



REVISTA AMBIENTE CONTÁBIL

Universidade Federal do Rio Grande do Norte

ISSN 2176-9036

DOI: 10.21680/2176-9036

Vol. 11, n. 1, Jan./Jun, 2019

Sítios: <http://www.periodicos.ufrn.br/ambiente>

<http://www.atena.org.br/revista/ojs-2.2.3-06/index.php/Ambiente>

Article received on: 5/17/2018. Peer-reviewed on: 08/22/2018.
Reworded: 09/24/2018. Reviewed by the system double blind review.

DOI: 10.21680/2176-9036.2019v11n1ID16270

Taxation and income: a study regarding the regressive model of indirect taxation in Brazil

Tributación e ingreso: un estudio a respeito del modelo regresivo de tributación indirecta en Brasil

Tributação e renda: um estudo a respeito do modelo regressivo de tributação indireta no Brasil

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Abstract

Purpose: To verify if indirect taxes on the income of taxpayers actually tend to be regressive, increasing the disparity between Brazilian taxpayers.

Methodology: The empirical strategy consisted in estimating a simple linear regression model, based on the model developed by Pintos-Payeras (2008). The database was based on the data from the family budget survey (POF / 2002-2003).

Results: The results show that indirect taxation tends to be regressive when family income is taken as the basis, since it affects all without distinguishing between its taxable capacity.

Contributions of the Study: The study demonstrates that those who are in better economic conditions have less and less to bear with this tax burden, and, therefore, taxes are more heavily burdened on people with lower purchasing power.

Keywords: Indirect taxation. Income. Regressivity.

Resumen

Objetivo: Verificar si los tributos indirectos en función de la renta de los contribuyentes de hecho tienden a ser regresivos, aumentando la disparidad entre los contribuyentes brasileños.

Metodología: La estrategia empírica consistió en estimar un modelo de regresión lineal simple, basado en el modelo desarrollado por Pintos-Payeras (2008). La base de datos tuvo como base los micros datos de la encuesta de presupuesto familiar (POF / 2002-2003).

Resultados: Los resultados muestran que la tributación indirecta tiende a ser de hecho regresiva, cuando se toma como base a la renta familiar, pues alcanza a todos sin hacer distinción de su capacidad contributiva.

Contribuciones del Estudio: El estudio demuestra que quienes se encuentran en mejores condiciones económicas arcan cada vez menos con esa carga tributaria, y, por consiguiente, los tributos inciden más gravosamente sobre las personas con menor poder adquisitivo.

Palabras clave: Tributación indirecta. Ingresos. Regresividad.

Resumo

Objetivo: Verificar se os tributos indiretos em função da renda dos contribuintes de fato tendem a ser regressivos, aumentando a disparidade entre os contribuintes brasileiros.

Metodologia: A estratégia empírica consistiu em estimar um modelo de regressão linear simples, baseado no modelo desenvolvido por Pintos-Payeras (2008). O banco de dados teve como base os micros dados da pesquisa de orçamento familiar (POF/2002-2003).

Resultados: Os resultados mostram que a tributação indireta tende a ser de fato regressiva, quando tomada como base a renda familiar, pois atinge a todos sem fazer distinção de sua capacidade contributiva.

Contribuições do Estudo: O estudo evidencia que quem se encontra em melhores condições econômicas arcam cada vez menos com esse ônus tributário, e, por conseguinte, os tributos incidem mais gravosamente sobre as pessoas com menor poder aquisitivo.

Palavras-chave: Tributação indireta. Renda. Regressividade.

1. Introduction

When the Federal Constitution (CF) (1988) instituted the indirect taxes, it allowed the agencies of the direct administration - Federal, State, Municipal and Federal District - to legislate about its rules and rates as well as their regulation. Indirect taxes are those linked to the production, purchase / sale and use of goods and services, and their ultimate impact on the composition of the price to be paid by consumers. Such taxes tend to be regressive because make no distinction between their taxpayers, whether rich or poor, paying the same amount for the products, goods and services regardless of their ability to pay.

The principle of ability according Torres (2011, p.94) defines that "each individual must contribute in proportion to their incomes and assets, regardless of any financial availability", in other words, without the resignation of existential minimum to life and human dignity. However, the indirect tax system in Brazil becomes unfair in that it establishes a wide disparity among its contributors.

