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VAT REDUCTION AS ANTICICLIC POLICY AND MACROECONOMIC EFFECTS: THE CASE OF BRAZIL IN THE CURRENT CRISIS

Rodrigo Emmanuel Santana Borges

rodrigoesborges@gmail.com

PhD Student – Universidad Complutense de Madrid

ABSTRACT

The economic crisis of 2008-2009 will be known as the day when the creator knelt before its creation (Syll, 2010). Amid such economic mess created by economists (and engineers so-called such) themselves, there seems to be a single economic orientation: every man for himself and save yourself if you can. In the midst of this major disruption in the global economy, the Brazilian government decided, in a set of economic measures, to promote a partial and time-limited VAT reduction as its main countercyclical policy.

This paper proposes to measure which were the direct and indirect effects of lowering the taxes for a limited time on production, employment generation and income. It intends to check also whether the reduction in the IPI - a tax that is one of the VATs in Brazil was indeed the most efficient choice among the other value added taxes in Brazil or not.

In order to accomplish such objectives, a simple final demand model for the GDP is adopted, and the latest national accounts input-output data is taken as basis to infer the multipliers for the variables chosen and to estimate hypothetical impacts of reduction in other taxes instead of IPI reduction in the specific sector.

Currently, it is a consensus that the countercyclical economic policy adopted in Brazil had a positive result and fulfilled the expected goals.

Keywords: VAT, IPI, CONSUMPTION, EMPLOYMENT, PRODUCT, BRAZIL, WORLD CRISIS

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1 Introduction

The global crisis of 2008 is a milestone in Brazil's recent history. In latest decades, economic policy implemented in Brazil in moments of crisis had been generally procyclical. The historically high foreign vulnerability forced to increase the basic interest rate to prevent capital flight, generally counterbalanced with greater fiscal austerity – in other terms, cutting spending (Barbosa and Souza 2010, 57-110).

Given the new macro-structural conditions of the country and the present economic orientation, the response to the crisis was countercyclical, especially from the point of view of tax policy, following bashfully the international response. All around the world State intervention was scathing, forgetting, pragmatically, the theoretical assumptions of neoliberalism.

Taking the focus to these actions, it is important to evaluate the potential effectiveness of such measures. This work is devoted to this task, in particular to examine the possible results of the policy of reducing taxes (IPI) implemented by the Lula Government in 2008-2009 as a response to the global crisis, using input-output analysis.

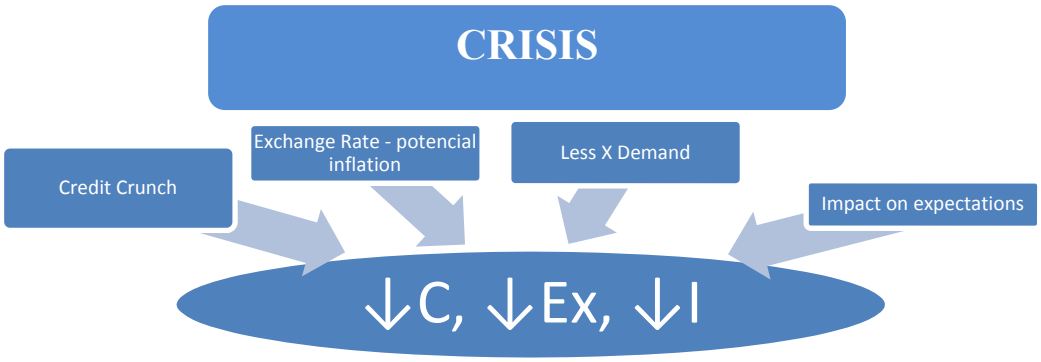
Before moving on to explain the evaluation framework and tools developed, it seems appropriate to briefly underline how the crisis translates into various shocks to the Brazilian economy. As notes Araújo, "the main channels of transmission of the international crisis for Brazil refer to credit, decrease of trade and global demand and expectations." (Araújo and Gentle 2010).

Figure 1 summarizes how the crisis is transmitted to aggregate demand of Brazilian economy, with severe negative impact. The effects, it is worth mentioning, are accumulative, leading to a fall in tax collection, and, depending on its force, could even trigger a deflationary spiral[1].

A countercyclical monetary policy, in response to shocks like this, involves the injection of liquidity – including the decrease of the interest rate and credit provision to the most affected actors by international contraction. With some delay and timidity regarding interest policy easing, due mainly to the tacit independence of the Central Bank of Brazil and its sole focus on controlling inflation, such measures were put progressively into place.

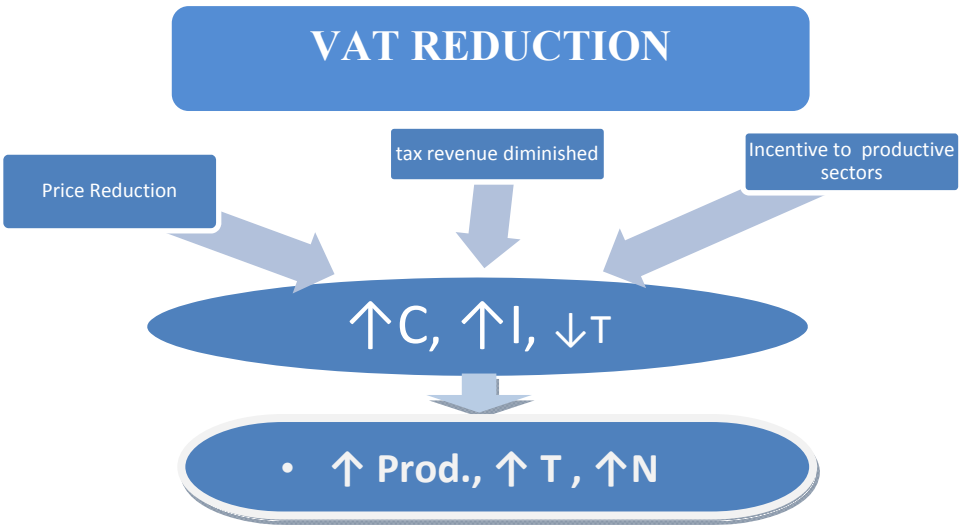
[1] This risk in the current crisis was low, based on the actual expansionist monetary policy and the response to the crisis taken by the United States, beholder of the global reserve currency.

