IMPACT OF TAX TRANSACTIONS AND TAX LITIGATION ON TAX DISOBEDIENCE[1]

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ABSTRACT

Brazil is a favourable country for tax research, as it has high tax complexity and relevant institutional characteristics, such as special instalment plans. All these aspects can make a substantial contribution to understanding business and individual behaviour in the face of taxation. In this sense, the aim of this research is to answer the following question: What is the impact of tax transactions on companies' decisions to terminate (or not) their tax and legal claims, in the light of game theory? To this end, a theoretical model based on Game Theory and Gomes et al. (2023) was developed to identify the best strategic decision for taxpayers in view of Brazil's tax complexity and tax transaction agreements. As a result, it was observed that the only Nash equilibrium is {disobey (challenge, appeal, embargo, instalment); inspect (assess)}, demonstrating that tax complexity and repetitive special instalment agreements encourage tax disobedience, even though the taxpayer has to bear the increase in tax debt due to legal charges and the costs of guaranteeing the tax lawsuit, such as a judicial deposit, insurance and guarantee bond or pledge. In order to confirm the theoretical findings and empirically prove them, the Gerdau Internal Goodwill Case Study was carried out. The empirical results corroborated the theoretical findings, showing that the long-term nature of tax collection in Brazil, combined with the State's frequent need for cash, encourages taxpayer non-compliance. It is hoped that this study will contribute to demonstrating the need to remove unnecessary tax complexity from the Brazilian tax system.

Key words: Game theory, Tax complexity, Special instalments, Tax disobedience, Brazilian National Tax System.

1. INTRODUCTION

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Tax complexity has been defined by the *Office of Tax Simplification* (OTS, 2015) as the difficulty taxpayers have in fulfilling their tax responsibilities and understanding their respective tax obligations. As a result of the taxpayer's delay in meeting these obligations, *tax amnesty has* emerged, considered to be a special instalment plan offered to defaulters, with benefits such as reduced fines, interest and longer payment periods (Baer and LeBoegne, 2008).

In Brazil, a special form of instalment payment, the Tax Transaction, is defined in item III of article 156 of Law 5.172/66, the National Tax Code (CTN). The CTN states that the tax credit can be extinguished through a tax transaction between the taxpayer and the state. Therefore, one of the ways of settling tax liabilities in Brazil is through an agreement between the state and the taxpayer, which establishes the conditions for extinguishing the tax credit.

It is noteworthy that until 2020 the institute of the tax transaction had not been the subject of extensive regulation. With the publication of Law No. 13,988/2020, the tax transaction was regulated and two types of transaction were defined: adhesion and individual. In the case of adhesion, the proposal is already moulded by the Government, while in the individual case it is up to the taxpayer to present their terms and negotiate them with the Government. By April 2023, the Federal Government had published 26 notices of tax settlement agreements.

According to Adhesion Transaction Notice (ETA) no. 9/22, taxpayers classified as tax defaulters for having used goodwill to reduce their payments of income tax (IRPJ) and social contribution to net profit (CSLL), could negotiate with benefits the debts under administrative or judicial discussion relating to the tax use of goodwill amortisation expenses arising from the acquisition of shareholdings (internal goodwill).

Notice no. 9/22 establishes that this type of tax transaction grants taxpayers the following benefits: a down payment of 5% of the total value of the selected entries, with no discount, in up to five months and payment of the remaining balance divided into: (i) up to 7 months, with a 50 per cent discount on the principal amount, fine, interest and other charges; (ii) up to 31 months, with a 40 per cent discount on the principal amount, fine, interest and other charges; (iii) up to 55 months, with a 30 per cent discount on the principal amount, fine, interest and other charges. This tax transaction grants discounts even on the principal amount of the debt, going beyond the special federal instalment plans published so far. Therefore, the tax transaction is also a type of special instalment payment.

Studies such as Andreoni, Erard & Feinstein (1998) have shown that special instalment plans encourage tax disobedience. In Brazil, Gomes, Cunha, Francisco and Lara (2023) showed that tax complexity and repetitive special instalment plans encourage tax disobedience in the

Brazilian tax administrative process. However, the model proposed by the authors did not include the tax judicial process.

The study by Gomes et al. (2023) showed that the fuel for tax aggressiveness is tax complexity, i.e., it is the difficulty of applying the tax law that produces the opportunity for tax aggressiveness. In addition, the authors showed that the special instalment plans in force in Brazil until then reduced the present value of taxes, given the benefits of reducing fines, interest, extending payments or using non-liquid tax credits such as income tax losses to pay tax debts. Thus, the authors have shown that tax aggressiveness arises from tax complexity and develops through special instalment plans.

However, Gomes et al. (2023) studied only one part of the tax process, which begins with the taxpayer assessing the tax due and paying it; the tax authorities then validate the taxpayer's assessment or not and, if they do not, the taxpayer has the tax administrative process to defend their assessment and, if they are unsuccessful, they have another chance to defend their assessment in the tax judicial process. However, the judicial process requires two efforts on the part of taxpayers, namely (i) a penalty for taking the case to court with a 20% charge on the tax debt and (ii) the need to guarantee the tax debt, either with a judicial deposit, insurance, a guarantee or assets. Therefore, the judicial process is more expensive for the taxpayer. Therefore, in order to have a complete view of the effects of the tax process on taxpayers' decisions, it is not enough to study just one part, but the entire process.

This research seeks to fill this gap and aims to answer the following question: What is the impact of tax transactions on companies' decisions to terminate (or not) their tax and legal claims in the light of game theory?

To achieve the proposed objective, the study seeks to understand whether the tax transaction related to Notice 9/22 (Goodwill Transaction) is economically advantageous to non-compliant taxpayers within the proposed extended theoretical model. In addition, the research proposes to empirically identify whether companies make the same strategic decisions identified in the model, selecting the Gerdau Internal Goodwill Case to test the hypothesis that Tax Complexity and the Tax Transaction incentivise tax disobedience.

Since the regulation of the Tax Transaction, Brazil has restricted special instalment payments to this new modality, which was not studied by Gomes et al. (2023). Therefore, there is a need to verify whether or not this new type of special instalment payment changes taxpayers' decision to disobey taxes or not. Therefore, this research seeks to understand whether the legal charges, plus the guarantees and the new tax transaction change the conclusions reached by the study by Gomes et al. (2023).

According to Jacob (2018), tax research can make a substantial contribution to understanding entrepreneurial behaviour and how a country's institutional characteristics shape the effects of taxes on entrepreneurial behaviour. Moreover, the literature has shown that policymakers around the world frequently change corporate taxes or profit-sharing payments to stimulate economic growth (Jacob, Müller & Michaely, 2017; Giroud & Rauh, 2017; Patel, Seegert & Smith, 2017).

It is true that Brazil needs a major tax reform, but the latest reforms are in the opposite direction to the conclusion of the research by Gomes et al. (2023), as they have all increased tax complexity in Brazil. In this way, this research contributes to scientifically demonstrating the need for tax simplification in Brazil, helping public policy makers in this endeavour.

