

Indirect Tax Incidence in Brazil

Assessing the Distributional Effects of Potential Tax Reforms

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Abstract

Using recent expenditure survey data, this paper investigates the incidence of all indirect taxes in Brazil. It applies a novel approach to estimate the effective tax rate by computing the specific cumulative taxes levied on thousands of items available in the data set. The findings show that for every R\$100 of indirect tax revenue, the first and second deciles pay R\$2 and R\$3, respectively, while the ninth and tenth deciles pay R\$16 and R\$33, respectively. Meanwhile, indirect taxes represent between 23 and 45 percent

of income among the poorest households. Simulations of a value-added tax reform suggest that it could be inequality reducing both horizontally and vertically. A flat value-added tax accompanied by excise taxes on fuel items, alcohol, and tobacco would also lead to lower decreases in expenditures. Households would spend 2.8 percent less on average, with those in the bottom (top) decile spending 7.0 percent (1.5 percent) less.

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Indirect Tax Incidence in Brazil: Assessing the Distributional Effects of Potential Tax Reforms⁺

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Introduction

The Brazilian tax system is well known for its complexity. According to the Insper's 2020 report on tax disputes (Núcleo de Tributação do Insper, 2021) there was R\$5.4 trillion in taxes under judicial or administrative dispute in 2019 across the three federal levels, amounting to 75% of Brazil's GDP in 2019. By some accounts, tax disputes amounted to 15.9% of the national GDP in 2019, while the 2013 medians for OECD and Latin American economies were of 0.28% and 0.19% of national GDP, respectively (Núcleo de Tributação do Inper, 2020). Brazil is among the lowest ranked economies in terms of costs of paying taxes. Brazilian firms spend over 1,500 hours a year to pay taxes and prepare for them. This is five times the average in Latin America and the Caribbean and close to ten times the average in OECD high income countries (World Bank, 2020).

The indirect tax system is widely recognized as one of the culprits of this problem. Indirect taxes are levied at all three levels of administration (federal, state and municipal) and the rates and exemptions vary substantially according to each sector and product. The system requires significant investments to navigate and thus potentially harms the business environment, the economy's productivity, and, ultimately, economic growth (Appy, 2017, and Oliviera, 2020).

Lately some concrete proposals are being discussed in the Brazilian congress to reform the indirect tax system. The general objective of such proposals is to replace the web of federal and state indirect taxes by a more straightforward system based on a value-added tax (VAT). This study aims to shed light on this policy conversation. The paper presents a distributional analysis of the current indirect tax system of Brazil, considering the consumption patterns of Brazilian households, and discusses three simulations of the indirect tax system: a flat VAT of 26.9%, a flat VAT accompanied by excise taxes, and a flat VAT of 12% to replace federal indirect taxes – each corresponding to potential reforms discussed broadly.

Survey data used in this study captures about 95% of total indirect tax revenues as found in national accounts. Our incidence estimates suggest that the highest taxes as a share of households' expenditures include tobacco (78.7%), hygiene and personal care products (40.6%) and transportation (35.8%).¹ In absolute terms, transportation (R\$15.5 billion) and housing (R\$11.3 billion) are the categories with the highest taxes paid. The total amount of indirect taxes paid is positively correlated with income, with the top decile paying R\$33 of every R\$100 collected by the government in this type of revenue. However, we find that indirect taxes present a high burden on the poor. Depending on the aggregate used, the burden of indirect taxes among the poorest decile ranges between 23% and 45% - the corresponding rates for the richest households are 19% and 13%.

The paper presents results on two sets of simulations. The first simulation illustrates the potential changes on expenditures of a total elimination of indirect taxes with a concomitant implementation of a flat VAT of 26.9%. Given the likelihood that such a reform is accompanied by the incorporation of excise taxes on products such as fuel and tobacco, we re-run this simulation making this assumption.² The second simulation focuses on eliminating federal indirect taxes (PIS/COFINS) and replaces them by a flat

¹ To note is that 35.8% accounts for all transport expenditures, but specific types of transportation such as public transportation have a tax burden of 10.81%

²The excise taxes adopted in our simulation allow reproducing the current tax rates on the relevant products.

12% VAT. All simulations are partial equilibrium and do not account for households' or firms' potential behavioral changes.

Results from a flat 26.9% VAT suggest that expenditures of households would decrease by about 4.3% nationally. This implies an increase in the purchasing power of households. Among the poorest decile, this change would be largest: 10.2%. For those at the top, the gains would still be large: 2.5% (or about R\$158 monthly per capita). Decreases in expenditures come largely from transportation and housing expenditures. The implementation of excise taxes reduces the expenditure fall (and the purchasing power gains): 2.8% on average. Relative gains are still higher among the poorest, but they are of lower magnitude across the income distribution. The final simulation shows that replacing federal taxes by a 12% VAT could lead to a negligible change in households' expenditure. Nonetheless, the expected change in purchasing power is a small *decrease*: to buy the same basket of goods, households on average will now have to spend 0.2% more.

This paper contributes to the literature by implementing a novel approach to the problem of estimating the indirect tax burden in Brazil. The methodology uses the taxes levied by the state of São Paulo as representative and allows the estimation of the effective tax rate by computing the specific cumulative taxes levied on each item available in the rich POF 2017/18 data set, which contains 8,700 items. Previous work has been done to estimate the cumulative taxes by using national input-output matrices (Siqueira et al, 2001, 2021), which – despite being able to estimate taxes for all components of the aggregate demand and not only families' consumption – is limited to a set of 67 activities and 127 products (Siqueira et al, 2021). In similar venue to this work, Silveira (2012) computes detailed indirect taxes for all states in Brazil, which is also a step further, since we restrict ourselves to the state of São Paulo. However, Silveira (2012) estimates nominal taxes, and assumes there is no cumulative nature in the taxes - an analytical challenge that this work intends to address.

This note is structured as follows. After a brief presentation of the Brazilian system of indirect taxes, the data and methodology sections are presented. The results of the analysis of consumption patterns and indirect tax incidence analysis follow. The subsequent sections present the results of the simulations and the conclusion.

Indirect Tax System in Brazil

Brazil has one of the most complex tax systems in the world. As discussed by Oliveira (2020) and Appy (2017), the complexity of the indirect tax system can cause severe inefficiencies and growth losses. Losses are due to the resources required to accurately comply with a high number of taxes, their cumulativeness, the influence of three different administrative levels (city, state and national)³ with different interests, the excessive number of exemptions and special regimes, and the lack of uniformity, since taxes vary by sector and product substantially. Oliveira (2020), using a dynamic CGE model, estimates that a 25% VAT implementation over a 10-year period would allow a 5.5% GDP growth over the same period, while a 26.9% VAT would reduce this growth to 2% since the author assumes 26.9% as the fiscal-neutral rate. Despite yielding a lower tax income due to a lower rate, the much larger GDP growth projected for the 25% VAT could compensate the lower tax income (Oliveira, 2020).

³ Each state, and sometimes even cities, can define their own indirect taxes on top of the federal ones.

Recent policy discussion in the country has focused on reforming the indirect taxes system (see Annex I). Indirect taxes currently levied in Brazil are the following:

- PIS/COFINS or *Programas de Integração Social e de Formação do Patrimônio do Servidor Público* (PIS), and *Contribuição para Financiamento da Seguridade Social* (COFINS): taxes levied on revenues under cumulative and non-cumulative systems; some items have exemptions;
- IPI or *Imposto sobre Produtos Industrializados*: a tax on imports and manufactured products, for some items it works like VAT, for others it works like excise;
- ICMS or *Imposto sobre Circulação de Mercadorias e prestações de Serviços de transporte interestadual, intermunicipal e de comunicação*: tax on circulation of goods and provision of interstate, inter-municipal transportation and communication services, similar to VAT; and
- ISS or *Imposto Sobre Serviços*: a municipal services tax that is regulated at the federal level.

A description of each of these is provided in Annex II.

Data

To analyze the incidence of indirect taxes in Brazil we use several sources of data. The first source is the Brazilian household budget survey (*Pesquisa de Orçamentos Familiares* or POF) 2017/18, collected by the Brazilian official statistics agency, IBGE (*Instituto Brasileiro de Geografia e Estatística*).⁴

Expenditure data in POF 2017/18 are classified into pre-defined items. There is information on about 8,700 items (out of a possible total of 13,500). The first three columns of Table A1 (see Annex III) show how these items can fall into four broad categories: current expenditures, liabilities reduction, assets increases, and imputed rent, which correspond to 80%, 3%, 4%, and 13% of the total POF expenditures, respectively. Current expenditures can be further divided into consumption expenditures (75% of total expenditures) – accounting for the typical groups of food, health, education, housing, transport, etc.- and “other current expenditures” (5% of total). This category includes payment of taxes, alimony, and bank services. Assets increases include mainly investments in real estate, whereas liabilities reduction are basically debt payments. The data collected in POF 2017/18 allows creating another type of categorization based on the pecuniary nature of the transaction. Thus, expenditures in POF can be classified into monetary expenditures (74% of total), such as cash and card purchases, and non-monetary expenditures (26%), which refer to the monetary valuation of in-kind transactions or activities such as own production or exchanges.

Two additional elements in households’ consumption expenditure collected in POF are worth highlighting. First, the Instituto Brasileiro de Geografia e Estatística (IBGE) publishes within the POF data a valuation for “non-monetary services” for public health and education services. These account for about 8% of total consumption expenditures. Examples of these include *Curso Pre-escolar* (pre-school), *Curso Regular do Ensino Fundamental* (primary school), and *Consulta Médica com Clínico Geral* (medical appointment with a general practitioner). Unfortunately, there are few details on how these values are

⁴ POF is a nationally representative budget survey, that collects detailed expenditures data from more than 178,000 individuals and 58,000 households. Apart from the household budget composition, POF also collects demographics and living conditions data, including the nutritional profile and subjective perceptions of quality of life. POF 2017/18 was collected between July 11, 2017 and July 9, 2018.

estimated (and in some cases imputed). A second item worth noting is the monetary valuation “imputed rent”. It is worth 13% of total consumption expenditures, and about half of the value of non-monetary expenditures. It reflects an estimated rental value of the dwellings where households who are *not* renters live. This group of households includes homeowners or households who are living in a space rent-free.⁵

Finally, the POF 2017/18 data allows for the measurement of household total income. We use an income aggregate to classify households into income per capita deciles and use these categories as basis for our incidence analysis. Household income is defined as all gross monetary labor and non-labor income (such as government transfers and pensions), as well as wealth variations (such as sale of cars, real estates, and other assets, inheritances, and positive net results from financial operations), effectively received during the survey reference period (12 months prior to the interview) annualized and transformed into monthly averages.⁶

Other supportive data sources were required to build the analysis presented in this note. The Sector Annual Surveys⁷ conducted by IBGE provide statistics on value added, employed labor force and its compensation and investments in fixed capital, among other aspects. For this work, the value-added information, that comes as a profit and losses (P&L) demonstrative of each subsector, allowed the calculation of the tax costs of each expense and cost item of the economic activity. In addition, for the health and education sectors, the data came from the TRU (Table of use and resources) of the National Account System. The IBGE Surveys and the TRU are for the year 2017.

We now turn to the methodology used to estimate the tax burden. Given the large number of nuances in the Brazilian tax system, the section provides several details on how the different parts of the burden were estimated and is somewhat technical. Readers interested in the results should go to the results section.