Figure 1: 2008-2009 World Crisis – transmission channels to Brazil



Our focus, however, is about the impact of fiscal policy as a counterweight to the crisis. One of the implicit assumption of any proposal to reduce a VAT (value-added tax) is that it acts positively on demand (C), by the impact of price reduction for the final consumer, partially offsetting the drop in exports (X) with an increased domestic demand (Manente and Zanette 2010, 407). Finally, the impulse sales indirectly would be reflected in the production which, because of the interdependence of the system´s sectors (a main focus of input-output approach), would result in positive effect on other components of Final Demand, among others investment (I). Finally, the positive effects would result in augmented tax revenues, by the increase in consumption and production, counterbalancing the initial fall in tax income. This can be summarized as shown in Figure 2.

Figure 2: VAT reduction as anticiclic policy - mechanisms



Given this abstract and general framework for dealing with the matter, the next section center on the specific analysis for Brazil's case, looking for clarifying important points about the Brazilian tax structure and the context where the countercyclical fiscal policy was developed.

2 Tax Policy and the Crisis in Brazil

This section aims at two goals: the first is to describe briefly the tax structure of Brazil with regard to value-added tax like IPI. The second objective is to outline the IPI cutback that occurred in 2009 and important elements of the context to be taken into account when creating the analysis framework, or a base model.

2.1 Value-added taxes in Brazil

In Brazil, unlike Europe, we have three main taxes on products: ICMS (tax on circulation of goods and services), IPI (Tax on Industrialized Products) and ISS (Tax on Services). These taxes together are similar to a VAT (value added tax).

The overlapping of taxes and particularly the main importance of indirect and regressive taxes are historical marks of the fiscal structure of the country. This form of taxation puts the country, according to the Brazilian Institute of tax planning – IBPT in 14th place on tax collection, being one of the countries with the highest gross tax burden in the world[2].

The VAT is a tax type used in the vast majority of OECD countries, like all from EU (despite name change in some countries, VAT is the term for almost all), United States, England, Scotland, Ireland (where it is known also as CBL), Australia (called GST-Goods and Services Tax) and Canada (where there is the GST and HST-Harmonized Sales Tax).

Among the classic advantages of value-added tax are better monitoring, since the actors of the supply chain acquire the role of collectors, and the fact that yet, with multiple collectors, this kind of tax avoids bi-taxation of cascading sales tax, which value-added tax substitute.

In Brazil the largest representative of the three taxes cited is the ICMS. Its collection is the competence of each State of the Federation and it level is around 17%, similar to the level of

[2] It should be recalled that net taxation, however, is less than 11% of GDP – discounting income transfers such as social assistance and welfare, and mainly the interest payments and debt burden. (Bastos and Rodrigues, 2010)

the aliquot commonly found on the international ground, around 17.5%. It was established as ICM in the tax reform of 1966, replacing the IVC – sales tax and consignments [3].

At the same time (1964-1967, period of reforms during the military dictatorship) the IPI was created – Tax on Industrialized Products, another value-added tax, which came to replace IC – the existing Tax on Consumption then. This tax is the responsibility of the Central Government, hence its use from its creation to make industrial policy by the Federal Government.

Due to the option to act during the crisis using IPI, we here focus only on the adopted policy in relation to this tax. From December 2008, the Government created multiple timelines for IPI reduction, reducing the tax rate to some products, exempting others, keeping or removing the benefits depending on the resumption of economic normalcy. Some products, such as stoves and "tanquinhos"[4], had the IPI rate reduced to zero. Let's look more closely at the governmental action in this field in the beginning of the current global financial crisis.

2.2 The Brazilian response of economic and fiscal policy to the crisis

Fiscal policy designed and executed to counteract the crisis in Brazil was centered on a set of tax reliefs associated with the maintenance of public expenditure. Since December 2008 the automotive sector enjoyed substantial reduction in IPI [5]. The reduction was being renewed quarterly until the total time of approximately one year.

From March 2009, similar policy was extended to sectors of white line appliances and building material [6]. Both sectors had quarterly, reductions in principle and in the sequence were being renovated the periods of validity of the discharge. For electric appliances/white line reducing total lasted 10 months. For the various building materials covered in politics, lasted about 15 months.(Barbosa 2010).

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[3] the IVC was a tax cascade. Already the ICM, when the Constitution of 1988, became the ICMS incorporate more 5 indirect taxes (Oliveira, F., 1981)

[4] A type of low-cost washing machine commonly found in Brazil.