On this, in a society where the collection of proceeds from taxation mostly happens indirectly. That is, people with higher purchasing power will contribute to a lesser extent, with the state funding.

Because, it sees that people considered rich or with greater economic capabilities are less subject to indirect taxation, levied on consumption and purchases of goods and services. It is appropriate that such a finding is of the fact that they hold greater savings capacity, thus contributing, in excess, with respect to absolute values because they have more access to goods and services offered by the market, however, not in proportionality for not demand large portion of their available funds for the above purposes.

Furthermore, it is perceived that the above case is somewhat contrary to the principle of tax equality laid down in article 150 of CF (1988), which prohibits arbitrary discrimination between payers who are in similar situations, namely it should also address the equal and unequally the unequal because, in a society in which there is great social inequality, one must

constantly seek instruments to reduce these disparities. Thus, this existence of inequalities, particularly income and consumption, justify the establishment of categories of taxpayers subject to a different tax treatment, while those taxpayers understood that the same category receive the same treatment.

Before the principle of tax isonomy - equality - is not stated in Brazilian society, the current indirect tax system becomes one of the instruments in order to maintain the static state's commitment to combat inequality. Given this context, we have in this work as a question to be answered: indirect taxes depending on income of the fact that taxpayers tend to be regressive, increasing disparities between the Brazilian taxpayers?

In this regard, the relevance of this work is focused on portraying the intimate relationship between the Brazilian indirect tax system and its dissemination among society. The discussion is not focused only glimpsing the purpose of tax collection indirect taxes, but in all its functionality related to collective life and the common good.

In order to analyze the relationship between taxation and its dissemination among society, this work aims generally to check whether the indirect taxes depending on income of the fact that taxpayers tend to be regressive, increase the disparity between Brazilians' taxpayers. It stands out among the factors that are based on this assumption the fact that these relate taxes, mostly on essential products to the livelihoods of individuals and whose share of the family budget, are quite significant. Moreover, the aim is also to bring this work to light the characteristics of indirect taxation, its ratings, its basic principles - relevant to this work -, and its tax collection and social purpose. In a specific way, it seeks to demonstrate with this work: i) quantitative variation of the Brazilian family income due to the ICMS, ISS, PIS / COFINS and IPI through a simple linear regression; ii) quantitative variation of the Brazilian family income depending on the total tax burden by means of a simple linear regression.

Thus, this work seeks to contribute to the discussion regarding the regressivity of indirect taxes and their effects on different layers taking into account differences in income. The aim is to demonstrate the establishment of indirect taxes end up penalizing the population that is in greater social vulnerability.

2. Theoretical Reference

2.1 Purpose of Taxation

One of the purposes of taxation is state funding, because without the proper financial contributions the State may not exercise its minimum duties. Thus, according to Viol (2005) the right to tax is inserted in the state of the core, because it allowed the men to live according Hobbes - English philosopher of the seventeenth century - defined as the natural state - pre-political life humanity - and to begin to be a fact of society, to manage it by a government, and finance it; establishing a clear relationship between ruler and ruled.

And instituted with the primary purpose of financing the state, once established, taxation acquires an importance that influences every aspect of life in society, precisely because it is considered one of the most powerful instruments of public policies by which governments express their economic, social and political convictions. Thus, according to Machado (2017, p. 6):

The more people can view the state as an important and effective instrument for the achievement of shared goals and objectives for all, more taxation will be effective with obedience of the rules which govern it being founded on the recognition and acceptance, not fear.

And for the state to provide citizens with the services they deserve, as the realization of the common good, the guarantees of social rights, education, health, security, among others, obtaining a large flow of financial income as necessary in the tax, which is fundamentally considered one of the biggest fundraising tools for government coffers, there is no way to separate taxation of social purpose aimed at achieving the fundamental objectives identified in art. 3º of CF (1988).

2.2 Classification of Taxes

According to Sabbag (2014), there are some classifications that can be adopted to the tributes, among them are the direct taxes whose incidence occurs when one person meet the conditions prescribed for taxpayers in laws such as the example of Income tax (IR) and the tax on Motor Vehicles (IPVA), and indirect taxes which according to Nogueira (1995) can be said to be those in which the tax financial burden is transferred to the final consumer through the phenomenon of economic repercussions, not calling the tax burden to a legal event or materials and in the absence of a direct reference to determine the economic capacity of the taxpayer. In line with the objectives presented in this work, the following indirect taxes are covered: ISS; ICMS; IPI; PIS / COFINS.

