucial role played by managers and the various factors that influence the agency conflict and information asymmetry.

The main contribution of this study is the analysis of the mitigating effect of the joint and several liability of managers on the positive relationship between infraction notices and tax avoidance. Assessing the effects of liability on tax avoidance can contribute to understanding the mechanisms by which government action can induce a change in the tax behavior of firms.

In this sense, the study also makes two practical contributions to the activities of the tax authority. The first is the suggestion that the planning of tax actions should place less emphasis on the expected value of infraction notices, since tax avoidance would be positively related to their cumulative value. The second is the suggestion that priority should be given to tax audits that have the potential to culminate in the joint and several liability of managers. These contributions are relevant to the public debate currently taking place in the National Congress of Brazil, in the context of legislative proposals aimed at modifying the establishment of tax liability.

2. BACKGROUND AND RESEARCH HYPOTHESES

From a historical perspective, the tax enforcement literature was initially concerned with the deterrent effects of the risk of being inspected as perceived by individuals. The seminal work in this line of research is that of Allingham and Sandmo (1972), who addressed the issue of individual income tax evasion from the perspective of expected utility theory. Their model of tax evasion deterrence assumes that individuals are risk-averse and that the fraction of real income declared is a decision made under uncertainty.

More recently, research has also focused on the effect of tax audit on corporations, as in the case of Slemrod (2004), opening a new line of research distinct from that focused on individual taxation, which suggests that the findings of the individual tax compliance literature cannot be automatically extended to corporate tax compliance.

Some studies have found evidence that firms take less aggressive tax positions when they perceive a stricter audit policy (Atwood et al., 2012; Hoopes et al., 2012). However, there are other studies, both empirical and experimental, whose results suggest that an audit may actually have the effect of increasing, rather than decreasing, a firm's tax avoidance. Belnap et al. (2022) assessed the effect of audit on small businesses and concluded that it has a negative effect on the amount of future revenues.

Using confidential United States Internal Revenue Service (IRS) data and financial statements with a sample of more than eight million observations, DeBacker et al. (2015) studied the behavior of firms for up to 10 years after an audit and concluded that, on average, firms increase their tax avoidance after being inspected. According to the authors, their finding is consistent with strategic responses that involve updating perceptions of the risk of an audit.

DeBacker et al. (2015) presented a model in which an audit may impact firm behavior through two effects that work in opposite directions. The first is the type update effect, in which the company believes that the tax authority classifies companies into types according to their likelihood of non-compliance and that the probability of audit differs across types. Under this effect, a firm would reduce its tax avoidance after an audit because it would come to believe that it belongs to the type of firm that is inspected more frequently. The second effect, called the bomb-crater effect, results from the firm's perception that it will not be inspected again immediately after an initial audit, so that it perceives tax avoidance as a safe activity for a certain period of time. The name of the effect comes from the belief of soldiers in World War I that a bomb would not fall into the crater left by a previous bomb and that it was a safe place to shelter (DeBacker et al., 2015). Under this second effect, the firm would increase its tax avoidance after being inspected. Consistent with the bomb-crater effect, some laboratory experiments have shown that taxpayers reduce their tax compliance after receiving an infraction notice, which would have as its psychological origin the misperception of the likelihood of being inspected again (Kastlunger et al., 2009; Maciejovsky et al., 2007; Mittone et al., 2017). Given these two antagonistic effects, empirical research is needed to determine which is stronger and under what circumstances. In the case of DeBacker et al.'s (2015) sample, the authors found that the ultimate effect of infraction notices was to increase tax avoidance, consistent with the prevalence of the bomb-crater effect over the type update effect.

In Brazil, research has shown that the adoption of more effective tax control instruments has not reduced corporate tax avoidance. In this sense, the study by Gomes et al. (2022) found no evidence that the introduction of Digital Tax Bookkeeping (EFD-Fiscal) had a positive impact on the effective rate of the Tax on the Circulation of Goods and Services (ICMS), contrary to the authors'

expectations. Along the same lines, the study by Neto and Martinez (2016) found that there was no increase in the collection of the Tax on Services of Any Kind (ISS) after the implementation of electronic service invoices (NFS-e) in municipalities with more than 100,000 inhabitants. It can be seen that improving the control mechanisms of the tax authority has not necessarily led to a reduction in corporate tax avoidance.