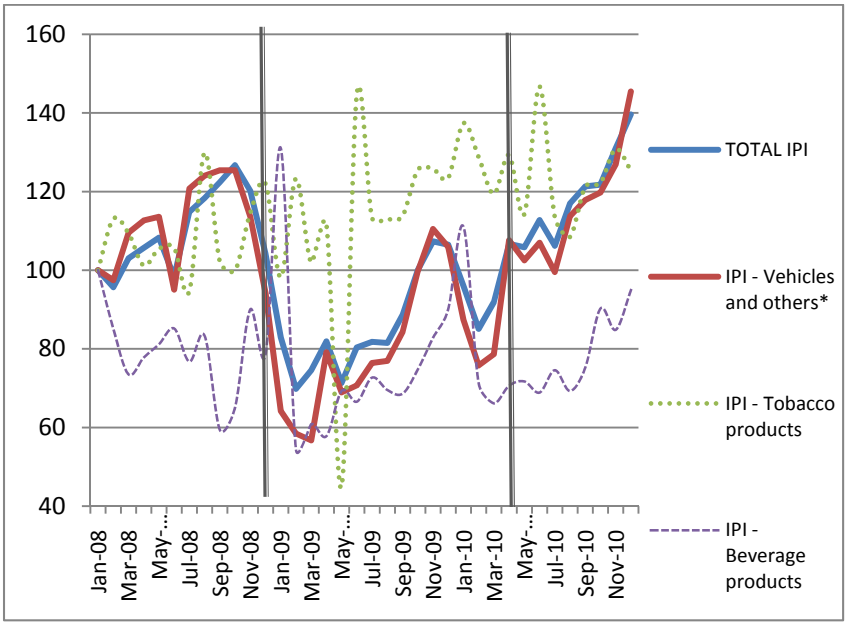
[5] "The reduction of the rates of the IPI was 100% on cars with maximum 1,000 cm^3 engine capacity (from 7% to zero) and 50% on cars between 1,000 cm^3 and 2,000 cm^3 engine capacity (13% to 6.5% for gasoline cars and 11% to 5.5% for cars on ethanol/flex fuel). Similar reduction rates also applied to pickup vehicles and similar (light commercial). "(IPEA-DIMAC, 2009)

[6] From the end of 2009, there was also specific fiscal policy for the furniture sector. However, by the significant difference in time between the deepening of the crisis (2008) and the beginning of these policies, we opted not to consider them for this study. The increase in IPI on tobacco products is neither taken into account in this analysis, since, in itself, it does not constitute a countercyclical policy.

Moreover, as said, the maintenance of public expenditure – so as not to neutralize the positive impacts of the tax relief – was contemplated by lowering the target of the fiscal primary surplus from 4.3% to 2.5% of GDP for 2009. Thus, the impact shown in Figure 2 of reduction of taxation (T) is virtually cancelled.

In March 2009 the Government was making IPI reductions and increases according to the signs of the economy, thus constituted in consumers mind as short-term and limited measures that were cut or extended according to Government planning. On this month the benefit of IPI reduction was extended for vehicles, and instituted for building materials and appliances (refrigerators, washing machines, stoves and "tanquinhos"). On the other hand, the cigarette tax was increased to compensate partially for the loss of tax revenue by the Government.

Chart 1 – IPI Sectoral incomes – 2008 to 2010



Elaborated by the author, based on data from Brazil's National Treasury. Jan/08=100
* Excluding IPI on Imports – approximation to the sectors with fiscal benefits.

Chart 1 shows how the total collection of IPI varied during the crisis. The period of deepening crisis and implementation of the policies discussed is the one between the two vertical lines. Note that there was significant reduction in tax revenue, due mainly to the performance related to sectors with countercyclical fiscal policy (red line). Tax revenue performance in smoke and drink sectors, as can be seen, would not explain the variation in the collection.

After having clarified about the actions regarding the fiscal policy which in the interest to this study, in the next section we will explain the construction of the analysis framework, based on a simulation from tables of input-output for the Brazilian economy.

3 Analysis framework

The lack of updated data that would enable to sufficiently assess the real effectiveness of economic policy measures cited has forced to choose building a model to evaluate its potential efficacy.

To do this, our basis was that of the last Input-Output tables made available by IBGE, concerning the year 2005 [7], with 55 x 55 activities.

Among the available data we find a column vector of the IPI (denoted by *i*), separated by activity. Thus, the first step in the analysis was to create a vector *r* of relative reductions for each activity (see Appendix, p. 16), on the basis that the reduction, for simplification purposes, has been in all cases of one year. From there, we make simply:

$$i * \hat{r} = i_1$$

It is important to note that the impact of a tax on consumption in output cannot be measured directly, so intermediate assumptions connecting the lowering to demand are necessary. In some cases or studies [8], this involves undergoing a modeling approach from income-elasticities and price elasticities for products/sectors [9].

The hypotheses adopted in this study are simplified, based on the construction of two scenarios. The first is that the reduction of IPI, for being limited in time, is transmitted to the final demand for the benefited goods, public spending remaining constant:

$$Df_1 = Df_0 + i_1$$

[7] IBGE computes Leontief Matrix from Tables of Resource and Uses of national accounts, assuming the hypotheses of industry technology, and distribution of the demand for constant market-share. However, the institution does not rebuild the Input-Output table compatible with Leontief approach; We did this and used its data in the appendix to have a clearer view of relationships.

[8] See (IPEA-DIMAC, 2009) or (Manente and Zanette 2010, 407).

[9] In this study it was not possible could not proceed to this form of practice because:

1) There aren't studies available on all sectors and their income and price elasticities.
2) IPI tax was lowered for goods that are part of the sets defined as activities or products in the Input-Output, which would make needed yet another mediation to be able to apply this approach using the Input-Output tables.

$$G_1 = G_0$$

The second scenario recognizes the effect of price reduction caused by IPI as responsible for a demand increase of 5%, in line with other studies (IPEA-DIMAC, 2009), and compatible with the relative magnitude of the tax. In other terms:

$$Df_2 = 1{,}05 * Df_0 + i_1$$
$$G_2 = G_0$$

The analysis of the results assumes that the actual impacts were most probably between the first and second scenario. Is it that we are dedicated to follow.