2. THEORETICAL BACKGROUND

2.1 Game theory

Game theory studies the strategies developed by decision-makers in their quest to maximise their expected utility. It seeks to identify the rational strategies of decision-makers by modelling the game, i.e., identifying the game, its participants, the possible strategies to be taken by its participants and their *payoffs* given the interaction of each player's possible strategies. Game theory is therefore concerned with identifying the rational strategies of the game, when the players are aware that the outcome depends not only on their own strategy, but also on those chosen by the other players, which may be different or have common objectives (Von-Neumann and Morgenstern, 1944; Bierman, 2010; Gomes, 2020).

In a game there are (i) the players, (ii) the strategies and (iii) the rewards (*payoffs),* which can be positive or negative. Each rational player adopts a strategy in order to maximise their reward, based on their belief of what their competitor's strategy is.

Given these elements, game theory establishes the equilibrium of the game, which is nothing more than the optimal strategy to be taken, taking into account the opponent's strategy (Pohlmann and Iudicibus, 2006). Game equilibria can basically be identified in three ways: (i) dominant strategy equilibrium, (ii) iterated dominant strategy equilibrium and (iii) Nash equilibrium.

Game theory proposes the first step to solving any static game: determining and eliminating from further consideration all the strictly dominated strategies of each player. Once this is done, the only strategy that remains is the dominant strategy. In this way, the dominant strategy equilibrium is only applied to static games, i.e. games without successive interactions.

For games with successive interactions, game theory proposes the iterated dominant strategy equilibrium, in which it is considered that, at each iteration, all the dominated strategies will be eliminated simultaneously, regardless of the order in which the strictly dominated strategies are eliminated, since the same limit set of dominant strategies is always reached (Bierman, 2010).

However, in most games there is no equilibrium of strictly dominant strategies or iterated strictly dominant strategies. In other words, the sequential elimination of dominated strategies does not lead to a single result. So, to overcome this obstacle, Professor John C. Nash developed a new methodology called the Nash Equilibrium, which represents the situation in which no player has anything to gain by changing their strategy individually, which leads to stability in the game (Nash, 1951). However, in some games the Nash equilibrium is not observed in pure strategies. Therefore, to overcome this limitation, Bierman (2010) advises considering the game from a probabilistic point of view, in which the player must choose a probability distribution over their pure strategies.

2.2 Tax Disobedience

According to Pohlmann and Iudícibus (2006), tax compliance is a true line of research given the similarity of theoretical focus and the recurrence or frequency with which studies follow one another, and the main objective within this line of research is to understand the reasons that lead taxpayers to pay or not pay their due taxes.

Gomes (2020) defines tax disobedience as non-compliance with tax legislation resulting in underpayment of the tax due. Such disobedience can occur in two ways. Involuntary disobedience, in which the taxpayer pays less tax due to the complexity and ambiguity of the legislation, i.e. the taxpayer does not want to pay less tax, but is unable to interpret and apply the tax legislation correctly. In the second form, disobedience is voluntary: the taxpayer looks for ways to reduce their tax liabilities through tax complexity. Even though they know the tax legislation, the taxpayer prefers to pay less tax.

Based on this concept, Gomes et al. (2023) developed a theoretical model that sought to understand the logical rational decision of a taxpayer and the tax authorities in a tax administrative process with high tax complexity and repeated special instalments. According to the authors' theoretical model, the taxpayer and the tax authorities are in a dynamic game in which the taxpayer needs to make a strategic decision to obey or disobey tax legislation. The inspectorate will make its strategic decision whether or not to inspect the taxpayer or not. As a result, the researchers identified that the only Nash equilibrium in this tax disobedience game

is for the taxpayer to disobey tax legislation and collect the tax due and not paid on time in a special instalment plan with its benefits. While the best strategy for the tax authorities is to assess the taxpayer and collect the tax due in a special instalment plan.

The model developed by Gomes et al. (2023) demonstrated that tax complexity and repetitive special instalments within the Brazilian tax administrative process produce adverse effects on society, as they identified that the best strategic decision for the taxpayer is to disobey tax legislation and for the tax authorities, given the taxpayer's strategic decision, is to inspect and assess the taxpayer, regardless of the type of tax disobedience carried out by the taxpayer, whether voluntary or involuntary.

This research extends the Gomes et al. model (2023) by including the judicial collection of the Public Treasury's Active Debt in order to test the result with the inclusion of this variable.

To design this model, the foundations of Putnam's Two-Level Game Theory (1988) were adopted. According to this theory, a winning strategy at level I depends on a set of victories at level II. In other words, you only have a victory at level I if it is ratified at level II. Therefore, the taxpayer will make his strategic decision taking into account the decisions/judgements of the higher courts, namely: Federal Supreme Court (STF) and Superior Court of Justice (STJ).

2.3 Tax complexity

Tax complexity is defined as the difficulty taxpayers face in complying with their tax obligations and understanding their tax responsibilities. It arises due to the number of laws, regulations and ambiguities present in tax legislation. Tax complexity can be categorised as necessary or unnecessary. Necessary complexity refers to the minimum complexity required to achieve tax policy objectives, while unnecessary complexity involves factors such as duplicated processes, complex and imprecise legislation, excessive regulations and unnecessary ancillary obligations (OTS, 2015; Ulph, 2014).

Tax complexity can generate uncertainty and insecurity, making it difficult to understand the laws and affecting the legal certainty of the tax system. According to Gomes (2020), tax complexity affects tax compliance, as it can lead to errors in calculating the taxes due, as well as offering opportunities for tax evasion or avoidance. Therefore, according to Laffer, Winegarden and Childs (2011), tax complexity can lead taxpayers to involuntary and voluntary tax disobedience.

Tax complexity increases compliance costs for taxpayers, making it more expensive to fulfil tax obligations. In addition, different interpretations of tax legislation among taxpayers can result in economic decisions that avoid paying taxes, as well as leading to the payment of

unnecessary taxes. In this way, tax complexity has a negative impact on countries' economic growth, as it results in additional costs for society. Moreover, tax complexity negatively affects economic growth as it creates uncertainty and discourages investment and entrepreneurship (Gomes, 2020).

2.4 Special instalments

Tax amnesty programmes are programmes offered by the government to delinquent taxpayers, in which they have the opportunity to pay their tax arrears with reduced interest, fines and without suffering criminal penalties. These temporary programmes aim to increase government revenue by allowing delinquent taxpayers to regularise their tax situation and return to fulfilling their tax obligations (Baer and LeBorgne, 2008; Gomes et al., 2023).

The aim of special instalment payments is both to increase revenue in the short term and to encourage tax compliance in the long term. The idea behind this is that taxpayers who benefit from special instalments are less likely to default again, as they see this opportunity as a way to become honest taxpayers again (Alm and Martinez-Vazquez, 2003; Andreoni et al.,1998; Torgler, 2003).

According to Torgler (2003), these special instalment plans have been adopted in several countries, including Belgium, France, Italy, Spain, Argentina, Colombia, India, Portugal, Russia, among others. In Brazil, the federal government has also used special instalment plans to increase revenue, such as REFIS, PAES, PAEX, PERT, among others (Paes, 2012 and 2014).