2.2.1 Tax of any kind service (ISS or ISSQN)

The ISS or ISSQN (Tax of any kind service), Table 1, according to Sabbag (2014), replaced the previous IIP (Tax Industries and Professions) by the Tax Reform implemented by Constitutional Amendment Nº. 18/65.

Thus, except for the services constitutionally placed over the range of incidence of the ICMS (comprising communication and interstate and intercity transport), any service can be taxed by municipalities, provided that defined by complementary law. The tribute has sharp tax purposes and is considered an important source of funds for the performance of the financial activity of municipalities and may also be exercised by the Federal District.

Table 1
Tax of any kind service

Fact Generator	Calculation basis	Aliquot	Passive subject	Competence
Service provision	Price of the service; Gross.	Fixed or proportional according to the possible features of the taxpayer. They range from 2 to 5% according to Complementary Law N°. 116/2003.	Service provider; company or self-employed.	Counties

Source: Adapted from Sabbag (2014).

2.2.2 Tax on movement of goods and services (ICMS)

The ICMS, Table 2, is the State tax, the former successor Tax Sales and Consignment (IVC) was established by the tax reform of Constitutional Amendment N°. 18/65 and according to a survey by the Brazilian Institute of Planning and Taxation (IBPT) (2016) the ICMS is on average 20% of the total collections conducted by public funds.

Before CF (1988), the tax termed ICM apply only to the movement of goods. With the advent of CF (1988), were added to its incidence of two services field, the interstate and intercity transport and communication. Hence the addition of the letter "S" in the acronym, so that, from the advent of the new constitutional order, came into being the ICMS, one of the highest grossing taxes in the country (Fenacon, 2017).

Table 2
Tax on movement of goods and services

Fact Generator	Calculation basis	Aliquot	Passive subject	Competence
Movement of goods or provision of interstate or intermunicipal transport service and communication	The value of the transaction; the price of the service; value of goods or imported goods.	Internal (17% 20%), interstate (can vary from 7% to 12%)	Person committing transactions relating to circularization of goods, goods importers, service providers (communication and interstate and intercity transportation)	State

Source: Adapted from Sabbag (2014).

2.2.3 Tax over industrialized products (IPI)

The IPI, Table 3, according to Sabbag (2014) can be considered as a real tax - because it has as fact the generator property - falling on a specific category of goods, in other words, products industry. It is considered a fiscal interest, as it represents significant increase of funds in the government budget. Analogous to this important tax collection function that goes with it, it also plays an important regulatory function of the market as it aims to encumber more strongly the luxuries and harmful to health.

Therefore, it is emphasized that the IPI is a selective tax. The selectivity is a technique incidence rate, which variation occurs in the essentiality of the product necessities. They must have low taxation, and luxury goods should receive higher taxation in accordance with art. 153, § 3º, I, CF(1988).

Table 3
Taxes over industrialized products

fact Generator	Calculation basis	Aliquot	Passive subject	Competence
Import; industrial plant output; acquisition of auction products.	Output operation value; regular price plus the tax industry itself; auction price.	They range from 0% to 365.63%	Importer; industry; product marketers subject to tax that supply industries; bidder at auction	Union

Source: Adapted from Sabbag (2014).

2.2.4 Social Integration Program / Public server's patrimony formation program (PIS / PASEP)

PIS is a social contribution tax and aims to pay unemployment insurance and workers' allowance. Actually, functions as an income transfer program.

The Public server's patrimony formation program (PASEP) works in conjunction with the PIS since July 1st 1976 and thus is collected by legal entities of public law the three levels of government - Federal, State and Municipal - thus returned to their servers (Sabbag, 2014). Table 4 shows the description thereof. Furthermore, the PIS / Pasep will be 0.65% in cumulative basis and 1.65% on not cumulative basis and 1% on the sheet.