These empirical findings are consistent with the Brazilian scenario, which presents incentives for tax arrears and litigation due to high bank interest rates and the slowness of administrative and judicial courts, where tax proceedings can take an average of 5 and 8 years, respectively, totaling 13 years for the company to be effectively compelled to pay the taxes resulting from an infraction notice (Plutarco, 2012). During this period, the company has the advantage of paying a lower interest rate (Selic) than that charged by banks, making the litigation process a source of financing for the company (Plutarco, 2012). This suggests that, after receiving an infraction notice, managers may decide to litigate over the amount owed and, influenced by the bomb-crater effect, increase their tax avoidance with respect to current taxes, in the expectation that if they receive another infraction notice, they will once again be able to count on the long deadline for effective payment, for as long as the litigation lasts.

In addition, the expectation of new special installment payment programs, which are recurrent in Brazil, leads managers to reduce the spontaneous payment of corporate taxes (Paes, 2014). This expectation has an even greater impact on the amounts resulting from infraction notices, since these special programs generally provide for a reduction or even elimination of the fines imposed.

More than the mere occurrence of an audit, it is natural to assume that tax avoidance is related to the amount of the infraction notice. However, there are few studies that assess the effects of the value of infraction notices. Hanlon et al. (2005) and DeBacker et al. (2015) are examples of the few studies that have examined the effects of the value of the adjustments proposed by IRS audits, which are equivalent to tax infraction notices in the Brazilian context.

Tax infraction notices have cumulative effects on financial statements because during tax litigation, companies must decide whether to recognize the provision in their liabilities or simply disclose the contingency in their explanatory notes (Accounting Pronouncements Committee [CPC], 2009). Since the average time to resolve tax litigation in Brazil is 13 years (Plutarco, 2012), it is likely that successive infraction notices will accumulate on the balance sheet and in the explanatory notes, making their cumulative value more informative for supporting business decisions than just the isolated value of each notice.

Considering the previous studies and the specificities of the Brazilian scenario, it is expected that in Brazil the bomb-crater effect will outweigh the type update effect, so that the cumulative value of infraction notices will be associated with an increase in company tax avoidance in subsequent periods. Therefore, the following research hypothesis is presented:

> H_1: there is a positive relationship between the cumulative value of infraction notices and the subsequent level of corporate tax avoidance.

According to agency theory, efficient contracts seek to align interests, reduce agency conflicts, and reduce managerial opportunistic behavior to the detriment of shareholders' interests (Santos et al., 2015). Given the problems arising from information asymmetry, the efficiency of compensation contracts becomes relevant to the study of corporate tax avoidance. Since shareholders want to minimize tax expenditures, managers have incentives to make tax-avoidance decisions. However, the ability to monitor managers' tax actions through a compensation contract is limited by the uncertainties associated with the interpretation of the tax legislation, which means that the final verdict on the legality of the actions taken by managers will only be known after a final and non-appealable court decision, at which point it will then be possible to know whether the firm has engaged in legitimate tax planning or committed tax evasion (Martinez, 2017). This legal uncertainty necessarily makes compensation contracts incomplete in terms of incentives to reduce the firm's tax burden (Chen & Chu, 2005).

Crocker and Slemrod's (2005) analytical model assumes that the CFO is responsible for setting the firm's compliance level. To align the manager's actions with the shareholders' interest in reducing the firm's tax burden, the CFO's compensation contract can provide that his salary will depend inversely on the effective tax rate achieved. However, if the tax authority detects evasion, the costs of the penalty will be borne mainly by the firm, since the contract will not be able to fully pass on these costs to the manager (Chen & Chu, 2005).