Methodology

a) Tax Burden

The POF 2017/18 captures in detail the expenditures of households and thus could provide an estimate of the taxes paid at time of purchase. However, the full burden of indirect taxes cannot be captured this way as some of the taxes are cumulative (such as PIS and COFINS under the cumulative system). That is, it is important to consider the taxes paid in all stages of the production chain to be able to accurately reflect the full tax burden of indirect taxes.

Our methodology estimates the effective tax rate paid by Brazilian households taking into account real-world aspects that affect the tax burden such as the accumulation and tax evasion.⁸ First, the items are

⁵ In IBGE publications, imputed rent is typically included in a “housing” category. However, given the tax-focused nature of the current analysis, this category is kept separate as it does not involve a pecuniary transaction, nor is it taxable.

⁶ Monetary income in POF is comparable to the widely used national household survey PNAD-C (Pesquisa Nacional por Amostra de Domicílios Contínua), except that POF’s non-labor component is substantially more detailed, which is expected to lead to less measurement error and slightly higher quantities. In Paffhausen et al. (2021), the authors find that differences remain within the surveys’ 95% confidence interval.

⁷ PAIC (Annual Survey of Construction Industry), PIA (Annual Survey of Industry), PAS (Annual Survey of Services) and PAC (The Annual Survey of Trade).

⁸ We use effective tax rate and tax burden interchangeably in the document.

grouped according to the sector of sales, such as restaurants or supermarkets. Within each of these sectors of sales, items are grouped according to their sectors of production of inputs or supply. Finally, within these categories, items are grouped according to the taxes paid in the final sale.

To estimate the burden of taxes we use the state of São Paulo as a representative state in our calculations.⁹ São Paulo was chosen as a representative state in our estimations for a few reasons. First, it is responsible for 30.7% of the Brazilian GDP (in 2017) – so it'd be an arguably good representation of about a third of the economic transactions of interest. Secondly, it can be argued that the state is placed in a “balanced” position with respect to other Brazilian states. São Paulo does not adopt high/extreme tax rates for not essential goods and services. For instance, in São Paulo, the maximum tax rate applied to energy is a 25% rate, while in Rio de Janeiro the rate can reach 32% if the monthly energy consumed is more than 450 Kw/hour. Silveira (2008) claims that using São Paulo as a representative state leads to underestimations because, for being the richest state and having a larger taxpayer base, it could afford higher exemptions. However, Afonso et al. (2014) show that São Paulo provides a lower number of tax benefits than other states in Brazil. These ‘opposing’ positions in regard to tax burden on households support the case of São Paulo representing a compromise for our estimations. Finally, having a representative state keeps the exercise at hand manageable while providing good intuition of the direction of the effects of potential reforms. Implementing alternative methodologies allowing state-level variation would require separate avenues of work in our case.¹⁰

To illustrate the methodology applied here, we can use an example from the items produced by the beverages industry, particularly from items that are sold in supermarkets and charged 9.25% of PIS/COFINS and 0% ICMS. These include many kinds of fruit juices, liquors and teas. We further focus on the example of bottled orange juices. Apart from adding the 9.25% (9.25 + 0) from the final sales tax, we must also add the taxes which are hidden in the costs of the good sold. This cost incurs in two ways: i) from taxes paid directly by the seller when acquiring the inputs, labeled “immediate supplier taxes”, and ii) from which is referred to as the “remaining chains”: taxes paid by the immediate suppliers when

⁹ Such strategy was also adopted in Silveira (2008).

¹⁰ An alternative methodology for assessing the ICMS tax burden, and consequently the impact of a VAT, would be, in a very short summary, the following: i) Insert the statutory tax rate of each good and service; ii) apply the tax rate on the consumer expenditure (POF); iii) compare this result with the actual collection of revenue from ICMS; and iv) the difference will be used to reduce (in most of the cases) the effective tax rates for each good and service, which will be used to calculate the ICMS tax burden. However, there are many downsides to the application of such a methodology. First, the revenue collected (in ii above) must be adjusted once part of the revenue comes from transactions with companies that are not ICMS taxpayers; even if we use the I/O Matrix for that purpose, the variety of ICMS taxation will result in distortions. Second, the tax costs hidden in the business chains will be distributed equally (proportionally) for all products and services; (our work demonstrates that the distribution of the tax costs is far from being equally distributed). Third, the exempted goods will be considered as carrying no tax burden, but, as a matter of fact, they do. Taking the example of beans, these are exempt of PIS/COFINS, IPI and ICMS, but because of the limitation of the tax credits, we estimate a 3.83% (average) tax burden. Finally, the tax burden that is overseen in this last step would be, in fact, distributed among the rest of (not exempted) goods further distorting the results. The methodology used in this work prefers to specify the taxation for each product, also, considering the tax cost hidden in the business chain. We illustrate with another example. São Paulo adopts a general rate of 18%. Rice and beans have a reduced tax basis, which results in effective tax rate of 7%. However, upon the sale to the end consumer, the legislation provides exemption. The determination of the tax burden depends on whether the tax paid by the food industry (7%) is creditable by the retailers. Exemptions do not allow credits unless the legislation provides an exception (which it does in this case). This methodology provides a number that is much closer to the effective tax burden of each product and what we consider a reasonable approximation of the reality. Using the same level of detail for the 27 Brazilian states would require opening new research avenues.

buying from their own suppliers, and in the remaining taxes that are part of the costs of the final seller which do not come from the direct inputs (e.g. marketing, administrative, other services).

To compute both components of the “hidden taxes” we proceed as follows. For the taxes from the “immediate supplier” only the cumulative part is relevant.¹¹ This step depends on the taxes charged on each key input (which, in our example, is the bottled orange juice), and on any specific tax deductions. For instance, note that ICMS is paid by the factory or importer (“*substituição tributária*” or tax substitution), while the wholesalers and retailers do not have to pay ICMS. In the case of a supermarket selling bottled orange juices, for example, such tax procedure results that ICMS will be in the cost of acquisition from the company that bottles the juice (but not in the final sale, see below). We calculate the taxes coming from the cost side (i.e. those paid by suppliers) based on the detailed information of each sector’s profit and losses statements (DRE - *Demonstração do Resultado do Exercício*) available from IBGE’s sector surveys. These statements contain the fully disaggregated cost structure of each sector, from which it is possible to infer the indirect tax incidence in each input.¹²

Estimates of the tax burden in the “remaining chains” also use the sectoral income statements. However, since these taxes are a residual and represent a small share of the total tax burden, they are bundled together as a “sector tax burden”. Hence, each sector’s DRE yields a sector tax cost (including only cumulative taxes), which is added directly to the costs of goods sold. For instance, the Agriculture DRE yields a 7%, the plastic industry another share, and so on. These are computed as part of the tax cost of the beverages industry selling orange juice to the supermarket and are added to the costs of input computed in the “immediate supplier” step. The taxes affecting the remaining costs of the supermarkets are computed in the same fashion.

Lastly, adding the indirect tax burden from the sales and the cost yields the total tax burden of each item in POF. With this result, we multiply the tax burden of each item by each household’s monetary expenditure on the item, which yields the total taxes paid by each family in each expenditure item. These can be aggregated by income decile and group of expenditures (e.g. food, housing, transport) using the survey weights from POF.

This method of calculation of the tax burden goes back to the fourth stage of the business chain. Therefore, there is a residual tax cost that is not captured. Some tests reveal that 3% to 4% of the total of the tax burden was not captured. However, this methodology allows to narrow the calculation of the tax burden by type of product, which helps to calculate the impact of the Brazilian tax system on the income distribution. Finally, in our methodology the tax cost of the fixed assets is not calculated.

¹¹ The non-cumulative ones are directly discounted by the businesses and are not part of the costs.

¹² The IBGE Sector Surveys is used for structuring the Table of Resources and Uses (TRU), and, as a consequence, the input/output (I/O) matrix that has been used in other studies (IBGE 2016, 2010). Therefore, using these surveys will likely result in similar estimates compared to an alternative approaches that use the I/O Matrix. However, by using the TRUs we lose the taxation details - specially of the costs (inputs) used in the production of goods and services. Such level of detail is very important due to the complexity of the Brazilian tax system and may result in singular tax burden for each product and service. We recognize, however, that the TRU allows to reach all stages of the business chain (infinitesimal number of chains). The methodology adopted by this work goes back to the 5th stage of the business chain, which captures 95% of the consumer tax burden of each product and service (see macro validation subsection). We do not expect the remaining 5% to change substantially the distribution of the tax burden among the consumption items, as well the tax burden borne by households.

b) Simulations

The VAT simulations that follow are built using a similar method to the tax burden calculation. However, we use the sectoral income statements to infer what would be each POF item's price variation if the taxes computed at each step of the production chain were substituted by a flat VAT and assuming that profit rates remained constant in each the sector/supplier. This procedure is applied at the three stages: (1) final sales, (2) immediate supplier, and (3) remaining chains. Therefore, it is assumed that firms would adjust their revenues via prices according to the tax changes, subsequently, until the final price variation to the consumer can be inferred. In other words, at each stage the taxes are removed from the costs, and the prices needed to arrive at the same profit rate are computed. The VAT is applied to the new prices and we have the final price variation of each sector and, ultimately, of each item in POF. See Annex IV for an example of how this price simulation is obtained.

If each item's price variation is multiplied by each household's reported expenditure in the respective good, the resulting number can be interpreted as the new expenditure of the household destined to the given item after the VAT implementation, holding firms' profits and quantities consumed constant (i.e. consumers' demand not reacting to price changes). When aggregated at the household level, this result allows identifying how each consumer group's expenditures would be affected. Winners of the reform face an expenditure reduction (as purchasing the same basket now costs less) due to a negative price variation – and vice-versa.¹³

Results

Consumption Patterns in Brazil Using POF 2017/18

Table 1 presents the monthly per capita expenditure by income decile. The per capita expenditure is about R\$389 for households in the 1st decile, R\$941 for households in the 5th decile, and just above R\$5,000 for households in the 10th decile. The high inequality in Brazil documented in other studies is evident here as well: the consumption of the 10th decile is 13 times the consumption of the 1st decile.

After disaggregating all consumption into 22 groups, we find that housing, transport, and food account for the highest consumption share across all categories, representing 21%, 18% and 18% of the national average expenditures.¹⁴ For the middle-top of the distribution (4th and 6th to 10th deciles) housing accounts for the highest consumption share among all categories, although transportation has virtually the same share for the top-three deciles. For the bottom three deciles food is the most important category, reaching almost one-third of the expenditures of the poorest decile.

