A Guide to Tax-Transfers Multipliers Applied to Brazil[*]

Um guia para multiplicadores de transferências de impostos aplicados ao Brasil

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Resumo: Este artigo mostra como é possível construir uma Matriz de Contabilidade Social (SAM) a partir das Contas Nacionais de Renda e Produto (NIPA) do Brasil e apresenta uma maneira possível de usar essa estrutura para estimar o impacto das mudanças na distribuição de renda e na demanda agregada sobre o produto. As simulações numéricas mostram que uma redistribuição equilibrada de renda dos ricos para os pobres tem um impacto pequeno, mas positivo, sobre o PIB. Isso acontece porque os valores da propensão média a consumir de ambos os grupos não são muito diferentes. Apesar desse resultado, como a propensão média a consumir dos pobres é muito alta, um aumento nas transferências do governo para os pobres, financiado pela dívida pública (déficit orçamentário), tem quase o mesmo impacto sobre o PIB que um aumento nos gastos públicos finais financiado pela dívida.

Palavras-chave: Matriz de contabilidade social. Tributação. Transferências. Multiplicadores.

Abstract: this paper shows how one can construct a Social Accounting Matrix (SAM) from the Brazilian National Income and Product Accounts (NIPA) and presents one possible way to use such a structure to estimate the impact of changes in income distribution and aggregate demand on output. The numerical simulations show that a balanced redistribution of income from the rich to the poor has a small but positive impact on GDP. This happens because the values of the average propensity to consume of both groups are not much apart. Despite this result, because the average propensity to consume of the poor is very high, an increase in government transfers to the poor financed by public debt (budget deficit) has almost the same impact on GDP as a debt-financed increase in public final expenditure.

Keywords: Social Accounting Matrix. Taxation. Transfers. Multipliers.

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1. Introduction

The increase in income inequality in western economies revived the economists' interest in income distribution and tax-transfer policies. To investigate the issue, it is necessary to divide the household sector in different income brackets, each of which with its own sources of income and propensities to consume.

Based on the methodology proposed by Barbosa-Filho (2014), this paper shows how one can construct a Social Accounting Matrix (SAM) from the Brazilian National Income and Product Accounts (NIPA) and presents one possible way to use such a structure to estimate the impact of changes in income distribution and aggregate demand on output.

The theoretical analysis follows the "structuralist" macroeconomic approach proposed by Taylor (2004). The economic logic of the model is Keynesian, in the sense that effective demand determines income, and we use it to analyze how changes in autonomous expenditures and income transfers determine the Gross Domestic Product (GDP) of the economy.

The transmission mechanisms from effective demand and income distribution to GDP occurs through a series of technological, demand and distributional multipliers. The numerical values of each multiplier come from the structure of the Brazilian SAM. The accounting framework used in this paper follows the work of Taylor et al (2013) on the US economy, with some adaptations to incorporate the idiosyncrasies of the Brazilian data.

In terms of the literature on Brazil, the SAM used in this paper is more aggregated than the one presented by Neri *et al.* (2013), but the economic results are basically the same. The main difference of this paper from Neri *et al.* (2013) is that we will investigate directly how changes in current transfers between institutional sectors impact effective demand and GDP, as well as that we will present all steps necessary to construct a SAM from the Brazilian NIPA.

The analysis is in four sections in addition to this introduction. The first section presents the construction of the Brazilian SAM and its main features. The second section presents a macroeconomic model based on the Brazilian SAM and shows how to use it to estimate the effects of changes in aggregate demand and income transfers. The third section uses the macroeconomic model of the second

section to estimate the impact of a series of fiscal policy "experiments" on the Brazilian GDP. The fourth and final section concludes the analysis with a summary of the results and some comments on possible further developments.

2. The Brazilian Social Accounting Matrix

The current structure of the Brazilian National Income and Product Accounts (NIPA) divides the economy in six institutional sectors: families, non-financial business, financial business, government, non-profit organizations and the rest of the world. The most recent detailed data on the flows between these sectors is from 2009 and the numbers can be organized into a flow-flow[1] SAM along the lines used in structuralist models. Before we do that, table 1.1 presents a summary of the Brazilian NIPA data for 2009 in millions of Brazilians currency (BRL).

