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Structural impacts of a cash transfer program: an application of a SAM based CGE model for Brazil

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ABSTRACT

The aim of this study is to introduce a methodology to project impacts of cash transfers programs, which we exemplify through the evaluation of the Bolsa Família Program in a recent period of the Brazilian economy (2009-2015). An original dynamic recursive computable general equilibrium model, modified to consider issues related to income distribution and their impact on households consumption levels as well as on sectoral output was applied. The results suggest that the program also generates income gains for classes which do not receive cash transfers from Government by its indirect effects on labor and capital income, but has effects on labor income inequality decrease and on productive structure. We conclude that cash transfers policies have important impacts over the process of development of the country, even though its effect on growth is small.

Keywords: Cash transfer programs; Bolsa Família; Inequality; Consumption; Productive Structure; Computable General Equilibrium.

JEL: H53; O15; C60; C68.

1. INTRODUCTION

The debate about inequality and income distribution has gained focus in the recent economic discussion, especially due to an income concentration trend verified in developed countries and the repercussion of "Capital in the twenty first century", by Thomas Piketty. In Brazil, data and studies have pointed out to an inequality decrease in the first decade of the 2000s. In addition to real minimum wage gains, the cash transfer program called "Bolsa Família" has been pointed out as one of the causes of inequality decrease observed in the 2000s in Brazil.

Conditional cash transfer policies have gained popularity in Latin America in 2000s being adopted as a policy instrument against poverty. Besides the Bolsa Familia in Brazil, the "*Oportunidades"* in Mexico and "*Chile Solidario"* are the most popular examples of these policies. These programs consist in monetary transfer amounts to poor families, which are conditional on the beneficiaries' counterpart, generally related to school attendance and to the

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monitoring of children's health. Many studies have shown positive effects on the education and health of beneficiary families, reducing poverty and the traditional ills of developing countries such as mortality and child labor (COADY & HARRIS, 2004; HANDA & DAVIS, 2006; SOARES et al., 2009).

The Bolsa Família (BF) program has received particular attention due to its magnitude and its estimated effects. It is a cash transfer program to poor and extreme poor households created in 2004 by the Brazilian Federal Government. The cash benefits are based on the household profile, considering besides per capita monthly income, number of members and the existence of children, teenagers and pregnant. The program is associated to conditionalities related to health and education and benefited 14 million of households in 2015 (MDS, 2015). Many studies have pointed out to positive effects of BF program on school attendance and education (GLEWWE E KASSOUF, 2008; OLIVEIRA E SOARES, 2013), on health care and nutrition (BAPTISTELLA, 2012; RASELLA *et al*., 2013), on life conditions (CEDEPLAR, 2005; JANUZZI E PINTO, 2013) and on income inequality decrease (HOFFMAN, 2009; 2013) in Brazil.

Besides those effects, researchers have considered other impact evaluations, relating effects on income inequality and economic variables (e.g., growth and consumption). Usually, these studies are based on the interdependencies produced by the income circular flow in a general equilibrium approach. Most of these studies point out to positive impacts of BF program on reducing income inequality, but there are divergences about economic impacts. Examples are the works by Mostafa, Souza and Vaz (2010) and Neri et al. (2013), who found positive results of the program on GDP and disposable income using Social Accounting models. These studies have in common the hypothesis that the financing of the program was by external indebtedness. On the other hand, Azzoni *et al.* (2007) and Zylberberg (2008), who used respectively an input-output (I-O) model and a social accounting model, and Cury and Leme (2007) and Silva and Ferreira (2015), who adopted a general equilibrium model, found negative impacts on the economic growth when it is considered a fiscal adjustment to finance the transfers.

The question pointed out by this paper is that the studies addressing this general equilibrium issue, which have been using input-output, social accounting, or even computable general equilibrium models, do not jointly address the full flow of income and transfers (typical of a social accounting model) and intersectoral interdependences (general equilibrium or input-output models). In input-output and social accounting models, impacts on certain agents and accounts, such as Government, external sector and Investment are considered as leaks of the system, making it impossible to capture the second order effect that a given policy can generate on specific agents. Moreover, they can generate results that are possibly overestimated due to the infinitely elastic supply hypothesis regarding the productive factors. On the other hand, in computable general equilibrium applications that do not make explicit connections between the different sources of income, their appropriation by income classes and the expenditure of the various agents of the economy, the impact analysis in this specific case may be limited. That occurs because these models do not take into account structural impacts, in terms of the linkages between productive structure and generation and distribution of income, of a policy that has an initial impact on income distribution and so on consumption.

The aim of this paper is to fill this gap in terms of modelling, contributing to the study of income transfer programs impacts using an original dynamic recursive computable general equilibrium (CGE) model for the Brazilian economy. This model, named BRIGHT (***Br****azilian*

*Social Accounting – General Equilibrium Model for **I**ncome **G**eneration, **H**ouseholds and **T**ransfers*), is modified to consider issues related to income distribution and their impact on households consumption levels as well as on productive structure. The BRIGHT has 10 representative households disaggregated by income classes, both in their consumption profile and in their sources of income (capital, labor, transfers) and takes into account the flows of income between households and other agents of the economy. These elements are captured in the database of the model, which has, among other elements, a detailed Social Accounting Matrix (SAM).

2. BRIGHT MODEL AND DATABASE

The BRIGHT model has several elements that make it appropriate to analyze the impacts of a cash transfer program, as the BF policy, as well as themes related to income distribution. It is a multi-product CGE model with recursive dynamic elements (backward looking) specified for 55 industries, 110 commodities, 12 institutional sectors (10 representative Households, Enterprises and Government) and Rest of the world; 3 endowments (land, capital and labor); 2 margins industries (Trade and transport); indirect tax (IPI, ICMS, Others taxes) and production taxes, as well as income and corporation taxes.

