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# Tax burden and tax evasion in Brazil

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***Abstract*—** *The study analyzed the relationship between the Brazilian tax burden and the country's level of evasion. The basis for the research stems from the fact that Brazil is considered a country whose tax burden is high and this would influence its level of evasion. However, there are international studies that have not identified significance in this relationship and, in the Brazilian case, despite being a widely discussed topic, the literature is incipient in testing this interaction. In view of this gap, the multiple linear regression method was used, based on data from the period from 2005 to 2015. The results showed that, in the Brazilian case, the tax burden presented statistical significance related to tax evasion, confirming the theoretical assumptions used. The present research also suggests that the Theory of Equity can be useful in improving the understanding of tax evasion behavior and the possibility of comparison with international studies.*

## I. INTRODUCTION

The size of the tax burden is a recurring problem in the Brazilian context (Siqueira, 2011). This is because it is considered high (Siqueira & Ramos, 2005) and, according to the theoretical economic assumption of the so-called Laffer Curve, from a certain level of tax burden, increases in rates would generate decreases in revenue, since the taxpayer would seek ways to avoid that greater burden (Franco, 2015). For this reason, Clotfelter (1983) identified the existence of a relationship between marginal tax burden and tax evasion focusing on individuals' returns. Therefore, the institution of an excessive tax burden would encourage tax evasion and increase the practice of informal activities (Afonso & Castro, 2016).

However, the Laffer assumptions do not apply to the Brazilian context, according to the study of Lima and Rezende (2019), which did not identify, in general, a drop in tax collection in periods of increased tax burden. Moreover, the criticism to the classical economic model motivates a greater empirical analysis of the tax evasion decision with the incorporation of other theoretical supports. Thus, with the removal of this classical theoretical application is that emerges the explanatory assumption of the Equity Theory that the evasive behavior of the taxpayer does not necessarily derive from the size of the tax burden imposed on him, but from his perception regarding the tax justice of that payment in terms of benefits to society (Kaplan, Reekers & Reynolds, 1986).

Along these lines, Siqueira and Ramos (2005, p. 400) point out, in relation to the Brazilian tax burden, that "there is a widespread feeling that the government does not efficiently apply the collected amounts, contributing to an increase in the desire to evade". On the other hand, international studies that tested the relationship between tax burden and evasion did not have unanimous results in attesting this interaction, since, depending on factors such as the existence of a public good, low pre-existing level of taxation and *enforcement*, the taxpayer may accept this more onerous condition (Cowell, 1990). The effect of higher tax rates on the aggregate level of evasion is ambiguous and there is no verification for the Brazilian case of this relationship, although it has been verified an increase in the burden at the expense of efficiency and equity of the tax system (Orair & Gobetti, 2018).

It is noted, therefore, that the Brazilian tax environment has characteristics that are theoretically associated with the irregular reduction of taxes, such as the tax burden and complexity (Afonso & Castro, 2016). This scenario reinforces the need for this study in the Brazilian context. Furthermore, Jacob (2018) indicates that researches in taxation have a potential for development, especially with data from developing countries like Brazil, lacking empirical researches that can better demonstrate the existing relationships in taxation.

Given this gap and in light of the Equity Theory, this paper has the following research problem: what is the relationship between the Brazilian tax burden and the level of tax evasion in the country? Thus, the objective is to analyze the relationship between the Brazilian tax burden and the country's evasion level. To this end, it will be used a methodology similar to the study of Richardson (2006), with a quantitative approach, using multiple linear regression, from data made available by international institutions, such as the International Monetary Fund and the World Bank.

It is important to highlight that in this study the analysis of the tax burden will be carried out from the standpoint of return to society, assuming the assumption of the Equity Theory. To this end, the verification model will use the index of return of welfare to society (IRBES) as the *proxy for* measuring the variable that seeks to capture whether in the Brazilian context there is the application of the perception of tax justice by taxpayers and its potential relationship with evasion.

With this verification it is possible to identify the behavioral relationship between tax burden and tax evasion in the Brazilian case, providing empirical subsidies to compare with international studies and also, in a practical way, helping companies and government to adjust their tax interactions.