The logic of table 1.1 is to show how one can move from the income decomposition of GDP to the financial balances, the net borrowing or net lending, of each institutional sector. The main features of each line of table 1.1 are described below.

a) All labor income goes to families (line 1). All proprietors' income also goes to families (line 2), which also receive part of profits because some of them are classified as units of production (line 3).

b) The government also receives part of profits because of government-owned enterprises, and the remainder of profits goes to financial and nonfinancial business (line 3).

c) As usual in NIPA, all net indirect taxes go to the government (line 4) and all imports to the rest of the world (line 5).

d) The sum of all sectors "functional income" is equal to GDP plus imports (line 6).[2]

e) Families send labor income to and receive labor income from the rest of the world (line 7).

[1] The Brazilian data on changes in financial stocks is neither well organized nor easily linked with NIPA data. Because this difficulty, we will work only with flows in this paper.

[2] We define functional income as the income before taxes, social contributions, social benefits, interest, dividends and other current transfers.

f) The sum of the capital income of all resident agents is equal to the net capital income sent to rest of the world (line 8 through 11).

g) Because all flows of labor and capital income between sectors cancel out, the sum of all institutional incomes after capital and labor payments is still equal to GDP plus imports (line 12).

h) The government collects all direct taxes from domestic agents (line 13).

i) Families pay social contributions to the government and financial business (line 14) and receive social benefits from them (line 15). This idiosyncrasy comes from the existence of mechanism of forced or long-term saving in Brazil, in the form of public funds managed by the government or financial markets.[3]

j) Similar to what happens with capital income, all other current transfers received by domestic agents and by the rest of the world cancel themselves out (line 16).

k) Because the sum of net taxes, social contributions, social benefits and other current transfers received is by definition equal to zero, the sum of the available income for final expenditure is still equal to GDP plus import (line 17). We will define this income as "final income" because this is the value available for each institutional sector to spend in consumption and investment.[4]

l) In theory, saving is the difference between the final income and final consumption (line 17 and 18). This does not happen in Brazil because of the existence of forced-saving and long-term mechanisms already mentioned earlier. In table 1.1, this "additional" saving is deposited by the government and financial business into the accounts of families (line 19) and it is not readily available for consumption.

m) As usual, exports are an expenditure of the rest of the world (line 20).

[3] The most important fund of is nature is the Brazilian "FGTS", which is an individual forced saving, managed by a public commercial bank, that pays an interest rate below market rates, and that workers can access only in case of unemployment, retirement or special personal circumstances.

[4] We refrain from naming it "disposable income" because such a definition has different meaning in NIPA methodology.

n) The difference between each sectors' final income and final non-capital expenditure, plus forced and long-term saving, equals each sectors' saving (line 21).

o) All domestic sectors invest in fixed capital (line 23), but only the nonfinancial business sector has inventories (line 24).

p) The difference between each sectors' saving (line 21) and investment (line 22) is the sectors' financial surplus, or net lending, before capital transfers.

q) The sum of net capital transfers received is zero (line 23).

r) The sum of net lending before or after capital transfers is zero (lines 22 and 24).

Table 1 – Summary of the National Income and Product Accounts of (2009, BRL million)

		Families	Non financial business	Financial institutins	Government	Non profit institutions	Rest of the world	Total
1	Labor compensation	1,412,999						1,412,999
2	Proprietors' income	260,424						260,424
3	Profits	207,741	696,480	124,072	46,150	1,401		1,075,844
4	Net indirect taxes				490,137			490,137
5	Imports						360,847	360,847
6	**Subtotal 1: GDP+Imports**	**1,881,164**	**696,480**	**124,072**	**536,287**	**1,401**	**360,847**	**3,600,251**
7	Labor income receives from the rest of the world	1,218					-1,218	0
8	Net capital income received	190,415	-167,649	8,223	-101,267	4,984	65,294	0
9	Interest	75,268	-24,852	87,127	-158,962	4,984	16,435	0
10	Dividends and distributyed earnings	68,874	-115,666	-30,367	28,300		48,859	0
11	Other capital income	46,273	-27,131	-48,537	29,395			0
12	**Subtotal 2: GDP+Imports**	**2,072,797**	**528,831**	**132,295**	**435,020**	**6,385**	**424,923**	**3,600,251**
13	Direct taxes	-95,523	-151,380	-20,482	267,552	-167		0
14	Social contributions received	-425,775		57,036	368,739			0
15	Social benefits received	506,919		-37,963	-468,956			0
16	Other current transfers received	-11,747	-33,046	-19,032	32,346	38,161	-6,682	0
17	**Subtotal 3: GDP+Imports**	**2,046,671**	**344,405**	**111,854**	**634,701**	**44,379**	**418,241**	**3,600,251**
18	Final consumption	-1,940,522			-687,001	-39,229		-2,666,752
19	Adjustment uue to forced and long-term saving	40,594		-24,173	-16,421			0
20	Exports						-355,653	-355,653
21	**Subtotal 4: Saving**	**146,743**	**344,405**	**87,681**	**-68,721**	**5,150**	**62,588**	**577,846**
22	Investment	-143,598	-340,198	-4,137	-83,272	-6,641	0	-577,846
23	Investment in fixed capital	-143,598	-347,669	-4,137	-83,272	-6,641		-585,317
24	Change in inventories		7,471					7,471
25	**Subtotal 5: Net lending before capital transfers**	**3,145**	**4,207**	**83,544**	**-151,993**	**-1,491**	**62,588**	**0**
26	Capital transfers	-849	502	-218	515	2,306	-2,256	0
27	**Subtotal 6: Net lending after capital transfers**	**2,296**	**4,709**	**83,326**	**-151,478**	**815**	**60,332**	**0**
Memo:								
	GDP	3,239,404						
	Natinal income	3,175,328						
	Disposable income	3,182,010						
	Domestic saving	515,258						