4 Assessment of the impacts of reducing the IPI rate

The analysis of the impacts of IPI reduction in automobiles, white line of appliances and building material was divided, for reasons of clarity of the text, in the areas of interest of the article. They are: production impact, impact on consumption, impact on employment and evaluation of alternatives.

4.1 Impact on Production

With the data obtained by simulation based on the input-output model (see Appendix page 16), we can observe that impacts on production are significant, particularly when compared to the size in proportion to GDP of tax waiver.

Table 1: Impacts on Supply of lowering IPI

	Scenario 1	Scenario 2
Initial Fiscal income lost (% GDP)	0,087%	0,087%
Impact on Production	0,210%	0,458%
Increase in vehicles output	4,531%	9,474%
Increase in bus and trucks output	0,426%	5,164%
Increase in appliances output	4,783%	9,368%
Increase in Cement for Construction purposes*	1,208%	1,711%

* Taken as representing building materials for being direct.

As we show in Table 1, for a gross tax waiver only about 0.09% of GDP, the impact on production achieved was between about 2.5 to 5 times the tax income loss, in reasonably conservative analysis. The result could mean increasing total production by slightly less than 0.5% of GDP.

In a sectoral point of view, the production of automobiles is the one that presents the greatest impact, with an increase of 4.5 to 9.5%, according to the scenario considered, as well as the appliance industry (between 4.7 and 9.4% increase). The production of trucks and buses is the one that fewer suffered impact of the reduction on IPI rate, partly because there was already a low rate before reduction has taken place.

Finally, albeit with significant impact, in absolute terms the policy of reducing IPI shows to be insufficient as unique policy against the crisis. This due to the magnitude of the crisis, under which perspective the negative impact of growth could be of 5% or more [10].

4.2 Impact on employment level

Because of the nature of assumptions adopted, the impacts on labor that can be see clearly devised from the model are those relative to the number of occupied.

As shown in table 2, the measures cited would create or retain about 70,000 jobs to 150,000 jobs during the year. The largest contributor to this would be once again the vehicle industry, which is explained on the one hand, by the size that represents the sector (being the greatest of all studied, with total output greater than the sum of sectors of appliances, trucks and buses and cement), and by the level of its chaining through the whole economic system, since, as seen in the table, direct jobs creation would be quite modest (between 3 000 and 7 thousand direct jobs created).

The industry with greater direct contribution to employment would, nevertheless, be the production of trucks and buses, with direct potential creation of some 8,000 jobs. However, its chaining derived from input-output data is quite low, which puts the industry's total

[10] In fact it was not the only policy adopted by the Brazilian Government before the crisis, having been accompanied by injection of liquidity, credit provision and governmental investment programmes.

contribution below the appliances sector. The cement sector, given the assumptions taken into account, had small contribution [11].

In next section the impacts on consumption shall be evaluated, to end after assessing comparatively and qualitatively the effectiveness of reducing the IPI tax and not other.

Table 2: IPI Policy - Impacts on employment

	Scenario 1	Scenario 2
Overall impact on employment	71 554	152 411
Vehicles Sector	**50 471**	**105 501**
Direct Jobs Created	3 356	7 015
Indirect Jobs Created	47 115	98 486
Trucks and buses sector	**1 374**	**17 682**
Direct Jobs Created	3 402	8 070
Indirect Jobs Created	4 052	9 612
Appliances sector	**9 407**	**18 422**
Direct Jobs Created	2 299	4 502
Indirect Jobs Created	7 107	13 920
Cement Sector	**1 326**	**1 830**
Direct Jobs Created	149	211
Indirect Jobs Created	1 292	1 830
Other sectors involving building materials*[12]	**8 980**	**8 980**

4.3 Impacts on consumption

Table 3 summarizes the impacts obtained in household consumption derived from the simulation. From it is possible to see that the increase in household consumption of cars, vans and light-commercials could range from 4.5% to 13.5% [13]. However, the industry's largest relative increase in blackouts in private consumption would cement, with positive variation between 17.7% 24.4%[14]. Finally, note that the performance at the final consumption in the case of trucks and buses is quite dependent on the possible impacts of tax reduction to demand, what can be assessed by the wide variation between the calculated scenarios.

[11] A possible modification to include assumptions about investment could certainly change this result, since the construction sector, large consumer of cement, it is strongly labor intensive.

[12] All the other products benefit from the policy measures, spread across a myriad of activities.

[13] This increase matches closely the estimates of technical note of Brazil's IPEA – Research Institute of Applied Economics.

[14] This could be seen as a certain inadequacy of simplified hypotheses to the reality of the industry, since it means an aggregate elasticity impact of more than 1.

Table 3: Impacts on Consumption

	Scenario 1	Scenario 2
Impacto on Household Consumption	0,24%	0,52%
Increase in household vehicle consumption	4,53%	13,53%
Increase in household trucks & buses consumption	0,43%	9,03%
Increase in household appliance consumption	6,10%	11,94%
Increase in household cement consumption	17,66%	24,38%

4.4 Comparative analysis of the effectiveness of the policy

Some criteria to benchmark and qualitatively appraise the choice of reducing IPI as fiscal policy seem at this point indispensable. These factors come to light thanks to the study done in terms of input-output analysis, which clearly identifies them[15].

Taking into account the labor market, the first factor is about the potential direct, measured by the number of jobs generated from each monetary unit of increase in production. A second is about the chaining potential of the sectors chosen, which leads us to the question of indirect effects.