## II. REVIEW OF THE LITERATURE

### 2.1 Tax burden and tax evasion

The reasons for tax evasion raise important questions for any government, since evasion has significant fiscal and social impact (Hasseldine & Bebbington, 1991). In this context, and considering the variety of factors that may be reflected in the evasive behavior, studies have been developed in order to capture the relationship of evasion with the variables that affect the way taxpayers evade (Clemente & Lírio, 2017) fact that expands the interest of social sciences in studying the different facets of tax relations (Lopo Martinez, Ribeiro, & Funchal, 2019).

In this sense, the study by Jackson and Milliron (1986) performed a consolidation of the literature on the possible determinants of tax evasion. These include: age, gender, education and occupation status (demographic determinants), income level, source of income, marginal tax rates, sanctions and probability of detection (economic determinants) and complexity, impartiality, contact with the tax authority, peer compliance, and tax ethics or morals (behavioral determinants).

The determinants are grouped into four categories: demographic, cultural/behavioural, legal and institutional, and economic (Khlif & Achek, 2015). The studies by Riahi-Belkaoui (2004) and Richardson (2006) also exposed a consolidation of determinants, as well as provided a sound empirical framework for future research on tax evasion and a fundamental summary of various data sources for empirical tests on tax evasion.

One of the elements posed as influencing the avoidance behavior is the size of the tax burden. Jackson and Milliron (1986) pointed out that there was a theoretical understanding that taxation impacts taxpayer compliance, but there would be little empirical support to confirm this assumption that taxpayers become less compliant as their marginal tax rate increases. The theoretical support for this statement is the so-called Classical Economic Theory, which believed that the stagflation observed in the 1970s was a consequence of excessive taxation that would discourage economic relations, especially investments and work, since agents would not be willing to produce or work more knowing that a greater portion of their income would remain with the State (Heijman & Van Ophem, 2005).

This assumption was expressed in the Laffer curve, which describes the expected relationship between public tax revenue and the tax burden, evidencing that when the tax rate becomes too high, economic agents become inactive or tend to evade (Laffer, 1986). With this perspective, the study of Torgler (2005) sought to identify which determinants were statistically associated with evasive behavior and obtained as a result that the tax burden and corruption as determinants of national tax evasion. On the other hand, the study of Richardson (2006) found no significance between evasion and tax burden, confirming the explanation of Lewis (1978) on this non-relationship, based on the fact that most taxpayers are not aware of their own marginal tax rate.

In the case of Brazil, Lima and Rezende (2019) tested this assumption and found that only in some periods the increase in the tax burden was accompanied by a reduction in revenue, i.e., in general, when taxation was higher, the higher was public revenue, a fact that also

contradicts the Classical Theory and does not present explanatory results that can improve the understanding between tax burden and tax evasion. Furthermore, studies point out that there seems to be a contrary relationship, i.e., it is the fact of having evasion that leads to an increase in the tax burden, since compliance with tax laws is essential for tax collection: the higher the level of non-compliance of taxpayers, the higher the tax burden will need to be to finance state expenditures (Richardson and Sawyer, 2001).

For this reason, the traditional economic theory, although it has been used in an attempt to explain tax evasion behavior, by itself, does not seem adequate to explain the phenomenon (Lewis, Carrera, Cullis, & Jones, 2009) which is why this study will use the theoretical support of the Equity Theory to analyze the relationship between tax burden and tax evasion in the Brazilian context.

### 2.2 Equity Theory

The perceptions about the effectiveness of tax systems consist of the extent of tax non-compliance and tax justice, the quality of public services (Feld & Frey, 2007), which are important factors and depend on the inevitability of the tax system structure (Slemrod, 2005). Once the importance of studies on tax evasion is acknowledged, Crocker and Slemrod (2005) explain that before pointing solutions to the tax evasion problem, it is necessary to understand the theoretical mechanisms that underlie the phenomenon, and only then point out possible mitigating factors. As a complex phenomenon, evasion has different theoretical approaches (Khlif & Achek, 2015), such as economic theory, theory of the firm and of contracts, *stakeholder theory*, *stewardship* theory, equity theory, behavioral theories, among others, which present assumptions that help to understand its occurrence (Kaplan *et al.* , 1986).