However, research has shown that special instalment plans can have negative effects on tax compliance. Studies indicate that the granting of special instalments leads to a decline in tax compliance, i.e., taxpayers become more likely not to pay their taxes in the expectation of benefiting from future instalments (Hasseldine, 1998; Alm & Martinez-Vazquez, 2003; Paes, 2012; Ross & Buckwalter, 2013; Paes, 2014; Bayer, Oberhofer & Winner, 2015; Shevlin, Thornock & Williams, 2017). In addition, the perception of unfairness on the part of taxpayers who pay their taxes on time, while others benefit from special instalment payments, can also negatively affect tax morale and encourage tax disobedience (Luitel, 2014; Mikesell, 2012; Ross, 2013; Torgler, 2007; Gomes et al., 2023).

Although special instalment payments can result in a temporary increase in revenue, the additional amount of funds is generally not significant. The low take-up of instalment payments by large debtors and the granting of benefits that are too broad are some of the factors that contribute to this (Paes, 2014).

2.5 Tax Settlement Agreement

Although art. 171 of the National Tax Code (CTN - Law No. 5,172/1966) establishes that the State can enter into a tax transaction with the Taxpayer, through mutual concessions, which will result in the settlement of the dispute and consequent extinction of the tax credit (art. 156 of the CTN), its regulation only occurred with the publication of Provisional Measure No. 889/2019, converted into Law No. 13,988/2020.

The tax settlement agreement can involve one or more special conditions, such as: an instalment payment of the debt, a discount on the total amount, an extension of the payment period or a reduced down payment, in other words, it is a type of special instalment payment. So, instead of waiting every 3 years for a special instalment plan to be published, taxpayers can now make an agreement directly with the state or wait for a public notice to apply for a special deal.

Law No. 13,988/2020 established the requirements and conditions for the Federal Government, its autonomous bodies and foundations, and debtors or adverse parties to settle disputes relating to the collection of tax or non-tax debts. According to the law, the tax settlement agreement has three modalities: (i) by individual proposal or adhesion, in the collection of debts registered as active debt or in the collection of debts within the competence of the Attorney General's Office (PGU); (ii) by adhesion, in other cases of judicial or administrative tax litigation; (iii) by adhesion, in small value tax litigation.

It should be noted that in the individual proposal, the tax transaction agreement is defined according to the taxpayer's specific scenario, based on documentation that proves the possibility of the agreement. In the adhesion modality, the government establishes the criteria that the taxpayer must fulfil in order to apply for the agreement.

Since the publication of Law No. 13,988/20, the Federal Government has published 23 notices for tax transactions by adhesion, including one for the settlement of tax disputes relating to the tax amortisation of goodwill (Notice of Adhesion Transaction (ETA) No. 9/22). Therefore, several tax transactions have already taken place.

According to Adhesion Transaction Notice (ETA) no. 9/22, taxpayers classified as tax defaulters for having used internal goodwill to reduce their income tax (IRPJ) and social contribution to net profit (CSLL) payments were able to negotiate debts under administrative or judicial discussion relating to this internal goodwill with benefits.

The benefits granted are: a down payment of 5% of the total value of the selected entries without discount, divided into up to five months and payment of the remaining balance can be divided into: (i) up to 7 months, with a 50% discount on the principal amount, fine, interest and other charges; (ii) up to 31 months, with a 40% discount on the principal amount, fine, interest

and other charges; (iii) up to 55 months, with a 30% discount on the principal amount, fine, interest and other charges. It should be noted that this tax transaction grants discounts even on the principal amount of the debt, even going beyond the special federal instalment plans published up until then (Notice 9/22).

Therefore, the tax transaction is a new type of special instalment plan in force in Brazil. Several studies have shown that special instalment plans are related to tax disobedience (Mikesell, 1986; Fisher, Goodeeris & Young, 1989; Crane & Nourzad, 1990; Alm & Beck, 1993; Das-Gupta, Lahiri & Mookherjee, 1995; Hasseldine, 1998; Christian, Gupta & Young, 2002; Luitel & Sobel, 2007; Cavalcante, 2010; Morais et al, 2011; Mikesell & Ross, 2012; Paes, 2012; Ross and Buckwalter, 2013; Paes, 2014; Bayer et al., 2015; Shevlin, Thornock & Williams, 2017). The logic of these studies is that the special instalment payments provide taxpayers with more favourable payments in the special instalment payment than in the timely payment.

In this way, this research seeks to understand how the new special instalment payment format in force in Brazil, the tax transaction, impacts on the decision of companies to close or not their tax and legal claims on a certain Brazilian tax complexity, goodwill.

2.6 Tax Court Proceedings

The tax judicial process is regulated in Brazil by Law No. 6,830/1980, which provides for the judicial collection of the Public Treasury's Active Debt. An active tax debt is a debt owed by the Public Treasury arising from a legal obligation relating to taxes and the respective surcharges and fines not paid on time by taxpayers and registered as a public debt by the Attorney General's Office (§2 of art. 39 of Law no. 4.320/1964). Therefore, it is an executive credit title and consequently state revenue. It should be noted that the active debt that is regularly registered enjoys the presumption of certainty and liquidity, i.e., it is an executive credit title with a certain value and proven liquidity, and therefore makes up the Union budget.

The tax judicial process begins once the tax administrative process has been completed and the taxpayer's tax debt has been registered as an active debt by the Attorney General's Office (PGFN). It should be noted that at this point there is a 10 per cent surcharge on the total amount of the debt (principal, fine and interest).

From this registration of the active debt, the PGFN will have the Active Debt Certificate (CDA) to instruct the judicial process against the debtor taxpayer and at this point the taxpayer's debt is increased by a further 10 per cent. Therefore, the tax judicial process imposes a total

increase of 20% on the taxpayer's total tax debt, in addition to the costs of guaranteeing the tax debt.

The second step after the registration of the active debt is the filing of the initial petition by the PGFN (filing of the lawsuit), which is done regardless of evidence, since the CDA presupposes liquidity and certainty. Once the judge of first instance has accepted the request in the initial petition, the debtor is summoned to pay the debt or guarantee it using one of the following methods: court deposit, bank guarantee, insurance guarantee or pledge.

It should be noted that according to art. 914 of the Code of Civil Procedure (CPC - Law No. 13.105/2015), the Motion to Stay Enforcement is an autonomous legal action that serves as a defence option for those enduring a forced enforcement process, and may be filed regardless of attachment, deposit or bond. However, only the filing of a motion to stay execution will not suspend the main execution, as stipulated in article 919 of the CPC, since the suspension of the main execution process is conditional on the court guaranteeing the execution, which will be made by means of a sufficient attachment, deposit or bond, and the fulfilment of the requirements for granting provisional relief, as stipulated in paragraph 1 of article 919 of the CPC.

Therefore, if the taxpayer does not pay, pay in instalments or guarantee the debt, the Federal Government, through the PGFN, can seize any of the assets of the defendant, except those that the law declares absolutely unseizable.

Once the lawsuit to collect the tax debt has been initiated and it has been established who the Plaintiff is (PGFN), the Defendant (taxpayer) and the Judge, the person invested by the State, responsible for analysing and impartially judging the issues presented by the Plaintiff and Defendant, the normal course of a lawsuit follows: the Defence, the Reply, the Evidentiary Stage and the Sentence.