From a more general point of view, another important factor is whether the engine derived from the reduction in terms of, for example, increased demand, is feasible and highly probable.

When we consider such factors, we can devise that some sectors, like agriculture and services, are more labour intensive than the sectors actually chosen. And, in terms of inter-sector potential, some activities in services seem to have more potential. That can be seen clearly because a homogeneous increase in demand (0,39%), for example (with the same total increase), would create 2.5 times more jobs.

But it is important to compare it to the realty and the options at hand for policy makers. Firstly, as seen through the scenario 2, impacts on additional demand leverage significantly the effects according to the model. So it was crucial to aim on products/sectors with great price-elasticity[16]. This is an important point in favor of the option of a tax on industrialized unrelated to food or agriculture sectors. Also because of the external limitations, it appears it

[15] It is important to note that investment was not deeply considered in this study. It certainly is an important element to be included in a broader analysis, but it´s out of the scope of this work.

[16] No less important is the fact that the policy focused on sectors that had power to ensure that the reduction would be transmitted mainly to the final price.

would be innocuous to aim at products intended for export, since because of the context foreign demand was shrinking exponentially.

Finally, in the practical arena, the IPI is the only one of three value-added taxes on consumption which is responsibility of the Central Government. The ICMS is managed in state-level, and the ISS is municipal jurisdiction. The effort to harmonize these policies in times of crisis, since even in times of serenity it has been innocuous, would seem a bet at risk at a time that required urgent action.

5 Concluding Remarks

Input-output analysis is quite relevant for these cases to assess impacts of economic policy in the overall economy. It allows to think about the key elements to draw and evaluate policies, by dividing clearly the results.

The study showed how important is the price-effect to the case of measures like this, that work or interfere from outside of the matrix of coefficients intermediaries.

Finally, the policy pursued has significant effects compared to the amount of the tax waiver, but clearly insufficient if thought of as single action (something that has not happened).

Among the alternatives and the margin of maneuver available for Brazilian central Government, the IPI reduction option for the sectors listed seemed good choice, if compared to other strategies aiming at lowering VAT-type taxes in the country.

In the near future, it will be possible to check with real data on the effectiveness of such a policy, in a retrospective manner.

As for the available data and estimates, the model presented good results. Even with fairly simplified hypotheses, it is interesting to note that the relative reduction predicted for a year in the model for vehicles, 60.80% (the most studied sector in various forums) is adjusted very well to the reality of tax collection during 2009 (falling in nominal prices 67 percent, which means something less in real terms) – something verified ex-post. The contribution of 50,000 to 105,000 is also in the same direction of the estimate made by IPEA (in a much more simplified framework) of 50,000 or 60,000 posts in one semester.

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APPENDIX 1 – VECTORS AND MATRICES

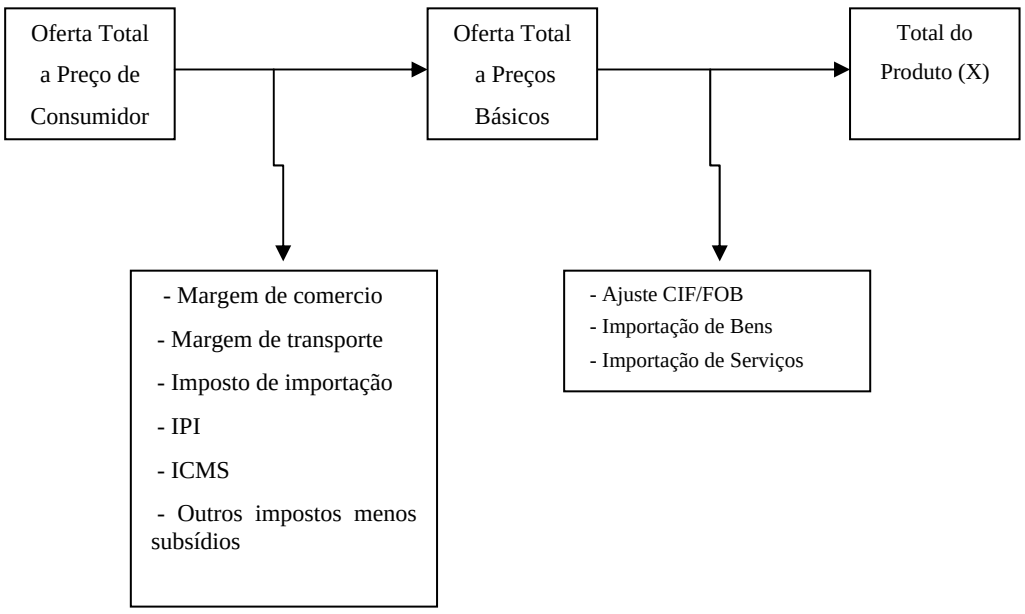
This section focuses on explaining the peculiarities of the I-O tables for Brazil, as well as the assumptions used for the simulation and results.

THE BRAZILIAN INPUT-OUTPUT MATRIX

Since it is a construction dependable on some assumptions, it is important to note how to get to the Input-Output table, from the official standard methodology.

Brazil's I-O Table is built upon the Table of Resources and Table of Uses from the system of national accounts of IBGE [17]. From the Table of Resources, it is possible to obtain the Total Supply at basic price and the Total Product, as shown in Figure 3. It is important to note that at this point the base tables are tables of product x activities (110 products x 55 activities, plus auxiliary lines and columns).

Figure 3: From Total Supply the Total of Product (X)



$$OTPB = OTPC - MC - MT - II - IPI - ICMS - OIMS^{18}$$

[17] Instituto Brasileiro de Geografia e Estatística.