Table 4
PIS / PASEP

Types	Taxable event	Calculation basis	Passive subject	Competence
Pis / Pasep (1)	Get monthly billing	Monthly billing	Legal entities of private law.	Union
Pis / Pasep (2)	Salary payment	Payroll	Non-profit entities (employers).	
Pis / Pasep (3)	Revenue collection or current transfers of income and capital	Amount of income or current transfers and capital income received	legal entities of public law	

Source: Adapted from Sabbag (2014).

2.2.5 Contribution to Social Security Financing (COFINS)

A Contribution to Social Security Financing (COFINS), Table 5, objective, as its name mentions, the financing of social security, which includes social security, social welfare and public health. Established by Law N°. 90/71 COFINS replaced the former Social Investment Fund (FINSOCIAL) (Sabbag, 2014).

Table 5
Cofins

Fact Generator	Calculation basis	Aliquot	Passive subject	Competence
Monthly billing	Monthly turnover or gross revenue minus the billing installments	The rate will be 7.6% on cumulative basis and not on cumulative basis 3%	Legal entities of private law and that you are treated (under IR legislation)	Federal Revenue of Brazil (SRFB)

Source: Adapted from Sabbag (2014).

2.3 Tax principles

The principles are commonly values that focus on a set of standards. Therefore, the principles that have been studied in this work include: the principle of Tax Equality; the selectivity and contributory capacity.

The principle of tax equality is known as the principle of tax equal, it is referred to in Art. 150, paragraph II, CF (1988) and said policy persons mentioned above are sealed to impose unequal treatment which are contributors in an equivalent situation, denying any discrimination in reason of professional occupation or job function, title or rights.

The principle of selectivity is provided in Art. 153, § 3º, section I, and is intended to tax more heavily more discretionary items, said superfluous. Already the essential products will have lower rates, seeking to facilitate taxpayer access to these products without burdening it too much. It is a principle that must apply to the IPI, and optionally has its application in relation to ICMS.

The principle of contributory capacity can be considered one of the main principles of tax law, because through it along with others is that the legislature and the right of the operator put into practice one of the basic principles of democracy is equality.

According to Regiani (2014), the principle of contributory capacity says that the legislature and the right operator also treat the equal and the unequal unequally, for only then the State may materially match people living in its territory.

We could say, then, that the principle of contributory capacity and the principle of equality are also linked to the principle of freedom. Thus, this principle should not define or inhibit freedom of taxpayers, reducing their growth and discouraging development, causing damage to the country's economic growth.

Furthermore, it is known that the State is not interested in ending its economy, on the contrary, its purpose is to make it grow, whether by increasing the production and the fostering of employment. Thus, according to Amaro (2004, p.137):

The principle of contributory capacity is inspired by the natural order of things: where there is no wealth tax is useless institute, just as on dry land does not help open the well for water. However, the legal formulation of the principle, not only want to preserve the effectiveness of the incidence of law (in the sense that it does not fall into the void for lack of wealth that supports the tax); Furthermore, you want to preserve the taxpayer, seeking to avoid excessive taxation (inadequate to their ability) to compromise their livelihoods, or the free exercise of their profession, or the free operation of your company, or exercise of other fundamental rights, since all relativize their economic capacity.

According to Torres (2011) there is a law for the minimum conditions for dignified human existence and it cannot be subject to tax incidence and still requires positive state

benefits. Without the minimum necessary for subsistence, ends the possibility of man's survival and also disappear the basic conditions of freedom. Human dignity and the material conditions cannot regress below a minimum, to which no human being should be private. The existential minimum is understood in several constitutional principles. The equality ensures protection against absolute poverty, as this results from social inequality. The right to existential minimum is implied in the proclamation of respect for human dignity, social state of law clause.

2.4 Indirect Taxation

According to Moraes (nd), in general it can be said that indirect taxation does not take into account the personal aspects of the economic capacity of the taxpayer. On the other hand, it makes use of the constitutional principles of ability, selectivity, among others. And because it does not take into account the individuals, the rate applied to taxes on consumption is the same for all people.