The BRIGHT model was calibrated from a multiple households SAM for the Brazilian economy with base year in 2008. The SAM was developed by Burkowsky, Perobelli e Perobelli (2014) and gathers data from the I-O matrix estimated by the Nucleus of Regional and Urban Economy of the University of São Paulo - NEREUS (GUILHOTO and SESSO FILHO, 2010), the Tables of Resources and Uses and of the Integrated Economic Accounts of the National Accounts System (IBGE, 2015). In order to build BRIGHT, the household agent in the SAM was disaggregated in 10 representative households by income classes (Table 1) based in the data from the 2008-2009 Household Budget Survey (POF) (IBGE, 2014). BRIGHT is especially structured to interconnect the income flows between the productive sectors, the 10 households and the other agents of the Brazilian economy.

Table 1: Household income groups in terms of minimum wage groups – minimum wage in 2009: 415.00 Brazilian Reais

Income group	Wage groups- in terms of minimum wage (m.w.)	Monthly household income (in Brazilian Reais R$)
H1	0-2 m.w.	R$ 0 to R$ 830
H2	2-3 m.w.	R$ 830 to R$ 1,245
H3	3-5 m.w.	R$ 1,245 to R$ 2,075
H4	5-6 m.w.	R$ 2,075 to R$ 2,490
H5	6-8 m.w.	R$ 2,490 to R$ 3,320
H6	8-10 m.w.	R$ 3,320 to R$ 4,150
H7	10-15 m.w.	R$ 4,150 to R$ 6,225
H8	15-20 m.w.	R$ 6,225 to R$ 8,300
H9	20-30 m.w.	R$ 8,300 to R$ 12,450
H10	Greater than 30 m.w.	Greater than R$ 12,450

Source: authors' elaboration

BRIGHT follows the Australian tradition in CGE models and was built on the theoretical frameworks of the BRIDGE model (Domingues et al., 2014) and PHILGEM (CORONG and HORRIDGE, 2012; CORONG and HORRIDGE, 2014). Both are Johansen-type models, formulated as a system of linearized equations and solved by the GEMPACK software (Harrison and Pearson, 1994). The applied specification of both models is composed of blocks of equations that determine supply and demand relationships, derived from optimization hypotheses and market clearing conditions. However, these two models present an important difference: While BRIDGE follows the original structure of ORANIG and MONASH (incorporates recursive dynamics), PHILGEM represents an extension of ORANIG, since it innovates by incorporating multiple households and additional equations that allow the use of a detailed SAM rather than an I-O matrix. Thus, BRIGHT starts from the theoretical structure of BRIDGE to calibrate the model from the I-O matrix, but connects to it, with some adaptations, the PHILGEM extension, which allows the incorporation of the additional SAM flows.

In some aspects, the theoretical specification of BRIGHT follows the standard in CGE models with recursive dynamics elements. Industries minimize costs subject to constant returns of scale technology, combining intermediate inputs and primary factor (aggregate) by a fixed coefficients function (Leontief). In the composition of intermediate inputs, there is substitution by prices between domestic and imported goods through a Constant Elasticity of Substitution function (CES). In the composition of the primary factors, there is also substitution by price between capital and labor by CES functions.

The household demand in the model is specified from a Stone-Geary non-homothetic utility function (PETER et al., 1996). This specification divides the consumption of goods and services into "luxury" and "subsistence" shares, reserving a fixed share of subsistence expenditure and a residual share in "luxury spending", which allows income changes to cause different modifications in the consumption of goods, hence its non-homothetic character. To the consumption decisions between domestic and imported goods, we use a CES function. Exports respond to demand curves negatively associated with domestic production costs and positively affected by the exogenous expansion of international income, adopting the hypothesis of a small country in international trade.

Investment and capital stock follow mechanisms of intersectoral displacement and accumulation based on pre-established rules, associated with expected rates of return and capital stock depreciation. Thus, industries with an increase in the expected rate of return, calculated endogenously, attract investment. This investment in period t generates the capital stock in period $t+1$ according to a standard accumulation rule, considering the initial capital stock discounted from the depreciation.

The labor market also presents an element of intertemporal adjustment, which involves the variables of real wages, current employment and trend employment. In this mechanism, the real wage rises relative to the trend scenario, proportionally to the deviation between the growth of labor supply and employment. The adjustment of the real wage to this gap between supply and demand of labor is controlled by an adjustment parameter.

We can mention some characteristics of BRIGHT that differentiate it from the Johansen tradition based CGE models for Brazil. BRIGHT has Enterprises as an Institutional sector and income characterization by sources: wages are distributed to households; income from Gross

Operating Surplus (GOS) is distributed to households, enterprises and Government. BRIGHT also takes into account income from transfers (e.g. Government transfers to households and property income from enterprises to households). There are linkages among wages paid by industries and wages received by households. The characterization of expenditure is complete: besides consumption by households and Government and indirect tax payments, BRIGHT identifies others outlays as Social Security spending as well as Direct tax payments from households to Government. The household consumption become an explicit function of household income. Usually this linkage is considered implicit by "closure" hypothesis in traditional CGE models. Government consumption may be a function of tax revenue (usually it is considered exogenous or follows household consumption).

3. SIMULATION STRATEGY

The simulation strategy proposed in this work aims to access the role of the BF program on the generation and distribution of income between 2008 (base year of the BRIGHT model) and 2015, as well as evaluate the impacts of the policy in sectoral and macroeconomic terms in this period. The mechanisms of recursive dynamics allow the explicit temporal use of the BRIGHT model, to which two types of simulations are applied: a historical and a policy simulation (DIXON et al., 2013).

In the historical simulation, observed values to macro variables between 2009-2014 (annual real growth rate) as GDP, Household Consumption, Investment, Government spending, Exports and price of Imports and population growth rate are applied as exogenous shocks in order to update BRIGHT economic environment to 2015.