This situation changes when the penalty for evasion is applied not only to the firm but also directly to the manager. An important contribution of the analytical

model proposed by Crocker and Slemrod (2005) is the suggestion that the effectiveness of enforcement policies depends on who receives the penalty for evasion, the firm or the manager. The authors suggest that, from the perspective of the tax authority, penalizing the manager would be more effective than penalizing the firm because it increases the manager's risk and leads to less tax avoidance. This prediction is supported by agency theory (Jensen & Meckling, 1976) and is a consequence of the incentives to reduce tax expenditures and the impossibility of fully reflecting these incentives in the compensation contract.

In Brazil, legislation provides for the personal and joint liability of directors, managers, or representatives of companies for acts performed in excess of their powers or in violation of the law, the articles of incorporation, or the bylaws. Liability may even arise in cases of abusive or aggressive tax planning, which presuppose acts considered illegal by the tax authority, such as abuse of rights and simulation (Zeca, 2021). It should be noted that the tax liability of managers presupposes the intentional conduct of these agents and should be enforced by the tax authority only in the presence of solid evidence that the managers have intentionally carried out managerial acts in excess of their powers or in violation of the law, articles of incorporation, or bylaws (Moretti & Costa, 2016). However, in the presence of such evidence, it is the duty of the tax authority to hold the liable parties accountable. Thus, based on the theoretical prediction of Crocker and Slemrod (2005), it is possible to predict that an infraction notice with joint and several liability of the managers will have less positive effects on tax avoidance, since liability compensates for the incompleteness of the compensation contract and allows the costs of the penalty to be passed on to the managers.

Thus, in being held personally liable for the taxes owed by the firm, directors have a greater perception of risk, which reduces the prevalence of the bomb-crater effect over the type update effect (DeBacker et al., 2015). As a result, the presence of director liability is expected to mitigate the positive effect of the cumulative value of infraction notices. Given this scenario, the following research hypothesis is established:

> H_2: the joint and several liability of directors attenuates the positive relationship between infraction notices and the subsequent level of corporate tax avoidance.

3. METHODOLOGICAL PROCEDURES

3.1 Population and Sample

The research population consists of companies that fall under the concept of large companies, as defined in Article 3 of Law 11,638 of December 28, 2007. The sample was formed by selecting, from the RFB database, companies that reported in their ECF a gross revenue of more than R$300 million in 2020 and that were taxed under the real profit system, regardless of whether they were listed on the stock exchange.

The data were collected directly from the RFB's internal systems, with specific authorization given to one of the authors, who is a career employee of the agency and undertook to maintain the tax secrecy of the taxpayers who are the subject of the study.

In terms of observations, the sample included data from a 7-year window covering the period from 2014 to 2020. Observations that did not contain the data needed to calculate all the variables in the operationalized models were excluded from the sample, as were observations that had a negative net income before taxes (NIBT) or an effective tax rate (ETR) outside the limits established in the literature, as detailed in section 3.3. As a result, the final sample consisted of 4,560 firms and 23,142 firm-year observations, as shown in Table 1.

Table 1
Sample formation

	Companies	Observations
Companies with gross revenues of more than R$ 300 million in 2020	4,723	29,718
Exclusion of companies/observations without data and with an ETR outside the range (0,1)	163	6,576
Final sample	4,560	23,142

Source: *Prepared by the authors.*

3.2 Statistical Model

To achieve the research objective and test the hypotheses, the multiple regression represented by equation 1 was operationalized, with coefficients estimated using ordinary least squares (OLS) with year fixed effects and robust standard errors clustered by company.

$$AGR_{it} = \alpha + \beta_1 V\_INF_{it} + \beta_2 POST\_LIAB_{it} + \beta_3 V\_INF_{it} * POST\_LIAB_{it} + \beta_4 SIZE_{it} + \beta_5 ROA_{it} + \beta_6 LEV_{it} + \beta_7 INTANG_{it} + \beta_8 PPE_{it} + \beta_9 \Delta REV_{it} + \sum year\_fixed\_effects + \varepsilon_{it} \quad (1)$$

where AGR is the tax avoidance measured by the book-tax differences (BTD) or the ETR, depending on the case, V_INF is the cumulative value of the infraction notices scaled by total assets since 2008 up to and including the year of observation, and POST_LIAB is a dummy variable that takes the value 1 if the year of observation is equal to or later than an infraction notice that has made the directors jointly and severally liable, and 0 otherwise.