Thus, Equity Theory has been used to assess the amount of taxpayer satisfaction that is generated when individuals compare their tax situations to others in their reference group (Torgler, 2003). This theory also suggests that taxpayers would be compliant if they perceive that the system applies equitable rules. Therefore, if the rules are not justifiable in relation to fairness and taxpayers, inequity in their tax and payment situations compared to others, compliance decreased to restore the system (King & Sheffrin, 2002). Therefore, an increased perception of disparity will result in increased taxpayer non-compliance (Smart, 2012).

Based on this assumption, it is necessary to understand that the tax burden is an indicator of the relative weight of taxes in the economy of a country and is commonly obtained by calculating the ratio between the total amount of taxes collected and the gross domestic product (GDP) of the country (Atrostic & Nunns, 1990), without incorporating measures of social returns. And being the amount of taxes, there is the need to know how these taxes are distributed and their legal characteristics. In the Brazilian case, the burden involves different species of taxation, such as taxes, fees and contributions (Zugman, 2016). The tax type is a payment to the government from which the taxpayer does not receive any specific direct benefit, while the other types presuppose direct linkage of benefits (Machado & Balthazar, 2017), which increases the taxpayer's perception of the fairness of their payments.

Lima and Rezende (2019) pointed out that the Contribution to Finance Social Security (COFINS) was the tax that presented the most explanatory power of the Brazilian tax burden, revealing that an important part of this burden stems from bound taxes. This kind of tax is more sensitive to equity, based on the verification of the direct improvement or benefit generated to the taxpayer (Entin, 2004).

This leads to the central hypothesis of the paper to verify whether there is a significant relationship between the Brazilian tax burden and the country's level of tax evasion. However, to better capture this relationship with evasion, the commonly used tax burden proxy will not be used, but rather the Index of Return of Welfare to Society (IRBES), prepared by the Brazilian Institute of Planning and Taxation (Folloni & Yazbek, 2013; IBPT, 2015), which in its constitution contemplates the tax burden associated with the country's Human Development Index (HDI).

## III. METHODOLOGICAL PROCEDURES

To verify the relationship between tax burden and tax evasion, multiple linear regression analysis was used, according to similar studies by Torgler (2005) and Richardson (2006), with the following variables: tax evasion index (EF), welfare return to society index (IRBES) and tax burden (CT).

To this end, two models were used in which the dependent variable is tax evasion and two control variables were included, tax complexity (CompxT) and the corruption perception index (Corrp).

In the model were used control variables found from the literature as those that have already been significantly associated with tax evasion and commonly pointed out as elements of the Brazilian scenario: corruption of the country and tax complexity.

These variables were chosen because they deal with aspects that can be the target of governmental actions

to change their scenario and, therefore, be useful for the adoption of governmental policies to reduce tax evasion, which would not be possible with demographic or individual variables such as gender, religiosity and tax morale.

Thus, the control variables, tax complexity and corruption, were chosen because they appear in the studies of Richardson (2006) and Torgler (2005) as significant determinants of tax evasion. Thus, the model will test the central theoretical hypothesis of the study even in the presence of these control variables.

### 3.1 Research Variables, Sample Definition and Data Collection

Data collection occurred through secondary data found in available databases, namely: tax evasion variable - IMF report (Medina & Schneider, 2018)[1] ; tax burden variable - World Bank *tax revenue*[2] ; welfare return variable to society (IBPT calculation: tax burden x HDI)[3] ; corruption variable - international transparency corruption perception index[4] ; and tax complexity variable - World Economic Forum global competitiveness report .[5]

The dependent variable, tax evasion, will be sourced from the IMF's *shadow ecomony* index, according to the model presented in the study conducted by Medina and Schneider (2018), since there is a strong causal relationship between a country's tax rate and the size of its *shadow economy* (Berrittella, 2015). The said index is constructed from estimates of the informal economy and calculated based on the approach called Multiple Indicator Causation Multiple Causation - MIMIC (Riedel, 2018). The MIMIC approach is a structural equation model that captures the statistical relationship between an unobservable variable, the informal economy, and independent variables.