We also include the BF transfers, indirect, income and corporation taxes annual growth rate (2009-2015) in the historical scenario. Table 2 shows the BF transfers distribution among income classes and on Table 3 is possible to access the transfers' growth rate between 2009-2015 (we took a hypothesis: transfers growth on a same rate for the 10 groups). The inclusion of taxes changes intends to avoid the adoption of ad-hoc hypothesis about BF funding by increasing taxes (these hypotheses are taken by many studies about BF economic impacts). Therefore, the historical simulation updates the economic environment annually from 2009 to 2015, including the effects generated by the BF transfers and taxes changes.

In the policy simulation, we take the growth rate of BF transfers off the economic scenario between 2009-2015. Thus, the results allow to access the role of BF's transfers growth in this period (Note: we interpret the results by changing the sign, this is, what are the impacts of BF' transfers growth rate among 2009-2015). The follow section presents the results.

Table 2: Bolsa Familia (BF) transfers distribution among Representative Households, 2008

Households	Share of each income group in total transfers from BF	Transfers from BF (in Brazilian Reais millions)	Number of Households (in millions)	BF transfers per household (BF/number of households) in Brazilian Reais
H1	50%	5,278.59	12.4	425
H2	24%	2,528.75	10.0	252
H3	18%	1,948.38	12.9	150
H4	3%	310.91	4.1	76
H5	3%	265.31	5.5	48
H6	1%	120.77	3.4	36
H7	1%	103.22	4.2	25
H8	0%	24.18	2.0	12
H9	0%	17.27	1.7	10
H10	0%	9.11	1.6	6
Total	100%	10,606.50	57.8	183

Source: authors' elaboration based on data from POF – 2008/2009 (IBGE) and MDS (2016).

Table 3: Transfers of BF program (in Brazilian Reais R$ bilions - current prices) and estimated annual growth rate (%), 2009-2015

	2009		2010		2011		2012		2013		2014		2015	
	R$ bi	Var.	R$ bi	Var.	R$ bi	Var	R$ bi	Var	R$ bi	Var	R$ bi	Var	R$ bi	Var.
H1	6.2	17%	7.2	15%	8.6	21%	10.5	22%	12.4	18%	13.5	9%	13.8	2%
H2	3.0	17%	3.4	15%	4.1	21%	5.0	22%	5.9	18%	6.5	9%	6.6	2%
H3	2.3	17%	2.6	15%	3.2	21%	3.9	22%	4.6	18%	5.0	9%	5.1	2%
H4	0.4	17%	0.4	15%	0.5	21%	0.6	22%	0.7	18%	0.8	9%	0.8	2%
H5	0.3	17%	0.4	15%	0.4	21%	0.5	22%	0.6	18%	0.7	9%	0.7	2%
H6	0.1	17%	0.2	15%	0.2	21%	0.2	22%	0.3	18%	0.3	9%	0.3	2%
H7	0.1	17%	0.1	15%	0.2	21%	0.2	22%	0.2	18%	0.3	9%	0.3	2%
H8	0.0	17%	0.0	15%	0.0	21%	0.0	22%	0.1	18%	0.1	9%	0.1	2%
H9	0.0	17%	0.0	15%	0.0	21%	0.0	22%	0.0	18%	0.0	9%	0.0	2%
H10	0.0	17%	0.0	15%	0.0	21%	0.0	22%	0.0	18%	0.0	9%	0.0	2%
Total	12.5	17%	14.4	15%	17.4	21%	21.2	22%	24.9	18%	27.2	9%	27.7	2%
BF/GDP	0.37%		0.37%		0.40%		0.44%		0.47%		0.48%		0.47%	

Source: authors' elaboration based on data from POF – 2008/2009 (IBGE) and MDS (2016).

4. RESULTS

The Table 4 shows the impacts of the growth of BF transfers on household income. Of course, part of this effect is the program transfer injection itself. However, the model captures how the other sources of income change with the impact of the policy, such as labor income, capital

remuneration and companies payments to households, reaching income groups in which the BF transfer is very small or inexistent.

All household classes have earned real income increase due to the growth of BF transfers among 2009 to 2015. Naturally, H1 has shown the highest accumulated impact (5.62%), since this group has received around 50% of the transfers. Although BF transfers do not target high-income classes, their income have increased because indirect impacts on others income sources.

Table 4: Impacts of the growth of BF transfers on Households real income, % accumulated variation between 2009 and 2015

	2009	2010	2011	2012	2013	2014	2015
H1	0.90%	1.47%	2.25%	3.11%	3.76%	4.32%	5.62%
H2	0.31%	0.53%	0.82%	1.13%	1.39%	1.62%	2.16%
H3	0.16%	0.29%	0.45%	0.63%	0.78%	0.92%	1.26%
H4	0.10%	0.20%	0.31%	0.43%	0.54%	0.65%	0.91%
H5	0.08%	0.16%	0.26%	0.35%	0.45%	0.55%	0.77%
H6	0.08%	0.17%	0.26%	0.36%	0.45%	0.55%	0.77%
H7	0.07%	0.15%	0.23%	0.32%	0.41%	0.50%	0.70%
H8	0.08%	0.16%	0.24%	0.34%	0.42%	0.51%	0.73%
H9	0.07%	0.14%	0.22%	0.31%	0.39%	0.48%	0.68%
H10	0.08%	0.16%	0.24%	0.32%	0.41%	0.49%	0.68%