Source: IBGE and authors' calculation

Table 1.1 is not a traditional SAM. It contains most of the relevant NIPA information for a macroeconomic analysis, but to build a SAM we have to break some of its entries in the amount paid and the amount received by each sector. Table 1.2 does exactly that and is a small-scale usual SAM of the Brazilian economy.

Table 1.2 – Social Accounting Matrix for 2009 (2009, BRL million)

		1	2	3	4	5	6	7	8	9	10	11
		Costs of production	Current expenditures								Capital expenditures	Row total
			Households	Nonfinancial business	Financial institutions	Government	Non profit organizations	Rest of the world	Financial intermediatio	Long terms saving funds		
1	Uses of production	2,325,515	1,940,522			687,001	39,229	355,653			577,846	5,925,766
	Income allocation											
2	Households	1,881,164			37,963	468,956		1,345	394,504	40,594		2,824,526
3	Nonfinancial business	696,480							367,577			1,064,057
4	Financial institutions	124,072	57,036						841,430			1,022,538
5	Government	536,287	464,262	151,380	20,482	14	167		469,902			1,642,494
6	Non profit organizations	1,401							43,174			44,575
7	Rest of the world	360,847	127						86,212			447,186
8	Financial intermediation		215,836	568,272	852,239	538,823	29	27,600				2,202,799
9	Long terms saving funds				24,173	16,421						40,594
	Flow of funds											
10	Households		146,743								-143,598	3,145
11	Nonfinancial business			344,405							-340,198	4,207
12	Financial institutions				87,681						-4,137	83,544
13	Government					-68,721					-83,272	-151,993
14	Non profit organizations						5,150				-6,641	-1,491
15	Rest of the world							62,588			0	62,588
16	Financial intermediation										0	0
17	Long terms saving funds										0	0
18	Column total	5,925,766	2,824,526	1,064,057	1,022,538	1,642,494	44,575	447,186	2,202,799	40,594	0	15,214,535
Memo: GDP		3,239,404										

Source: IBGE and authors' calculation;

Similar to what we did for table 1.1, the main features of the Brazilian SAM can be summarized in a series of definitions and assumptions. To keep the analysis short, we will do this only for total demand and production, and for the family sector. The logic for interpreting the data of all other institutional sectors of the economy is the same as the presented below.

First, in line 1, the gross output of the Brazilian economy (BRL 5,925,766 million) goes to intermediary consumption, final consumption, investment and exports.

Second, in column 1, the gross output of the Brazilian economy is also equal to the sum of wages, profits, proprietors' income, indirect taxes and imports. To simplify the analysis, we assume that all imports "pass through" the domestic production sector before reaching their final destinations. In other words, all imports go to intermediary consumption.

Third, reading along line 2, the families' income comes from six sources: what they receive from production (BRL 1,881,164 million), social benefits from financial business (BRL 37,963 million) and the government (BRL 468,956 million), labor income from the rest of the world (BRL 1,345 million), capital income and other current transfers from "financial intermediation" (BRL 394,504 million), and income from "long-term saving funds" (BRL 40,594 million).

Fourth, financial intermediation is a fictitious accounting sector that allocates the capital and other-current-transfers flows in the SAM (in line 8 and column 8).

Fifth, by analogy with financial intermediation, the "long-term saving funds" sector is another accounting device that allocates the families' current income that is not readily available for consumption (in line 9 and column 9 of the SAM).