Thus, metrication consists of two sets of equations, a structural equation and a measurement equation. The structural equation links the dependent variable to the independent variables, while the measurement equation relates the dependent variable to economic indicators, such as the share of direct and indirect taxation in GDP, the burden of state regulation and interference, the unemployment quota, GDP per capita, the unemployment rate and the annual GDP growth rate (Schneider, 2005).

Through this methodology, it is possible to estimate the extent of tax evasion and, therefore, to make decisions about its adequate control (Medina & Schneider, 2018), which is why this index has already been used in other similar studies, such as Schneider (2005), Schneider (2007) and Buehn, Dell'Anno & Schneider (2018). This index was also used as dependent variable in the study of Richardson (2006).

The sample used refers to data from Brazil in the period 2005 to 2015. This period was determined by the fact that the response variable used was obtained from tax evasion data provided by the IMF report (Medina & Schneider, 2018), which covers this period.

### 3.2 Model Specification

Considering that the data are only for Brazil for a period of 11 years, the data format does not allow for panel data modeling, but rather regression by time series. Thus, the data collected were tabulated and treated in Excel and SPSS *software.*

With this, the econometric models described below were estimated.

**Model 1**

$$EF = \beta_0 + \beta_1 IRBES + \beta_2 CompxT + \beta_3 Corr + \varepsilon_i$$

In which:

EF - tax evasion index;

$\beta_0$ - intercept of the regression model;

IRBES - index of return of welfare to society;

CompxT - tax complexity;

Corr - corruption;

$\varepsilon_i$ - random error term of the model.

**Model 2**

$$EF = \beta_0 + \beta_1 CT + \beta_2 CompxT + \beta_3 Corr + \varepsilon_i$$

In which:

EF - tax evasion index;

$\beta_0$ - intercept of the regression model;

CT - tax burden;

CompxT - tax complexity;

[1] Available from: < https://www.imf.org/~/media/Files/Publications/WP/2018/wp1817.ashx>. Accessed 05 Nov. 2019.
[2] Available from: < https://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS>. Accessed 05 Nov. 2019.
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[4] Available at: < https://www.transparency.org/cpi2018>. Accessed on: 05 Nov. 2018.
[5] Available at: <www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2014-15.pdf>. Accessed on: 05 Nov. 2018.

Corr - corruption;

$\varepsilon_i$ - random error term of the model.

Model 1 serves to test the central hypothesis based on a measure different from that normally used for the tax burden, while model 2 serves to confirm the findings of the first model. The difference between the models is that, first, the index of return on welfare to society (IRBES) was included to verify the relationship with evasion, and then this variable was replaced by the traditional tax burden in order to robust the theoretically expected results.

With these models, it is expected to verify the theoretical hypothesis stated in this study that the sense of justice regarding the return to society of taxes paid by taxpayers affects the evasive behavior and, consequently, tax evasion.

## IV. PRESENTATION AND ANALYSIS OF RESULTS

### 4.1 Descriptive Analysis

Initially, descriptive statistics are presented to outline the behavior of the variables in the analyzed 11-year period. Thus, one can observe the evolution of indicators over time, as well as the average pattern of Brazil, as shown in Table 1.

*Table 1: Evolution of Indicators*

| | Brazil | |
|---|---|---|
| Indicator | Variation 2005-2015 | Average |
| Tax Evasion | -9,23% | 35,12 |
| IRBES | -19,18% | 10,41 |
| Tax Complexity | -22,41% | 14,37 |
| Corruption | 4,88% | 41 |

*Note*. Source: Survey data (2019).

The tax evasion indicator provided by the IMF varies between 6 and 70, so that the lower the better. Brazil presented an average of 35.12 in the period, with a reduction of 9.23%, showing an improvement of the indicator. In a comparative analysis, it is observed that the average evasion of the G20 countries is 17.95, which places Brazil well above the average of the group, despite the reduction seen in the period analyzed. With regard to the IRBES, the indicator depends on the HDI of the countries, with a range in this sample of 9.59 for the lowest return and 11.57 for the highest. Brazil has an average of 10.41 and in the 2005-2015 period, the index worsened by 19.18%, indicating that the return to society fell proportionally more than the level of evasion.