3.3 Constructs

To measure the level of corporate tax avoidance, we used the BTD, defined as the difference between accounting profit and taxable profit, and the ETR, defined as the ratio between income tax expense and accounting profit (Dunbar et al., 2010; Hanlon & Heitzman, 2010; Lee et al., 2015).

The calculation of BTD involves estimating the taxable profit from the tax expense and then calculating the difference between the accounting profit and the estimated taxable profit (Dunbar et al., 2010), so the higher the BTD, the greater the tax avoidance. However, since this study had access to the taxable profit actually reported to the tax authorities, it was not necessary to estimate the taxable profit, so BTD was calculated according to equation 2:

$$BTD_{it} = \frac{NIBT_{it} - Actual\ Profit_{it}}{Final\ Total\ Assets_{it}} \quad (2)$$

where NIBT is the net income before taxes, as reported in the ECF, and Actual Profit is the basis for calculating income tax, as reported in the ECF.

To calculate the BTD, data were collected from the Balance Sheet, the Statement of Net Income for the Fiscal Period, and the Statement of Actual Profit Method – Entries in Part A of the e-LALUR (Electronic Book for the Calculation of Actual Profit), contained in records L100, L300, and M300 of the ECF, respectively. It should be recalled that access to these data was expressly granted by the RFB to one of the authors of this study.

The ETR consists of the effective income tax rate, which is defined as the ratio between the income tax expense [Corporate Income Tax (IRPJ) and Social Contribution on Net Profit (CSLL), in the case of Brazil] and the pre-tax accounting profit (Hanlon & Heitzman, 2010; Lee et al., 2015). The ETR is an inverse measure of tax avoidance, since the higher the effective tax rate, the lower the aggressiveness, and vice versa. The ETR can lead to interpretation difficulties in the case of a negative NIBT (i.e., an accounting loss), resulting in negative proxies indicating high tax avoidance, even when tax expenditure is high, which, on the contrary, indicates low aggressiveness. Therefore, observations with a negative NIBT were excluded. In addition, observations with an ETR lower than 0 or higher than 1 were also excluded, which improves the fit of the econometric models, as found in previous studies (França & Monte, 2019). The ETR was calculated using data extracted from the income statement included in the ECF, according to equation 3:

$$ETR_{it} = \frac{Tax\_exp_{it}}{NIBT_{it}} \quad (3)$$

where Tax_exp is the income tax and CSLL expense, as reported in the ECF.

The variation of the ETR used in this study is the generally accepted accounting principles (GAAP) ETR (Hanlon & Heitzman, 2010), which considers the total IRPJ and CSLL expense reported in the income statement, which includes both current and deferred tax expenses. Deferred taxes consist of temporary differences that will be taxed in future periods, such as unearned income that, according to the tax legislation, should only be taxed when received. This is a fundamental difference between the BTD and the ETR calculated in this study, as the BTD takes into account the value of actual profit, which is the basis for calculating the current IRPJ and usually the CSLL. Thus, in this study, tax planning that consists solely of tax deferral is not captured by the ETR, but only by the BTD.

The variables V_INF and POST_LIAB were used to capture the number of infraction notices with and without the joint and several liability of directors. The variable used as a proxy for the infraction notice, V_INF, takes into account the importance of infraction notices in relation to the company's assets. Instead of using a dummy to capture the infraction notice, we chose to use a variable that includes its value, which is a more robust variable than the dummy, as the value can have a relevant effect on aggressiveness (Hanlon et al., 2005). V_INF is a continuous quantitative variable that corresponds to the cumulative value of the infraction notices received by the company in the context of audits focused on IRPJ and CSLL, from 2008 to the year of observation, scaled by total assets. The amount considered in the calculation of V_INF includes the difference between the tax determined in the audit and the ex officio fine applied.