Sixth, reading along column 2, the families' income goes to final consumption (BRL 1,940,522), social contributions to the financial sector (BRL 57,036 million), social contributions and direct taxes to the government (BRL 464,262 million), the labor income paid to domestic but non-resident workers (BRL 127 million), capital income and other current transfers to "financial intermediation" (BRL 215,836 million), and saving (BRL 146,743 million).

Seventh, the families' investment (BRL 143,598 million) is registered in column 10 of the SAM and their net lending before capital transfers appears in column 11 (BRL 3,145 million). In economic terms, a positive net lending means that families accumulated both capital and financial instruments.[5]

Now, looking at the SAM as whole, we can see that it is very useful tool to analyze the macroeconomic relations of any economy. The sources and uses of income add up to the same number (lines and columns 1 through 9 in table 1.2). Total saving and investment are divided by sectors (lines 10 through 17 and column 10 in table 1.2), and each sector's net lending gives us a starting value to decompose the changes in financial assets and liabilities in the economy.

3. The Macroeconomic Model

This section presents a simplified macro model in real terms. The underlying assumption is that nominal and relative prices are constant, so that all values are denominated in terms of the GDP price index. With such a simplifying assumption in mind, let VPRO be the value of the gross output of the economy. From the usual cost decomposition of total output:

$$\mathrm{VPRO} = \mathrm{GDP} + \mathrm{CINT} + \mathrm{IMPORT}, \tag{1}$$

where CINT is the consumption of domestic inputs and IMPORT the consumption of imported inputs. As we did in the previous section, we will assume that all imports are intermediary in our model.

[5] A more complete SAM, as done by Taylor (2004) for the US, would also break the net lending per financial instrument.

Next, assume that both intermediary consumption and imports can be modeled as a fixed ratio of total output, which in their turn correspond to the technological coefficients of production. More formally:

$$\mathrm{CINT} = \mathrm{A_I VPRO} \tag{2}$$

and

$$\mathrm{IMPORT} = \mathrm{A_M VPRO}, \tag{3}$$

with $\mathrm{A_j} > 0$ for j=I and M. From (1), (2) and (3) it is straightforward that both the value of production and the value of imports are functions of income (GDP), that is:

$$\mathrm{VPRO} = \mathrm{GDP}[1/(1 - \mathrm{A_I} - \mathrm{A_M}) \tag{4}$$

and

$$\mathrm{IMPORT} = \mathrm{GDP}[\mathrm{A_M}/(1 - \mathrm{A_I} - \mathrm{A_M})] = \mathrm{mGDP}, \tag{5}$$

where to simplify notation we define "m" as the ratio of imports to GDP.

Moving to the demand side, we have:

$$\mathrm{VPRO} = \mathrm{CINT} + \mathrm{CFIN} + \mathrm{INVEST} + \mathrm{EXPORT}, \tag{6}$$

where CFIN, INVEST, and EXPORT represent final consumption, investment and exports, respectively. As usual in Keynesian models, from (1), (5) and (6) we can define GDP in terms of the final demand of the economy:

$$\mathrm{GDP} = [1/(1 + \mathrm{m})][\mathrm{CFIN} + \mathrm{INVEST} + \mathrm{EXPORT}] \tag{7}$$

For the purpose of this paper, we will treat investment and exports as exogenous variables and focus the analysis on the interaction between demand and income distribution through the consumption function.[6]

Based on the taxonomy of the Brazilian data, let the final consumption of our model be:

$$\mathrm{CFIN} = \mathrm{CFAM} + \mathrm{CGOV} + \mathrm{CNPO}, \tag{8}$$

where CFAM, CGOV and CNPO are the consumption expenditures of families, government, and non-profit organizations, respectively.

[6] A more complete macroeconomic model would contain some behavioral assumptions and policy rules to explain the determination of investment, public expenditures and exports.

To simplify the analysis further, we will also treat the consumption of the government and non-profit organizations as exogenous. The remaining variable, the consumption expenditure of families, consists of many income groups, from the "poor" to the "rich", where each groups' spending is a function of their "final income".[7]

More formally, divide the family sector in G income groups and assume that the total consumption of the economy is:

$$\mathrm{CFAM} = \sum_{\mathrm{j}} \mathrm{c_j YFIN_j}, \tag{9}$$

where $\mathrm{YFIN_j}$ is the final income of family group "j" and c_j is its corresponding average propensity to consume. In matrix notation (9) means

$$\mathrm{CFAM} = \mathbf{c}'\mathbf{y}_{\mathrm{FAM}}, \tag{10}$$

where **c** is the vector of propensities to consume and $\mathbf{y}_{\mathrm{FAM}}$ is the vector containing the final income of each income group.[8]