Also, according to Moraes (nd), the poorer a person is, the greater the portion of his income converted in food consumption and well essential is. And as there is an increase of rates in indirect taxes depending on income on consumer goods and, unlike what happens with the direct taxes, the impact on the poorest consumers end up being proportionately higher than the incidence of the richest in function of their income. The consequence of this kind of tax system is the trend of increasing social and economic inequalities. Thus, it appears that:

It is undecided that indirect taxes, particularly, tend to regressive, as consumers, rich or poor, performing transactions of goods and services, pay at the same rate, relative to the value of the good or service purchased, regardless of their capacity to pay. There is evidence, year after year, that the Brazilian state becomes increasingly financed by the lower income classes, with the low-income population supporting a high indirect taxation, which contributes to the worsening of social inequalities. (Sabbag, 2012, p.132)

Therefore, the weight of the tax burden reaches heavily rents layers of lower purchasing power, given the highest incidence on consumption, and is quite modest on the taxation of profits, income and assets. According to the study by Pintos-Payeras (2010) one of the ways for you to reduce the regressive nature of the tax system would be the reduction of levied taxes just on the food, which could serve as an additional to the programs carried out by the government in favor as an improvement in the living conditions of the poorest people.

In this same line of reasoning Vecchio (2002) points out that the prevalence of the principle of justice on the economic efficiency is necessary. Thus, distributive justice can be achieved through the redistribution to which taxation is an essential tool.

2.5 Distributive Justice and Tax Justice

Regarding the taxation Sanches (2010, p.13, as quoted in Mello, 2013, p.41) points out that:

The concept of fair taxation can have several meanings: the first is taxation towards tax justice, which merely make a quantitative assessment of how the tax burden is distributed among the citizens and businesses, or better, among various categories of taxpayers. Faced with a given tax burden, it is to know how it is shared among all, particularly in view of its incidence among taxpayers with higher and lower incomes. Already the term distributive justice concerns the fair distribution, equitable society.

However, for Rawls (1997) the basic institutions for the realization of distributive justice are political and legal and should therefore be appropriate in order to consummate the realization of this justice. Also, according to Rawls (1997), if these basic institutions are not adequate and harmonious with the principles of justice, aiming to provide the conditions for its realization, the result of this distributive process cannot be considered equal due to the lack of justice during his trial. "The realization of distributive justice is therefore a goal to be achieved by the choice of public policies to make effective equality" (Vecchio, 2002, p.5).

3. Methodology

3.1 Characterization Analysis and Data Source Unit

To achieve the goals it was made a pertinent literature about the issue of indirect taxation, in books, articles, theses and others. The literature admits as its main focus the study on theoretical references already analyzed. In Gil (2007), there are the most characteristic examples of this type of research on investigations, on ideologies or those that propose the analysis of the different positions on an issue.

So that one can understand consistently the object to be studied, it is also necessary to know the context in which it is inserted. To extent the question to be studied concerns the final incidence of indirect taxes on income, we sought to know *a priori* the concepts underlying the Brazilian indirect tax system, then correlating them to distributive justice concepts.

In order to describe the complexity of the problem in question, it used concomitantly quantitative and qualitative methods. The quantitative method according to Richardson (1999) is characterized by the use of measurement, both in the form of data collection and information regarding the processing of data by statistical techniques. According to Groulx (2008) qualitative research lies generally its contribution to social research, in the renewal of look cast on the question. The use of these two lines of research allows you to check for a more convinced result as to the occurrence or not of these consequences.

In this context, the secondary data investigated for obtaining the estimated indirect taxes on income is taken as a source of research, study of Pintos-Payeras (2008) containing 10 samples, which estimated the taxes from the micro data of the Family Budget Survey (POF) based in the years 2002 and 2003, a total of 48.112 families in Brazil after being incompatible deleted data.

According to the Brazilian Institute of Geography and Research (IBGE) (2018), the POF consists in a household sample survey, investigating the information about the characteristics of households, families and residents as well as their budgets.

3.2 Empirical Model Data treatment and Description of Variables

To fulfill the specific objectives proposed for this work to analyze the regressivity of indirect taxes depending on income, it was made a study of data through a simple linear regression for each selected type of tax. Regression as described Cecon, Silva, Nascimento and Ferreira (2012) determines, from the parameter estimates, one or more independent variables exerts, or appears to influence the dependent variable. Costa (2012, p.221) describes the regression allowing the estimation of the value of a variable as a function of another single variable, and "results in a mathematical equation that describes the relationship between these

two variables." It is noteworthy that for both the Excel programs were used Stata (Version 14) and SPSS (Version 21).