The use of the cumulative value of infraction notices is justified because each notice remains under the control of the company until all possible administrative or judicial appeals have been exhausted. This control is exercised by establishing a provision for disputes with probable loss expectations or by disclosing contingent liabilities in the explanatory notes for disputes with possible loss expectations (CPC, 2009). When making decisions that affect the company's level of tax avoidance, managers are likely to consider the cumulative value of infraction notices already received. Since tax litigation in the federal sphere lasts an average of 13 years, with 5 years for administrative proceedings and 8 years for judicial proceedings (Plutarco, 2012), it was decided to put back the start of the period for collecting data on infraction notices by 6 years with respect to the first year of the sample (2014) and by 14 years with respect to the last year of the sample (2020), in an attempt to cover the entire expected duration of litigation.

Thus, considering that tax avoidance was analyzed from 2014 to 2020, the period considered for the collection of data on infraction notices was from 2008 to 2020, thus allowing the identification of notices issued in the 6 years preceding each year of the period analyzed, including the first year of observation (2014). The dummy variable POST_LIAB was used to indicate whether the observation refers to a period after or at the same time as an infraction notice that made the directors jointly and severally liable, taking the value 1 if the notice issued against the company in the year of the observation or in the previous 6 years made the directors jointly and severally liable, and 0 otherwise. As with V_INF, the calculation of POST_LIAB only takes into account audits that focused on IRPJ and CSLL.

Two RFB computer systems were consulted to collect data on infraction notices. Data were collected on IRPJ audits carried out between 2008 and 2020 that resulted in the effective establishment of a tax credit. In its Annual Audit Report for 2020, the RFB reported that more than 90% of the audits carried out between 2012 and 2020 resulted in the taxpayer being issued with an infraction notice (RFB, 2021, p. 10). Thus, it is assumed that the assessment of infraction notices is sufficient to capture the influence of government action on corporate tax avoidance. For this reason, no data were collected on audits that ended without an infraction notice.

In terms of control variables, we operationalized variables related to company size (SIZE), profitability (ROA), leverage (LEV), intangibility (INTANG), plant, property and equipment (PPE) and net revenue growth (ΔREV). Larger firms (higher SIZE), although subject to greater public scrutiny, have greater incentives and more power to influence the political process, so they are expected to exhibit greater tax avoidance (Wang et al., 2020). Firms that are more profitable (higher ROA) and more leveraged (higher LEV) have greater incentives to avoid taxes (Chen et al., 2010; Martinez & Motta, 2020). Firms with more intangible assets (higher INTANG) may have greater opportunities to reduce their tax burden, especially through the tax deductibility of goodwill arising from business combinations. Firms with more plant, property and equipment (higher PPE) are subject to greater effects from the difference between accounting and tax treatments in terms of depreciation rates and terms, which can increase the difference between taxable and reported profits (Chen et al., 2010). Finally, a

positive relationship between net revenue growth and tax avoidance is expected, as firms with higher sales growth (higher ΔREV) tend to manage their taxable income to reduce their tax burden (Fonseca & Costa, 2017). With the exception of SIZE, which consists of the natural logarithm of total assets, all control variables were scaled by total assets.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics and Correlation Matrix

Panel A of Table 2 shows the descriptive statistics for the continuous variables. The frequency distribution of the dummy variable is shown in Panel B of Table 2.

Table 2
Descriptive statistics

Panel A – Continuous variables (n = 23,142)							
	Mean	**St. Dev.**	**Min.**	**Perc. 25**	**Median**	**Perc. 75**	**Max.**
BTD	0.0214	0.9333	-86.9303	-0.0020	0.0041	0.0319	98.1165
ETR	0.2413	0.1774	0.0000	0.0755	0.2806	0.3410	1.0000
V_INF	0.0146	0.1100	0.0000	0.0000	0.0000	0.0005	11.7495
SIZE	19.9729	1.5586	10.0738	18.9681	19.8002	20.7980	29.2837
ROA	0.1179	3.9517	-29.8708	0.0179	0.0570	0.1386	594.5014
LEV	0.1378	2.3490	0.0000	0.0000	0.0243	0.1391	265.0365
INTANG	0.0375	0.1977	0.0000	0.0000	0.0016	0.0104	21.0404
PPE	0.2562	2.7880	0.0000	0.0436	0.1651	0.3300	335.9309
ΔREV	0.7763	14.4022	-196.6423	0.0140	0.1145	0.2610	966.6750
Panel B – Frequency distribution of the dummy variable							
		0		**1**		**Total**	
POST_LIAB		22,645 (98%)		497 (2%)		23,142 (100%)	

