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Progressivity and distributive impacts of personal income tax: the case of China and Brazil

Progressividade e impactos distributivos do imposto de renda de pessoa física: o caso da China e do Brasil

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RESUMO: Este artigo tem o objetivo de avaliar e comparar o impacto distributivo das faixas de imposto de renda sobre pessoa física na China e no Brasil estimando o Coeficiente de Gini antes e depois da aplicação desse imposto. O artigo também estabelece uma metodologia para transpor as faixas de imposto de renda entre esses dois países. Os resultados mostram que faixas mais progressivas realizadas pela China, com maior número de alíquotas e com taxa marginais mais elevadas, não garantem maior redução da desigualdade. Argumentamos que isso ocorre devido à alta faixa de isenção e às baixas alíquotas das primeiras faixas, que acabam reduzindo a taxa efetiva para a maioria da população chinesa, incluindo aqueles considerados ricos dentro da distribuição de renda desse país. Com isso, percebe-se que as alíquotas de IRPF desses dois países merecem revisões caso busquem cumprir melhor a sua função distributiva.
PALAVRAS-CHAVE: Coeficiente de Gini; distribuição de renda; imposto de renda da pessoa física; progressividade tributária.

ABSTRACT: This paper aims to evaluate and compare the distributive impact of the personal income tax (PIT) on individual's income in Brazil and China by measuring the Gini Index before and after this tax incidence. The paper also proposes a methodology for transposing the PIT backets from one country to another. The results show that a more progressive scheme implemented by China, with more brackets and higher rates, does not guarantee reduction of inequality, due to the level of income exemption and to the incomes on which the marginal rates affect. Thus, it can be perceived that the PIT brackets of these two countries deserves revisions if they seek to fulfill the distributive function.
KEYWORDS: Gini index; income distribution; personal income tax; tax progressivity.
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1. INTRODUCTION

Fiscal policy has important distributive impacts as it affects differently the households and social classes by its public expenses – social transfers, public services, etc. – and by taxation. As described by Atkinson (2015), State's fiscal policies has the power to redistribute the national income and directly affect the households' income. Several authors emphasize the role of fiscal policy in reducing inequalities and suggest that using tax policy is the primary instrument for serving this purpose (Bird and Zolt, 2005; Piketty, 2014; Zhou and Song, 2016). Chieza, Franchescini and Santos (2020) state that the Personal Income Tax (PIT) is the most appropriate tax mechanism to meet tax justice and the redistributive purpose of the tax policy.

According to Kakwani (1976), a tax is considered proportional when the tax paid by an individual ($T(x)$) in relation to his income (x) is perfectly elastic, that means the elasticity of T in relation to x is equal to one. When the elasticity is higher than one, the tax system is progressive, implying that the tax will increase more than proportionally as the income grows. When the elasticity is less than one, the tax is considered regressive, growing less than proportionally to the increase of income. Among the tax instruments, personal income taxes (PIT) are potentially progressive as it allows differentiation of rates according to the individual's ability to pay[1].

This paper will seek to evaluate the distributive impact of the tax policy, specifically with regard to personal income taxes (PIT) brackets on labor income[2]. It aims to present a comparative study of this tax rule in Brazil and China. In China, the important economic growth has been accompanied by a rapid increase in income inequality (Knight, 2013), sometimes attributed to the high return rate of various kinds of capital including financial capital and real estate (Pikkety and Qian, 2009; Zhou and Song, 2016). Currently, China has seven progressive PIT rates (3%, 10%, 20%, 25%, 30%, 35% and 45%) with, as we will see, very limited distributive impact.

Brazil, on the other hand, is a country marked by historical inequality. As shown by Silveira (2012), the poorest 10% of the social pyramid commit 30% of their total income to indirect taxes and the richest 10% contribute only with 12% of their total income with indirect taxes. Currently, there are four progressive PIT rates in Brazil (7.5%, 15%, 22.5% and 27.5%), with limited distributive impact and restricted to a small part of the population.

In this context, this paper aims to evaluate and compare the distributive impact of personal income tax (PIT) brackets in China and Brazil by measuring the Gini

[1] On the other hand, taxes on commodities and services are regressive because they do not differentiate by income and wealth. Income taxes can then be separated by those that affect labor income (wages) and those that affect capital income (profits, interest rates, dividends and others).