[18] Oferta Total a Preços Básicos = Oferta Total a preço de Consumidor - Margem de Comércio - Margem de Transporte - Imposto de Importação - IPI - ICMS - Demais Impostos Líquidos de Subsídios.

The Table of Uses, in turn, provides us the Total Demand at consumer prices, including imports. The division of imports is made allocating demand products proportionately to the activities that produce it [19]. So to be able to unite the values of supply (resources) with the demand (uses) based on the basic price and only for domestic production, imports and taxes must be taken out of demand [20].

Logo:

$$Dt_{pb} = \left(Dt_{pc} - D_M\right) - T_{Dt}$$ [21]

But the matrix of Intermediate Consumption compatible with Leontief's approach, as seen below, is in the form of nxn:

$$\Delta X_{(N\times 1)} = (I - A)^{-1}{}_{(N\times N)}.\,\Delta Y_{(N\times 1)}$$

Being:

$(I - A)^{-1}$ → Leontief Inverse Matrix

ΔY → Final Demand Variation

ΔX → Variation of Total Production

However, the presentation of the data of IBGE is, as said, in the form of 110 x 55, since the set of products is not merely a subset of the set of activities, one that could be grouped by simple addition. An activity can produce different products from different industries. So it is missing one mediation. To solve this a model of simple industry-technology is adopted for the calculation of the I-O tables, without by-products. This means that to build a 55x55 matrix from the 110x55 that is available, technology of the industry is translated into constant market-share, that is, understanding that the demand for each activity for each product

[19] See Technical Notes – TRU in IBGE(IBGE, 2008).

[20] This is done with the assistance of the ERETES software used by IBGE for national accounts.

[21] The Dm matrix is calculated from the Table of Resources – and made available as table 4, and the array T (a set of matrices, AIDS) is calculated with assistance from software system of national accounts, but has not been made publicly available. Only the result, which is the basis for creating arrays of Leontief already homogenized, table 3, is disclosed in the package.

remains fixed [22]. So we have to create from the Table of Resources a matrix of "market share" D, where:

$$D_{ij} = o_{ij}/x_j$$

The value of production vector (x) is taken from of gross income (a line vector in Payments), which is the sum of total value added, remuneration of factors and taxes[23], and each element is taken from the original table, the table of resources.

Finally, multiplying D by the matrix of technical coefficients derived from Dt_{pb} (obtained with the same calculus as D), we obtain an array of 55x55 activities by activity to, or A. From there on the Leontief-matrix calculation very well known.

Estimates and assumptions-basis for simulation

A major difficulty in order to undertake the simulation was to adapt the tax policy to an input-product model with available data. The reason for that is that the fiscal easening was made on specific products and, at greater disaggregation level of data than the disaggregation by 110 products available. Therefore, estimates were necessary to see the impact of these reductions in the tax rate on what would be the activity to which they belong[24]. These estimates, summarized in table 4, were made as follows. For vehicles, trucks, appliances and cement, estimated directly by Annual Industrial Research (PIA) IBGE and sectoral data support (as of Anfavea or Eletros [25]) the relative weight of each product in the activity. The average IPI in relation to total production for each activity was estimated with these data and auxiliary with the I-O data, and then, it was possible to obtain the equivalent percentage of reduction of IPI in each activity.

On the other hand, various building materials products, whose tax relief was about 90%, were products whose membership to activities wasn't even directly possible from the data of the PIA. For them, we identified the activities to which they belong and arbitrated that the IPI

[22] With fixed demands, technical coefficients by activity are constant and equal if one takes the Table of Resources and de I-O table.
[23] This is a note with it is taken as a factor of harmonization, justified by the hypothesis.
[24] For that we assumed that each benefited product belonged only to one activity.
[25] Respectively National Association of manufacturers of automotive vehicles and the National Association of manufacturers of electro-electronics products.

would drop 10% (see items in yellow in Table 5). Finally, the vector r was calculated, and vector i_1, as indicated in section 3.

With these elements, two scenarios were defined, based on simplified assumptions, understanding as feasible and likely that actual results would stand between both scenarios. Both scenarios considered constant the Exports and Government consumption (the first by the crisis, the second by the package of government action, as we saw in section 2.2).

The first scenario, more conservative, assumes that the tax cuts is converted into Final demand for the same sectors, since the limited tax reduction was perceived as a discount, being disseminated widely as temporary opportunity.

The second scenario, in addition to the factor income as designed in the first, adds to sectors for which it was possible to make precise specification of reduction of the IPI (vehicles, trucks, appliances and cement), an increase of final demand by 5% by effect of this "temporary discount" as a price-effect.

APPENDIX 2 – DATA, ESTIMATES AND RESULTS

Table 4: Estimation of relative reduction of IPI revenue for activities

Products/Sectors	Trucks and Buses	Appliances	Vehicles	Cement	IPI	Average Reduction IPI (%)	Reduction (% total act.)
Trucks and Buses					4,9%		76,1%
Trucks	74,2%				5,0%	100%	
Cars, light-commercial and pickups					8,7%		60,80%
Cars up to 1000c			34,2%		7,0%	100%	
Cars 1000/2000c			50%		11,5%	50%	
Appliances					12,1%		61,58%
Refrigerators		35,71%			15,0%	66,67%	
Stoves		16,81%			5,0%	100%	
Washing Machines		17,06%			20,0%	75,00%	
“Tanquinhos”		5,00% *			10,0%	100%	
Others					4,0%		71,1%
Cement for Construction**				71,1%	4,0%	100,00%	