Note: *The variables are described in the text.*
Source: *Prepared by the authors.*

Panel A of Table 2 shows the existence of extreme minimum and maximum values (outliers) in various variables. It was decided not to treat these outliers by excluding observations or using the winsorization procedure, since it is believed that they are not due to information or collection errors, but to special situations that occur on a daily basis in business dynamics and carry information that cannot be ignored. For example, a very high extreme ETR value may simply mean a NIBT close to 0, which is far from being considered abnormal or atypical.

With respect to BTD, Panel A of Table 2 shows that, on average, the firms have higher accounting profits than taxable profits, which may indicate aggressive tax behavior. This is confirmed by the average ETR (0.2413), which is lower than the combined statutory IRPJ/CSLL rate (34%). With regard to Panel B of Table 2, the distribution of POST_LIAB shows that only 2% of the observations (497 occurrences) refer to periods after an infraction notice with joint and several liability of the managers.

In order to examine the univariate association between the variables, Table 3 was created, which includes Pearson's correlation coefficients.

Table 3
Pearson's correlation coefficients

Variable	BTD	ETR	POST_LIAB	V_IFR	SIZE	ROA	LEV	INTAN	PPE	ΔREV
BTD	1									
ETR	-0.01	1								
POST_LIAB	-0.00	-0.01*	1							
V_INF	0.26***	-0.03**	0.20***	1						
SIZE	-0.02***	0.04***	0.07***	-0.02**	1					
ROA	0.70***	0.02**	-0.00	-0.00	-0.04***	1				
LEV	-0.01**	-0.02**	-0.00	-0.00	-0.00	-0.04***	1			
INTANG	-0.00	0.01*	0.02**	0.01*	0.10***	0.01	0.07***	1		
PPE	-0.00	-0.02***	-0.00	-0.00	-0.21***	-0.03***	0.31***	0.08***	1	
ΔREV	-0.01	-0.01**	-0.01	-0.01	-0.01	0.01	0.01*	-0.00	0.02***	1

Note: *The variables are described in the text.*
*Significance levels: * = p < 0.10; ** = p < 0.05; *** = p < 0.01.*
Source: *Prepared by the authors.*

Table 3 shows that BTD has a positive correlation with V_INF, which is significant at the 1% level. This suggests that tax avoidance increases with the cumulative value of infraction notices, consistent with H1. Similarly, ETR has a negative correlation with V_INF, indicating that the higher the cumulative value of infraction notices, the lower the effective rate, i.e., the greater the tax avoidance. The correlations between BTD, ETR, and V_INF provide preliminary evidence that infraction notices are associated with increased tax avoidance in subsequent periods.

4.2 Regression Analysis

Prior to each regression, White's test was carried out to verify the assumption of homoscedasticity of the residuals. As this assumption was not met, the coefficients were estimated using robust standard errors with clustering at the firm level. The number of clusters, i.e. the number of firms in the sample, was reported in the results table. Regarding the assumption of normality of the residuals, the central limit theorem (CLT) was assumed due to the large number of observations. Table 4 shows the results of the regressions according to equation 1.

Table 4
Moderating effect of the joint and several liability of directors on the relationship between the cumulative value of infraction notices and subsequent tax avoidance

	BTD		ETR	
	Coef.	Est. t	Coef.	Est. t
constant	-0.2251	-0.88	0.1460***	5.75
V_INF	2.6791**	2.41	-0.0293*	-1.85
POST_LIAB	0.0287*	1.82	0.0035	0.29
V_INF*POST_LIAB	-2.6842**	-2.41	-0.0943**	-2.24
SIZE	0.0098	0.75	0.0053***	4.15
ROA	0.1668***	36.95	0.0007	1.27
LEV	0.0048	1.01	-0.0009***	-2.97
INTANG	-0.0620***	-2.95	0.0083	0.75
PPE	0.0067**	1.99	-0.0010***	-3.15
ΔREV	-0.0008	-1.11	-0.0002**	-2.09
Fixed effects – Year	Yes		Yes	
n	23,142		23,142	
White test	0.0000***		0.0000***	
Robust errors	Yes		Yes	
No. clusters	4,560		4,560	

Table 4
Cont.