[2] We use the labor income as a proxy for taxable income, which was feasible either for the Chinese and the Brazilian data.

Index before and after the tax incidence and by presenting a methodology for transposing theses tax scheme from one country to another. One limitation of this comparison is that it focus only on the marginal tax rates brackets, which burdens on the taxable income. In that matter, all the other elements that are related to the income tax, such as incomes that suffers special taxation, the credits and exemptions related to specific expenses are not contemplated. This methodological choice was due to the limitations of data that would make it possible such comparison, once the data of China that would fit for a broader comparison was not available.

For this task, the paper is divided into three sections, beyond this introduction and a conclusion. The second section discusses the general features of the PIT in China and Brazil, together with a literature review. The third section part estimates the impact of the PIT on the Gini index. Finally, the fourth section conducts an exercise in switching the PIT rules between China and Brazil to compare the differences in redistributive terms between these two countries. One issue to be assessed is whether the more progressive PIT brackets of China result in a greater distributional impact.

2. INCOME TAX AND INEQUALITY IN CHINA AND BRAZIL: GENERAL FEATURES AND LITERATURE OVERVIEW

Literature Review

Taxation system is one of the most important institutions for redistribution, and it has been regarded as a key factor of national capacity building. According to the definition of "politics" by Easton (1955, 1965a, 1965b), the authoritative distribution of social values is the most important function of the political system. In turn, Musgrave (1959) points that ability of the state to redistribute wealth and income is an important role of public finance, which the tax system plays an important role. Pye (1966) insisted that there is a "distribution crisis" in the political development of developing countries, which is how to use government power to influence the distribution of goods, services and values in society. Almond and Powell (1978) raised the concern that in the process of policy development, the political system must face the challenge of distribution. It is the pressure generated by domestic society to use the power of the political system to redistribute income, wealth and opportunity. Sen (1997) brings an important critic to an "economic view" of inequality, which insists in a utilitarianism approach that fails to meet the heart of the social issues caused by inequality. In this path, Feital (2021) points out that the tax structure plays an important role to address the State's human rights obligation. Lustig (2017), on the other hand, shows that although fiscal policy plays a important role in reducing income inequality in almost every case, this is not true when addressing to poverty issues, since the tax structure may burden heavily on the poorest by the consumption taxes.

Thus, the construction of national redistribution capacity is regarded as a major challenge for policy development (Almond & Powell, 1978). Furthermore, Mann (1994) insisted that redistribution is one of the most important functions of modern countries because of its most collective and public characteristics. From this perspective, the redistributive capacity should not be limited to issues such as the general understanding of the state's fiscal system and its operations, but also the reconstruction and sustainable development of state-society relations.

For the redistributive effect of income tax, Wagstaff et al. (1999) systematically measured and investigated the income redistribution effect of individual income tax in 12 OECD countries, and the measured results were comparable among countries. Bird and Zolt (2004, 2005) found that the PIT has done little to reduce inequality in many developing countries, and they need to look for other options to reduce poverty or inequality. Gerber et al. (2018) finds that the PIT progressivity has declined in the OECD countries over the 1980s and 1990s, and that this trend has not affected the GDP growth. Pfahler (1990) decomposed the redistributive effects of tax base and tax rates in income taxation. Using panel data from China and Vietnam, Wagstaff (2005) decomposed changes in income inequality into vertical and horizontal redistribution and reranking.

With the trend of income polarization in China (Wang & Wan, 2015), the redistributive effects of income tax has been widely discussed and investigated. For the pension system, the net benefit from the social security system is increasing with income, indicating an adverse income transfer in the social security system (He & Sato, 2013). Compared with developed countries, the PIT brackets in China seems relatively progressive, since it has maximum tax rates relatively high. Nevertheless, the average tax rate is relatively low, pointing out that the effective tax rates does not accomplish the role of progressivity. (Ma, Xu & Li, 2015; Xu, Ma & Li, 2013). For the standard deduction, results show that the exemption setting of China's PIT has a negative impact on the redistribution. (Jia & Liang, 2010; Tian et al., 2017; Liu & Kou, 2019).