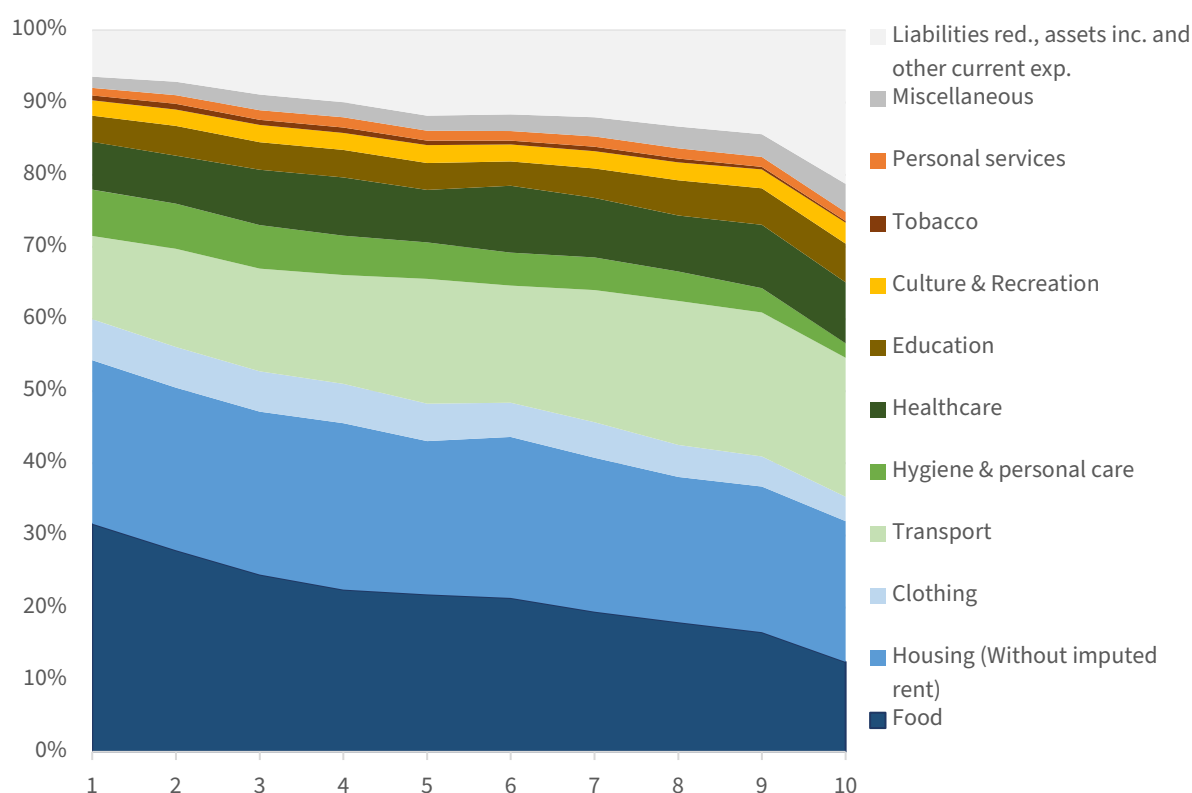
Figure 1 presents in detail the categories included as Consumption Expenditures (i.e. the top panel of Table 1) showing the relative weight of expenditures by income decile. Non-monetary services and imputed rent are not included in the total of Figure 1 for ease of presentation. The share of food expenditure decreases as one moves along the income distribution, representing 32% and 12% of the 1st

¹³ Our simulations implicitly assume that the final consumers bear the full incidence of indirect taxes. Earlier studies (Benzarti and Carloni, 2019; Harju, Kosonen and Skans, 2018) have analyzed changes in VAT and have found evidence of various degrees of "passthrough rates". Estimating an appropriate rate for Brazil is beyond the scope of this study. We thus explicitly interpret our results as upper bounds of potential effects on households' expenditures.

¹⁴ We exclude imputed rent and non-monetary services in this calculation. A comprehensive description of the expenditures included in POF 2017/18 is included in Annex III.

and 10th deciles expenditures, respectively. Housing expenditures' share follows a similar decreasing trend, despite being more stable across deciles, decreasing from 23% to 20% when moving from 1st to the 10th decile. While being a relatively smaller expenditures group, hygiene and personal care also follow a similar trajectory, reducing its share from 6% to 2%, when comparing the poorest with the richest decile. Expenditures on transportation show a contrasting pattern. Its share increases from 12% in the 1st decile, to 19% in the 10th decile. The expenditure categories that show a relatively higher concentration in the richest decile are contributions to private pensions (*previdência privada*) and housing acquisition. These present the highest ratio between the expenditures of the 10th decile and the national, 81% and 71%, respectively. The least concentrated categories are hygiene & personal care and tobacco, with a ratio of 19% and 18%, respectively.¹⁵

Figure 1: Categories' Share of Monthly Per Capita Consumption Expenditures (in BRL) by Decile



Source: World Bank staff calculations based on POF 2017/18.

Notes: Deciles are based on monetary income per capita. Figure is only detailed to the level of the categories within the "Consumption Expenditures" group, which correspond to the top panels of both Table 1 and Table A1. The remaining categories are displayed in Figure A1. Non-monetary services and imputed rent are not included.

¹⁵ Imputed rent and non-monetary services are excluded from Figure 1. Figure A1 shows how the shares of both decrease with income, from 13% to 11% and from 20% to 3%, respectively.

Table 1: Average Monthly Per Capita Expenditure (in BRL) by Per Capita Income Decile

	National	Deciles									
		1	2	3	4	5	6	7	8	9	10
Income per capita	1,358	132	302	450	601	775	983	1,205	1,593	2,359	6,427
Current expenditures											
Consumption expenditures											
Food	220	103	122	136	148	178	198	221	253	326	554
Housing*	259	74	99	125	151	173	207	242	284	397	866
Clothing	53	18	25	31	35	42	44	56	63	82	150
Transport	227	37	60	79	99	141	150	208	281	392	856
Hygiene**	46	21	27	34	36	41	42	51	57	66	89
Healthcare	101	22	29	43	53	59	86	94	110	172	375
Education	59	12	18	21	25	30	31	46	69	99	239
Culture***	32	7	10	13	16	20	21	27	35	51	129
Tobacco	6	2	3	4	5	5	5	7	8	7	10
Personal services	16	3	5	7	9	11	12	16	20	27	55
Miscellaneous	38	5	8	12	14	17	21	30	43	62	174
Other current expenditures											
Bank Services	15	2	3	4	6	8	8	14	18	24	74
Donations+	13	2	2	4	6	6	8	11	13	22	66
Private pensions	4	0	0	0	1	1	0	1	2	4	33
Employee taxes	6	1	1	2	2	3	3	4	7	9	28
Taxes and Fees++	30	4	7	9	13	14	19	23	36	53	121
Other	3	0	1	1	1	1	2	2	4	5	18
Liabilities reduction											
Mortgage +++	14	1	2	3	3	5	6	8	11	21	75
Debt payments	37	4	9	15	18	22	33	34	43	67	144
Assets increase											
Home improv.	21	4	5	6	10	13	17	22	34	35	69
Home acquisition	42	4	1	6	6	22	11	19	19	42	317
Other investments	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,4
Imputed Rent	187	64	75	100	110	126	168	181	210	290	562
Total Monetary and non-monetary consumption (in kind)	1,428	389	513	655	766	941	1,095	1,317	1,619	2,256	5,002
Non-monetary Services	118	98	117	125	124	127	122	115	123	124	133
Total POF Consumption	1,546	487	629	780	890	1,068	1,217	1,433	1,742	2,380	5,136

Source: World Bank staff calculations based on POF 2017/18.

Note: Deciles and income are based on monetary income per capita, which includes labor and non-labor income, and excludes equity variation. Monetary values are given in values from 15th of January 2018. * Housing excludes imputed rent, but includes rent, energy, internet. **Hygiene category includes personal care. ***Culture includes recreational activities. +Donations include alimony and pocket money. ++ Taxes and fees include “taxes” paid such as IPVA, IPTU, and fees related to registering vehicles and other regulations. +++Payment of debts related to home acquisition. Other information: Personal services includes hairdresser, phone repair, laundromat. House acquisition includes all forms of payment for real estate property where people live in. Miscellaneous includes expenditures such as lawyers and pets. Other include other real estate expenditures and investments.

Incidence Analysis of Indirect Taxes

Table A1 shows that, among the consumption expenditures subgroup, the category with the highest tax burden – expressed as the ratio of taxes paid over the total expenditures on taxable items- is tobacco

(78.7%). Other categories follow with some distance: hygiene & personal care (40.6%), transport (35.8%), clothing (30.6%), housing (27.1%), culture & recreation (25.5%), miscellaneous (16.3%), food (16%), health (13.3%), personal services (12.8%), and education (10.9%). Together, these categories account for 74% of the total POF consumption. To give examples of items outside this group, the tax burden for house improvements is 30.6%, but for house acquisition it is one of the lowest (13.7%).

Table 2 presents the amount of monthly per capita indirect taxes paid by each decile. In absolute values, indirect taxes are positively correlated with households' incomes. The amount of indirect taxes paid is increasing from the 1st decile to the 10th decile - a pattern that is repeated across all consumption categories. In general, for low-income people, most of indirect taxes paid are on housing, followed by transport and food consumption. These account for 28%, 20% and 18% of the indirect taxes paid by the poorest decile, respectively. For high-income people, transportation taxes account for the largest share of total taxes paid. These represent 36% of the indirect taxes paid by the richest decile. Housing and food taxes are the second and third largest categories, with a share of 17% and 11%, respectively.

Table 2: Monthly Per capita Indirect Taxes for Each Consumption Category (in BRL), by Decile

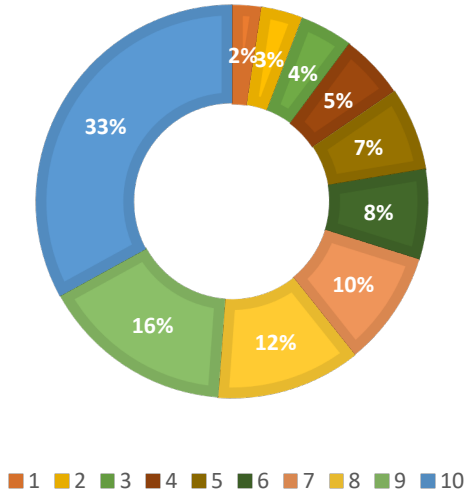
	National	Deciles									
		1	2	3	4	5	6	7	8	9	10
Current expenditures											
Consumption expenditures											
Food	30.4	10.7	13.9	16.5	18.3	24.0	26.1	30.2	35.9	47.7	86.3
Housing*	54.5	16.8	23.2	29.9	36.5	42.7	49.9	57.7	66.9	85.1	142.2
Clothing	14.5	4.0	5.6	7.5	8.9	11.1	11.6	15.2	17.3	23.2	44.1
Transport	75.3	11.7	18.6	23.9	29.9	46.0	47.2	66.0	93.5	131.7	292.5
Hygiene**	17.2	7.1	9.6	12.4	13.3	15.5	15.5	19.5	22.1	25.5	34.6
Healthcare	12.1	1.9	2.9	4.4	5.6	6.7	9.1	10.7	12.8	20.7	50.1
Education	6.0	1.1	1.8	2.3	2.7	3.3	3.4	5.0	7.2	10.4	24.0
Culture***	7.7	1.6	2.4	3.4	4.1	5.3	5.8	6.8	8.7	12.5	28.2
Tobacco	4.5	1.6	2.5	3.2	3.8	4.0	4.0	5.8	6.2	5.3	8.0
Personal services	2.0	0.4	0.7	0.9	1.2	1.4	1.5	2.0	2.4	3.4	6.7
Miscellaneous	5.4	0.8	1.3	2.0	2.1	2.8	3.5	4.5	6.6	9.2	22.5
Other current expenditures											
Bank Services	2.4	0.3	0.4	0.6	0.9	1.2	1.2	2.2	2.8	3.8	11.6
Donations+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Private pensions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Employee taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taxes and Fees++	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Liabilities reduction											
Mortgage+++	1.8	0.1	0.3	0.4	0.4	0.7	0.8	1.1	1.5	2.9	10.2
Debt payments	0.2	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.2	0.4	0.6
Assets increase											
Home improv.	4.1	0.8	0.9	1.3	2.3	2.7	3.1	4.5	7.0	6.6	13.5
Home acquisition	5.1	0.4	0.1	0.6	0.7	2.7	1.1	2.4	2.3	3.9	39.7
Other investments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Indirect Taxes	243	59	84	109	131	170	184	234	294	392	815

Source: World Bank staff calculations based on POF 2017/18.