	BTD	ETR
F	667.50	7.17
R^2	0.5777	0.0056
Adjusted R^2	0.5764	0.0023
VIF max	1.87	1.87
DW	1.91	1.09

Note: *The variables are described in the text.*
*Significance levels: * = p < 0.10; ** = p < 0.05; *** = p < 0.01.*
Source: *Research data.*

Given the extreme values in the sample, quantile regressions were also carried out for the median in relation to the models shown in Table 4, which produced results (not tabulated) similar to those obtained from the regressions using the OLS method, so it can be concluded that the presence of outliers did not cause any significant bias in the coefficients obtained. As an additional analysis, panel data regressions were also run, using fixed and random effects models, the results of which (not tabulated) are essentially similar to those obtained with the OLS model, with year fixed effects and with standard errors clustered by company.

Table 4 shows that the model operationalized with BTD has a positive and significant V_INF coefficient at the 5% level. This suggests that the cumulative value of the infraction notices is positively related to tax avoidance. Thus, it can be seen that the amount of the infraction notices has the effect of increasing subsequent corporate tax avoidance, and it is important to note that while this behavior is consistent with the findings of DeBacker et al. (2015), it is the opposite of what the tax authority seeks to induce in taxpayers.

In the model operated with ETR, the coefficient of V_INF is negative and significant at 10%. Considering that ETR is an inverse measure of tax avoidance, this result confirms the one obtained with BTD, so that H1 is not rejected. Considering the argument of DeBacker et al. (2015), this result suggests that for large Brazilian firms, the bomb-crater effect outweighs the type update effect, so that the resulting effect is an increase in tax avoidance in the periods following a tax infraction notice.

Regarding the joint and several liability of directors, the BTD model shows a negative coefficient for the interaction V_INF*POST_LIAB, which is significant at the 5% level, indicating that the liability of directors attenuates the positive effect of the cumulative value of infraction notices on tax avoidance. Considering that the sum of the coefficients of V_INF and V_INF*POST_LIAB is not statistically different from 0 (2.6791-2.6842 = -0.0051; F-test: 0.02; p < 0.8748), it can be seen that this moderating effect is quite relevant and it is possible to state that in cases where there is a previous infraction notice that made the directors liable, the cumulative value of the notices does not influence the subsequent level of tax avoidance. In this way, it can be seen that the joint and several liability of managers cancels out the positive effect of the cumulative value of infraction notices on tax avoidance and, from the point of view of the tax authority, is a relevant instrument for controlling the level of tax avoidance of large companies.

However, when ETR is used as the dependent variable, the moderating effect of the joint and several liability of managers occurs in the opposite direction. In fact, as shown in Table 4, the model operationalized with ETR shows a negative V_INF*POST_LIAB coefficient, in the same direction as the V_INF coefficient, significant at the 5% level. This indicates that an infraction notice with joint and several liability of the directors potentiates the negative effect of the amount of the notice on the ETR, in other words, increasing tax avoidance, since the ETR is an inverse measure of aggressiveness. This effect is the opposite of what happens when BTD is used as a proxy for aggressiveness.

Thus, the results suggest that an infraction notice with joint and several liability of managers has no influence on the BTD, but a stronger negative effect on the ETR than when there is an infraction notice without liability. Considering that the calculation of ETR in this study includes both current and deferred tax expenses, while BTD includes only current taxes, it can be seen that, after an infraction notice with the liability of the managers, the company reduces its total tax expenditure without changing its current expenses. In other words, the reduction occurs only in the deferred IRPJ and CSLL, which may indicate that the company, when it is issued with an infraction notice in which the managers are

held jointly and severally liable, maintains its level of tax avoidance in the current period, but prepares to increase it in the future, since it will have a smaller stock of deferred taxes to pay. Thus, with respect to the research hypothesis, H2 cannot be rejected when BTD is used as the dependent variable, but it must be rejected when ETR is used.