In Brazil it is well known, by the literature, that the tax system is regressive, which is more generous with the richest. As shown by Gobetti and Orair (2017) this is especially true when observing that the taxation on dividends paid by corporations to their shareholders are exempt, and in turn, this became an important source of income of the wealthiest people of the country. Castro (2014), Rocha (2002) and Soares et al. (2010) call attention to the fact that PIT has a small redistributive impact in Brazil when compared with international standards.

Taking that into consideration, it is crucial to highlight that the capital gains taxation is as important as Income Taxation for equality measures. Indeed, "capital income inequality is much higher than labor income inequality, since these earnings are concentrated among the richest population"(Fernandes et al., 2018, p. 6). According to Fernandes et al. (2018), capital gains can be divided in interest from deposit or securities, gains on real estate properties, and profits and dividends. (Capital gain term not applied to Brazilian case in these two species).

Considering international practices (such as almost all the OECD countries) the biggest divergency of Brazilian capital taxation system regards the profits and dividends that are exempt on an individual level. Gobetti and Orair (2015) shows that the income from the richest part of the Brazilian population comes from distributed profits and dividends. Therefore, these authors estimated that those who had annual earnings over R$ 1.3 million had a tax rate around 7% in 2015. This discrepancy must be taken into consideration when analyzing the distributive impact of the tax structure in Brazil. Research from Gobetti and Orair (2015) concludes that taxes on profits and dividends would have a higher impact on reducing the Gini's index than having a higher PIT with more progressive brackets.

General features of Income tax in China and Brazil

The Case of China

Tax revenue in China accounts for about 85 % of total budget revenue in 2017, among the taxes about 40% of tax revenue is from value added tax (VAT) and the rest of them are exercise tax (7.1%), corporate income tax (22.2%), personal income tax (8.3%) and tariff (2.1%)[3].

In terms of PIT, the "Personal Income Tax Law of the People's Republic of China" was enacted in September 1980 and revised in October 1993. Since then, in August 1999, October 2005, June 2007, December and June 2011, the PIT law has been revised five times, mainly to raise the threshold (exemption amount). The monthly standard deduction has increased from the initial 800 yuan ($130) to 1,600 yuan (in 2006), 2,000 yuan (in 2008) and 3,500 yuan (in 2011). The seventh amendment occurred, which occurred on August 31, 2018, had a large impact on the tax design (the new tax law was implemented on January 1, 2019, and the new threshold and tax rates were implemented on October 1, 2018). The reform increased the deduction from 3,500 to 5,000 (RMB), changed the brackets of different tax rates, and some special deductions were added for pretax deduction, for example, education and medical expenses.

It is important to bear in mind that the PIT in China has some peculiarities. First, it has a monthly tax rate schedule on wages, differently from other countries that practice a yearly schedule. Secondly, it burdens on individual level (not on households) and does not depend on the marital status neither the number of dependents. Lastly, the income is divided in three types: wage income; self-employment income; and other incomes. Only the wage income is subjected to the progressive rate structure analyzed in this research.

> According to the statutory schedule, wage/salary income is subject to a multiple-tier progressive rate structure, self-employment income is subject to a different multiple-tier progressive rate structure, and other incomes are subject to a proportional rate (in general 20%). In practice, however, self-employment income in general is not taxed following such

[3] According to China Statistics Bureau (2019).

progressive rate structure. Due to the absence of a reliable book-keeping, tax officials choose to enforce a predetermined fixed amount self-employment income tax based on projected incomes for most self-employed businesses (He, Peng & Wang, 2018, p. 7).

Before the reform, the number of taxpayers was 187 million, which accounted for 13.45% of the total population. After adjusting the standard deduction to 5,000 yuan per month, the number of taxpayers was reduced to 64 million (a reduction of nearly two-thirds), accounting for 4.6% of the total population. In other countries and regions, the proportion of taxpayers is much higher: in the United States is 44.1%[4], in Germany is 49.7%[5], and in Japan is 39%[6]. Therefore, the low proportion of individual taxpayers in China limits the role of personal income taxation in changing the income distribution of residents.