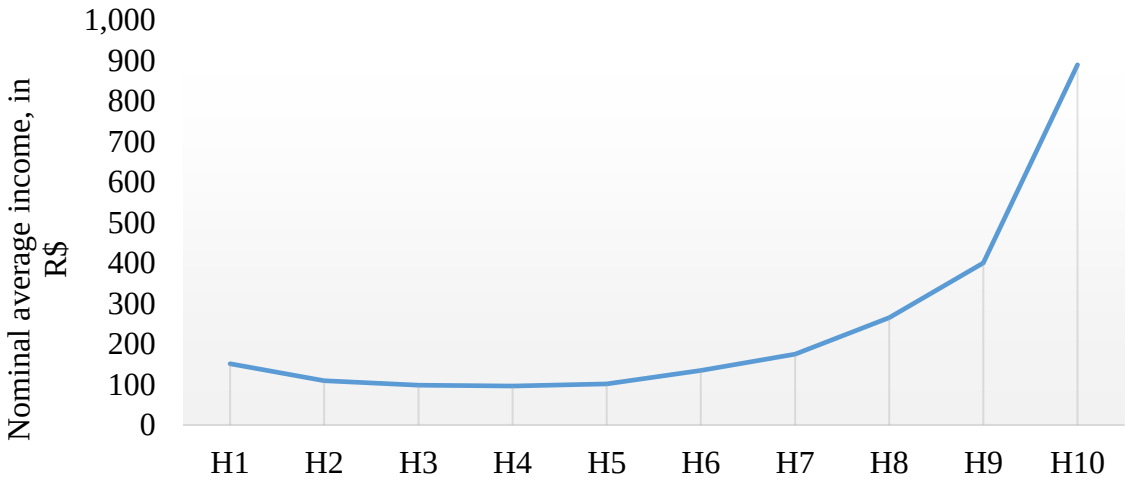
Source: Results of the simulations.

If the nominal average income by class (Nominal income generated in each class/ number of households in each class) is considered (Figure 1), the per-household impact is greater for high-income classes, as report Figure 1. This is because 60% of the Brazilian households are concentrated in the first three income brackets.

The Figure 2 shows the contribution of each income source for the total income variation by household classes due to the growth of BF transfers from 2009 to 2015. For low-income households, the greatest impact on their income comes from BF transfers (for H1, 66% of the impact on total income is due to BF transfers). For middle-income classes, indirect impacts on labor income are more important (for H4, H5 and H6, 57% of the total income variation are due to wages variation), while for high-income ones indirect impacts on capital income (GOS + Corporation transfers: profits and dividends) are more relevant (for H10, 47.2% of the total income variation are due to capital income variation). Thus, while the BF program direct impacts act to reduce inequality, indirect impacts may occur in the opposite direction, mainly due to capital income generation (which is highly concentrated on high-income households).

Results on Figure 2 can be explained by the income composition of each class (Table 5). Labor income is more relevant for middle classes, while capital income is more important for high-income classes. Naturally, Government transfers are more important for the low ones.

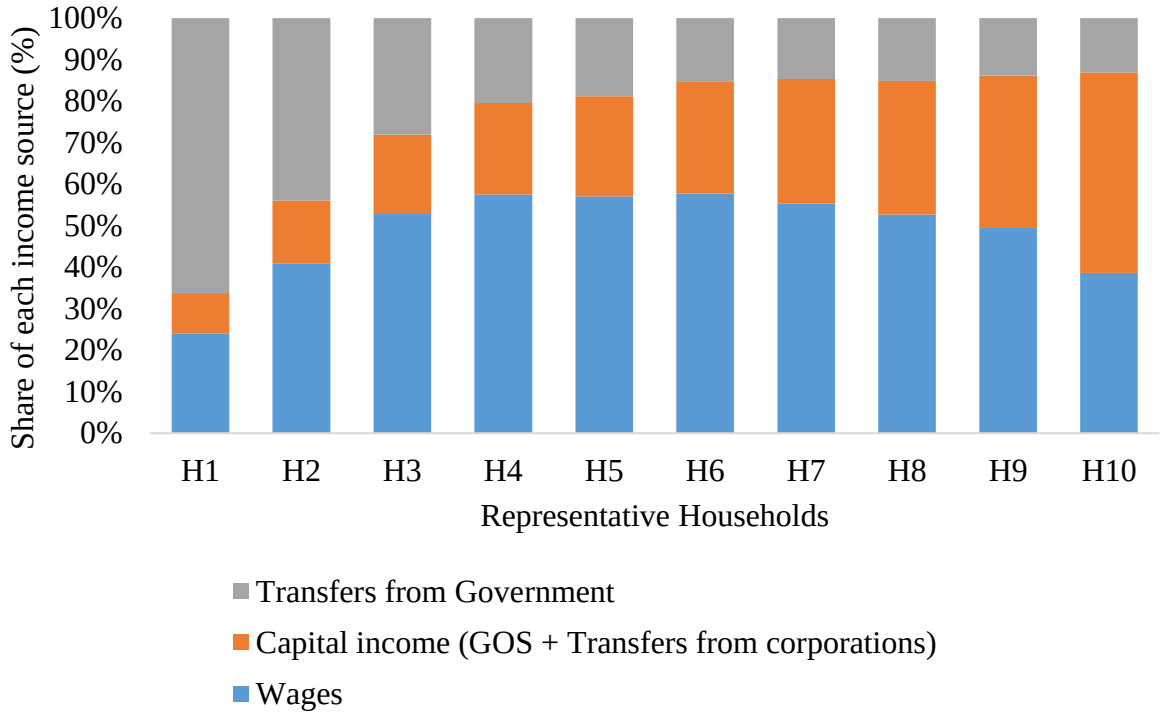
Figure 1: Nominal average income of each class generated by growth of BF transfers, accumulated variation (in Brazilian Reais R$) between 2009 and 2015



Note: Nominal average income generated for each class = Nominal income generated in each class/ number of households in each class

Source: Results of the simulations.

Figure 2: Percentage contribution by income source on total Households Income variation due to the growth of BF transfers (2009-2015)



Source: Results of the simulations.