Elaboration from data of IBGE PIA-Incidence table and IPI (Inland Revenue)

* estimated

** estimated from the M-I-P.

Table 5: Data used and results of I-O simulation

Product Code Level 110	Product Discretion Level 110	IPI REDUCTION (%) – ®	IPI COLLECTED (*i*)	IPI REDUCTED (i_r)	Df (2005 MIP)	Df1	X1	ΔX1 (%)	ΔL1	ΔC1	Df2	ΔX2 (%)	L2	ΔC2
101	Agricultura, silvicultura, exploração florestal	0%	0,0	0,0	44 652,98	44 652,98	122 702,24	0,02%	2 245,82	0,0%	44 653	0,03%	4 534	0,0%
102	Pecuária e pesca	0%	0,0	0,0	23 059,73	23 059,73	71 800,25	0,01%	347,92	0,0%	23 060	0,01%	724	0,0%
201	Petróleo e gás natural	0%	0,0	0,0	12 940,49	12 940,49	71 273,14	0,11%	47,47	0,0%	12 940	0,22%	98	0,0%
202	Minério de ferro	0%	0,0	0,0	15 175,84	15 175,84	23 616,14	0,19%	47,56	0,0%	15 176	0,40%	102	0,0%
203	Outros da indústria extrativa	0%	0,0	0,0	2 485,47	2 485,47	12 164,6	0,19%	384,28	0,0%	2 485	0,38%	778	0,0%
301	Alimentos e Bebidas	0%	2 359,0	0,0	163 927,3	163 927,3	257 314,33	0,01%	156,91	0,0%	163 927	0,02%	331	0,0%
302	Produtos do fumo	0%	3 516,0	0,0	9 051,61	9 051,61	9 520,01	0,00%	0,02	0,0%	9 052	0,00%	0	0,0%
303	Têxteis	0%	20,0	0,0	10 680,9	10 680,9	33 811,21	0,04%	410,28	0,0%	10 681	0,08%	826	0,0%
304	Artigos do vestuário e acessórios	0%	0,0	0,0	24 831,13	24 831,13	28 023,51	0,01%	237,23	0,0%	24 831	0,03%	526	0,0%
305	Artefatos de couro e calçados	0%	389,0	0,0	17 811,0	17 811,0	23 521,14	0,02%	115,4	0,0%	17 811	0,04%	240	0,0%
306	Produtos de madeira - exclusive móveis	0%	12,0	0,0	6 651,46	6 651,46	19 631,46	0,06%	293,76	0,0%	6 651	0,11%	539	0,0%
307	Celulose e produtos de papel	0%	187,0	0,0	13 465,26	13 465,26	37 562,22	0,15%	285,16	0,0%	13 465	0,30%	564	0,0%
308	Jornais, revistas, discos	0%	0,0	0,0	8 468,11	8 468,11	29 385,27	0,10%	365,15	0,0%	8 468	0,21%	791	0,0%
309	Refino de petróleo e coque	0%	0,0	0,0	37 433,76	37 433,76	122 865,99	0,13%	23,66	0,0%	37 434	0,27%	49	0,0%
310	Álcool	0%	0,0	0,0	4 199,64	4 199,64	12 316,81	0,07%	52,08	0,0%	4 200	0,15%	110	0,0%
311	Produtos químicos	0%	0,0	0,0	6 407,01	6 407,01	61 182,83	0,23%	262,73	0,0%	6 407	0,46%	522	0,0%
312	Fabricação de resina e elastômeros	0%	0,0	0,0	4 303,31	4 303,31	24 125,07	0,52%	141,12	0,0%	4 303	1,01%	276	0,0%
313	Produtos farmacêuticos	0%	19,0	0,0	16 601,62	16 601,62	27 438,1	0,01%	8,57	0,0%	16 602	0,02%	18	0,0%
314	Defensivos agrícolas	0%	0,0	0,0	397,21	397,21	11 727,26	0,07%	11,5	0,0%	397	0,14%	23	0,0%
315	Perfumaria, higiene e limpeza	0%	1 132,0	0,0	12 573,11	12 573,11	17 526,77	0,03%	28,97	0,0%	12 573	0,06%	60	0,0%
316	Tintas, vernizes, esmaltes e lacas*	10%	3,0	0,3	1 089,46	1 089,76	8 451,05	0,39%	118,26	0,0%	1 090	0,80%	242	0,0%
317	Produtos e preparados químicos diversos	0%	0,0	0,0	2 601,67	2 601,67	13 042,6	0,17%	156,19	0,0%	2 602	0,34%	306	0,0%
318	Artigos de borracha e plástico*	10%	833,0	83,3	5 019,99	5 103,29	48 555,98	0,77%	2 931,21	11,4%	5 103	1,52%	5 809	11,4%
319	Cimento	71%	104,0	73,91	562,4	636,31	6 755,65	1,21%	149,14	17,7%	664	1,71%	211	24,4%
320	Outros produtos de minerais não-metálicos	0%	636,0	0,0	4 373,16	4 373,16	25 570,2	0,18%	981,55	0,0%	4 373	0,37%	2 025	0,0%
321	Fabricação de aço e derivados	0%	1 780,0	0,0	21 987,85	21 987,85	73 977,04	0,67%	754,9	0,0%	21 988	1,45%	1 621	0,0%
322	Metalurgia de metais não-ferrosos	0%	34,0	0,0	10 165,59	10 165,59	25 338,09	0,29%	304,22	0,0%	10 166	0,61%	631	0,0%
323	Produtos de metal - exclusive máquinas e equipamentos*	10%	1 424,0	142,4	13 636,91	13 779,31	53 221,59	0,68%	5 121,15	1,2%	13 779	1,13%	8 470	1,2%