The Case of Brazil

The main direct Brazilian taxes are the Income Tax (IR)[7] and the Social Security (INSS), with an average from 2002 to 2017 of 5.69% and 5.20% of GDP, respectively. The main indirect tributes are the Tax on the Circulation of Goods and Services (ICMS) and the Contribution to Social Security Financing (COFINS), with an average of 6.87% and 3.6% of GDP in that same period. These four tributes represented 21.41% of GDP in 2017, in other words, 66% of the total tax income of that year[8].

The PIT in Brazil has a long history, beginning in the "old republic", in 1922.

[4] According to the latest federal income tax data, available in <https://taxfoundation.org/summary-of-the-latest-federal-income-tax-data-2020-update/>. Accessed in May 07, 2020.

[5] According to Destatis, available in <https://www-genesis.destatis.de/genesis/online?operation=previous&levelindex=2&levelid=1588945385984&levelid=1588945310836&step=1#abreadcrumb> Accessed in May 07, 2020.

[6] According to the 143rd National Tax Agency Annual Statistics Report, available in < https://www.nta.go.jp/publication/statistics/kokuzeicho/h29/h29.pdf>. Accessed in May 07, 2020.

[7] Considering the Personal Income Tax (IRPF), Withholding Income Tax (IR Retido na Fonte) and Business Income Tax (IRPJ). If we consider just the IRPF and IR Retido na Fonte – what is the taxation directly on households – the average falls to 3.62% of the GDP from 2002 to 2017 (Receita Federal do Brasil, Carga Tributária no Brasil 2017, available in <https://receita.economia.gov.br/dados/receitadata/estudos-e-tributarios-e-aduaneiros/estudos-e-estatisticas/carga-tributaria-no-brasil/carga-tributaria-2017.pdf>).

[8] It is worth to mention that the Brazilian tax with the highest income revenue is the Tax on the Circulation of Goods and Services (ICMS), it is not Federal, but a state tribute. This fact imposes a political issue for attempts to reform the tax system in Brazil. Any government that is compromise in modify this fiscal arrangement into a more progressive system needs to deal with the fact that the financing process of subnational entities are the most regressive ones. Therefore, to reduce taxes on goods and services it would be necessary to compensate the states for the loss of tax revenues, either raising Real Estate taxation or motor vehicle taxation (that are direct taxes levied by states and municipalities) or imposing new direct taxation or transforming the federal income tax into a state taxation.

Since the establishment of the current Constitution of 1988, it has been through small reforms, from either changing the number of brackets or the income level for each bracket. In 1995 there were 3 progressive brackets besides the exemption range (15%, 26.6% and 35%), which became only 2 brackets from 1997 until 2008 (15% and 27.5%). Since 2009 there have been four progressive tax rates (7.5%, 15%, 22.5% and 27.5%) and since than the income level of each bracket has been adjusted seven times.

From 2015 to 2019, individuals with monthly earnings under R$ 1,903.98 were exempt from income tax. The first range of taxable income is from R$ 1,903.98 to R$ 2,826.65, with 7.5% tax. The second range is from R$ 2,826.65 to R$ 3,751.05 Reais, paying a 15% marginal rate. The third range goes until 4,664.68 Reais, with marginal tax rate of 22.5%, and the income over 4,664.68 Reais contributes with 27.5% tax rate.

Table 1 resumes the PIT over labor income in Brazil.The estimative of the population on each bracket and the tax revenues are made by applying the PIT rule over the labor income on the PNAD database of 2017. It can be noticed that the great majority of the Brazilian population with formal jobs has low income and do not reach the minimum range for the payment of the income tax. Table 1 shows that 52% of the workers with formal jobs earn under a R$ 1,903.86 monthly salary. Even though a monthly earning of R$ 1,903.86 is only slightly higher than 2 minimum salaries (R$ 937 in 2017), it is close to the 85th percentile of the income pyramid.

It also stands out that in Brazil only 13% of the population (about 27.5 million people) contributes with PIT (PNAD 2017). As in China, this low rate of taxpayers limits the capacity of this mechanism to play a major role in redistributing income. Also, the top PIT rate of 27.5% is extremely low in comparison to international standards (OECD countries), which lowers the contribution of the richest.