Table 5: Share of each income source on total Household income in the benchmark of BRIGHT model (2008)

Households	Wages	Capital income (GOS + Transfers from corporations)	Transfers from Government	Transfers among households	Transfers from Rest of the World	Total
H1	46.5%	20.2%	31.6%	1.3%	0.5%	100.0%
H2	50.0%	19.7%	29.0%	0.9%	0.5%	100.0%
H3	55.4%	21.3%	22.4%	0.6%	0.4%	100.0%
H4	56.6%	22.9%	19.6%	0.6%	0.3%	100.0%
H5	55.3%	24.3%	19.4%	0.7%	0.3%	100.0%
H6	55.8%	27.2%	16.3%	0.5%	0.3%	100.0%
H7	53.5%	29.7%	16.0%	0.6%	0.3%	100.0%
H8	50.2%	31.8%	17.0%	0.6%	0.3%	100.0%
H9	48.4%	35.6%	15.3%	0.4%	0.2%	100.0%
H10	37.2%	47.2%	14.7%	0.6%	0.2%	100.0%

Source: authors' elaboration from the database of BRIGHT model.

The Table 6 reports a comparison between Gini indexes in the scenario where the growth of BF transfers has been taken in account and in the one that this growth is not included. In the absence of the growth of BF transfers from 2009 to 2015, the Gini index would be 2.12% higher. For disposable income, this difference is slightly higher: 2.32%. It indicates that endogenous tax collection have slightly reduced income concentration. Considering the Gini index by income source, it is possible to see that the reduction on inequality has occurred mainly due to a decrease on Government transfers concentration, but also due to a slight drop on labor income inequality. This an unprecedented result about the effects of the BF program.

Table 6: Gini Index between 10 income classes, comparison between a scenario including BF and a scenario excluding BF transfers, 2015

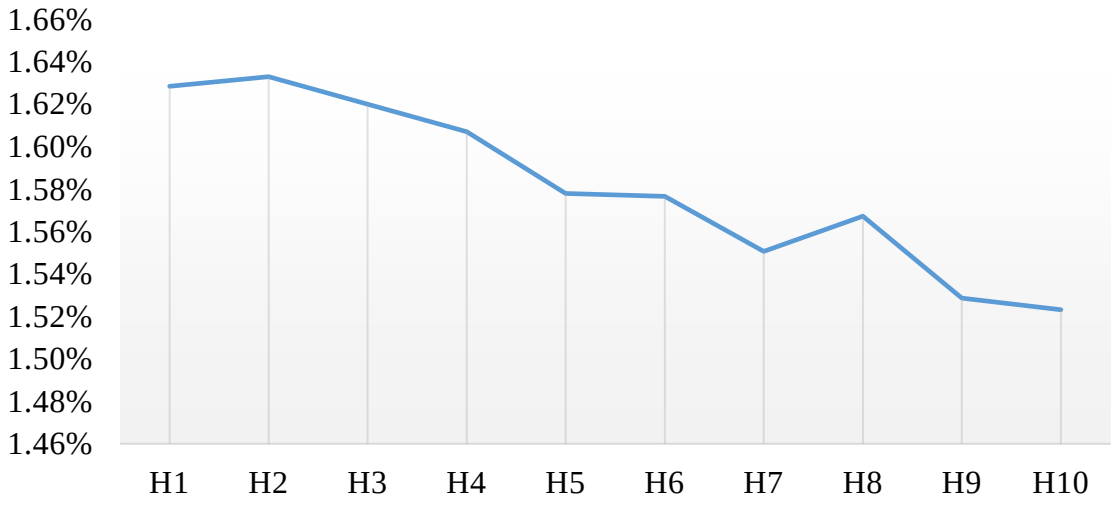
Income	Excluding growth of BF transfers	Including growth of BF transfers	Difference %
Total income	0.5784	0.5661	-2.12%
Disposable income	0.5533	0.5405	-2.32%
Labor income	0.5584	0.5548	-0.64%
Capital income	0.6903	0.6898	-0.08%
Government transfers	0.4830	0.4243	-12.16%

Source: Results of the simulations.

The analysis about the effects on labor income inequality was possible due to a BRIGHT feature: Linkages among wages paid by industries and wages received by households. In SAM analysis and in CGE models for the Brazilian economy this kind of linkage is not taking into account. Thus, changes on productive structure and then on factor payments do not imply changes on income appropriated by households, since factor payments are distributed among households always by a benchmark share. The new feature incorporated on BRIGHT allows to analyze how labor income appropriation changes when industry payments change.

The Figure 3 explains why the BF program have reduced labor income inequality: wages growth rate have increased more for low-income households than for high-income ones due to the BF transfers expansion in 2009-2015. That occurs because of asymmetric impacts on industries activity, induced by the effects of the program on consumption. The analysis of Tables 7 and 8 help to understand this effect.

Figure 3: Impacts of the growth of BF transfers on labor payments, % accumulated variation 2009-2015



Source: Results of the simulations.

The Table 7 shows the impacts of the growth of BF transfers on commodity consumption by household. H1 has been the class with major impacts on consumption, increasing mainly their consumption of services as Lodging and food, Passenger transport and Rent. “Salary goods” activities as Food and beverages, Processed meet, Apparel, Pharmaceuticals and Personal hygiene also have been impacted by an increase of H1 and H2 consumption due to the program in 2009-2015. For Automobiles, its consumption has increased mainly for high-income classes (as H8 and H9), since they also have gained income by indirect effects of the program. These results are explained by the Linear Expenditure System (LES), since households increase their consumption according to a share of each commodity on their total luxury expenditure.