Note: Deciles and income are based on monetary income per capita, which includes labor and non-labor income, and excludes wealth/equity variation. Monetary values are given in values from 15th of January 2018. * Housing excludes imputed rent, but includes rent, energy, internet. **Hygiene category includes personal care. ***Culture includes recreational activities. +Donations include alimony and pocket money. ++ Taxes and fees include "taxes" paid such as IPVA, IPTU, and fees related to registering vehicles and other regulations. +++Payment of debts related to home acquisition.

Figure 2 shows the percent of taxes borne by each decile. The 1st decile contributes approximately 2% of total taxes collected. A similar percentage is paid by the second decile. Meanwhile, about R\$50 of every R\$100 collected in indirect taxes are paid by the top 20%. The 9th decile contributes about 16% of all indirect taxes, while the 10th decile contributes to about a third of the total tax revenue (33%).

Figure 2: The Share of the Total Indirect Tax Revenue Paid by Each Income Decile



Source: World Bank staff calculations based on POF 2017/18.

To complement the analysis above, we examine next the relative tax burden for each decile. There is a established literature that discusses whether the indirect tax burden should be analyzed as a share of income or of consumption. Within the studies focused on Brazil, whenever income is used, the consensus states that the most important caveat is that it overestimates the tax burden of the poorer income deciles (Siqueira et al. 2017, and Silveira et al. 2013). The reason is that the poorer individuals in POF – the only source available to conduct such type of analysis in the country- underestimate their (habitual) income. In addition, this group very often presents a budgetary deficit in the survey. Households in the bottom of the distribution typically report spending more money than they earn. This outcome could be due, for instance, to the income fluctuations they face. Thus, a “natural” feature of this kind of survey is that when ordering individuals by income deciles, analyses mechanically place in the bottom decile those individuals who “most underreported” their income in POF, or those who faced the largest negative fluctuations at the time of the interview. The consequence of this is that, because monetary consumption is much larger than monetary income in the first income deciles, i.e. there is an engrained monetary “deficit”, the tax burden will also be very large – or overestimated (Siqueira et al. 2017).

In the specialized literature, authors deal with this issue in different ways. Siqueira et al. (2017) compute the tax burden as a share of monetary consumption itself showing the average tax burden of the consumption bundles of different deciles. In other words, it shows the average tax burden of the items

consumed (from monetary consumption) across the income distribution. Seeking to address the overestimation of the poorest’s tax burden, Siqueira et al. (2017) also argue that consumption is more comparable to the long-term permanent income of households and a better approximation for welfare. However, there are two clear limitations to this approach: i) since the richer consume a much lower fraction of their income, this is likely to provide a biased picture of the tax burden among rich households; and ii) non-monetary consumption can be argued to be an important part of the “long-term” income of households.

Silveira et al. (2013) use monetary income, total income (including non-monetary income), and adjusted income. Including the non-monetary income compensates the bottom deciles “distortion”, since non-monetary income is much more relevant for the poorer households – but it is not addressing the monetary deficit problem, arguably the root problem behind the adjustment. The adjusted income is an income aggregate that is “topped-up” to match monetary consumption whenever a household reports budgetary deficits. Recognizing that there is no superior yardstick, we present the tax burden across the income distribution and estimated for different aggregates.

Table 3 shows that when using monetary income, on average, 17.9%, of households’ income is paid as indirect taxes, but there is significant variation across deciles. The 1st decile has the highest relative tax burden, which is approximate to 45%. This burden drops significantly for the second decile to just below 28%. The burden continues decreasing as income rises, reaching 12.7% for the richest decile. The decreasing pattern is found when using other income aggregates, but the gaps are much lower. Based on the adjusted monetary income, the poorest decile destines 21% of their income to indirect taxes, while the richest decile spends 12%. Using monetary consumption, these rates are 23% and 19%, respectively.

Table 3. Tax Burden as a Share of the Different Parameters used in the Literature

Deciles	Monetary Income	Adjusted Monetary Income*	Monetary Consumption
1	45%	21%	23%
2	28%	20%	23%
3	24%	19%	23%
4	22%	18%	22%
5	22%	18%	23%
6	19%	16%	22%
7	19%	17%	22%
8	18%	16%	22%
9	17%	15%	21%
10	13%	12%	19%

Notes: Deciles and income are based on monetary income per capita *Income adjusted to match monetary consumption whenever the household’s monetary consumption is higher. Source: World Bank staff calculations based on POF 2017/18.

Macro Validation

To contextualize the results presented above, it is important to make a note of how much the POF is able to capture the indirect taxes actually paid in the country. Thus, we provide the following comparison between the estimated indirect taxes captured by our data and estimates of the taxes collected as reflected in administrative data. It should be highlighted that the indirect taxes in Brazil are borne not only by consumers and government, but also by investment and exports. According to

Siqueira et al. (2021), 20.7% of the revenue from indirect taxes is found in the costs of investments and exports.

In addition to that, aggregating the monetary consumption data from POF, we found that total annual household consumption is about 2,885 billion, which corresponds to 80% of the household consumption in the national accounts. Consumption from POF is smaller than the national account's one most likely because people may be underreporting their consumption. More specifically, the literature says that the consumption of the high-income families is underdeclared in the POF (Hoffman & Vaz, 2020). Underreported (of taxable) consumption would imply that we are missing some part of the indirect taxes. Therefore, taking to account that POF basis is smaller than the consumption from national accounts, the indirect taxes found in this work are expected to be smaller than the actual revenue collected from consumption.

On the other hand, it is expected that part of the tax burden (and associated total amount of indirect taxes paid) calculated here is *not* collected (nor reflected in the administrative data) due to the tax evasion. Using a previous round of the POF (2008/09), Neto and Ramos (2014) estimated that the underreported production that is included in the GDP was 4.2% in 2009. The authors do not find evidence that the tax evasion is distributed irregularly among the class of families of POF. To the best of our knowledge, there are no more recent estimates.

The indirect taxes identified from POF are about 75% of total indirect tax revenues from the national account (Table 4). A back of the envelope calculation that scales up the POF-estimated revenues to account for the lower levels of POF-estimated *consumption* expenditures (with respect to national accounts) suggests that this ratio would be 95%. This result is consistent with the distribution of the indirect taxes in the GDP variables mentioned above (investment and export).

Table 4: Macro Validation with National Accounts Figures

	Annualized POF monetary (in million BRL)	National Accounts (in million BRL)	POF/National Account
Annual Household Consumption	2,880,901	3,623,548	80%
Annual Income (GDP for n.a.)	3,646,277	6,583,319	
Annual Indirect Taxes	603,094	799,231	75%
Indirect Tax/Consumption	21%	24%	
Indirect Tax/Income	17%	15%	

Notes: POF monetary income includes labor and non-labor monetary income and excludes wealth/equity variation.

Source: IBGE National Accounts, World Bank staff calculations based on POF 2017/18, and Receita Federal Report . Accessed at:

<<http://receita.economia.gov.br/noticias/ascom/2018/dezembro/carga-tributaria-bruta-atingiu-32-43-do-pib-em-2017/carga-tributaria-2017-1.pdf>> Last access: 1st of June, 2021.

Before turning to the simulation results, one final point is worth highlighting. Despite the documented broad coverage of indirect taxes captured by POF 2017/18, a concern may arise due to the potential effects of not capturing informal consumption in our estimations. Informal consumption say, from sales that occur on the streets that do not pay any sales taxes, could affect the estimated level of progressivity/regressivity of indirect taxes if not captured properly. In fact, Bachas *et al.* (2021) use consumption surveys from 32 countries (including Brazil) and document that informal consumption declines rapidly with income, suggesting that might reverse the regressivity of sales taxes. We do not expect informal consumption to significantly affect our estimates. The reasons are varied. First, certain

products like beverages, tobacco and some medicines are subject to the tax in advance (substituição tributária) at the factory level, which usually reduces substantially the level of tax evasion (i.e. the potential for not paying sales taxes). Second, food sales are highly (95%) concentrated in the supermarkets, which can be considered as a formal sector¹⁶ and most of the food consumed is either exempt or taxed with low rates at the retail level (the tax burden of these products comes from the “hidden taxes” described above). Third, small companies can rely on the SIMPLES. This tax regime (that has a reduced rate) is already considered in our data. Finally, data from POF 2017/18 suggest that only about 1% of taxable monetary expenditures can be mapped to street and fair vendors. While it could be assumed that these points of sale are “informal”, all other places of acquisition are less clear on whether they could be classified as informal. Incidentally, our estimates of the tax burden are generally higher for supermarkets than for local food stores, or street and fair vendors. Nonetheless, these differentials are likely to reflect more the type of goods sold and the profit and losses structure of the sellers, rather than higher levels of informality.

Simulations

The methodology developed to estimate the tax burden of indirect taxes allows us to run partial equilibrium simulations of potential reforms to this tax system. In this section we present the results of three scenarios: i) replacing the indirect taxes for a flat 26.9% VAT; ii) a complementary scenario where excise taxes are implemented to make the replacement of indirect taxes closer to revenue neutral; and iii) replacing the federal indirect taxes for a 12% VAT. All simulations do not take into account potential behavioral changes of individuals or firms in reaction to the simulated reforms. Thus, the results we present next should be interpreted under this light.

Replacing Indirect Taxes for a Flat 26.9 Percent VAT

Following the methodology used to compute each POF item’s specific tax burden (see Section 4), we simulate the impact of swapping the current indirect tax system for a flat VAT of 26.9%. To do this, we estimate what would the change in each good’s price be after implementing the 26.9% VAT. Then, we apply each item’s price variations directly to each family’s expenditures in the respective item, which is an estimate of how each family’s expenditures would change if the quantity bought of each item remained constant after the price change. Lastly, we aggregate the new expenditures’ values for each family, which allows us to do a comparison with the original POF 2017/18 income and expenditures data.

The results are presented in Table 5. We use simple differences for comparing the total monthly expenditures before and after the implementation of a 26.9% VAT for each decile and consumption group. For instance, the poorest decile’s average food expenditures would be R\$ 5.4 *higher* than the previous expenditures levels after implementing the 26.9% VAT – holding firms’ profits and consumption bundles constant. However, the summation of the expected expenditure differences across all categories leads to a decrease in total expenditures for households in the first decile of R\$ - 13.5. Put another way, as a share of the 1st decile’s average income, this result implies an increase in the

¹⁶ See IMAFLORA et al. (2020) “Um retrato do sistema alimentar brasileiro e suas contradições” https://www.ibirapitanga.org.br/wp-content/uploads/2020/10/UmRetratoSistemaAlimentarBrasileiro_%C6%92_14.10.2020.pdf.