The tax complexity presented an average indicator of 14.37, while the G20 countries, for example, have an average of 8.85. And the Brazilian corruption index had an average of 41, while the G20 average is 53.79. It is noted that Brazil presents indicators of tax evasion, tax complexity and corruption above the average of the G20 countries, confirming the indications of Jacob (2018) and Siqueira (2011).

### 4.2 Analysis of Correlations

After the descriptive analysis, we proceeded to the analysis of correlations between the variables used in the research, in order to highlight the direction and intensity of interactions, as shown in Table 2.

*Table 2: Correlation Matrix of Analyzed Variables - Model 1*

| | EF | IRBES | CompxT | Corr |
|---|---|---|---|---|
| EF | 1 | | | |
| IRBES | 0,7146 | 1 | | |
| CompxT | 0,1977 | 0,4111 | 1 | |
| Corr | -0,2216 | -0,3345 | -0,5702 | 1 |

*Note*. Source: Survey data (2019).

It is noted in Table 2 that there is no high correlation between the variables, since the correlation coefficients between the regressors were not higher than 0.8, so the absence of multicollinearity between them is assumed (Gujarati, 2006).

The signs presented allow the identification of the directions of interactions between the response variable and the explanatory variables, so that both IRBES and tax complexity (CompxT) and corruption (Corr) indicated positive correlation with the tax evasion index (EF). It is worth noting that the variable corruption appeared with negative sign in the correlation since the measurement scale of this index is inverted, i.e., the higher the index, the less corrupt is the country. With these results, it is suggested that the higher the IRBES, the complexity and the corruption, the higher is the verified level of evasion. However, this is not the expected behavior for all regressors. Table 3 summarizes the directions found and compares them with those expected.

*Table 3: Comparison of Expected and Found Correlations*

| Independent Variables | Direction of Correlation with the Dependent Variable | |
|---|---|---|
| | Expected | Found at |
| IRBES | Negative | Positive |
| CompxT | Positive | Positive |
| Corr | Positive | Positive |

*Note*. Source: Survey data (2019).

Only the IRBES variable did not present the expected behavior. However, these results should be analyzed with caution since, in all relationships, the values found are low, revealing a weak or moderate relationship in terms of explanation of the variation response by the regression model (Gujarati, 2006).

**4.3 Analysis of Regression Results**

Multiple linear regression and model variance analyses were performed, in which the significance level α of 5% (α = 0.05) was adopted for the interpretation of results. Thus, "when the *p-value of* a hypothesis test is smaller than the chosen value of α, the test procedure leads to the rejection of the null hypothesis" (Hill, Griffiths & Judge, 2006, p.119). Thus, the regression presented the values specified in Table 4.

*Table 4: Regression Results Model 1*

| | Coefficients | Standard Error | Stat t | P-value |
|---|---|---|---|---|
| Intersection | 12,3750 | 19,9289 | 0,6210 | 0,5543 |
| IRBES | 2,5503 | 0,9741 | 2,6182 | 0,0345* |
| CompxT | -0,0965 | 0,2264 | -0,4262 | 0,6828 |
| Corr | -0,0539 | 0,3517 | -0,1534 | 0,8824 |

*Note*. Source: Survey data (2019).

The coefficient of determination ($R^2$) of 0.5233, i.e., 52.33% of the tax evasion variation (response variable) is explained by the proposed regression model, keeping the environment constant. Moreover, the results of Table 4 show that there was statistical significance only in relation to IRBES, with α of 5%, confirming the assumption of the Equity Theory, that the evasion behavior is more likely in the face of unsatisfied public needs. Thus, the control variables, without statistical significance, had no effect of suppressing the behavioral relationship between the response variable and the IRBES, so that there are no elements to reject the theoretical hypothesis tested in this study that the Brazilian tax burden, measured in the form of benefit to society, is a determinant for the level of tax evasion in the country.

Furthermore, a second model was also performed, now including the tax burden variable measured in the traditional way, so as to confirm whether there is actually significance. The results can be seen in Table 5.