Table 7: Impacts of the growth of BF transfers on commodities consumption, most benefited commodities (% accumulated variation 2009-2015)

Commodities	Households										
	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	Total
Lodging and food services	0,33	0,13	0,10	0,08	0,07	0,07	0,06	0,05	0,05	0,06	0,99
Passenger transport	0,48	0,17	0,09	0,05	0,04	0,03	0,02	0,03	0,01	0,01	0,93
Imputed Rent	0,07	0,09	0,07	0,07	0,08	0,09	0,10	0,13	0,13	0,00	0,84
Automobile	0,62	0,16	0,06	0,01	0,00	0,00	-0,01	-0,01	-0,01	-0,01	0,80
Eletricity and gas, water, s	0,27	0,21	0,09	0,05	0,03	0,03	0,02	0,02	0,01	0,02	0,74
Financial intermediation ar	0,12	0,05	0,05	0,04	0,04	0,05	0,04	0,04	0,04	0,06	0,53
Private health	0,20	0,08	0,05	0,03	0,03	0,02	0,02	0,02	0,03	0,03	0,50
Processed meat	0,28	0,09	0,03	0,02	0,02	0,01	0,01	0,01	0,01	0,01	0,49
Information services	0,14	0,07	0,05	0,04	0,04	0,04	0,03	0,02	0,02	0,03	0,48
Apparel	0,18	0,07	0,05	0,03	0,03	0,03	0,03	0,03	0,02	0,02	0,47
Pharmaceutical products	0,20	0,07	0,04	0,03	0,02	0,02	0,02	0,02	0,02	0,02	0,47
Perfumes, hygiene and cle	0,20	0,07	0,05	0,03	0,02	0,02	0,02	0,02	0,01	0,01	0,45
Diverse industries	0,15	0,05	0,03	0,02	0,02	0,02	0,02	0,02	0,02	0,03	0,37
Housing	0,03	0,02	0,02	0,02	0,02	0,03	0,04	0,03	0,06	0,08	0,35
Household services	0,14	0,05	0,03	0,02	0,02	0,02	0,02	0,01	0,01	0,02	0,34
Other food	0,16	0,06	0,03	0,02	0,01	0,01	0,01	0,01	0,01	0,01	0,32
Beverages	0,14	0,06	0,03	0,02	0,01	0,02	0,01	0,01	0,01	0,01	0,32
Others agricultural prod.	0,21	0,05	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,30
Home appliance	0,14	0,04	0,03	0,02	0,02	0,01	0,01	0,01	0,01	0,01	0,30

Source: Results of the simulations.

Asymmetric impacts on consumption induce impacts on productive structure. The Table 8 shows that the growth of BF transfers between 2009-2015 has induced a change on industry composition towards to Services, Food, beverage and smoking and Durable goods industries in 2015. Industries as Extractive activities, Agriculture and Chemicals have lost participation on total output.

Table 8: Changes on industry shares due to impacts of the growth of BF transfers, aggregated industries, in p.p., 2015

Industries	Variation in p.p.
Agriculture, forestry, livestock and fishing	-0,23
Extractive industry	-0,74
Food, beverages and smoking	0,37
Textiles, apparel and footwear	-0,20
Perfume, hygiene, cleaning and pharmaceuticals	0,20
Chemicals	-0,61
Durable goods	0,69
Heavy industry	-0,24
Others manufacturing	-0,19
Services	0,98

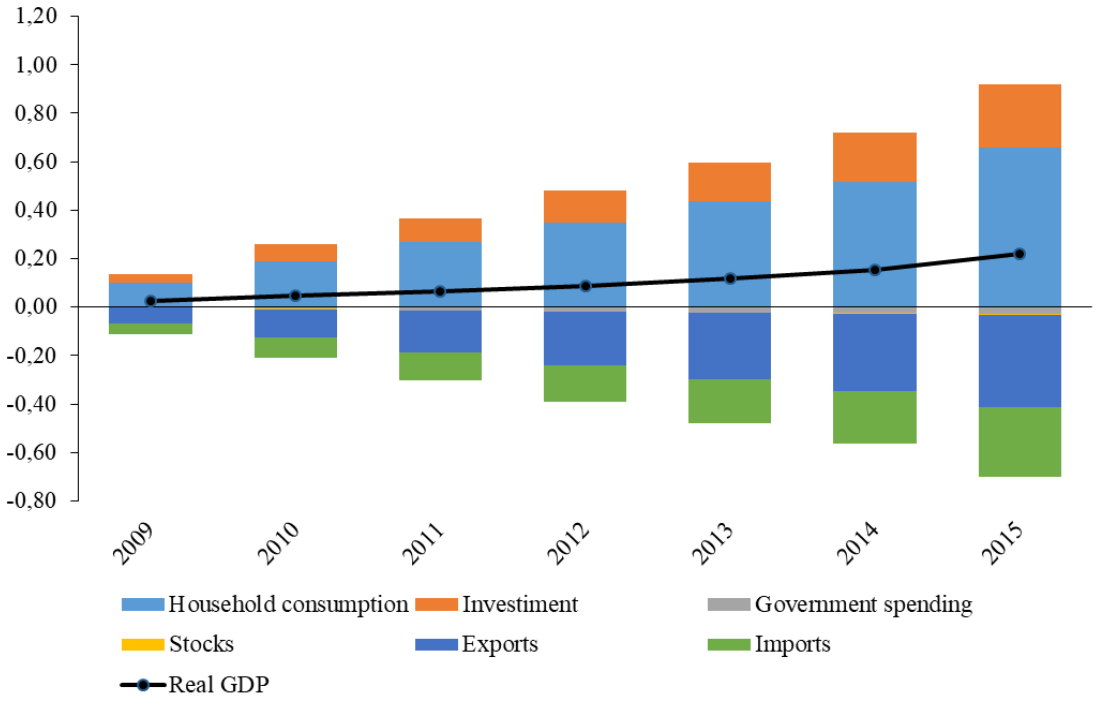
Source: Results of the simulations.

Industries that have increased their activity level also have been the most impacted ones in terms of employment and amount of wages paid. For those the activity level have dropped, impacts on employment and wage bill are negative. These results explain why income labor have increased more for low-income classes than for high-income ones. According to the SAM database, some of the discouraged industries concentrate a large proportion of their amount of wages paid on high classes (e.g., mining), while in some stimulated activities the appropriation of labor income is less unequal (e.g., Food beverage and smoking, Durable goods and some Services).