Table 1: PIT in Brazil: marginal tax rates,
tax revenues and taxpayers by income bracket.

Monthly Income		PIT Marginal Rate	Population on each Bracket (millions)	Total PIT Revenue on Each Bracket (millions, R$)
Above:	Less than:			
0	*1.903,98*	0,0%	60,68	-
1.903,98	*2.826,85*	7,5%	11,64	270,78
2.826,85	*3.751,06*	15,0%	5,58	643,09
3.751,06	*4.664,68*	22,5%	2,77	791,35
4.664,68	...	27,5%	7,49	13.005,32

Source: PNADC 2017. Elaborated by the authors.

3. DISTRIBUTIVE IMPACTS OF THE PIT ON THE GINI INDEX IN CHINA AND BRAZIL

Data

For China's analysis, we use data from the China Family Panel Studies 2016 (CFPS) by the Institute of Social Science Survey (ISSS) at Peking University[9]. The data set contains detailed information on housing attributes and family features. Housing attributes include market value, floor space, and year of purchase (move-in). Family features include income, outlays, wealth, and some family behavior. Since these surveys constitute the best available data that is large enough, we believe they are usable for our purposes. After cleaning up missing values, the data set contains about 10 thousand observations, widely distributed among 25 of the 31 provinces in China[10].

The database for the Brazilian case is the National Household Sample Survey (Pesquisa Nacional de Amostra de Domicílios – PNAD). The PNAD is a probabilistic sample survey of households made annually in a national territory scope by the Brazilian Institute of Geography and Statistics (IBGE). The 2017 PNAD survey has a sample with 211 thousand households, that is 457,992 people that captures data from all regions of Brazil. The PNAD brings data on labor and income of the households with important socio-economic and demographic information. Hence, it is possible to estimate the direct taxes on income by applying the rules for payment of Individuals' Income Tax[11].

In both the Chinese and the Brazilian database, adjustments were made in order to consider different sources of income of the same taxpayer and to exclude non-taxable forms of income[12]. With the per capita income of each household, the Gini Index is calculated before and after the PIT. Income tax refunds are not included in this analysis since the database won`t allow for distinguishing how each person spent their earnings, making it very hard to assume the tax refund for each household. Therefore, it is expected to over evaluate the distributive impact of the PIT.

It is important to mention that sample surveys such as those used in this work tend to underestimate the income of the richest population. Although there are

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[9] Detailed information of this survey can be found at http://www.isss.edu.cn/cfps/.

[10] The survey excluded six provinces—Inner Mongolia, Hainan, Tibet, Ningxia, Qinghai and Xinjiang.

[11] "PNAD data can be used to estimate the incidence of direct taxes, specifically those levied on income and real estate – specifically, IRPF, social security contributions and IPTU. These estimates are made by applying the legal norms relating to these taxes to the information in the PNAD on income received, labor relations (type of occupation) and the declared values for properties, to obtain potential amounts for IRPF, social security contributions and taxes (Silveira, Resende, Afonso & Ferreira, 2013, pp. 10-11).

[12] For the case of Brazil, it was excluded earnings from informal jobs and capital gains.

methods to link sample surveys with tax data (such as the Pareto interpolation[13]), they were discarded for this paper since Chinese data were not made available. To use similar databases and allow comparation between the two countries, we use only the sample bases presented.

Impacts of the PIT on the Gini Index

The results indicate that PIT in China has reduced the Gini coefficient from 0.456 to 0.447, equivalent to a 1.97% reduction of the inequality. In the case of Brazil, the Gini Index before PIT, with the Total Income (TI) of the Brazilian PNAD 2017, was 0.551, and after applying the PIT over the Taxable Income, the Gini Index goes to 0.537, reducing Gini Index in 2.51%. These results show that while the PIT redistributes income, as expected, it also occurs in a modest way when compared to international experience. Table 2 summarizes the Brazilian and Chinese information on the distributive impact of the PIT.

Although the PIT rule in China seems more progressive, with more brackets, widely spaced and growing up to 45%, the PIT in Brazil has a higher effect on the Gini Index. Table 2 also shows the *per capita* income and the median income, both in local currency, that will be used in the next section for the transposition exercise of the PIT between both countries.