*Table 5: Regression Results Model 2*

| | Coefficients | Standard Error | Stat t | P-value |
|---|---|---|---|---|
| Intersection | 17,5730 | 16,5958 | 1,0589 | 0,3248 |
| CT | 1,4438 | 0,4501 | 3,2079 | 0,0149* |
| CompxT | -0,1356 | 0,2048 | -0,6623 | 0,5290 |
| Corr | -0,0233 | 0,3157 | -0,0740 | 0,9431 |

*Note*. Source: Survey data (2019).

Thus, the results of the regression models suggest that there is a behavioral relationship between the Brazilian tax burden and tax evasion. And this can be explained by the lack of return perceived by society in relation to the taxes paid and not exactly by the effective size of the tax burden, as pointed out by the Laffer Curve.

Moreover, the presence of other potential determinants of control has not shown to have influence on the verification of the models, partially contradicting the findings of Richardson (2006) and Torgler (2005). Thus, the results presented, in comparison with the theoretical basis of equity and tax evasion, suggest that in Brazil it is the lack of perception of return to society that is related to the behavior of the level of tax evasion and not the simple fact of having a high tax burden, even because the taxpayer does not have a uniform weight of this burden, which makes it difficult to adhere to the classical economic Laffer's theory, as suggested, in the Brazilian context, by Lima and Rezende (2019).

Thus, it is evident that the debates about tax burden and tax evasion need to be better expressed theoretically, so that there is no misunderstanding about reality. On the other hand, the results of this study are important to provide subsidies to tax policymakers, in relation to the fact that this aspect of the tax burden may not have the dimension that is socially exposed, including for purposes of reforms in the taxation system.

Therefore, this study meets the need to address these tax issues in countries like Brazil, which is considered a country with an above-average level of tax evasion (Jacob, 2018), which can be confirmed by comparing the Brazilian average with that of G20 countries.

## V. FINAL CONSIDERATIONS

This study sought to analyze the relationship between the Brazilian tax burden and the level of tax evasion in the country from the perspective of the Equity Theory, allowing us to know the intensity and direction of the relationship between these elements. To this end, multiple linear regression models were used with collection of secondary data on tax evasion, return to society and tax burden, in the period 2005 to 2015. The proposition of two models served to strengthen the initial results. The time lapse used was due to the availability of data restricted to this time interval. In order to better position the analysis, a descriptive analysis was also conducted and some comparisons between the average Brazilian indicators and those of the G20 countries were made.

Tax burden and corruption were included as control variables in the models, since these two factors, in addition to being mentioned in the literature as determinants of tax evasion, are discussed as possible causes of the Brazilian tax context. For this reason, the set of these three variables allowed a better analysis for the study objective.

The theoretical hypothesis that the Brazilian tax burden, measured under the assumption of return to society, is related to the behavior of the country's tax evasion level was not rejected, since the results of model 1 showed that the IRBES variable was the only one that presented statistical significance, the same occurring with model 2. Thus, neither complexity nor corruption presented themselves as significant determinants to explain the behavior of the tax evasion level. These results reveal, under a theoretical perspective different from the classical economic approach, a different scenario from that commonly propagated in Brazil, however, confirms international studies that pointed out the interaction of evasion from the perspective of equity and not under the purely aspect of the size of the tax burden.

This particular way of measuring the tax burden and the statistical model used also presents itself as an advance in the methods used by studies on the subject, given the need to better understand the real relationship between tax burden and evasion, a recurrently discussed issue, but little empirically explored. Thus, the results of this study expand the still underdeveloped Brazilian literature when compared to international research and can inform future national discussions of a possible reform of the tax system. The findings fill a gap regarding research evidence in an emerging economy country, but with relevant economic and commercial weight worldwide, as is the case of Brazil.

Despite the results, this research has limitations. First, the database offered has some limitations, especially regarding the available period and the delay of disclosure with the last published period. However, these problems are not of localized nature and the other studies also had them, so that does not invalidate the findings found. The metrics and variables used are also subject to adjustments, especially regarding the inclusion of other types of determinants pointed out by the literature, such as state *enforcement* or the country's religious regime.

Finally, the study indicates some future suggestions. It is recommended that in addition to the inclusion of other possible variables to the model, analyses might be conducted with other countries with characteristics similar to those of Brazil, to better highlight explanatory lines and confirmation of the results presented herein.

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