These results also suggest that cash transfer programs as Bolsa Familia have potential to induce a long-term structural change, diversifying productive structure towards to local market industries. That may be important to countries as Brazil, where primary industries hold a large share on total output.

The Figure 4 shows the macroeconomic impacts of the growth of BF transfers in 2009-2015. The GDP has slightly increased (0.3%). By the income side, this expansion is explained by increases in labor income, capital income and Indirect taxes. By the expenditure side, as shown in the figure 4, the GDP expansion is explained by increases in Household Consumption and Investment. Input prices rise inducing an elevation on domestic prices, which reduce the competitiveness of domestic goods and then exports fall and imports rise. The small magnitude of the monetary transfers can explains the small effect on GDP, since the transfers of BF represent around 0.4% of GDP.

Figure 4: Decomposition of impacts of the growth of BF transfers on GDP by expenditure side (accumulated contribution in p.p. of GDP)



Source: Results of the simulations.

The impact on GDP suggests that there is no economic cost associated with the BF program. Also reveals it cannot be considered a growth policy on short-term, since its effect on growth is small. We figured out that each Brazilian Real spent with the BF program generates an increase of 1.04 Brazilian Reais on GDP in the period considered in this study. This result contrasts with studies which have pointed out for a large "generator effect" (greater than 1) of BF program, as Neri et al. (2013). Also, contrasts with studies that have pointed out for negative impacts (e.g., Azzoni et al., 2007; Zylberberg, 2008; Cury and Leme, 2007; and Silva and Ferreira, 2015. Although the short-term GDP impact has been small, the results of this work have pointed out for important structural changes associated with cash transfers policies.

5. FINAL REMARKS

The aim of this study was to contribute to the literature of the economic impacts of cash transfer programs in developing economies, studying the experience of the Bolsa Família program in the recent economic dynamics in Brazil. The main advance in relation to other studies that have analyzed the economic effects of the program was the use of an original CGE model – BRIGHT, which was calibrated by a detailed SAM, making it appropriated to be applied to themes related to income distribution.

The results suggest that cash transfer programs, in the form of the BF, act as a policy instrument that exerts positive effects on income deconcentration. Due to indirect effects of this type of program, which stimulate consumption and production, even those classes that do not receive benefits are benefited with income gain. These indirect effects are higher, monetarily per capita, for the classes in the top of distribution, which hold the largest share of labor and capital incomes and the lowest proportion of the population.

The results for labor income have shown that the asymmetric impact of the program on the productive structure, which stimulates relatively industries with domestic-oriented production to the detriment of exported commodities, causes a trend of deconcentration of these remunerations. Therefore, we suggest that the effects on the reduction of inequality resulting from the BF program are mainly due to the increase in income coming from transfers to low-income classes, but also due to internal mechanisms of the productive process.

The impact on GDP suggests that there is no economic cost associated with the BF program. Also reveals it cannot be considered a growth policy on short term, since its effect on growth is small. The magnitude of monetary transfers can explains the small effect, since the transfers of the BF program represent around 0.4% of GDP. Although the short-term GDP impact has been small, results have pointed out for important structural changes associated with cash transfers policies.

Finally, the results found in this work illustrate the importance of the use of CGE models especially suited to issues related to income distribution and structural change in studies that focus on distributive issues.

6. REFERENCES

AZZONI, C. R.; GUILHOTO, J.; HADDAD, E. A. ; HEWINGS, G.; LAES, M.; MOREIRA, G. R. C. *Social policies and regional income inequality in Brazil: an I-O analysis of the Bolsa Família program*. 35º Encontro Nacional de Economia, 2007, Recife.

BARBOSA, A. L. N.; CORSEUIL, C. H. L. Bolsa Família, escolha ocupacional e informalidade no Brasil. In: Campello, T.; Neri, M, C. (Ed.). *Programa Bolsa Família: uma década de inclusão e cidadania.* Brasília: IPEA, 2013.

BAPTISTELLA, J. C. F. *Avaliação de programas sociais: uma análise do impacto do bolsa família sobre o consumo de alimentos e o status nutricional das famílias*. V Prêmio SOF de monografias, 1º lugar – Coletânea, 2012.

BURKOWSKY, E.; PEROBELLI, F.F.C.; PEROBELLI, F. S. *Matriz de Contabilidade Social e Financeira para o Brasil*. Programa de Pós-Graduação em Economia Aplicada – FE/UFJF, 2014 (Texto de discussão n. 02).

COADY, D.; HARRIS, R. *Evaluating Targeted Cash Transfer Programs A General Equilibrium Framework with an Application to Mexico.* Trade and Macroeconomics Research Report 137. International Food Policy Research Institute. Washington, D.C. 2004.

CORONG, E. L.; HORRIDGE, M. PHILGEM: *A SAM-based Computable General Equilibrium Model of the Philippines*. Centre of Policy Studies: Monash University. General Paper No. G-227, April -2012.

CORONG, E. L. *Tariff elimination, gender and poverty in the Philippines: A computable general equilibrium (CGE) microsimulation analysis*. Melbourne: Center of Policy Studies, 2014.

CURY, S.; LEME, M. C. S. *Redução da desigualdade e programas de transferência de renda: uma análise de equilíbrio geral*. In: BARROS, Ricardo Paes de; FOGUEL, Miguel Nathan; ULYSSEA, Gabriel (Ed.). Desigualdade de renda no Brasil: uma análise da queda recente. Brasília: Ipea, 2007. v. 2.

CEDEPLAR. *Avaliação de Impacto do Programa Bolsa Família*. Relatório de pesquisa. Belo Horizonte, Centro de Desenvolvimento e Planejamento Regional/Universidade Federal de Minas Gerais: 2005.