Now, to link the family's consumption with income distribution, note that we can define $\mathbf{y}_{\mathrm{FAM}}$ in terms of a vector containing the final income of all institutional sectors of the economy, that is:

$$\mathbf{y}_{\mathrm{FAM}} = \mathbf{B}_{\mathrm{FAM}}\mathbf{y}_{\mathrm{FINAL}}, \tag{11}$$

where $\mathbf{B}_{\mathrm{FAM}}$ is a matrix of zeros and ones of appropriate dimension and $\mathbf{y}_{\mathrm{FINAL}}$ is a vector that contains the final income of all institutional sectors in the economy.[9]

From our previous discussion of the structure of a SAM, we can define the vector of final incomes as

$$\mathbf{y}_{\mathrm{FINAL}} = \mathbf{y}_{\mathrm{INST}} + \mathbf{h}, \tag{12}$$

where $\mathbf{y}_{\mathrm{INST}}$ is a vector that contains the income of each institutional sector before current transfers, and **h** is another vector that contains the net income transfers received by each institutional sector.[10]

[7] Recall that in the previous section we defined "final income" as the income available for final expenditures after current transfers.
[8] All vectors are column vectors unless stated otherwise and **x**' is the transpose of **x**.
[9] Based on the Brazilian data this means the G family groups plus nonfinancial business, financial business, government, non-profit institutions and the rest of the world.
[10] Recall that since a transfer received by someone is a transfer paid by someone else, the sum of the components of h is zero.

The next step is to define the institutional distribution of income in terms of the functional distribution of income. To do this let $\mathbf{y}_{\text{FUN}}$ be a 5x1 vector containing labor compensation, profits, proprietors' income, indirect taxes and imports, as presented in the Brazilian data. From the functional distribution of income we can define $\mathbf{y}_{\text{INS}}$ as

$$\mathbf{y}_{\text{INST}} = \mathbf{B}_{\text{INST}}\mathbf{y}_{\text{FUN}}, \tag{13}$$

where $\mathbf{B}_{\text{INS}}$ is a matrix that "projects" the functional distributional of income onto the institutional distribution of income before current transfers.

Finally, to link consumption with income, let $\mathbf{b}_{\text{FUN}}$ be a vector of functional income distribution and imports, so that:

$$\mathbf{y}_{\text{FUN}} = \mathbf{b}_{\text{FUN}}\text{GDP}. \tag{14}$$

The economic intuition of the above is that the share of each type of income and the ratio of imports to GDP are fixed, so that they can be used to divide GDP in terms of the functional distribution of income and to determine imports.

We can now use all of the above definitions to make the final consumption of families endogenous and obtain a way to simulate demand and distribution shocks to our theoretical economy. More formally, note that from (7)

$$\text{GDP}(1 + \text{m}) = \text{CFAM} + \text{OTHER}, \tag{15}$$

where to simplify notation

$$\text{OTHER} = \text{CGOV} + \text{CNPO} + \text{INVEST} + \text{EXPORT}. \tag{16}$$

Then, using equations (10) through (14) we can rewrite CFAM as

$$\text{CFAM} = \mathbf{c}'\mathbf{B}_{\text{FAM}}(\mathbf{B}_{\text{INS}}\mathbf{b}_{\text{FUN}}\text{GDP} + \mathbf{h}) \tag{17}$$

and, therefore:

$$\text{GDP} = \left(\frac{1}{1+\text{m}-\mathbf{c}'\mathbf{B}_{\text{FAM}}\mathbf{B}_{\text{INS}}\mathbf{b}_{\text{FUN}}}\right)(\mathbf{c}'\mathbf{B}_{\text{FAM}}\mathbf{h} + \text{OTHER}). \tag{18}$$

The equation above is the final expression we need to do simulations based on the Brazilian parameters.

In terms of Keynesian macroeconomic theory, (18) represents the determination of income by aggregate demand, with some extensions to include

the functional distribution of income into the analysis, as usually done in post-Keynesian models, together with the personal distribution of income, which is not an usual feature of post-Keynesian models. The personal distribution of income is very important in practice because, was we saw in the Brazilian SAM, the structure of current transfers can change the distribution of income substantially.