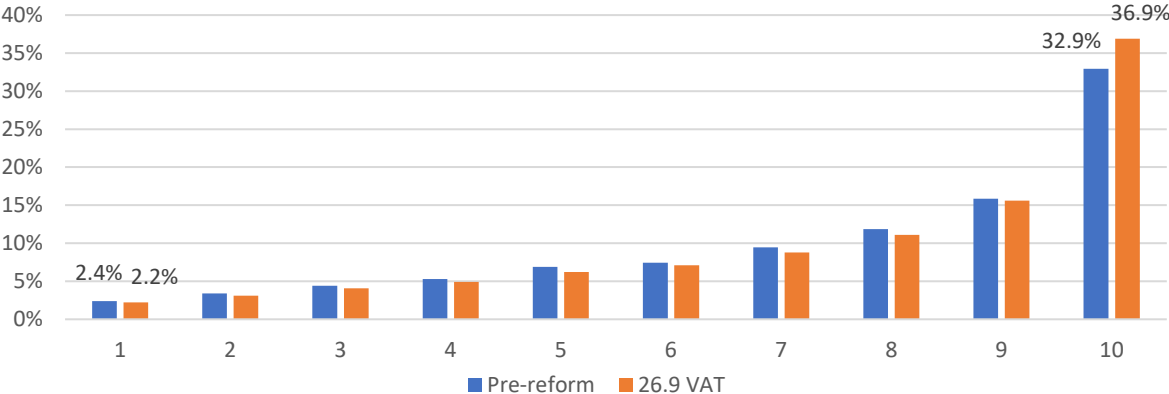
households' real income of about 10.2%. Since our simulations do not model behavioral responses from the part of consumers when facing price variations, it is not possible to make inferences regarding the final impact of the reform on households' budget, which in turn will depend on consumers' ability to substitute between consumption goods. However, it is still possible to observe how the reform will affect the current consumption bundles across the income distribution.

Our simulation results suggest that a reform implementing a flat 26.9% VAT could reduce families' expenditures, as the increased in prices of some goods are more than compensated by the reduction in prices in various consumption categories. After the reform, expenditures per capita are estimated to be on average R\$ 58.4 lower than the previous levels for the same quantities consumed. This corresponds to 4.3% of the average national income per capita. Our simulations also show that such a reform is expected to have a stronger impact on the poorest deciles' budget (i.e., larger expenditure reductions as a share of income), going from -10.2% on the poorest, to -2.5% on the 10th decile.

This reform may also be equity-enhancing in another way. The share of taxes paid by the richest households increases under a VAT system when compared to the status quo. Under the current system, the poorest decile contributes about 2.4% of total indirect taxes while the richest decile contributes about 33 percent (Figure 3). After the reform, the poorest decile contribution would fall to 2.2 % and the richest decile contribution would increase to 36.9 %.

The overall reduction in expenditures observed for all deciles is mostly driven by transport expenditures (a drop of R\$ 43.1 on average), which comprises fuel, public transport, and the acquisition of vehicles. The housing category is second (a decrease of R\$ 17.2 on average) - which comprises items such as electricity, rent, water & sewage, and internet. These results come from the high-consumption high-taxes combination of these two categories. Transport is the second-largest consumption group, with 18% of total monetary and in-kind non-monetary consumption. Because of the high tax burden over the items with most expenditures in this category, gasoline (44.52%) and national passenger cars (49.55%), transport is likely to play a substantial role on the negative effect observed overall. In other words, for these high-taxed items, a 26.9% VAT would substantially reduce its prices and expenditures in transport. By contrast, food, the third largest consumption group, shows an increase in expenditure for all deciles, and an average increase of R\$ 10.4 across all deciles. Another category where expenditures are expected to increase in education (R\$ 7.2).

Figure 3. Share of total indirect taxes paid by each income decile – status quo vs. VAT simulation



Source: own calculations using POF 2017/18

Table 5: Changes in Total Households' Monthly Expenditures (in BRL) After Simulating a Flat 26.9 percent VAT

	National	Deciles									
		1	2	3	4	5	6	7	8	9	10
Current expenditures											
Consumption expenditures											
Food	+10.4	+5.4	+6.1	+6.7	+7.4	+8.1	+9.7	+9.7	+11.5	+14.6	+25.1
Housing*	-17.2	-4.8	-6.7	-8.5	-10.3	-13.0	-15.0	-17.7	-20.9	-27.6	-47.8
Clothing	-6.1	-1.7	-2.3	-3.0	-3.7	-4.6	-4.7	-6.2	-7.1	-9.5	-18.3
Transport	-43.1	-6.3	-10.3	-12.9	-15.8	-25.6	-25.2	-36.2	-53.6	-76.6	-168.2
Hygiene**	-12.4	-4.9	-6.6	-8.7	-9.4	-11.0	-10.9	-13.9	-15.7	-18.1	-24.6
Healthcare	+2.8	+0.1	+0.2	+0.2	+0.6	+0.5	+0.9	+1.7	+2.5	+5.8	+15.9
Education	+7.2	+0.5	+1.3	+1.8	+2.3	+3.1	+3.4	+5.5	+8.7	+13.0	+32.5
Culture***	-2.1	-0.8	-1.0	-1.3	-1.7	-2.1	-2.3	-2.2	-2.6	-3.3	-3.2
Tobacco	-4.1	-1.5	-2.3	-2.9	-3.5	-3.7	-3.8	-5.4	-5.8	-5.0	-7.5
Personal services	+1.5	+0.3	+0.5	+0.7	+0.8	+1.0	+1.1	+1.5	+1.8	+2.5	+4.9
Miscellaneous	+1.7	+0.1	+0.2	+0.4	+0.5	+0.6	+0.5	+0.9	+1.9	+3.1	+9.0
Other current expenditures											
Bank Services	+0.8	+0.1	+0.1	+0.2	+0.3	+0.4	+0.4	+0.7	+0.9	+1.2	+3.7
Donations+	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Private pensions	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Employee taxes	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Taxes and Fees++	+0.1	+0.0	+0.0	+0.1	+0.1	+0.1	+0.1	+0.1	+0.1	+0.1	+0.2
Other	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.1	+0.0	+0.0	+0.0	+0.0
Liabilities reduction											
Mortgage +++	+0.9	+0.1	+0.1	+0.2	+0.2	+0.3	+0.4	+0.6	+0.8	+1.5	+5.2
Debt payments	+0.1	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.1	+0.1	+0.2
Assets increase											
Home improv.	-1.8	-0.3	-0.4	-0.5	-1.0	-1.1	-1.3	-1.9	-3.0	-2.8	-5.5
Home acquisition	+2.8	+0.2	+0.1	+0.3	+0.4	+1.4	+0.6	+1.2	+1.2	+2.0	+20.3
Other investments	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Total difference in expenditures	-58.4	-13.5	-20.8	-27.4	-32.9	-45.5	-46.0	-61.6	-79.3	-99.1	-158.1
Income per capita	1,358	132	302	450	601	775	983	1,205	1,593	2,359	6,427
Lower expenditures expressed as a share of income	4.3%	10.2%	6.9%	6.1%	5.5%	5.9%	4.7%	5.1%	5.0%	4.2%	2.5%

Note: Deciles are based on total expenditures. Monetary values are given in values from 15th of January 2018. * Housing excludes imputed rent, but includes rent, energy, internet. **Hygiene category includes personal care. ***Culture includes recreational activities. +Donations include alimony and pocket money. ++ Taxes and fees include "taxes" paid such as IPVA, IPTU, and fees related to registering vehicles and other regulations. +++Payment of debts related to home acquisition.

The results above suggest that swapping the existing indirect tax system for a 26.9% VAT would lead to a fall in households' expenditures of the order of 4.3%, as a share of income, nationally.¹⁷ Nonetheless, the discussions around the tax reforms many times have included ways to make such reforms as revenue neutral as possible. To account for this, we complement the simulation above by incorporating excise taxes that could accompany such reform. In fact, these are taxes that are likely to be implemented by the government as it has shown an interest in discouraging their consumption for several reasons.

We model this scenario in the following way. First, for gasoline, diesel, beer, hot drinks, wine, cigars, and cigarettes we estimate an excise tax rate that will be required (as a complement to the flat 26.9% VAT already simulated) so that the final prices remain the same as in the current indirect tax system. Table 6 shows the associated rates. Second, the excise tax is modeled so that it is creditable for the business (only the end consumer will bear the excise tax). Therefore, for example, the public transportation company will not be affected by the excise tax. Finally, the tax burden rate calculated is a sum of VAT rate plus the excise tax.

Compared to the previous simulation, households' expenditures are affected to the extent that they consume food, transport and tobacco (Table 7). At the national level, expenditures are expected to fall by 2.8%. Tobacco expenditures remain largely unchanged compared to the current indirect tax system.¹⁸ Expenditures on transport are lower than in the current indirect tax system though substantially higher than in the absence of excise taxes. In this case, transport expenditures of the bottom quintile fall by 10%, when compared to the current tax system, whereas it would fall 17% without the excise tax. The top decile's transport expenditures are estimated to decrease by R\$115.3 with the excise tax. Albeit substantial, the decrease is much smaller than under a VAT-only replacement scenario), where it fell R\$168.2. Finally, food expenditures increase by R\$11.1 nationally (compared to R\$10.4 in the previous scenario), with the top decile's expenditure increasing by R\$27.8 (about 11% higher than when only a VAT is put in place).

¹⁷ Despite showing a decrease in expenditures, our simulations do not allow us to conclude unambiguously how these reforms would affect government revenues. On the one hand, we are not modeling behavioral changes that could change demand. The reduction in prices could also be compensated by a higher demand and GDP growth in the long term (Orair & Gobetti, 2019). Increased demand due to lower prices would cushion the fall in revenues. On the other hand, POF data do not match national accounts and likely underreport the top deciles' expenditures could also affect government revenues. Thus, the potential drop in revenues coming from the richer part of the income distribution is likely to be underestimated.

¹⁸ We do not explore the incidence of excise taxes separately. However, the high rates of, say, tobacco could imply that such a tax is regressive given that lower income households devote a higher share of their consumption to it. While outside the scope of this study, work along the lines of Fuchs et al. (2019) or Allcott et al. (2019) could help shed light on whether once behavioral responses and overall health benefits are taken into account, the net benefits actually fall more on the relatively poor.

Table 6: Excise tax rates required to match (selected) items' current final prices

Excise Tax Gasoline	88.79%
Excise Tax Diesel	41.75%
Excise Tax Beer	44.63%
Excise Tax Hot Drinks	126.31%
Excise Tax Wine	73.63%
Excise Tax Cigars and Cigarettes	398.99%

Source: own calculations using POF 2017/18 data.

Table 7: Changes in Total Households' Monthly Expenditures (in BRL) After Simulating a Flat 26.9 percent VAT, Including Excise Taxes

	National	Deciles									
		1	2	3	4	5	6	7	8	9	10
Current expenditures											
Consumption expenditures											
Food	+11.1	+5.5	+6.3	+6.9	+7.5	+8.4	+10.0	+10.5	+12.3	+15.7	+27.8
Housing*	-17.2	-4.8	-6.6	-8.5	-10.3	-13.0	-15.0	-17.7	-20.9	-27.6	-47.8
Clothing	-6.1	-1.7	-2.3	-3.0	-3.7	-4.6	-4.7	-6.2	-7.1	-9.5	-18.3
Transport	-27.1	-3.6	-6.1	-7.2	-8.0	-15.3	-14.3	-20.7	-33.6	-47.0	-115.3
Hygiene**	-12.4	-4.9	-6.6	-8.7	-9.4	-11.0	-10.9	-13.9	-15.7	-18.1	-24.6
Healthcare	+2.8	+0.1	+0.2	+0.2	+0.6	+0.5	+0.9	+1.7	+2.5	+5.8	+15.9
Education	+7.2	+0.5	+1.3	+1.8	+2.3	+3.1	+3.4	+5.5	+8.7	+13.0	+32.5
Culture***	-2.1	-0.8	-1.0	-1.3	-1.7	-2.1	-2.3	-2.2	-2.6	-3.3	-3.2
Tobacco	-0.1	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.0
Personal services	+1.5	+0.3	+0.5	+0.7	+0.8	+1.0	+1.1	+1.5	+1.8	+2.5	+4.9
Miscellaneous	+1.7	+0.1	+0.2	+0.4	+0.5	+0.6	+0.5	+0.9	+1.9	+3.1	+9.0
Other current expenditures											
Bank Services	+0.8	+0.1	+0.1	+0.2	+0.2	+0.4	+0.4	+0.6	+0.9	+1.2	+3.5
Donations+	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Private pensions	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Employee taxes	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Taxes and Fees++	+0.1	+0.0	+0.0	+0.1	+0.1	+0.1	+0.1	+0.1	+0.1	+0.1	+0.2
Other	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.1	+0.0	+0.0	+0.0	+0.0
Liabilities reduction											
Home debt pay+++	+0.9	+0.1	+0.1	+0.1	+0.2	+0.3	+0.4	+0.7	+1.0	+1.6	+4.9
Debt payments	+0.1	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.1	+0.1	+0.2
Assets increase											
Home improv.	-1.7	-0.3	-0.3	-0.5	-0.7	-1.0	-1.2	-1.6	-2.9	-2.7	-5.9
Home acquisition	+2.6	+0.1	+0.2	+0.1	+0.3	+0.5	+0.4	+0.9	+1.0	+3.2	+19.1
Other investments	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Total difference	-37.1	-8.5	-12.8	-17.9	-20.9	-30.3	-29.9	-35.9	-50.8	-60.8	-102.8
Income per capita	1,358	132	302	450	601	775	983	1,205	1,593	2,359	6,427
Lower expenditures expressed as a share of income	2.8%	7.0%	4.7%	4.1%	3.6%	4.0%	3.2%	3.3%	3.3%	2.7%	1.5%