Table 2: Basic comparison between the structure of income distribution and the distributional impact of the PIT in China and in Brazil

	Brazil	China
Gini Before PIT	0.551	0.456
Gini After PIT	0.537	0.447
Per Capita Income (local currency)	1,246.20	2,352.33
Median Income (local currency)	752.12	1,530.95

Source: Elaborated by the authors.

Although not the purpose of this paper, it is worth noting that the PIT distributive impact in both Brazil and China is low in comparison with central countries. As a reference, Hanni, Martner and Podestá (2015) shows that income tax plays a major role in reducing inequality in OECD countries. The authors compared the impact of fiscal policy in the Gini index on the OECD countries and the Latin American countries in 2011. One important finding of their research is that while in the OECD countries the Gini index dropped 36% on average after transfers

[13] The Pareto Interpolation was used in papers such as Atkinson, Piketty and Saez (2011) for 22 countries, and Medeiros, Souza and Castro (2015) and Fernandes, Campolina and Silveira (2018) for the Brazilian case.

and direct taxes, in Latin America and the Caribbean dropped by just 6% after these fiscal measures. According with Hanni, Martner and Podestá (2015, p. 13) this is due to the difference in the approach towards the PIT on these two groups of countries:

> [...] in the Latin American countries the structure relies heavily on indirect taxes, while in OECD countries a significant proportion of tax is levied directly, particularly through personal income tax, which has a greater redistributive impact. For example, the revenue raised by personal income tax averaged 8.4% of gross domestic product (GDP) in OECD, compared to just 1.4% in Latin America and the Caribbean.

In the same path, CEPAL (2015) points that the Latin American countries, including Brazil, should reform the PIT structures to higher the burden on the top incomes which suffers with low effective rates. The research shows a very limit hole of the PIT to redistribute income on this group of countries.

4. SIMULATION OF A TAX STRUCTURE TRANSPOSITION BETWEEN CHINA AND BRAZIL

After analyzing the impact of the PIT on the Gini Index for each country, this paper proposes a methodology to switch the PIT rules, applying the Chinese PIT brackets on the Brazilian sample, and vice versa. The transposition of PIT rules from one country to another is important because a tax can have quite different impacts on each country, since they have different income distribution, different levels of income, and therefore, different taxable bases. To fix the values of the income brackets, first a ratio is created by dividing the limits of each bracket of the PIT by the median income of that same country[14].

Subsequently, simulation multiplies the median income of one country by the ratio of each bracket of the other country in order to keep the same proportion in terms of the median income on the PIT structure of both countries. Table 3 summarizes how the Chinese PIT Rule is applied on the Brazilian sample. The multiplication of the median income of Brazil (R$ 752.12) by each Chinese ratio reveals what would be the Brazilian Income Brackets with the Chinese PIT rule.

It stands out that the exempt range for Brazil goes from R$ 1,903.98 on the Brazilian rule to R$ 2,456.39 with the Chinese rule. A taxpayer with an income of R$ 5,000, who is in the last income bracket and pays the marginal rate of 27.5%, when applying the Chinese rule that person would still be in the second rate of 10%.

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[14] The median is a more adequate measure than the average because, as the distribution is asymmetric, the average income can be in different percentiles for different countries.

Table 3: Transposing the Chinese PIT rule for Brazil[15]

Limits of Each Bracket / Median Income = Ratio	Ratio (Ch) * Median Income (Br)	Income Brackets (R$)			PIT Marginal Rate
Chinese Median Income = RMB 1,530.95	*Brazilian Median Income* = R$ 752.12	Over		41,758.65	45%
85,000/1,530.95 = 55.52	55.52 * 752.12 = 41,758.65	29,476.70	-	41,758.65	35%
60,000/1,530.95 = 39.19	39.19 * 752.12 = 29,476.70	19,651.13	-	29,476.70	30%
40,000/1,530.95 = 26.13	26.13 * 752.12 = 19,651.13	14,738.35	-	19,651.13	25%
30,000/1,530.95 = 19.60	19.60 * 752.12 = 14,738.35	8,351.73	-	14,738.35	20%
17,000/1,530.95 = 11.10	11.10 * 752.12 = 8,351.73	3,930.23	-	8,351.73	10%
8,000/1,530.95 = 5.23	5.23 * 752.12 = 3,930.23	2,456.39	-	3,930.23	3%
5,000/1,530.95 = 3.27	3.27 * 752.12 = 2,456.39	Under		2,456.39	0%

Source: Elaborated by the authors.