The application of the regression model, according to Fávero, Belfiore, Silva and Chan (2009), is justified by the fact that other models, including logistic regression and multinomial logistics are applied when using a binary variable and has more flexible assumptions, since the linear regression assumptions presented as the homogeneity of variance and homogeneity residues.

To verify the efficiency of regression was performed an analysis of variance (ANOVA) by setting a null hypothesis and an alternative hypothesis, in this prior work, the objective is to reject the null hypothesis. The hypotheses were:

H_0 : Indirect taxes are not regressive when taken based on the income of individuals;

H_1 : Indirect taxes are regressive when taken based on the income of individuals.

The analysis of variance for the hypotheses above was evaluated at 5% probability for all variables under study, the F test (Doane, & Seward, 2008). In the case of rejection of the null hypothesis, it can be concluded that the regression parameter (β_1) is not significant, that is, the regression would not have statistical validity.

The data for this study were adjusted for inflation, in order to compensate the currency value loss over time. In order to check the assumption of linear regression data normality, the Shapiro-Wilk parametric test was performed, which is suitable for studies in which there is a small number of observations. In the case of this study there were a total of 10 observations representing income classes in the study. The application of the Shapiro-Wilk test was performed on all the variables under study, under the assumptions:

H_0 : The data follows a normal distribution;

H_1 : The data did not follow a normal distribution. If the probability shown by the test is greater than 0.05 it accepts the null hypothesis (H_0), otherwise it rejects it.

Then the variables are logarithmic by natural logarithm (ln) so that the values in observation could all be under one model of standardization and evaluated percentage. Finally, it is estimated the coefficient of determination (r^2) in order to analyze how much of the income variation is explained by variables related to taxes.

In addition, the variables in the analysis were: family income with dependent variable; as explanatory variables were used ICMS, IPI, PIS / COFINS and ISS. For each explanatory variables it was estimated coefficient of linear regression. Finally, an explanatory variable named total tax load containing the sum of all taxes mentioned was also evaluated.

4. Results and Discussion

4.1 Behavior of income as a function of variables ICMS, ISS, PIS / COFINS.

The normality of Shapiro-Wilk, Table 6, showed that all variables follow a normal distribution at 5% probability and if it allows to apply simple linear regression.

Table 6
Shapiro-Wilk normality test

Variable	P-value
Total taxes	0.5810 *
ICMS	0.9460 *
IPI	0.3350 *
PIS / COFINS	0.9470 *
ISS	0.6270 *

Source: Research Data

The analysis of variance for the regression, the F test, showed variables, the total taxes, ICMS, PIS and ISS significant at the 5% probability, while the IPI variable was not significant. The coefficient of determination (R²), which explains how the variable depends, is explained in relation to the predictor variable, the estimates of regression parameters and their significance levels are presented in Table 7. These estimates show the behavior of the variation income taxes in relation to the study, obtained by simple linear regression.

The results presented in Table 7 indicate that for every percentage point increase in the tax burden related to ICMS, family income decreases by approximately 3.63% indicating a negative impact of increasing the tax burden on family income. As in the ICMS, one can see that for every percentage increase in the increase in PIS / CONFINS family income decreases by approximately 3.90%, which is considered the most expensive among the taxes, also indicating a negative impact of increased tax burden on family income.

On the other hand, the result shown in Table 7 for the variable ISS reveals that the said tax affects not more heavily household incomes considered lower because, in relation to this tax, the results show that for every percentage point increase of the ISS the trend is that in household income, which will be focused, the said tax is approximately 5.44% higher compared to the increase of the tax burden.

Also noteworthy is that in relation to this tax - ISS - the value obtained by the result shows that, as it is a tax that is allowed to progressive rate according to the characteristics of the taxpayer, that is, those who hold greater economic capacity, it will contribute in greater proportion, much due to the fact that they are more likely to purchase services considered more expensive and expendable, against individuals who are in lower economic classes, little or time or other subject themselves to acquire these services too taxed for that.

Table 7
Estimation of household income on the basis of indirect taxes

variables	Coefficient	P-value	r ²
<i>ln</i> ICMS	-3.6305	0.0000 *	.9056
<i>ln</i> ISS	5.4384	0.0031 *	.9128
<i>ln</i> IPI	2.6261	0.1490 **	.2416
<i>ln</i> PIS / COFINS	-3.9071	0.0000 *	.9194
<i>ln</i> Total load	-5.2278	0.0000 *	.6833

*Significant at 5% probability; **Not significant.