Note: Deciles are based on total expenditures. Monetary values are given in values from 15th of January 2018. * Housing excludes imputed rent, but includes rent, energy, internet. **Hygiene category includes personal care. ***Culture includes recreational activities. +Donations include alimony and pocket money. ++ Taxes and fees include "taxes" paid such as IPVA, IPTU, and fees related to registering vehicles and other regulations. +++Payment of debts related to home acquisition.

Replacing Federal Indirect Taxes for a 12 Percent flat VAT

Next, we simulated another indirect tax reform proposal that the current government submitted for congress appreciation. In this proposal, only the federal indirect taxes (PIS/COFINS) will be substituted by a 12% flat VAT - also called CBS (*Contribuição sobre Bens e Serviços*) with few but very important exceptions. According to the proposal, essential food, sale of residential property and public transportation will be exempted of CBS. The state and city-level indirect taxes remain unchanged.

The results of this simulation are presented in Table 8, where we show the simple difference in total monthly expenditures before and after the implementation of a 12% CBS. According to our simulations, and considering our assumptions, the CBS reform would lead to an overall *increase* of households' expenditures, in contrast to the decline of the national 26.9% VAT. The proportional size of the simulated change is negligible, reaching 0.1% of the national average income per capital. The third decile shows the largest value at 0.35% of expected increase in expenditures – holding everything else constant. Most deciles register an impact of 0.2 to 0.3%, and the impact is virtually zero for the richest decile. This relative size of these changes is small especially when compared to the 26.9% VAT simulations (whose simulated effect range from -9% to -2.2%).

Differently from the national 26.9% VAT, the 12% CBS will be felt more in the education and health categories, with an average simulated change of R\$ +3 and R\$ +2.5, respectively, with a stronger effect concentrated on the richest deciles (R\$ +12.9 and R\$ +9.6, respectively). Despite having an average negative effect, expenditures on food are also expected to increase for most deciles, except for the three richest ones. The categories that showed the largest decrease in expenditures were home acquisitions (R\$ -1.7), clothing (R\$ -1.5), and transport (R\$ -1.1), all of them more heavily concentrated in the top decile, but especially home acquisitions, whose R\$ 12.7 reduction practically cancelled out the observed increase in education expenditures for the richest decile (R\$ +12.9).

Table 8: Changes in Total Households' Monthly Expenditures (in BRL) After Simulating a Flat 12 percent CBS (federal taxes VAT)

	National	Deciles									
		1	2	3	4	5	6	7	8	9	10
Current expenditures											
Consumption expenditures											
Food	-0.5	+0.2	+0.4	+0.5	+0.5	+0.4	+0.3	+0.2	-0.2	-1.0	-6.7
Housing*	-1.2	-0.7	-0.8	-0.9	-1.0	-1.1	-1.3	-1.3	-1.2	-1.5	-2.1
Clothing	-1.5	-0.4	-0.6	-0.7	-0.9	-1.1	-1.2	-1.5	-1.7	-2.3	-4.4
Transport	-1.2	-0.2	-0.2	-0.1	-0.2	-0.3	-0.3	-0.7	-1.1	-2.6	-5.9
Hygiene**	-0.3	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3	-0.3	-0.4	-0.4	-0.6
Healthcare	+2.5	+0.4	+0.6	+0.9	+1.2	+1.3	+1.9	+2.1	+2.6	+4.4	+9.6
Education	+3.0	+0.3	+0.6	+0.8	+1.0	+1.4	+1.4	+2.3	+3.6	+5.3	+12.9
Culture***	+0.3	-0.0	+0.0	+0.0	+0.0	+0.1	+0.1	+0.2	+0.3	+0.5	+2.0
Tobacco	+1.6	+0.6	+0.9	+1.1	+1.3	+1.4	+1.4	+2.1	+2.2	+1.9	+2.9
Personal services	+0.6	+0.1	+0.2	+0.3	+0.3	+0.4	+0.4	+0.6	+0.7	+1.0	+1.9
Miscellaneous	+0.9	+0.1	+0.1	+0.2	+0.3	+0.4	+0.4	+0.5	+1.1	+1.5	+4.3
Other current expenditures											
Bank Services	+0.4	+0.0	+0.1	+0.1	+0.1	+0.2	+0.2	+0.4	+0.5	+0.6	+2.0
Donations+	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Private pensions	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Employee taxes	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Taxes and Fees++	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.1
Other	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Liabilities reduction											
Mortgage +++	-0.6	-0.0	-0.1	-0.1	-0.1	-0.2	-0.3	-0.4	-0.5	-0.9	-3.3
Debt payments	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.1	+0.1
Assets increase											
Home improv.	-0.3	-0.0	-0.1	-0.1	-0.1	-0.2	-0.2	-0.3	-0.4	-0.4	-0.8
Home acquisition	-1.7	-0.1	-0.0	-0.2	-0.2	-0.9	-0.4	-0.8	-0.7	-1.2	-12.7
Other investments	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Total difference	+2.0	+0.1	+1.0	+1.6	+2.0	+1.4	+2.4	+3.1	+4.5	+4.9	-0.7
Income per capita	1,358	132	302	450	601	775	983	1,205	1,593	2,359	6,427
Higher expenditures expressed as a share of lost income	0.16%	0.11%	0.36%	0.37%	0.34%	0.20%	0.25%	0.27%	0.29%	0.21%	-0.01%

Note: Deciles are based on total expenditures. Monetary values are given in values from 15th of January 2018. * Housing excludes imputed rent, but includes rent, energy, internet. **Hygiene category includes personal care. ***Culture includes recreational activities. +Donations include alimony and pocket money. ++ Taxes and fees include "taxes" paid such as IPVA, IPTU, and fees related to registering vehicles and other regulations. +++Payment of debts related to home acquisition.

Conclusions

This study aims to contribute to the existing body of knowledge by using recent data and using a novel approach to answer the question on what the indirect tax burden on Brazilian households is. We find that indirect taxes in Brazil are regressive. The poorest decile pays about 45% of their income in indirect taxes, while the richest decile pays about 13%. Inequality in income levels and consumption patterns explain these patterns. The poorest decile is estimated to earn R\$ 132 per capita each month. This is less than one-third of the one-half minimum wage (2018) threshold that the Ministry of Citizenship uses to allow households to register for their universal social registry or *Cadastro Único*. Put another way, this income is equivalent to US\$ 1.79 per person per day in 2011 PPP. Meanwhile, the top decile's monthly income is several times higher than the poorest: R\$ 6,427 per capita.

Consumption patterns also somewhat follow these same lines. Including non-monetary expenditures, the poor have a level of consumption about 13 times smaller than the rich. The poorest decile spend significantly in food (32%) and housing (23%), two groups that have estimated indirect tax rates of 16% and 27%, respectively. Meanwhile, the richest households spend more in housing (20%) and transportation (19%), and the tax burden of the latter is estimated to be 30.8%. However, this does not mean that the taxes levied on the kinds of goods purchased by richer households are higher, since it depends also on the specific consumption basket within each category. If we consider only monetary outlays, the poorest decile pays 23% in taxes while the richest, 19%. This suggests that the average consumption basket of the richest decile is relatively less taxed than that of the poorest decile. Hence, not only the low-income deciles pay a larger tax burden with respect to their income, but also with respect to their monetary consumption – which shows that the items they consume are on average taxed higher.

In this study we compute in detail the unique tax burden of each item of POF, by considering the specific taxes charged on each item, as well as their specific production chain and the taxes that accumulate throughout it. The cumulative and non-standardized feature of the Brazilian indirect tax item what makes it both inefficient and difficult to analyze, requiring a herculean task of discovering the individual tax of burden of thousands of items in POF and of their corresponding production chain. To make this task feasible, we used the rules of the state of São Paulo as representative of the whole country.

The need for simplification by using a representative state comes from the higher complexity that our approach achieves at the consumption items level. Differently from us, Orair & Gobetti (2019) and Silveira (2012) assume nominal taxes, i.e. nominal taxation instead of effective. Therefore, these authors do not compute the cumulative taxation. Our work advances in this sense by providing estimates that include the cumulative taxation for each specific item in POF. Similarly to us, Siqueira et al. (2001) and Siqueira et al. (2021) also include cumulative taxation for estimating the effective tax burden. However, they performed this analysis by using an input-output matrix, which is a method restricted to at most 67 sectors that cannot fully explore the deep granularity offered by POF.

Computing precise estimates of the indirect tax burden in Brazil and potential reforms' impacts remains a challenge that can only be addressed through a multiplicity of analyses. Our study fills a gap of exploring as deep as possible the cumulative incidence of indirect taxes. There are a few ways that this work could be extended in the future. Studies that assume nominal taxes typically underestimate the tax burden, and we can use our estimates that correct for this to assess the size of this bias. However, using São Paulo as a representative state also creates a distortion, and assessing with more precision the direction and size of this bias could be a worthwhile extension. Another caveat of our analysis is the lack of behavioral responses from the consumers since we assume constant consumption bundles. Estimating how demand would react in the case of the price reductions we simulated would also be an important next step – especially for better assessing fiscal, macroeconomic and welfare impacts. Further, including tax evasion would be an important next step for improving our estimates, although we believe that overestimation of the tax burden in which we incurred by ignoring tax evasion would not be large and skewed enough to modify the distributional incidence we simulated. Finally, there are mechanisms that can help mitigating negative impacts of the VAT reform on the low-income families, such as the partial refunds of indirect taxes (e.g. the existing e-tax invoice return system). Simulating these policies is also a possible avenue for expanding this line of research.

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Annex I. Current Reform Proposals

There are three main indirect tax reform proposals that have been discussed in the Brazilian congress recently. Two of them were submitted in 2019 by members of the congress, one from each house. The one from the Chamber of Deputies (lower house) is called “Proposta de Emenda à Consituição” (PEC) nº45/2010 and was submitted in April 2019. The one from the Federal Senate (upper house) is called PEC nº110/2019 and was submitted in July 2019.¹⁹ Both share the same origins, from several years ago, and follow the principle of unifying and simplifying all the multiple indirect taxes that now exist in Brazil. A third and narrower proposal was submitted to the congress by the current government in July 2020 and covers only the federal taxes (PIS/COFINS) and is named “Projeto de Lei” (PL) 3.887/2020. The government’s proposal suggests the creation of a federal VAT (Contribuição sobre Bens e Serviços – CBS) of 12%. This proposal does not include any reforms to the state and cities’ indirect tax systems.