4. Estimates of the Impact of Public Policies

We will now analyze how changes in income transfers and aggregate demand may alter the Brazilian GDP. To do this we will use the structure of the Brazilian economy in 2009, the reference year used by Barbosa-Filho (2014).[11] The exercises will use equation (18) of our theoretical model to calculate the impact of changes in the vector of income transfers (**h**) and in autonomous expenditures (**OTHER**). More formally, all exercises use the following specification

$$\Delta \text{GDP} = \left(\frac{1}{1+\text{m}-\mathbf{c}'\mathbf{B}_{\text{FAM}}\mathbf{B}_{\text{INS}}\mathbf{b}_{\text{FUN}}}\right)(\mathbf{c}'\mathbf{B}_{\text{FAM}}\Delta\mathbf{h} + \Delta\text{OTHER}). \quad (19)$$

and vary according to which item of "**h**" and "OTHER" changes.

Before we present the results of our simulations it is worthy to pause and present some information on the Keynesian multiplier and the structure of the uses and sources of income by Brazilian families. Starting with the multiplier, the data from the Brazilian 2009 SAM indicate that

$$\frac{1}{1+\text{m}-\mathbf{c}'\mathbf{B}_{\text{FAM}}\mathbf{B}_{\text{INS}}\mathbf{b}_{\text{FUN}}} = \frac{1}{1+0.1114-0.5237} = 1.7016. \quad (20)$$

In economic terms (20) means, for example, that an exogenous increase of one BRL in investment expands GDP in 1.7016 BRL. Moreover, imports represent 11.14% of Brazilian GDP and the average propensity to consume out of income, after we control for taxes, interest, dividends and all other income transfers, is 0.5237.[12]

[11] The Brazilian National Institute of Statistics and Geography (IBGE) publish the NIPA data for 2021 at the end of 2022. The most recent household survey of the families' sources and uses of income (the Brazilian "POF"survey) is also from 2018.

[12] To put this number in perspective, the final consumption by families represented 59.9% of GDP. The difference between the two numbers show that share of consumption in GDP is not a good guide of the average propensity to consume out of final income.

Moving to the household income and spending patterns, the survey of the Brazilian households' budget ("Pesquisa de Orçamento Familiar" or POF) divides the Brazilian families in five income groups. The first group contains the families with a household income smaller or equal to two minimum wages. The second group contains the families with a household income greater than two minimum wages and smaller or equal to three minimum wages, and so on and so forth. Table 3.1 presents the share of each group in income and total population.

Table 3.1 – Population and income distribution (2009)

Income group, by value of household income, measured in units of the economy's minimum wage	Share of population in % points	Share of income in % points
smaller or equal to 2	20,2	4,42
between 2 and 3	16,8	6,75
between 3 and 6	30,1	19,42
between 6 and 10	16,0	18,03
between 10 and 15	7,6	13,26
between 15 and 25	5,5	14,72
higher than 25	3,8	23,39
Colunm total	100,0	100,00

Source: IBGE, Table 2.1.1 of the Survey of Household Budget, 2008-09 (*Pesquisa de Orçamentos Familiares*, POF), available at www.ibge.gov.br.

The Brazilian "POF" survey also contains data on sources of income, final income and consumption of each income group. Table 3.2 present the allocation of labor compensation, profits and proprietors' income to family income group and to the other institutional sectors of the Brazilian economy. The data shows, for example, that in 2009 the richest group of families received 22.5% of all labor income, 19.8% of all proprietors' income and 9.9% of all profits. And this happened before interest, dividends, taxes and other types of current transfers.

Table 3.2 – Distribution of income and imports by institutional sector (% points)

Institutional sector		Labor compensation	Proprietors' income	Profits	Net indirect taxes	Imports
Families (income group in minimum-wage units)	smaller or equal to 2	3.1	5.0	0.0		
	between 2 and 3	5.7	7.1	0.1		
	between 3 and 6	19.5	20.7	0.9		
	between 6 and 10	19.2	19.0	2.1		
	between 10 and 15	14.1	14.4	2.4		
	between 15 and 25	16.0	13.9	3.9		
	higher than 25	22.4	19.9	9.9		
Non financial business				64.7		
Financial institutions				11.5		
Government				4.3	100.0	
Non profit organizations				0.2		
Rest of the world						100.0
Column total		100.0	100.0	100.0	100.0	100.0

Source: authors' estimates based on the data from the Brazilian national accounts of 2009 and the Brazilian Survey of Household Budget, 2008-09 (Pesquisa de Orçamentos Familiares, POF), available at www.ibge.gov.br.