It should be noted that if any of the parties does not agree with the decision handed down by the judge, in part or in whole, they can use the second instance to defend their rights. The Courts (Federal and State Regional Courts) have the function of examining the appeal and can re-examine questions of fact and law. If the party alleges a violation of federal law or the Constitution of the Republic in the decision handed down by the Courts, they can submit the re-examination to the STF for offences against the Constitution and to the STJ for offences against the law. STJ decisions on violations of the law can also be re-examined by the STF if a violation of the Constitution is alleged. It is therefore possible for the case to be examined by the STF, which will issue a definitive decision, returning the case to the first instance for the

fulfilment of the sentence, i.e., enforcing the credit, constituting rights, closing businesses. There may also be questions in the fulfilment of the sentence, albeit to a lesser extent.

Therefore, the tax judicial process is made up of three phases, and in order to use it there is an increase in the tax debt due to the incidence of legal charges of 20% on the tax amount due, as well as the need for guarantees. These variables must therefore be taken into account by taxpayers when deciding whether to obey or disobey tax legislation.

As already mentioned, this research extends the Gomes et al. (2023) model by including the tax judicial process and adding the variables legal charges and costs with the guarantees required in their theoretical model to check whether their conclusions, which are that tax complexity and special instalment plans encourage tax disobedience, remain the same. Thus, the next topic presents the Tax Disobedience Game considering the tax judicial process with its particularities.

3. OF THE COMPLETE TAX DISOBEDIENCE GAME

Before presenting the Complete Tax Disobedience Game, it is worth clarifying the modifications made to the game model by Gomes et al. (2023). The authors' methodological choice was to consider the fine to be stable and not to be updated during the course of the CARF judgement. However, under the terms of CARF Precedent No. 108, approved by the Full Bench on 03/09/2018, "late payment interest, calculated at the Special Settlement and Custody System (Selic) reference rate, is charged on the amount corresponding to the ex-officio fine." Therefore, according to CARF, the ex-officio fine is updated at the Selic rate. However, CARF's understanding is not universally accepted in the courts. Taxpayers maintain that the fine cannot be adjusted by the Selic interest rate. However, in order to check whether correcting the fine by Selic interest alters the results found by Gomes et al. (2023), this research will correct the fine by Selic interest, as advocated by Precedent 108.

In addition, as seen above, when a taxpayer's debt is registered as an active debt, it is increased by 10%, and when the collection of this debt is filed, it is increased by 10%. In other words, there are legal charges of 20% on the updated tax debt. Therefore, the remuneration of the Inspection R_f should be rewritten as follows:

$$R_f = \left[\left(T_t - T_p \right) . \left\{ 1 + \left[\sum_{1}^{n} selic + \left(multa + \sum_{1}^{m} selic \right) \right] \right\} \right] . (1 + \text{encargos legais de } 20\%) \qquad \textbf{(10)}$$

Where: R_f is the remuneration expected from the inspection; T_t is the tax estimated by the inspection; T_p is the tax paid; *selic is the* interest calculated by the Selic rate between the due date and the tax payment date plus 1% in the month of payment*; fine* is the fine applied to

the uncollected tax plus interest calculated at the Selic rate between the due date of the fine established in the infraction notice and the date of payment plus 1% in the month of payment; *legal charges of* 20% levied for registration as an active debt and for tax enforcement.

For the sake of simplicity, Selic interest and the updated fine will be represented by *m*, $[\sum_1^n selic + (multa + \sum_1^m selic)] = m]$ and legal charges by *e*:

$$R_f = \left[\left(T_t - T_p\right).(1+m)\right].e \quad \textbf{(11)}$$

In view of the publication of Law No. 13,988/2020, which deals with tax settlement agreements, taxpayers can enter into agreements with the state that reduce fines, interest and legal charges, and take advantage of extended payment deadlines. In this way, the tax inspectorate's remuneration is no longer R_f but P_f, in which the tax not paid on time is collected under the terms of the tax settlement agreement:

$$P_f = \{\left[\left(T_t - T_p\right).(1+m)\right].e\}.r \quad \textbf{(12)}$$

Where: P_f is the expected remuneration from the inspection; T_t is the tax estimated by the inspection; T_p is the tax paid; *m* are the penalties applied in the assessment; *e* are the legal charges levied on tax enforcement; and *r* are the benefits of the tax settlement agreement.

In the same way as Gomes et al. (2023) analysed tax transaction agreements from the taxpayer's point of view, there is the possibility of a return for tax disobedience, since the income from disobedience (R_i) can be greater than the payment in the tax transaction agreement (P_f), i.e. (R_i - $P_f > 0$) = P_i

$$P_i = [\{\left[\left(T_t - T_p\right).(1+\delta)^n\right] - g\}] - [\{\left[\left(T_t - T_p\right).(1+m)\right].e\}.r] \quad \textbf{(13)}$$

Where: P_i is the taxpayer's expected return; T_t is the tax estimated by the tax inspectorate; T_p is the tax paid; δ is the taxpayer's opportunity cost; *n is the* number of months between the due date of the tax due and its settlement in the tax settlement agreement; g is the cost of the guarantee in the tax enforcement, which can be a judicial deposit, insurance or pledge; *m are the* penalties applied in the assessment; *e* are the legal charges levied on the tax enforcement; and *r are the* benefits of the tax settlement agreements.

It follows from Equation 13 that the result of the disobedient P_i will be positive if, and only if, $R_i > P_f$: Therefore, for this to happen, the opportunity cost δ has to be greater than the remuneration of the inspectorate minus the benefits of the tax transaction agreement, i.e.,$(\delta - g) > \sqrt[n]{[1+(m.e.r)]} - 1$.

Based on this information, which complements that of Gomes et al. (2023), the taxpayer's utility function can be rewritten as follows:

$$\mathrm{E[U]} = (1 - \mathrm{p}).\mathrm{U}\left[\left(T_t - T_p\right).(1+\delta)^n\right] + \mathrm{p}.\mathrm{U}\{\left[\left(T_t - T_p\right).(1+\delta)^n\right] - \mathrm{g}\}] - [\{\left[\left(T_t - T_p\right).(1+m)\right].e\}.r] \quad \textbf{(14)}$$

Or to put it simply:

$$E[U] = (1 - p).U(R_i) + p.U(P_i) \quad \textbf{(15)}$$

Where: E is the expectation operator; U is the utility function; R_i is disobedience income updated according to Equation 1; and P_i is disobedience income minus the special instalment payment according to Equation 13.