324	Máquinas e equipamentos, inclusive manutenção e reparos	0%	1 494,0	0,0	43 942,67	43 942,67	60 673,89	0,17%	785,21	0,0%	43 943	0,39%	1 768	0,0%
325	Eletrodomésticos	62%	722,0	444,61	8 522,1	8 966,7	10 017,22	4,78%	2 298,61	6,1%	9 393	9,37%	4 502	11,9%
326	Máquinas para escritório e equipamentos de informática	0%	920,0	0,0	11 409,03	11 409,03	11 874,73	0,01%	1,77	0,0%	11 409	0,01%	4	0,0%
327	Máquinas, aparelhos e materiais elétricos*	10%	1 219,0	121,9	8 505,06	8 626,96	30 744,18	0,84%	1 604,17	3,0%	8 627	1,37%	2 602	3,0%
328	Material eletrônico e equipamentos de comunicações	0%	2 107,0	0,0	31 892,68	31 892,68	36 648,82	0,03%	26,98	0,0%	31 893	0,06%	60	0,0%
329	Aparelhos/instrumentos médico-hospitalar, medida e ótico	0%	632,0	0,0	7 217,62	7 217,62	10 632,35	0,21%	242,66	0,0%	7 218	0,44%	507	0,0%
330	Automóveis, camionetas e utilitários	61%	3 818,0	2 321,46	50 623,48	52 944,94	55 491,56	4,53%	3 355,62	6,5%	55 476	9,47%	7 015	13,5%
331	Caminhões e ônibus	76%	97,0	73,8	17 528,5	17 602,29	19 777,89	0,43%	107,51	0,7%	18 479	5,16%	1 303	9,0%
332	Peças e acessórios para veículos automotores	0%	44,0	0,0	14 319,44	14 319,44	56 469,16	1,18%	3 401,87	0,0%	14 319	2,79%	8 070	0,0%
333	Outros equipamentos de transporte	0%	127,0	0,0	18 076,51	18 076,51	24 563,84	0,02%	20,06	0,0%	18 077	0,04%	45	0,0%
334	Móveis e produtos das indústrias diversas*	5%	487,0	24,35	26 655,77	26 680,12	32 952,67	0,10%	960,6	0,1%	26 680	0,13%	1 258	0,1%
401	Eletricidade e gás, água, esgoto e limpeza urbana	0%	0,0	0,0	34 093,25	34 093,25	132 879,11	0,18%	685,46	0,0%	34 093	0,39%	1 453	0,0%
501	Construção	0%	0,0	0,0	141 784,78	141 784,78	167 705,15	0,02%	1 161,1	0,0%	141 785	0,04%	2 538	0,0%
601	Comércio	0%	0,0	0,0	176 895,24	176 895,24	294 797,71	0,14%	20 497,11	0,0%	176 895	0,31%	46 061	0,0%
701	Transporte, armazenagem e correio	0%	0,0	0,0	70 211,2	70 211,2	181 191,22	0,16%	6 144,99	0,0%	70 211	0,35%	13 342	0,0%
801	Serviços de informação	0%	0,0	0,0	38 168,32	38 168,32	140 445,21	0,13%	1 957,2	0,0%	38 168	0,27%	4 197	0,0%
901	Intermediação financeira e seguros	0%	0,0	0,0	95 779,57	95 779,57	199 518,79	0,09%	866,55	0,0%	95 780	0,21%	1 923	0,0%
1001	Serviços imobiliários e aluguel	0%	0,0	0,0	153 135,83	153 135,83	176 286,31	0,02%	91,38	0,0%	153 136	0,03%	196	0,0%
1101	Serviços de manutenção e reparação	0%	0,0	0,0	14 867,37	14 867,37	25 466,88	0,05%	921,49	0,0%	14 867	0,11%	1 996	0,0%
1102	Serviços de alojamento e alimentação	0%	0,0	0,0	56 021,73	56 021,73	69 759,74	0,02%	818,56	0,0%	56 022	0,05%	1 738	0,0%
1103	Serviços prestados às empresas	0%	0,0	0,0	26 118,7	26 118,7	139 820,45	0,15%	6 256,4	0,0%	26 119	0,33%	14 000	0,0%
1104	Educação mercantil	0%	0,0	0,0	33 423,16	33 423,16	36 055,27	0,01%	69,45	0,0%	33 423	0,01%	150	0,0%
1105	Saúde mercantil	0%	0,0	0,0	63 980,13	63 980,13	65 911,5	0,01%	88,84	0,0%	63 980	0,01%	195	0,0%
1106	Outros serviços	0%	0,0	0,0	94 612,08	94 612,08	109 627,1	0,03%	2 903,43	0,0%	94 612	0,06%	6 392	0,0%
1201	Educação pública	0%	0,0	0,0	78 957,48	78 957,48	79 162,35	0,00%	14,84	0,0%	78 957	0,00%	33	0,0%
1202	Saúde pública	0%	0,0	0,0	58 789,73	58 789,73	58 799,01	0,00%	0,26	0,0%	58 790	0,00%	1	0,0%
1203	Serviço público e seguridade social	0%	0,0	0,0	286 239,57	286 239,57	294 928,32	0,01%	290,01	0,0%	286 240	0,01%	634	0,0%
TOTAL			**24 115**	**3 286**	**2 156 325**	**2 159 611**	**3 794 621**	**0,21%**	**71 554**	**0,24%**	**2 163 473**	**0,46%**	**152 411**	**0,52%**