Table 3.3 presents the data on the uses of income by family income group. To obtain the average propensity to consume out of final income, we have to divide consumption by total income minus other current expenditures. This is done in the rightmost column of table 3.3 and the results show that the average propensity to consume varies from a maximum of 96.8%, in the lowest-income group, to a minimum of 83.9%, in the highest-income group.

Table 3.3 – Households' uses of income, in terms of total income, and average propensity to consume out of final income (% points)

Income group by value of household income measured in units of the economy's minimum wage	Total income	Current Expenditure	Consumption	Other current expenditure	Net change in Assets (financial saving)	Final income (total income minus other current expenditure)	Average propensity to consume out of final income, in % points
smaller or equal to 2	100	96,9	93,9	3,0	3,1	97,0	96,8
between 2 and 3	100	96,4	92,0	4,4	3,6	95,6	96,2
between 3 and 6	100	95,0	88,7	6,3	5,0	93,7	94,7
between 6 and 10	100	92,9	84,2	8,7	7,2	91,3	92,2
between 10 and 15	100	90,0	79,2	10,8	10,0	89,2	88,8
between 15 and 25	100	92,0	78,2	13,8	8,0	86,2	90,7
higher than 25	100	87,1	67,2	19,9	12,9	80,1	83,9

Source: IBGE, Table 2.1.1 of the Survey of Household Budget, 2008-09 (Pesquisa de Orçamentos Familiares, POF), available at www.ibge.gov.br.Now, to start our simulations, note that the average propensities to consume out of final income already allow us to have an idea of the impact of changes in income transfers on the families' consumption.

For example, assume that the government adopts a pure "Robin Hood" policy that diminishes its transfers to the richest income group in, say, BRL 10 billion, while raising its income transfers to the poorest income group in the same BRL 10 billion. The consumption of the poor goes up in BRL 9.68 billion, while the consumption of the rich goes down in BRL 8.39 billion. The net effect of such a balanced transfer from the richest to the poorest is an increase of BRL 1.29 billion in consumption. The final impact on income is an expansion of BRL 2.20 billion in GDP because of the Keynesian multiplier presented in (20).[13]

It is always useful to scale macroeconomic simulations in terms of GDP to have results that can be compared through time and across countries. To do this, recall that from table 1.1 the Brazilian GDP was BRL 3,239 billion in 2009 and consider the following shocks of 1% of GDP:

a) a reduction in the government's net transfers to the richest matched by an equal increase in the government net transfers to the poorest (our previous pure "Robin Hood" exercise);

b) an increase in the government's net transfers to the poorest, without any compensatory reduction in its other net transfers or its final expenditures, so that the government net borrowing goes up.

[13] The final impact is 1.29 x 1.7016 = 2.20.

c) an increase in the government's net transfers to the poorest, matched by an equal reduction in its final expenditure (investment or consumption), so that the governments' net borrowing remains the same.

d) an increase in the government's final expenditure (investment or consumption), matched by an equal reduction in its net transfers to the richest, so that the governments' net borrowing remains the same.

e) an increase in the government's final expenditure (investment or consumption), without any compensatory reduction in its net transfers, so that the governments' net borrowing goes up.

Table 3.4 presents the impact of simulation above on GDP. In words, the first simulation expands GDP in 0.22% with no immediate impact on the governments' net borrowing. This small impact happens because a great part of the increase in consumption by the poorest is offset by a reduction in the consumption by the richest, as we already mentioned in our Robin Hood example.

In the second simulation, GDP expands 1.65% because the increase in the consumption by the poorest is not accompanied by a reduction in the consumption of the richest.[14] The adjustment happens in public finance with an initial increase in the governments' net borrowing. The final increase in the governments' net borrowing is smaller because tax revenues go up with GDP, but we did not model this here because it would require a dynamical framework that is beyond the static scope of this paper.

The third simulation reduced GDP in 0.05%. This happens because of the balanced-multiplier effect, that is, since families do not immediately spend the all of the positive change in their income, the increase in private consumption is smaller than the reduction in the governments' expenditure. However, due to the high propensity to consume of the poor, the result is almost zero, that is, GDP practically remains the same.

[14] According to Neri *et al.* (2013), an increase of 1% of GDP in Brasil's most important anti-poverty program (Bolsa Familia) expands GDP in 1.78%. The result in this paper is slightly smaller than the one obtained by Neri *et al.* (2013) because we simulate a direct increase in transfers to the population with a household income smaller or equal to two minimum wages, which is a larger group than the population in the Bolsa-Familia program.