Along the same lines as Gomes et al. (2023), the statements made here can be proven, since in total honesty (T_t - T_p = 0) the expected utility is zero:

$$\mathrm{E[U]} = (1 - \mathrm{p}).\mathrm{U}\left[\left(T_t - T_p\right).(1+\delta)^n\right] + \mathrm{p}.\mathrm{U}\{\left[\left(T_t - T_p\right).(1+\delta)^n\right] - [\left(T_t - T_p\right).(1+(m.r)]\}$$

$$\mathrm{E[U]} = (1 - \mathrm{p}).\mathrm{U}[(0).(1+\delta)^n] + \mathrm{p}.\mathrm{U}\{[(0).(1+\delta)^n] - [(0).(1+(m.r)]\} \quad \textbf{(16)}$$

$$\mathrm{E[U]} = 0$$

If the opportunity cost is greater than the punishments reduced by the benefits of the tax transaction agreement ($\delta - g > \sqrt[n]{[1+(m.e.r)]} - 1$) the expected utility will be positive, greater than 1. Therefore, the maximisation of the utility function proposed in equation 15 will be obtained by replacing $(1+\delta)^n - g$ for $\delta - g$ e $(1+(m.e.r)$ Thus, the derivative of the opportunity cost will be a function of the Selic for the maximum period, as well as the maximum difference between the opportunity cost and the Selic, in order to prove that disobedience is greater than the punishments deducted from the benefits of the tax transaction.

From the first-order condition it follows that:

$$\frac{dEU}{dSelic} = \delta - g.(1-p).U'\left(T_t - T_p\right) + (\delta - g - m.e).p.U'\left(T_t - T_p\right) > 0$$

$$U'\left(T_t - T_p\right)[\delta - g.(1-p) + (\delta - g - m.e).p] > 0$$

$$[\delta - g.(1-p) + (\delta - g - m.e).p] > 0$$

$$\delta - g - \delta p - g + \delta p - g - m.e.p > 0$$

$$\delta - g > m.e.p$$

This proves that the opportunity cost of tax disobedience minus the cost of tax enforcement is greater than the probability of paying the punishment reduced by the benefits of the tax settlement agreement, i.e. ($\delta - g > \sqrt[n]{[1+(m.e.r)]} - 1$).

Based on these assumptions, the variables of the theoretical model for the complete tax disobedience game are established as follows:

(j) the set of players, j = [contributors (1) and inspectors (2)];

(b) the set of independent participants, the judges, b = [DRJ, CARF, Judge at first instance, Court and Higher Courts];

(i) the set of strategies: for taxpayers it is $S_i^1 = \{obedecer\ e\ desobedecer\}$ and for inspection $S_i^2 = \{fiscalizar\ e\ não\ fiscalizar\}$;

(k) the set of possible moves by the players: the taxpayers k^1 = (pay, challenge, appeal, lodge an embargo and pay in instalments), the inspectorate k^2 = (assess and don't assess), the judges' k^b = (annul and uphold) the infraction notices.

(U) the set of player rewards:

C_i = The taxpayer's cash outflows;

C_f = Cost of the State;

R_f = Infringement notice with penalties and legal additions;

P_f = Notice of violation with penalty reductions under the tax settlement agreement;

R_i = Profitability of tax evasion;

P_i = Return on tax disobedience minus the instalment payment of the infraction notice, with the penalty reductions from the settlement agreement.

Figure 3 shows the *Pay-offs* Matrix of the Complete Tax Disobedience Game, taking into account the costs of tax enforcement, as well as the payment according to the tax transaction signed with the PGFN.

U:

Taxpayer	**Inspection**	**Movements - inspection (taxpayer, [judges])**	**Rewards**
{strategy}			**(Taxpayer, Inspection)**
Obey	Not Inspect		*(0, 0)*
Obey	Inspect	Not charge	$(-C_i , -C)_f$
Obey	Inspect	Charge (challenge, appeal, [annul])	$(-C_{i*} , -C)_{f*}$
Obey	Inspect	Charge (challenge, appeal, [maintain], contest, [annul])	$(-C_{i**} , -C)_{f**}$
Obey	Inspect	Charge (challenge, appeal, [maintain], contest, [maintain], pay)	$(-R_f , R)_f$
Obey	Inspect	Charge (challenge, appeal, [maintain], contest, [maintain], divide)	$(-P_f , P)_f$
Disobey	Not Inspect		*(Ri, 0)*
Disobey	Inspect	Not charge	$(R_{i*} , -C)_f$
Disobey	Inspect	Charge (challenge, appeal, [annul])	$(R_{i**} , -C)_{f**}$
Disobey	Inspect	Charge (challenge, appeal, [maintain], contest, [annul])	$(R_{i***} , -C)_{f***}$
Disobey	Inspect	Charge (challenge, appeal, [maintain], contest, [maintain], pay)	$(P_i , R)_{f**}$
Disobey	Inspect	Charge (challenge, appeal, [maintain], contest, [maintain], divide)	$(P_{i*} , Pf)_{**}$

Figure 3: *Pay-offs* Matrix
Source: prepared by the authors

Therefore, the rewards occur when taxpayers adopt the following *{strategies}* and (movements) *{obey, disobey (pay, challenge, appeal, contest, pay and pay in instalments)}* and the inspection *{tax, don't tax (assess and don't assess)}, and* the rewards will be increased or decreased when the judges adopt their decisions [annul and uphold].

Similarly to Gomes et al. (2023), it is assumed that the tax assessment of a taxpayer whose strategy is to obey is lower than the tax assessment of a disobedient taxpayer, as well as the cost of the audit. Therefore, if the inspectorate assesses an obedient taxpayer, it will only have costs, as it will not recoup the investment in that tax audit. Furthermore, if the inspectorate penalises an obedient taxpayer, it will only incur costs, be it in terms of compliance with the inspection, the tax administrative process, the tax judicial process and the possible payment or instalment of the infraction notice. It is also assumed $that\ \delta - g > \sqrt[n]{(1 + (m\,.\,e\,.\,r)} - 1$ when the taxpayer adopts the strategy of disobedience, then $P_f < R_f$ and $P_i < R_i$. The notice of infraction collected in the special instalment plan is greater than the cost of inspection and the tax administrative process, as well as the tax judicial process ($P_i > C_f$). Equilibrium in the game occurs when the objective is achieved, i.e. when the taxpayer maximises their expected utility and the tax authorities receive their tax assessment.

Therefore, by analysing the *Pay-offs* Matrix of the Game (Figure 3), it can be seen that when taxpayers adopt the strategy of obeying, there is no remuneration, but only cash outflows, either through payment of defence costs or payment of the infraction notice. In this way, this strategy is strictly dominated by the decision to disobey, in which the taxpayer has an expectation of a positive return whatever the strategy of the inspection or movement of the judging bodies. Furthermore, given that the infraction notice in the case of disobedience is higher than the infraction notice in the case of obedience, as well as the recovery of the cost of the inspection, the tax administrative process and the tax judicial process, the remuneration of the inspection in the case of disobedience is higher than in the case of obedience. As such, the only Nash equilibrium in the Complete Tax Disobedience Game remains the one observed in Gomes et al. (2023), which is *{disobey (challenge, appeal, embargo, instalment); Enforce (assess)}*.