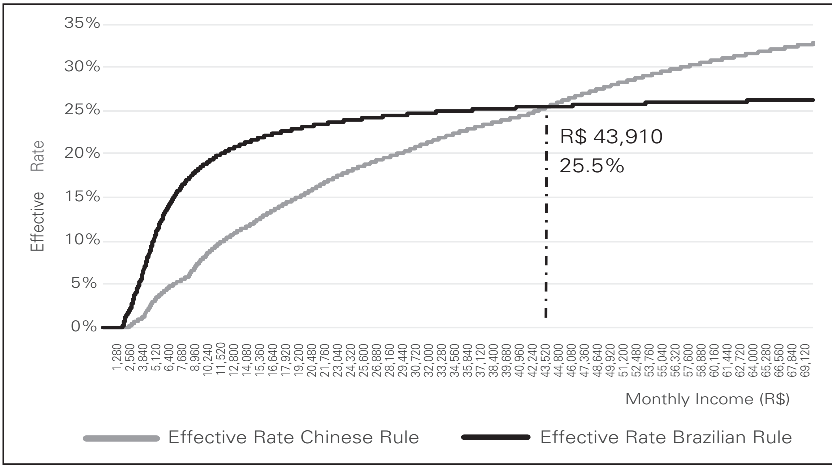
Figure 1 compares the effective PIT rate with the regular Brazilian rule and with the Chinese rule applied to Brazil. It is clear from that graph that with the Chinese rule the PIT is very generous with a part of the population that can be considered rich in Brazil. With the Chinese rule, high income taxpayers can benefit from the higher exemption level and from the lower tax rates in the beginning of the first tax bracket. Only those that have monthly earnings more than R$ 43,910[16] would pay more income tax on the Chinese PIT rule than with the Brazilian one. This effect is described by Souza (2020), who emphasized that raising the exemption level on the PIT brackets would also benefit the wealthiest by reducing the effective rate. The author's conclusion is that only an increase in the exemption range would result in a worsening of the distributive impact.

In the same path, the Brazilian PIT rule is applied to China. Table 4, summarizes this exercise, shows that the exemption rate falls considerably, from RMB 5,000.00 with Chinese rule to RMB 1,425.28 with the Brazilian rule. Not to mention that the last bracket, of 27.5%, the monthly salary limit is RMB 9,491.89, only a little over the second bracket in the Chinese rule, which the limit is RMB 8,000.00 and the marginal rate is 10%. Therefore, when applying the Brazilian rule for China, the PIT grows significantly in the beginning of the tax bracket, but it ceases to grow for the highest income.

[15] The Brazilian and the Chinese Median Income refers to 2017 database.

[16] That is a very high salary, around 51 times the minimum wage in Brazil in 2017.

Figure 1: The Effective Income Tax Rate in the Brazilian Sample with Chinese and Brazilian PIT Rules – monthly income in R$ 2017



Source: Elaborated by the Authors.

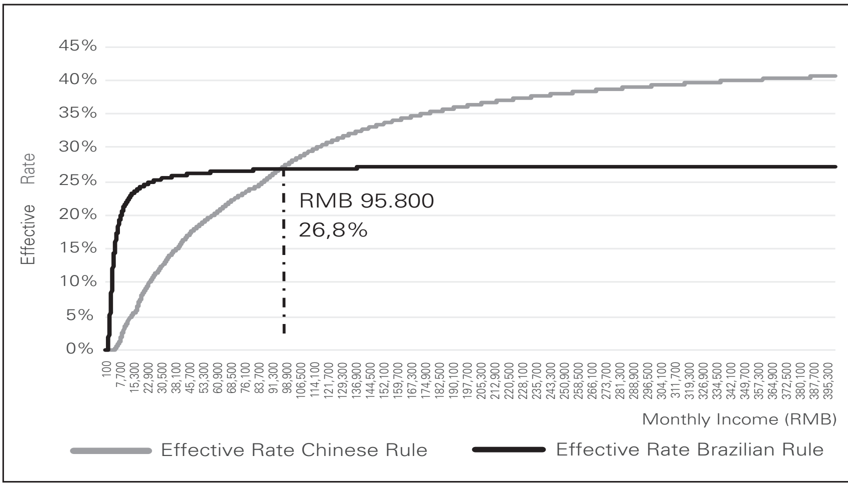
Table 4: Transposing the Brazilian PIT rule for China