Both the Chamber’s (PEC nº45/2010) and the Senate’s (PEC nº110/2019) proposals aim to the substitute all indirect taxes at the federal (PIS/COFINS, IPI), state (ICMS), and municipal (ISS) levels by a single flat VAT (Imposto sobre Bens e Serviços - IBS) and are the focus of this note. The proposal of the Senate is broader, covering four more tributes, and both reforms also include an excise tax (Imposto Seletivo)^{16F}²⁰ for goods with negative externalities such as alcohol and tobacco. In both proposals, states will have some limited autonomy to set their own rates – and also cities, in the case of the Chambers’ proposal. However, exemptions are not allowed and the tax must be unique within each competency. The two proposals differ substantially on the autonomy conferred to states – the Senate’s proposal, especially, gives more power to them – and on how the tax income is distributed. For a more detailed comparison between proposals, see Orair & Gobetti (2019). The results presented in this note are closer in spirit to the Chamber’s proposal (PEC nº45/2010).

The Chamber’s proposal is largely based on the original proposal of the Centro de Cidadania Fiscal (CCiF, 2017, 2019),²¹ which suggests a 25% VAT, which was estimated using 2015 tax revenues and is based on the principle that the reform should be fiscally neutral. Orair & Gobetti (2019), however, estimate that a fiscally neutral rate would be 26.9% for the VAT.

¹⁹ On the 12th of May, 2021, the Congress Special Tax Committee approved a report with a new proposal that combined both PEC 45 and PEC 110. Technically, the two PECs still exist and can be voted.

²⁰ Because the Senate’s proposal centers on a state-VAT, for compensating the loss of income from the Union, its federal excise taxes also cover other selected goods – such as fuel - with the intention of increasing revenue, and not only discouraging consumption.

²¹ The original CCiF document from 2017, which is the one cited by Orair & Gobetti (2019), is not available anymore. We consulted, therefore, CCiF (2019), which is the version 2.2 from July 2019. It maintains the 25% proposal.

Annex II. Indirect Tax System in Brazil

The indirect taxes currently in place in Brazil include the following:

1. Taxes on Gross Revenue

PIS and COFINS are federal taxes charged on revenues, on a monthly basis, under two systems: cumulative and non-cumulative.

The PIS and COFINS non-cumulative systems are mandatory for companies subject to the Actual Profit method of computing corporate income taxes. Taxpayers under the non-cumulative system are subject to PIS at the rate of 1.65% and to COFINS at the rate of 7.60% and are allowed to recognize tax credits at the same rates for PIS and COFINS levied on certain inputs, such as: (a) products purchased for resale; (b) goods and services used as inputs in the rendering of services or manufacturing (excluding labor); (c) consumed electrical power; (d) the rental of real estate and fixed assets applied in the activities; (e) the acquisition of certain fixed assets; and (f) returned goods, if the corresponding revenue was included in the previous month's PIS and COFINS taxable bases. Provided certain requirements are observed, these credits may be used to offset PIS and COFINS due on the company's taxable revenue.

The PIS and COFINS cumulative system is applicable for certain entities, such as financial institutions and companies operating under the Presumed Profit system. Among these entities, and for some revenues deriving from telecommunications, transport and software development services, they are generally subject to a 0.65% tax rate for PIS and 3% tax rate for COFINS with no credits available. Financial institutions are subject to a 4% COFINS rate.

Companies with some revenues subject to the cumulative system and other revenues subject to the non-cumulative system are required to calculate PIS and COFINS separately in each system. Revenues related to export transactions and the sale of permanent assets are, in general, exempt from these taxes. There are special PIS and COFINS systems for companies engaged in certain types of industries, such as automotive, auto parts, cosmetics, pharmaceutical, oil, beverage, packaging materials,²² energy and real estate, among others.

2. Taxes on Manufactured Products

The Imposto sobre Produtos Industrializados (IPI) is a type of value added tax or excise on imports and products made in Brazil. Unlike most taxes, the government can raise the rate of this tax by Executive Decree. This tax is not subject to the approval of the Legislature. Furthermore, it can be collected in the same financial year in which the law or decree was published. IPI rates vary by product and depend upon how the government has classified the product. For example, they are higher for nonessentials such as cigarettes and perfumes. Some products are exempt from IPI, such as exports and sales to the Manaus Duty-Free Zone. IPI works as a value added tax, since in some cases the amount paid in previously taxed operations can be used as a tax credit in later production stages. The tax authorities restrict the use of IPI tax credits when the matching inputs are bought to make a product which will be exempted from IPI. Sometimes taxpayers may use IPI accumulated credits to pay other federal taxes or contributions.

²² The "monofásico" system is not applied to packaging materials, except those used to bottle beverages.

It is important to note that IPI does not go until the end of the business chain. As a rule, distributors and retailers do not pay IPI, and the IPI charged upon the importation or by manufactures will be a cost for them (no credit in these cases).

3. *Taxes on Circulation of Goods, and Provision of Transportation and Communication Services*

The Imposto sobre Circulação de Mercadorias e prestações de Serviços de transporte interestadual, intermunicipal e de comunicação (ICMS) is a tax on the circulation of goods and provision of interstate, inter-municipal transportation and communication services. The ICMS is a state type of value added tax levied on the import of products, transactions involving goods (including electricity), and inter-municipal and interstate transportation services and communication services. A key distinction between ICMS and a VAT is that the acquisition of goods destined to the consumption of the establishment will not generate tax credit. Thus, there are limitations on the tax credits demonstrate how cumulative the tax system in Brazil is.

For transactions within the same state and in the case of imports, the rates may be 17%, 18% or 20% (currently the 20% rate is charged by the State of Rio de Janeiro). Besides that, states can apply different rates according to the essentiality of the goods and services. For example, sales of communications services and electricity are normally subject to ICMS at 25%, while essential food is exempted or taxed at a lower rate (ex: São Paulo 7%).

For the circulation of goods involving two different states, the rates are 7% if the purchaser is located in the States of the North, Northeast and Centre West regions or in the State of *Espírito Santo* and 12% if the purchaser is located in the South and Southeast regions. In view of the significant growth of e-commerce and following a request made by the National Revenue Policy Council (*Conselho Nacional de Política Fazendária* – CONFAZ) and several trade associations, Congress enacted Constitutional Amendment 87, dated April 16, 2015, altering the wording of the Brazilian Federal Constitution, with respect to sharing ICMS dues, and such provisions were regulated by ICMS Convention 93, dated September 17, 2015, with effect as of January 1, 2016. The Amendment established that revenue generated by the difference between intra-state and inter-state rates will gradually be allocated to the destination state.

ICMS is also due either when a product is resold on the domestic market or when it is physically removed from a facility. The taxable base is equal to the value of the transaction, including the ICMS itself (gross-up), the PIS/COFINS tax, insurance, freight and conditional discounts. IPI must also be added to the ICMS tax base when the transaction is carried out with a non-ICMS taxpayer or when it involves a product that will not be further manufactured or resold (e.g. fixed assets).

Each branch of a company is considered as a separate taxpayer for ICMS tax purposes. In general, ICMS taxpayers are entitled to a tax credit in the amount of the tax paid on the previous transaction involving the same asset (inputs), provided the purchaser is an ICMS taxpayer with respect to that product, i.e. the subsequent transactions with the purchased product are also subject to ICMS. The tax credit may be offset against future ICMS payables. If the purchaser is not an ICMS taxpayer, depending upon whether its sales are subject to this tax, ICMS may become a cost and will not be recoverable as a credit.

4. Taxes on Municipal Service

The Imposto sobre Serviços (ISS) is a municipal tax levied on the revenues derived from the provision of services. Although it is a municipal tax, the services subject to the ISS are listed in federal law (Complementary Law 116/03). The tax base of ISS is the price of the service and the rates vary from 2% to 5%, depending on the municipality where the service provider is located and provided and the type of the service. For some services, there is a significant debate as to whether the ISS should be paid to the municipality where the service provider is located or where the service is performed. The taxpayer is, in principle, the service provider. However, the relevant municipal tax legislation may impose a withholding responsibility to the company with these services. When the provision of the service also involves the provision of goods, ISS applies on the total price of the service, except when there is a specific provision determining the applicability of ICMS on the value of the goods. ISS also applies on the import of services. The Brazilian company retaining the services is obliged to collect the tax on the service fees paid to the non-resident. Furthermore, Complementary Law 116/03 introduced an ISS exemption for certain exports of services.

5. Taxes on Imports

PIS and COFINS Imports are enforced on the import of products and applied at a combined rate of 11.75% (2.10% for PIS and 9.65% for COFINS). However, there are specific rates for some products: in the case of imports of pharmaceutical products, for instance, rates are 2.76% for PIS and 13.03% for COFINS, and in the case of perfumes and certain cosmetics, rates are 3.52% for PIS and 16.48% for COFINS. PIS and COFINS Imports may generate a tax credit that can be offset against PIS and COFINS paid on gross revenues if the importer is subject to the non-cumulative PIS and COFINS based on its domestic transactions. The tax base is the CIF amount plus ICMS, PIS and COFINS. Certain products may be subject to different tax rates. PIS and COFINS Imports are also levied on the import of services, at a combined rate of 9.25% (1.65% for PIS and 7.60% for COFINS).

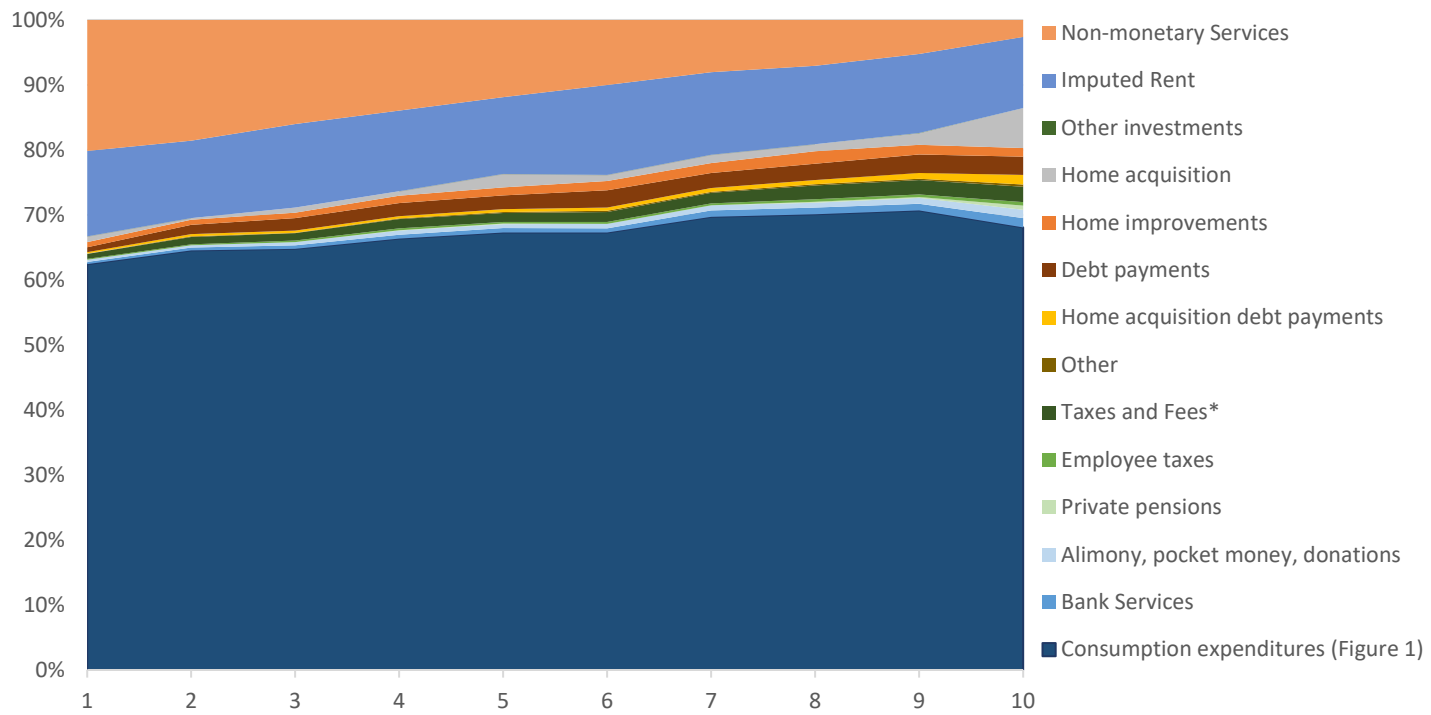
Annex III. Distribution of monthly expenditures based on POF 2017/18 data