To corroborate this understanding, we now present the Complete Tax Disobedience Game using the Decision Tree, where the dynamic also begins with the Taxpayer choosing one of two strategies *{to* obey *or to* disobey}, the Tax Inspectorate moves next choosing {to inspect *or not to inspect}* and adopts one of the two possible moves (to assess or not to assess). Next, the taxpayer makes its moves: (pay, pay in instalments, challenge, appeal and lodge an embargo). Figure 4 shows the tree for the Complete Tax Disobedience Game, with the game starting at the tip of the diagram's pyramid where the taxpayer chooses between disobeying or obeying tax legislation. Two branches run from the root downwards and each represents one of the choices, disobey or obey. Each branch points to a decision node of the Tax Authority, since this player makes its input decision after the taxpayer has assessed and collected its tax. From

each of these two decision nodes extend two branches that represent the two possible moves for the Inspectorate, to inspect or not to inspect. If the Inspectorate decides to inspect, there are two more decision nodes, to assess or not to assess. Each terminal decision node shows the possible rewards for the Inspectorate and the taxpayer, always in that order. And so the game continues from left to right until the end, which is when the taxpayer chooses to pay the infraction notice in instalments with the benefits of the tax settlement agreement.

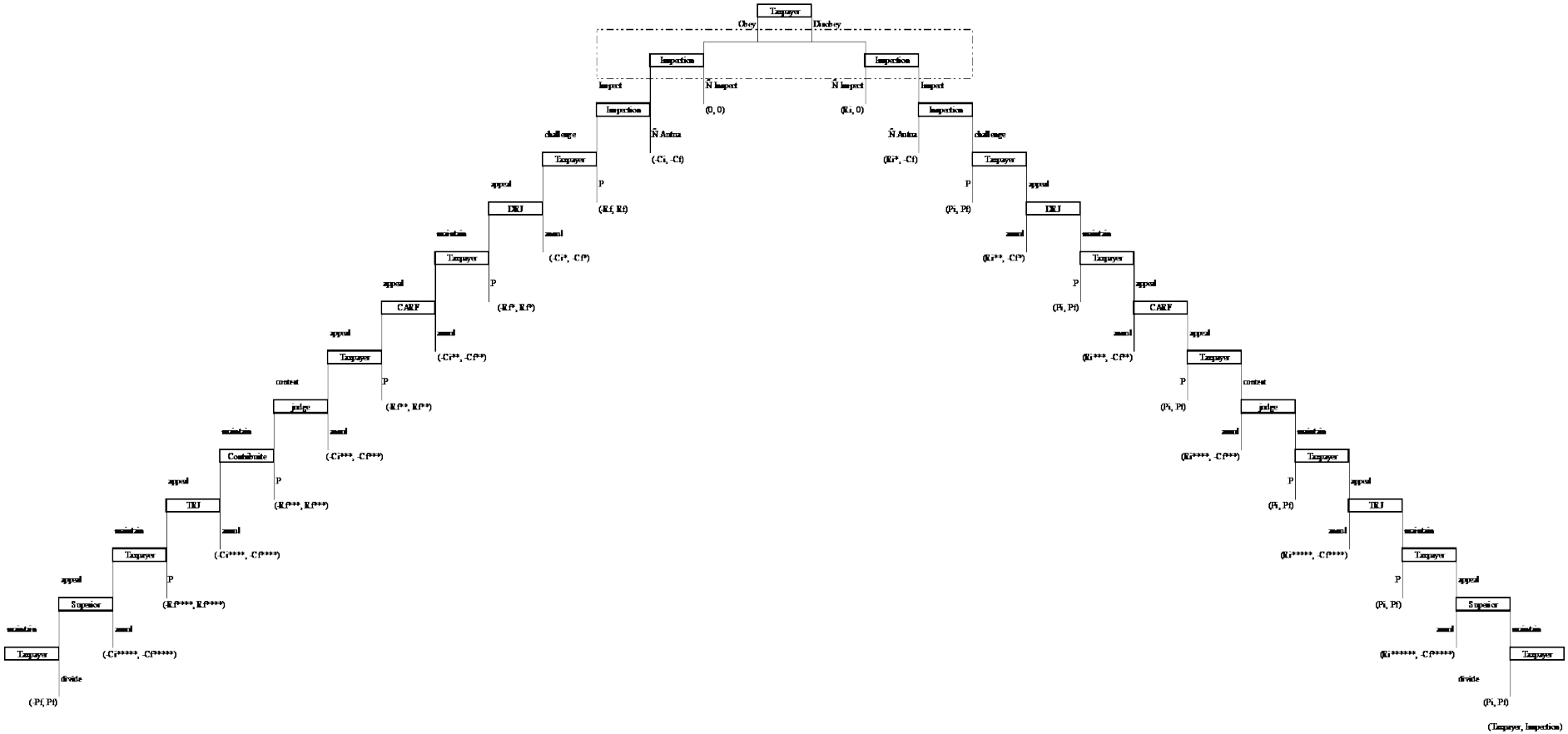

Figure 4: Tree for the Complete Tax (Dis)obedience Game
Source: Prepared by the authors.

Analysing the Tree of the Complete Disobedience Game (Figure 4), it can also be seen that the taxpayer who adopts the {obey} strategy has cash outflows throughout the game and at no stage of the game does it expect cash inflows, since it will have costs to comply with the inspection and then with the tax administrative and judicial processes.

On the other hand, the taxpayer who adopts the {disobey} strategy achieves positive results when the inspectorate adopts the {don't inspect} strategy or the {don't assess} move. These positive results are also observed when the judges (DRJ, CARF, Judge, TRJ and Superior) adopt the motion to annul the tax assessment. In addition, the disobedient taxpayer, who has applied the disobedience remedy, will be able to earn positive cash flows at any point in the game when they decide to pay their tax assessment in instalments under the tax benefits of the tax settlement agreement.

On the other hand, the tax authorities won't see any positive results when they inspect an obedient taxpayer, since the tax assessment notice is less than the cost of inspection, and the loss only increases over time due to investments in the tax administrative and tax judicial processes. The only opportunity for the tax authorities to receive positive resources from the infraction notice is when they inspect a taxpayer who has adopted the strategy of disobedience and moves (in instalments) under the tax settlement agreement. Because the disobedient taxpayer's infraction notice is higher than the obedient taxpayer's and sufficient to exceed the cost of the inspection.

Therefore, the {obey} strategy is strictly dominated by the {disobey} strategy and the {don't tax} strategy is strictly dominated by the {tax} strategy. Therefore, given the state's need for cash, which needs to negotiate with taxpayers by granting them tax benefits, such as reduced fines and interest, extended deadlines and cancellation of tax crimes, aligned with tax complexity, which generates uncertainty for society as a whole, provides a perfect environment for taxpayers to identify positive cash flows with tax disobedience. Therefore, as long as the state doesn't reform the national tax system to make it simpler, there will always be opportunities for taxpayers to be remunerated through taxes.

Thus, corroborating the findings of Gomes et al. (2023), it can be seen in the game of complete disobedience that even with the increase in legal costs, as well as the cost of the guarantees necessary for the tax judicial process, the only Nash equilibrium is *{disobey (challenge, appeal, embargo, installments) and inspect (assess)}*.

4. GERDAU CASE - INTERNAL GOODWILL

In order to perform a triangulation and empirically verify whether the conclusions observed in this article through the analyses of the Rewards - Pay-offs Matrix (Figure 3) and the Decision Tree for the Complete Tax (Dis)Compliance Game (Figure 4) can be verified in the day-to-day operations of companies, the Gerdau Internal Goodwill Case is analysed. The Gerdau Internal Goodwill Case is well known in academia in various sciences (Law, Accounting and Economics), as well as in tax administrative and judicial proceedings, in which judges have analysed the various processes to conclude whether the operation was legitimate or not.