The fourth simulation corresponds to an expansion in the governments' final expenditure financed through a reduction in its net transfers to rich, so that the budget balance remains the same. The impact on GDP is positive and very similar to what we obtained from our first simulation, 0.27% vs 0.22%. In other words, "taxing" the rich to increase government consumption and GDP have practically the same result as "taxing" the rich to increase the governments' transfers to the poor.

The final simulation is a typical Keynesian initiative, with no redistribution of net transfers. There is only an increase in public expenditure in 1% of GDP, which in its turn raises GDP in 1.7% because of the induced increase in private consumption. It should be noted that the expansion of GDP in this case is almost the same (1.70% vs 1.65%) that we obtained from our unbalanced increase in income transfers to the poor. In other words, because of the poor's high propensity to consume, raising income transfers to them has practically the same impact on GDP as raising the government's final expenditure.

Table 3.4 – Impact of alternative fiscal shocks on GDP (% of GDP)

Policy initiative: all shocks correspond to 1% of GDP	Change in GDP, in % points
Reduction in the government's net transfers to the most rich matched by an equal increase in the government net transfers to the most poor	0.22
Increase in the government's net transfers to the most poor, without any compensatory reduction in its other net transfers or its final expenditures	1.65
Increase in the government's net transfers to the most poor, matched by an equal reduction in its final expenditure (investment or consumption)	-0.05
Increase in the government's final expenditure (investment or consumption), matched by an equal reduction in its net transfer to the most rich	0.27
Increase in the government's final expenditure (investment or consumption), without any compensatory reduction in its net transfers	1.7
Source: author's simulation based on a Social Accounting Matrix of the Brazilian Economy, for 2009.	

In general terms, the results of our five fiscal policy shocks indicate that "pure" redistribution has a small impact on GDP because, even though the poor have higher propensity to consume than the rich, the difference is not substantial according to the most recent Brazilian data. The results also indicate that raising the net transfers to the poorest has almost the same impact on GDP than raising public final expenditure. This happens because the poorest have a propensity to consume almost 97% of their final income. As result, we can say that, if the governments' objective is to raise GDP, it would be slightly better to raise public

consumption or investment than to raise public net transfers in Brazil, a result that confirms Haveelmo's (1945) balanced-budget multiplier hypothesis. However, because in Brazil the poor have such a high propensity to consume, the two routes of action have almost the same impact on GDP.

Finally, it should also be noted that raising income transfers to the poor has one important macroeconomic advantage when compared to raising public expenditure: both initiatives raise GDP in almost the same level in Brazil, but income transfers to the poor also reduces income inequality, which is an objective of fiscal policy in itself. In fact, in a country with a still high income inequality as Brazil, reducing poverty through income transfers is also an important objective of fiscal policy and it usually has spillover effects on GDP growth that go beyond demand and distribution multipliers.

5. Conclusion

This paper presented a guide to build a SAM from the Brazilian NIPA data. The SAM was used as reference to construct a simplified macroeconomic model, in which exogenous of effective demand determines income and where changes in income distribution also affect GDP. The theoretical model was applied to Brazil using the country's SAM data as a guide to calculate the technological, distributive and demand multipliers. The numerical simulations showed that a balanced redistribution of income from the rich to the poor has a small but positive impact on GDP. This happens because the values of the average propensity to consume of both groups are not much apart. Despite this and because the average propensity to consume of the poor is very high, an increase in government transfers to the poor financed by public debt (budget deficit) has almost the same impact on GDP as a debt-financed increase in public expenditure. Because of the balanced-multiplier effect, the impact of higher public expenditure on GDP is obviously higher than the impact of higher government transfers to the poor. However, since income transfers to the poor are also very effective in reducing poverty and income inequality, they may be a better way for fiscal policy to stimulate social and economic development than public expenditure in a situation of fiscal restraint.

Going beyond the results of this paper, the SAM presented in section two and the macroeconomic model presented in section three can be expanded and refined to incorporate many additional features and analyze other issues than the

impact of fiscal policy on growth and distribution. For example, we worked under the assumption of fixed prices, but this can be relaxed by introducing a system of equations that determine prices in terms of the costs of production a la Sraffian models. The exogenous nature of investment and exports can also be relaxed by introducing an investment and an export function in the analysis. The behavior of fiscal policy can be modeled within the SAM through a fiscal rule, and changes in each sectors' financial assets and liabilities can be introduced into the analysis from data on financial stocks and flows. The SAM and the macroeconomic model presented in this paper are, therefore, just a first but important step in better understanding the macroeconomic dynamics of the Brazilian economy.

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