Table A1: Monthly expenditure contributions of POF 2017/18 items

1 st Categorization	2 nd Categorization	3 rd Categorization	Total Consumption		Distribution of Consumption by type of expenditure			Monetary Consumption for Tax Analysis Purposes			Tax burden (taxes paid as a share of taxable monetary expenditures)
			(R\$ Bi)	Share of Total Consump.	Monetary	Non- monetary	Non- monetary Services	Monetary (R\$ Bi)	Monetary Taxable (R\$ Bi)	Taxes Paid (R\$ Bi)	
Current expenditures	Consumption expenditures	Food	45.4	15%	87%	13%	0%	39.3	39.3	6.3	16.0%
		Housing*	55.0	18%	94%	3%	3%	51.9	41.5	11.3	27.1%
		Clothing	11.1	4%	89%	11%	0%	9.8	9.8	3.0	30.6%
		Transport	48.4	16%	92%	5%	3%	44.4	43.5	15.5	35.8%
		Hygiene**	9.4	3%	93%	7%	0%	8.8	8.8	3.6	40.6%
		Healthcare	22.2	7%	68%	7%	24%	18.8	18.8	2.5	13.3%
		Education	12.1	4%	45%	2%	53%	11.5	11.5	1.3	10.9%
		Culture & Recreat.	6.8	2%	91%	6%	3%	6.2	6.2	1.6	25.5%
		Tobacco	1.2	0%	99%	1%	0%	1.2	1.2	0.9	78.7%
		Personal services	3.6	1%	93%	0%	7%	3.3	3.2	0.4	12.8%
		Miscellaneous	7.9	3%	97%	1%	2%	7.7	6.9	1.1	16.3%
		Bank Services	3.2	1%	99%	0%	1%	3.2	3.2	0.5	15.6%
		Donations***	2.8	1%	100%	0%	0%	2.8	0.0	0.0	0.0%
		Other current expenditures	Private pensions	0.8	0%	97%	0%	3%	0.8	0.0	0.0
Employee taxes	1.2		0%	99%	0%	1%	1.2	0.0	0.0	0.0%	
Taxes and Fees+	6.5		2%	97%	0%	3%	6.2	0.2	0.0	11.6%	
Other	0.7		0%	94%	0%	6%	0.7	0.1	0.0	12.8%	
Liabilities reduction	Debt paym. (mortgage)	-	2.8	1%	99%	1%	0%	2.8	2.8	0.4	13.7%
	Debt payments	-	7.6	3%	100%	0%	0%	7.6	0.2	0.0	15.6%
Assets increase	Home improvements	-	4.4	1%	96%	1%	3%	4.2	2.8	0.8	30.6%
	Home acquisition	-	8.7	3%	88%	12%	0%	7.6	7.6	1.0	13.7%
	Other investments	-	0.0	0%	81%	0%	19%	0.0	0.0	0.0	-
	<i>Imputed Rent</i>		38.7	12%	0%	100%	0%	-	-	-	-
	Total		319.4	100%	75%	17%	8%	240.1	207.5	50.3	24.2%

Source: own calculations using POF 2017/18. Expenditures shown in January 2018 prices, using survey weights. Notes: Monetary refers to out of pocket expenditures. Non-monetary refers to valuations of in-kind consumption such as donations, exchanges, and own production. Non-monetary services refer to donations, exchanges, and own production of services, the majority of which (74%) come from health and education public services provided by the state. *Housing excludes imputed rent. **Hygiene & personal care. *** Donations include alimony and pocket money. + Includes "taxes" paid such as IPVA, IPTU.

Figure A1: Categories' Share of Monthly Per Capita Total Expenditures (in BRL) by Decile



Source: own calculations using POF 2017/18.

Annex IV. A walkthrough example of the methodology to estimate the implementation of the VAT

The simulations to measure the impact of the implementation of a VAT (and replacement of the 5 indirect taxes that constitute the current Brazilian system) is based on the following broad steps:

- 1) All taxes included on the price of the products and services are removed;
- 2) Assuming the companies will keep the same profit margin after the tax reform, we apply the EBITDA margin to the cost and expenses (net of taxes) to calculate the price; and
- 3) The VAT rate is applied on the price, so we can calculate if the final price will be lower or higher than the current price.

As explained in the main text, IBGE provides the profit and losses statement (PL) for each sector of the economy. We can take as an example the PL of the supermarket sector. Table A2 presents a simplified version of the PL. The tax paid by the sector, the total cost, and total expenses are explicitly marked. We choose (and show) the Cost of Goods Sold (COGS) and Marketing expenses to help understand the adopted methodology.

Table A2: Simplified Profit and Losses statement for supermarket sector

	Sales by Supermarket – Current Amount
Gross Revenue	441,252,542
Tax on Sales	(24,212,363)
Other Deductions	(11,787,702)
Net Revenue	405,252,477
% of Local Operation	94%
Total Costs	(361,525,213)
Cost of Goods Sold	(320,583,293)
Total Expenses	(33,697,850)
Marketing	(2,390,173)
Ebitda	10,029,414
Ebitda % (on Net Revenue)	2.47%

Source: Adaptation from IBGE tables.

Using the tax rules, it is then calculated the tax that was paid (incidence) by the suppliers that was not credited by the supermarket. The tax not credited by the supermarket is thus incorporated into the cost or expenses of the supermarket – this is the reason behind the adoption of the term “hidden tax” in this work to describe the nature of such tax.

Table A3: Simplified Profit and Losses statement for supermarket sector, with previous chain

	Sale by Supermarket - Current Amount	Previous Chain	
		Adjusted Amount	Percentage
Gross Revenue	441,252,542		
Tax on Sales	(24,212,363)		
Other Deductions	(11,787,702)		
Net Revenue	405,252,477		
% of Local Operation	94%		
Total Costs	(361,525,213)	(361,259,573)	
Cost of Goods Sold	(320,583,293)	(320,583,293)	0.00%
Total Expenses	(33,697,850)	(30,242,377)	
Marketing	(2,390,173)	(2,226,207)	6.86%
Ebitda	10,029,414		
Ebitda % (on Net Revenue)	2.47%		

Source: Adaptation from IBGE tables.

Thus, the taxes paid by the suppliers are fully recovered (credited) by the supermarket in case of products included in the COGS. On the other hand, the taxes paid by the marketing providers are not creditable, so it is necessary to reduce the amount in order to remove the taxes. The adjusted amount in Table A3 reflects the amounts after the elimination of taxes in this step.

However, removing taxes of the previous chain is not enough to remove all the tax from the supermarket's numbers. To see how, we investigate the supplier of marketing services to the supermarket sector (table A4).

Table A4: Simplified Profit and Losses statement for marketing services

	Marketing Services - Current Amount
Gross Revenue	2,390,173
Tax on Sales	(164,860)
Other Deductions	(113,338)
Net Revenue	2,111,975
% of Local Operation	94%
Total Costs	(1,297,844)
Salary	(833,417)
Total Expenses	(633,287)
Office Material	(11,422)
Ebitda	180,843
Ebitda % (on Net Revenue)	8.56%

Source: Adaptation from IBGE tables.

The amount reduced according to Table A3 is only part of the taxes that is included in the statements of the supermarket sector. Using a similar approach, it is possible to calculate the taxes paid by the suppliers of the marketing sector that are not recovered.

Table A5: Simplified Profit and Losses statement for marketing services, with previous chain

	Marketing Services - Current Amount	Previous Chain Adjusted Amount	Percentage
Gross Revenue	2,390,173		
Tax on Sales	(164,860)		
Other Deductions	(113,338)		
Net Revenue	2,111,975		
% of Local Operation	94%		
Total Costs	(1,297,844)	(1,244,379)	
Salary	(833,417)	(833,417)	0.00%
Total Expenses	(633,287)	(581,360)	
Office Material	(11,422)	(8,759)	23.32%
Ebitda	180,843		
Ebitda % (on Net Revenue)	8.56%		

Source: Adaptation from IBGE tables.

For example, the office material is taxed at 23.32% and, according to the tax rules, such tax is not recovered by the sector. Making this calculation for all other costs and expenses of the sector, we conclude that 4.41% of the price charged by the sector refers to the “hidden taxes”. The Table A6 demonstrates the effect of this reduction on the supermarket PL.

Table A6: Estimate of the hidden taxes for the supermarket sector

	Sale by Supermarket - Current Amount	Previous Chain Adjusted Amount	Percentage	Adjusted Amount	Percentage	Sector of the Supplier
Gross Revenue	441,252,542					
Tax on Sales	(24,212,363)					
Other Deductions	(11,787,702)					
Net Revenue	405,252,477					
% of Local Operation	94%					
Total Costs	(361,525,213)	(361,259,573)		(356,151,921)		
Cost of Goods Sold	(320,583,293)	(320,583,293)	0.00%	(315,531,024)	1.58%	Industry
Total Expenses	(33,697,850)	(30,242,377)		(28,821,770)		
Marketing	(2,390,173)	(2,226,207)	6.86%	(2,120,815)	4.41%	Marketing
Ebitda	10,029,414			(384,973,691)		
Ebitda % (onNetRevenue)	2.47%			2.47%		

Source: Adaptation from IBGE tables.

According to the above table (A6), the amount spent in marketing is further reduced to R\$ 2,120,815. The same rationale is applied to the industry that manufactures merchandises included in the COGS. Therefore, 1.58% of the price that is charged by the industry is related to “hidden taxes”. This rationale allows us to go back until the fourth business chain, removing more than 96% of the taxes of the current system.

Finally, let’s suppose that the adjusted amounts (other chains) are the final numbers without tax. In other words, they are the costs and expenses in an economy without tax. In order to calculate the price, the ebitda margin has to be applied to the total of cost and expenses. After that, the VAT rate shall be used to calculate the VAT. Having the final price, it is possible to compare the prices before and after the tax reform.

Table A7: Estimate of price variation under VAT

Costs	356,151,921
Expenses	28,821,770
Ebitda	2.47%
Price Without Tax	394,723,357.90
VAT (26.9%)	106,180,583.28
Final Price	500,903,941.18
Price Before Tax Reform	441,252,542.00
Price Variation	13.52%

Source: own calculations.