In the Gerdau Internal Goodwill Case, the Group carried out corporate reorganization operations (capital subscription, merger and demerger). The combination of these operations generated goodwill that had an impact on the calculation of Income Tax and Social Contribution Tax of several Group companies. According to the tax authorities, the goodwill arising from the operation was not deductible, as it was internal goodwill artificially generated within the economic group. However, the Gerdau Group maintained that the deduction was legitimate, as the entire operation was carried out in strict legality, under the terms of article 36 of Law 10.637/02 and articles 7 and 8 of Law 9.532/97.

The case began with the corporate reorganisation that took place in December 2004, involving several companies linked to the Gerdau Group, namely: (i) Gerdau S/A, (ii) Gerdau Participações S/A, (iii) Gerdau Açominas S/A, (iv) Gerdau Internacional Empreendimentos Ltda, (v) Gerdau Aços Especiais S/A, (vi) Gerdau Comercial de Aços S/A, (vii) Gerdau Aços Longos S/A and (viii) Gerdau América do Sul Participações S/A.

Immediately prior to the start of the reorganisation, on 29/12/2004, Gerdau S/A held the majority of the voting capital of Gerdau Açominas S/A (91.49%), Gerdau Participações S/A (98.98%) and Gerdau Internacional Empreendimentos Ltda (94.88%). However, on the same day, based on the Economic Valuation Reports of the Company's Holdings, prepared by the company Metal Data Engenharia e Representações, on 22/12/2004, Gerdau S/A increased the capital of Gerdau Participações S/A with the shares of Gerdau Açominas S/A and part of Gerdau Internacional Empreendimentos Ltda, generating in this capital increase a capital gain, as well as a goodwill to be amortised of R$ 10.347,317,617.46, of which R$ 9,460,436,468.30 relates to Gerdau Açominas S/A and R$ 886,881,149.16 relates to Gerdau Internacional Empreendimentos.

It should be noted that according to article 36 of Law 10637/2002, this capital gain of Gerdau S/A obtained from the capital gain of the shares of Gerdau Açominas S/A and Gerdau Internacional Empreendimentos Ltda. in the capital merger of Gerdau Participações S/A would not need to be taxed at that time, as there would be a deferral of taxation until the sale of the new shares obtained. It should be noted that article 36 of Law 10.637/2002 was only revoked by Law 11.196/2005, so it was in force at the time of the Gerdau Group's corporate reorganisation.

Thus, on 05/09/2005, four months after Gerdau S/A paid up its capital in Gerdau Participações, the latter was merged into its subsidiary Gerdau Açominas S/A. With the merger, Gerdau Açominas began to amortise the goodwill recorded in Gerdau Participações, relating to its investment in Gerdau Açominas itself. At this point, it should be noted that according to articles 7 and 8 of Law 9,532/97, goodwill could reduce the IRPJ and CSLL calculation basis. Therefore, Gerdau Açominas S/A was not breaking the law.

After the merger, Gerdau Açominas began to amortise the goodwill absorbed from Gerdau Participações at a rate of 1/120 per month. This took place over a period of three months, after which Gerdau Açominas was partially spun off, reducing its share capital and incorporating the spun-off parts into four companies, namely (i) Gerdau Aços Especiais, (ii) Gerdau Aços Longos, (iii) Gerdau Comercial de Aços and (iv) Gerdau América do Sul. Therefore, as of August 2005, the new companies resulting from the spin-off of Gerdau Açominas began to amortise the goodwill over a period of 117 months, since the spin-off company had already amortised it over three months.

On 03/08/2009, i.e. four years after the amortisation of goodwill began, the Brazilian Federal Revenue Service began inspecting the amortisation of the Gerdau Group's internal goodwill. There were several inspections, and all the companies that amortised goodwill were fined for the entire amortisation period. In 2012, two years after the first assessment, the Administrative Council for Tax Appeals (CARF) published the first rulings (decisions) on the goodwill amortised by the Gerdau Group, as shown in Figure 5, with a summary of the main decisions.

Process	Judgement	Session	Recurring	Calendar Year	Decision
16682.720271/201154	1301001.434	12/02/2014	Gerdau Aços Longos S/A	2006, 2007, 2008, 2009, 2010	Dismissal of the voluntary appeal

16682.720533/201423	1302002.349	17/08/2017	Gerdau Aços Longos S/A	2011	Dismissal of the voluntary appeal regarding the undeductibility of goodwill.
16682.722531/201631	1301003.351	18/09/2018	Gerdau Aços Longos S/A	2012	Dismissal of the voluntary appeal as regards the deductibility of internal goodwill
16682.720556/2018-61	1402-006.322	14/08/2023	Gerdau Aços Longos S/A	2013	Dismissal of the voluntary appeal in relation to goodwill amortisation expenses
11080.723702/2010-19	1101-00.709	11/04/2012	Gerdau Comercial de Aços S/A	2005, 2006, 2007, 2008, 2009, 2010	Grant the voluntary appeal
16643.000276/2010-42	1101-000.811	02/10/2012	Gerdau International	2005	Grant the voluntary appeal
11080.723701/2010-74	1101-00.710	11/04/2012	Gerdau Aços Especiais S/A	2005, 2006, 2007, 2008, 2009, 2010	Grant the voluntary appeal
11080.732740/201143	1402002.322	04/10/2016	Gerdau Aços Especiais S/A	2006, 2007	Dismissal of the voluntary appeal.
11065.720650/201521	1201001.896	20/09/2017	Gerdau Aços Especiais S/A	2010, 2011, 2012	Dismissal of the voluntary appeal.
16682.722732/201638	1402003.700	23/01/2019	Gerdau S/A	2011	Grant the application ex officio
16682.720314/2018-78	1401-004.053	10/12/2019	Gerdau S/A	2013, 2014, 2015	Dismissal of the voluntary appeal.
16682.722238/2017-54	1402-006.106	22/09/2022	Gerdau S/A	2012	Grant the voluntary appeal to recognise the amortisation of goodwill
16682.720523/2017-31	1402-006.107	22/09/2022	Gerdau S/A	2013	Grant the voluntary appeal to recognise the amortisation of goodwill and cancel the tax assessments.

Figure 5: List of cases judged by CARF in the Gerdau Case - Internal Goodwill
Source: Prepared by the authors

Figure 5 shows the heterogeneity of the decisions, as some are in favour of the Gerdau Group and others are not. In other words, according to Gomes et al. (2023) and explained here, given the complexity of Brazilian tax legislation, judges are unable to be

certain about the calculation of taxes. As a result, they make contradictory decisions on the same issue, generating legal uncertainty for society as a whole.

According to item a.6 of item II, which deals with unprovisioned contingent liabilities, of Note 19 - Tax, Civil and Labour Liabilities and Contingent Assets, of the Gerdau Group's 2022 Financial Statements, Gerdau S.A. and its subsidiaries are parties to administrative and judicial proceedings relating to the disallowance of the deductibility of internally generated goodwill from the IRPJ and CSLL calculation basis, arising from the corporate reorganisation carried out in 2004/2005 in the total updated amount in 2022 of R$ 8,734,573 (thousand).