Source: Research Data

4.2 Behavior of income as a function of total tax burden

Table 7 also shows the behavior of the function of the total income tax burden. In this sense we have that, assuming the simultaneous incidence of all indirect taxes such analyzed for this work on family income, their impact would be approximately -5.23%, indicating a disproportionate impact of the increase in total tax burden on family income, therefore, this result shows us that for every percentage increase in total tax burden, there is a tendency for the family income decreases 5.23% in contrast to this increase.

In this case, it is seen that in so far as it increases the total tax burden, the value of family income will be less and less for the levy of these taxes, that is, they do not grow with increasing income, thus the case otherwise, increase while income is dwindling. Therefore, the more it rises the indirect tax burden in Brazil, considering only the taxes under study, the lower it is the amount of income for the occurrence. However, it appears that the distribution of indirect tax burden in Brazil does not happen in an equal way, favoring those who are in the higher income classes and that theoretically would have more financial means to afford the contributions.

5. Concluding Remarks

In this work, we performed a relevant study to indirect taxation in Brazil, where were presented some relevant concepts to taxation in line with the objectives presented in this work. Given these concepts, it follows that the indirect taxation as a whole, is more regressive, since both rich and poor contribute the same value when they purchase a single service or a commodity. However, this tax burden reaches more heavily the lower income classes than income classes with greater purchasing power, therefore they carry a proportionately less effort than the poorest families to pay the taxes under consideration, what will the mismatch of the principle of ability to pay.

The principle above is based on the view that who has more appeal should contribute in greater proportions, following this logic, it increases the level of income taxes, which should be collected from increasingly high fashion, therefore, it should not impose on citizens who are in lower financial capacities the same tax effort supported by those considered rich, because it is known that in practice it is not possible to organize a society with absolute equality. Differences exist, particularly the social and financial, and derive from the actual current social structure in Brazil.

In the estimation of the indirect tax burden it was introduced a statistical model of simple linear regression that allowed it to be made a statistical inference about the data under study, revealing some existing inconsistencies in the act of tax. What you could see in the results is that the quantitative variation of income in the percentage change in ICMS taxes, PIS / COFINS and on total indirect load, in fact tends to be smaller, therefore, the taxes in question are collected in larger numbers at the expense of a shrinking income.

Otherwise, regarding the ISS tax, he demonstrated that the findings of this study, the incidence of the same is true in a more progressive manner, therefore, the extent to which increases the value to be transferred to the payment the tax burden related to this tax, the higher the income of which will fall this taxation. It turns out that, because it is a tax that applies the rate of progression in line with the different segments of services offered by the market, the most favored economic classes have the financial means to acquire non-essential services, or even superfluous in that the basis of calculation which will focus the tax burden is considered high and cannot be acquired by those considered poor.

Still, we note that the result is considered somewhat antagonistic to the concept of distributive justice, which values the fair and equitable distribution of responsibilities among the individuals responsibility that the study is understood as the payment due taxes to the public coffers, and do not follow the objectives set by the current CF (1988), which includes equality to eradicate poverty and social inequalities as a whole, indicating a need for reform so that it can suit the requirements of a more just and equitable system , on the basis of ability to pay, aiming at a greater fiscal and social equality.

In this case it is possible to say that with the mitigation of taxes considered regressive there may be a significant contribution to a better distribution of income among families. The final price of the good or service to be paid by individuals would be lower, providing them more disposable income for other purposes and even to spare.

In summary, the study shows that those in better economic conditions bear less and less with this tax burden, and therefore the taxes levied more heavily on those with lower purchasing power.

It is suggested for future research to estimate the regressivity of indirect taxes on the Brazilian family income since the most recent data from POF 2008/2009 is already on the IBGE site and data from POF 2017/2018, which will be finalized in May 2018, and made available in 2019 and compare the results with the data from this work. This article and the databases above corresponded to a limiting factor for the performance of this study with more recent data. Such a comparison will enable trace trend curves which measure progress of such taxes in the budget of Brazilian families.