Limits of Each Bracket / Median Income = Ratio	Ratio (Br) * Median Income (Ch)	Income Brackets (RMB)			PIT
Brazilian Median Income = R$ 752.12	Chinese Median Income = RMB 1,530.95	Over	-	9,491.89	27.5%
4,664.68/752.12 = 6.20	6.20*1,530.95 = 9,491.89	7,639.44	-	9,491.89	22.5%
3,751.05/752.12 = 4.99	4.99*1,530.95 = 7,639.44	5,756.37	-	7,639.44	15%
2,826.65/752.12 = 3.76	3.76*1,530.95 = 5,756.37	3,873.30	-	5,756.37	7.5%
1,903.98/752.12 = 2.53	2.53*1,530.95 = 3,873.30	Under	-	3,873.30	0%

Source: Elaborated by the authors.

Figure 2 illustrates that only those with monthly earnings higher than RMB 95,800 would pay more income tax with the Chinese PIT rule than with the Brazilian one, with an effective rate of 26.8%. Figure 2 also shows that someone with a monthly salary of RMB 30,000 would meet an effective rate of 12% with Chinese PIT rule, and with Brazilian rule the effective rate would be over 25%. As the income lowers, this difference gets higher: someone that earns RMB 18,000 a month would contribute with an effective rate of 6.6% with the Chinese rule, and with the Brazilian rule the effective rate would be 23.9%. And someone that earns RMB 5,000 that is exempt from the PIT in the Chinese jurisdiction, would commit to an effective rate of 14.5% with the Brazilian PIT rule.

Figure 2: The Effective Rates in China with the Brazilian and the Chinese PIT Rules – monthly income in RMB (2017)



Source: Elaborated by the authors.

The results of this transposition in terms of Gini Index are summarized in Table 3. When transposing the PIT between countries, we noticed that the Brazilian rule applied to China reduces the Gini Index by 6.3%, and the Chinese rule applied to Brazil reduces the Gini only by 1.42%. Therefore, the Chinese PIT rule is less effective in reducing inequality than the Brazilian rule when applying it into regular databases than when transposing the rules between countries. Therefore, despite the Chinese PIT rule has a higher maximum PIT rate and more brackets than the Brazilian, its impact on income distribution tends to be lower.

Table 5: Results of the PIT Transposition in the Gini Index

Transposing PIT Rules	Gini Before PIT	Gini After PIT	Reduction of the Gini After PIT
Brazilian Rule in China	0.456	0.427	6.36%
Chinese Rule in Brazil	0.551	0.543	1.42%

Source: Elaborated by the authors.

CONCLUSION

This paper assessed the distributive impact of the PIT calculated by the Gini Index, and proposed a methodology for transposing the PIT structure between Brazil and China. The results show that PIT reduces the Gini Index by 2.51% in

Brazil and 1.97% in China. These results also point to a counterintuitive conclusion: a more progressive PIT brackets does not guarantee a better distributive impact. Although the Chinese PIT has more brackets with higher marginal rates, they do not guarantee a better distributional impact. The higher exemption bracket and the lower rates in the beginning of the tax brackets distribution end up lowering the effective rate also for those with higher incomes.

Therefore, if the policy goal is focused on redistribution, it is important to observe the effective tax rates, since an apparently more progressive tax rate design is obviously not a sufficient condition. Thus, it can be perceived that the PIT brackets of these two countries deserves revisions if they seek to fulfill the distributive function. In further research, we can investigate what kind of income tax design can get to an optimal redistributive effect. This paper points out the importance of new studies that may show the way to improve the PIT structures and their role in reducing income inequalities in countries such as Brazil and China.

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