It can be seen from the reproduction above that of the total updated debt (R$8,734,573 thousand), 66% (R$5,755,883 thousand) has been decided in favour of the Gerdau Group in the courts, although there has not yet been a definitive decision. There is also a variation in the decisions, with some judgements being positive and others negative. This corroborates the assertion that Brazil's tax complexity generates legal uncertainty for society as a whole, since the judging bodies make different decisions in all their spheres. In other words, given the complexity of the tax system, the taxpayer doesn't know what the correct tax base is, nor does the inspectorate or the judges. Therefore, it is not known who is disobedient and who is obedient from a tax point of view.

Well then, applying the mathematical model proposed by Gomes et al. (2023) and expanded in this article, the total value of the Gerdau Group's internal goodwill of R$10,347,317,617.46 generated a tax saving for the Group of R$3,518,087,989.94, which was used in 120 monthly and successive instalments, according to reports in the CARF rulings. Therefore, updating this tax saving by the Selic rate at compound interest gives an updated value up to December 2022 of R$11,133,760,732.65. It should be noted that this amount was identified by dividing the tax saving by 120 instalments, which resulted in a monthly saving of R$29,317,399.92, which was updated by the Selic rate at compound interest, between the month of use and 31/12/2022.

Therefore, the tax savings from the strategic decision of {disobedience} generated a tax return for the Gerdau Group of R$11,133,761 thousand, while the updated debt, even with legal charges, is R$8,734,573 thousand. Therefore, a gain of R$2,399,188 thousand for the Gerdau Group, which even if it had to bear the cost of the 8% guarantee insurance on the amounts under judicial discussion (R$5,755,883 thousand), which would cost R$460,471 thousand, would still bring a tax gain of R$1,938,717 thousand. This

statement corroborates the conclusions identified in this article, as well as those presented by Gomes et al. (2023).

It should be noted that this simulation assumed that the opportunity cost (δ) was the Selic rate. However, the savings obtained by the Gerdau Group could have been used to purchase inventories, pay payroll or Capex that increased the Group's return on equity. Or, it could have been used to pay off loans and financing. Thus, in view of the rationality imposed by Game Theory, one has the impression that the gain obtained by the Gerdau Group may have been even greater, since a rational being, faced with this situation, would place the benefit of the tax saving at the highest possible opportunity cost at the time of the decision.

Finally, it should be noted that if the Gerdau Group had adhered to the tax transaction agreement of the Notice of Adhesion Transaction (ETA) No. 9/22, the tax benefit would also have been considerable. With a discount of 50% of the 95% of the debt (R$8,734,573 thousand), since it is necessary to pay 5% without any reduction, the Gerdau Group could pay in 8 months the amount of R$4,585,651 thousand. This, compared to the identified benefit of R$11,133,761 thousand, would generate a gain of R$6,548,110 thousand. However, given that the judiciary is signalling a gain to taxpayers, in this case the judiciary's move is to (annul), there is, within the model, full remuneration for the taxpayer (R_i). Therefore, the decision to adhere to the tax settlement agreement is strictly dominated by the strategy of waiting for the final decision from the courts. Once again, this corroborates the findings of this study and those of Gomes et al. (2023).

5. FINAL CONSIDERATIONS

According to Varsano (1996), the most radical of the tax reforms carried out in Brazil was certainly that of the 1960s, which culminated in the publication of the National Tax Code (Law No. 5.172/1966) and was designed as a block, a true national tax system. This reform eliminated the cumulative taxation that had been in force in Brazil until then, eliminated inefficient taxes and published new efficient taxes that increased tax collection. However, a few years later cumulativeness was once again introduced into the national tax system, with the requirement for PIS, followed by Finsocial, which was replaced by Cofins.

Given the demand for new sources of revenue, the CSLL, the IPMF was created, then replaced by the CPMF, which was finally eliminated from tax legislation. Finally,

the non-cumulative nature of social contributions, PIS and Cofins, was implemented, generating a veritable tangle of legislation, in which the Brazilian Federal Revenue Service itself, in its collection, stated that it didn't know if all the legislation in force was published there.

It is therefore well known that Brazil is once again in need of a radical tax reform that simplifies taxpayers' lives and provides certainty about how to calculate and pay taxes in Brazil. However, in order to be efficient, we need to think about a new tax system that clearly or with reasonable certainty states the source of the state's wealth so that, with this information, the state can design its investments and expenses, without the need to look for new sources of revenue at any cost, which only distorts the national tax system and creates insecurity for society as a whole.

To help with this new design and to demonstrate the need to remove unnecessary tax complexity from the national tax system, the general objective of this research was to answer the following question: What is the impact of tax transactions on companies' decisions to terminate (or not) their tax and legal claims in the light of game theory?

To this end, a theoretical model was developed along the lines of Game Theory and the work of Gomes et al. (2023) to identify what would be the best strategic decision for taxpayers in view of Brazil's tax complexity and tax transaction agreements. As a result, it was observed that the only Nash equilibrium is {disobey (challenge, appeal, embargo, instalment); inspect (assess)}. This demonstrates, along the same lines as Gomes et al. (2023), that tax complexity and repetitive special instalments encourage tax disobedience, even though the taxpayer has to bear the increased tax debt due to legal charges and the costs of guaranteeing the tax lawsuit, such as a judicial deposit, insurance and a guarantee bond or pledge.

Also, to confirm the theoretical findings, the Gerdau Internal Goodwill Case Study was carried out, the results of which corroborated the results of the theory and showed that due to the long-term nature of tax collection in Brazil, coupled with the frequent need for cash from the state, which has to grant considerable discounts to taxpayers in order to meet this need, there are incentives for taxpayers to disobey taxes.

In this way, as long as there is an extreme need for cash by the state and the Brazilian tax mess, the best choice for the rational taxpayer to increase the performance of his enterprise is to disobey the tax legislation, i.e., to choose to reduce tax liabilities in the present and pay them in the future under some special instalment plan, if necessary,

because there is still the chance that the judiciary will back the decision of tax disobedience strategy.

In these terms, this research has advanced the knowledge of the literature on tax aggressiveness by verifying that companies can use tax complexity and tax transactions to make their decision to disobey taxes.

The study also showed that tax complexity generates legal uncertainty, making jurisprudence shaky and increasing administrative and judicial costs, which are borne by society as a whole with judgements in various spheres of the process. Furthermore, tax complexity makes taxpayers and the tax authorities doubt the application of the law, creating an environment of mistrust between the parties.

In addition, a vulnerable environment can affect the tax morale of taxpayers, as it leaves room for dishonest people not to collect their taxes on time, financing themselves with state resources. And it can make honest taxpayers feel outraged and demotivated to honour their tax commitments on time, because they have seen their dishonest competitors benefit from tax subsidies (tax deals). Therefore, this study opens up the perception that special instalment plans may not be fair to society.

As such, this research also understands the need to set up an independent body to identify unnecessary tax complexity in Brazil, along the lines currently developed by the *Office of Tax Simplification (*OTS) in the UK.

Possible avenues for further research in the area include the same study with other companies to see if the findings are the same, as well as studies focusing on municipal and state taxes.

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