In general, the results in Table 4 confirm Crocker and Slemrod's (2005) theoretical prediction, as penalties imposed on managers are more effective in preventing a reduction in the firm's current tax expenditure than penalties imposed on the firm itself. In this sense, the results suggest that tax infraction notices that hold managers liable increase managers' perception of risk and mitigate the agency conflict to the extent that they attribute to managers the costs of the penalty that would otherwise be borne only by shareholders. As a result, managers begin to make decisions that lead the firm to adopt more conservative tax positions, thereby keeping the level of tax avoidance relative to current taxes at a lower level.

5. CONCLUSION

The aim of this research was to assess the effect of the joint and several liability of managers, provided for in Article 135, item III, of the CTN (Law no. 5,172 of October 25, 1966), on the relationship between the cumulative value of infraction notices and the subsequent level of tax avoidance of large Brazilian companies. To this end, a descriptive and documentary study was conducted on a sample of 4,560 Brazilian companies with gross revenues of R$300 million or more in 2020. The companies' economic and tax information, as well as tax infraction notice data, were obtained directly from the RFB's internal systems.

First, it was found that the higher the cumulative value of the infraction notices, the greater the subsequent tax avoidance, whether measured by BTD or ETR. Notably, this effect is the opposite of what is desired by the tax authority, given that the goals explicitly stated by the RFB's audit area are "to bring actual collection closer to potential collection" and "to increase tax compliance" (RFB, 2021). Thus, the subsequent behavior of the companies that received infraction notices is contrary to the intentions of the tax collection agency. It should be remembered that in this study the value of infraction notices is the value of fines imposed as a result of non-payment of taxes due. Thus, the subsequent more aggressive behavior is consistent with the perception that tax sanctions are not very effective in reducing tax avoidance.

If the sanctions applied to the company are not very effective in controlling tax aggression, the same cannot be said for the sanctions applied to managers. The results allow us to conclude that holding managers liable attenuates the positive effect of the cumulative value of infraction notices on BTD, which in the case of this study is related to current taxes. This confirms Crocker and Slemrod's (2005) theoretical prediction that, due to the incompleteness of compensation contracts, penalties imposed on managers are more effective in reducing tax avoidance than penalties imposed on the firm.

In general, it can be concluded that infraction notices increase subsequent tax avoidance, except in the case of joint and several liability of directors, where there is no such positive effect in the case of aggressiveness related to current taxes. With regard to deferred taxes, the results suggest that the liability of managers intensifies the relationship between the cumulative value of infraction notices and subsequent tax avoidance. A decrease in the deferred tax expense implies a decrease in future tax payments.

This research has two important practical implications for the tax authority. The first is the recommendation to place less emphasis on the expected value of the infraction notice when planning tax actions, since tax avoidance is positively related to the cumulative value of infraction notices. The second is the recommendation to give priority to tax audits that have the potential to lead to the joint and several liability of managers. Often, this possibility can be identified during the planning and selection of taxpayers to be inspected. Given the mitigating effect of manager liability on the positive relationship between the cumulative value of infraction notices and subsequent corporate tax avoidance, it is recommended that priority be given to tax audits that provide evidence that managers have acted in excess of their powers or in violation of the law, the articles of incorporation, or the bylaws, a necessary condition for attributing the tax liability in question.

This study has some limitations. First, it should be recognized that BTD and ETR may capture not only tax avoidance but also earnings management. Since they are based on the differences between accounting profit and taxable profit, the metrics may be affected by opportunistic actions by managers to manipulate both

profit measures. New studies could adopt metrics that allow a better separation between the two phenomena, such as abnormal BTD (Tang & Firth, 2011).

Another limitation is related to the selected population, which consists only of large companies. Although this is not really a limitation, but a choice made by these researchers, it is important to note that the conclusions of this study cannot be extended to medium or small companies, which may behave very differently from the ones described here, possibly more like the behavior of individuals in relation to taxation than that of large companies. In this sense, it is suggested that future studies evaluate the response of smaller companies to infraction notices and the possible liability of their managers.

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