References

Amaro, L. (2004). *Direito tributário brasileiro* (10a ed.). São Paulo. Saraiva.

Banco Central do Brasil. (2017). *Calculadora do cidadão*. Recuperado em 24 outubro, 2017, de <https://www3.bcb.gov.br/CALCIDADA0/publico/corrigirPorIndice.do?method=c orrigirPorIndice>

Cecon, P.R., Silva, A. R., Nascimento, M., & Ferreira, A. (2012). *Métodos Estatísticos* (1a ed.). Viçosa: Editora UFV.

Costa, G. G. O. (2012). *Curso de Estatística Inferencial e Probabilidades: Teoria e Prática*. Atlas.

Doane, D. P.; Seward, L. E. (2008). *Estatística aplicada à administração e à economia*. São Paulo: McGraw-Hill.

Fávero, L. P.; Belfiore, P. P.; Silva, F. L., & Chan, B. L. (2009). *Análise de dados: modelagem multivariada para tomada de decisões*. Editora Campus: Rio de Janeiro.

Federal, Senado. (1998) *Constituição da república federativa do Brasil*. Brasília: Senado.

Fenacon. (2017). *ICMS: o peso-pesado dos impostos*. Recuperado 23 outubro, 2017, de <http://www.fenacon.org.br/noticias/icms-o-peso-pesado-dos-impostos-1387/>

Gil, A. C. (2007). *Métodos e técnicas de pesquisa social* (5a ed.). São Paulo: Atlas.

Groulx, L-H. (2008) *Contribuições da pesquisa qualitativa à pesquisa social*. In: Poupart, Jean; et.al. *A pesquisa qualitativa: enfoques epistemológicos e metodológicos*. Petrópolis, RJ: Vozes.

IBGE. (2018) *Pesquisa de orçamentos familiares – POF*. Recuperado em 15 maio, 2018, de <https://ww2.ibge.gov.br/home/estatistica/populacao/condicaodevida/pof/>

Machado, H. B., Segundo. (2017). *Manual de Direito tributário* (9a ed.). Atlas.

Mello, E. R. de. (2013). *Direito fundamental a uma tributação justa*. Atlas.

Moraes, E. de A. *A tributação indireta sob a ótica da teoria da justiça de John Raws*. Recuperado em 23 outubro, 2017, de <http://www.publicadireito.com.br/artigos/?cod=d99fa3a9dd5df426>

Nogueira, R.B. (1995). *Curso de Direito Tributário* (9a ed.). São Paulo: Saraiva.

Pintos-Payeras, J. A. (2008). *A carga tributária no Brasil e sua distribuição*. Tese (Doutorado em Economia Aplicada). Escola Superior de Agricultura Luiz de Queiroz, Universidade de São Paulo, Piracicaba, SP, Brasil.

- Pintos-Payeras, J. A. (2010). *Análise da progressividade da carga tributária sobre a população brasileira*. Recuperado em 31 agosto, 2018, de <http://repositorio.ipea.gov.br/handle/11058/5097>
- Rawls, J. (1997). *Uma teoria da justiça*. Tradução de Almiro Pisetta, Lenita M. R. Esteves. São Paulo: M. Fontes.
- Regiani, R.C.D. (2014) *Planejamento tributário e interpretação sistemática do princípio constitucional da capacidade contributiva*. Dissertação (Mestrado em ciência jurídica). Universidade do Vale do Itajaí/SC, Itajaí, SC, Brasil.
- Richardson, R.J. (1999) *Pesquisa social: métodos e técnicas* (3a ed.). São Paulo: Atlas.
- Sabbag, E. (2012). *Manual de direito tributário* (3a ed.). São Paulo: Saraiva.
- Sabbag, E. (2014). *Manual de direito tributário* (4a ed.). São Paulo: Saraiva.
- Torres, R. L. (2011). *Curso de Direito Financeiro e Tributário* (18a ed.). Rio de Janeiro: Editora Renovar.
- Vecchio, H.P. (2002). *Justiça distributiva e tributação*. Tese (Doutorado) – Curso de pós-graduação em Direito, departamento de Direito, Universidade Federal de Santa Catarina, Florianópolis, SC, Brasil.
- Viol, L. A. (2005). *A finalidade da tributação e sua difusão na sociedade*.