DIXON, P.; RIMMER, M. *Dynamic general equilibrium modelling for forecasting and Policy: A practical guide and documentation of MONASH*. Cayton: Emerald, 2002.

DIXON, P.B.; KOOPMAN, R. B.; RIMMER, M. T. The MONASH Style of Computable General Equilibrium Modeling: A Framework for Practical Policy Analysis. In: DIXON, P.B.; JORGESON, D (Ed). W. *Handbook of CGE modeling*. Oxford: Elsevier, 2013, v.1.

DOMINGUES, E. P.; MAGALHÃES, A.S.; BETARELLI JUNIOR, A.A.B.; CARVALHO, T.S. ;SANTIAGO, F.S. . The World Financial Crisis in Brazil: Industry and Regional Economic Impacts. *Journal of International Business and Economics*, v. 2, p. 57-94, 2014.

GLEWWE, P.; KASSOUF, A.; L. (2008). *The Impact of the Bolsa Escola/Familia Conditional Cash Transfer Program on Enrollment, Drop Out Rates and Grade Promotion in Brazil*. Department of Applied Economics, University of Minnesota.

GUILHOTO, J.J.M. e SESSO FILHO, U.A. Estimação da Matriz Insumo-Produto Utilizando Dados Preliminares das Contas Nacionais: Aplicação e Análise de Indicadores Econômicos para o Brasil em 2005. *Economia e Tecnologia*, ano 6, vol 23, Out., 2010.

HANDA, S. AND DAVIS, B. (2006). The Experience of Conditional Cash Transfers in Latin America and the Caribbean, *Development Policy Review*, 24(5), 513-536.

HARRISON, W.J., & PEARSON, K.R. Computing Solutions for Large General Equilibrium Models Using GEMPACK, *Computational Economics* 9(2): 83-127, 1994.

HOFFMAN, R. *Distribuição de Renda: Medidas de Desigualdade e Pobreza*. São Paulo: Editora da Universidade de São Paulo. 1998.

HOFFMANN, R. Desigualdade da distribuição da renda no Brasil: a contribuição de aposentadorias e pensões e de outras parcelas do rendimento domiciliar *per capita*. *Economia e sociedade*, v, 18, n. 1, p. 213-231, 2009.

HOFFMAN, R. Transferências de Renda e Desigualdade no Brasil (1995-2011). In: Campello, T.; Neri, M, C. (Ed.). *Programa Bolsa Família: uma década de inclusão e cidadania.* Brasília: IPEA, 2013.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). *Pesquisa de Orçamentos Familiares (POF) – 2008-2009*. Rio de Janeiro, 2014. Disponível em: http://www.ibge.gov.br/home/xml/pof_2008_2009.shtm

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). *Sistema de Contas Nacionais*. Rio de Janeiro, 2015. Disponível em: http://www.ibge.gov.br/home/estatistica/economia/contasnacionais/2013/defaulttab_xls.shtm

INSTITUTO DE PESQUISA EM ECONOMIA APLICADA (IPEA). IPEADATA: Banco de Dados do Instituto de Pesquisa em Economia Aplicada. Macroeconômico. 2014. Disponível em: <http://www.ipeadata.gov.br>. Acesso em: setembro de 2015.

JANUZZI, P. M.; PINTO, A. R. Bolsa família e seus impactos nas condições de vida da população brasileira: uma síntese dos principais achados da pesquisa de avaliação de impacto do Bolsa Família II. In: Campello, T.; Neri, M, C (Ed.). *Programa Bolsa Família: uma década de inclusão e cidadania.* Brasília: IPEA, 2013.

MEDEIROS, M.; SOUZA, P. H. G. F.. State Transfers, Taxes and Income Inequality in Brazil. *Brazilian Political Science Review*, v. 9, p. 3-29, 2015.

MINISTÉRIO DO DESENVOLVIMENTO SOCIAL E COMBATE À FOME (MDS). Bolsa Família. 2016. Disponível em: http://www.mds.gov.br/bolsafamilia (Acesso: 15/04/2016).

MOSTAFA, J.; SOUZA, P. H. G. F.; VAZ, F.. Efeitos econômicos do gasto social no Brasil. *In*: CASTRO, Jorge Abrahão *et al*. (Ed.).*Perspectivas da política social no Brasil*. Brasília: IPEA, 2010.

NERI, M.C.; VAZ, F.M.; SOUZA, P.H.G.F. Efeitos macroeconômicos do Programa Bolsa Família: Uma análise comparativa das transferências sociais. In: Campello, T.; Neri, M, C (Ed.). *Programa Bolsa Família: uma década de inclusão e cidadania.* Brasília: IPEA, 2013.

OLIVEIRA, L. F. B.; SOARES, S. S. D. Bolsa família e repetência: resultados a partir do cadúnico, projeto frequência e censo escolar. In: Campello, T.; Neri, M, C (Ed.). *Programa Bolsa Família: uma década de inclusão e cidadania.* Brasília: IPEA, 2013.

PETER, W. W. HORRIDGE, M.; MEGUER, G.A. NAVQUI, F.; PARMENTER, B. R. *The theoretical structure of MONASH-MRF*. Cayton: Center of Policy Studies, 1996. 121 p. (Preliminary working paper, OP-85).

RASELLA, D.; AQUINO, R.; SANTOS, C. A. T; SOUSA, R. P.; BARRETO, M. L. Efeitos do programa bolsa família sobre a mortalidade em crianças: uma análise nos municípios brasileiros. In: Campello, T.; Neri, M, C (Ed.). *Programa Bolsa Família: uma década de inclusão e cidadania.* Brasília: IPEA, 2013.

SECRETARIA DA RECEITA FEDERAL (SRF). Carga Tributária no Brasil 2013 – Análise por Tributos e Bases de Incidência. Brasília: RFB, 2014. Disponível em:

http://idg.receita.fazenda.gov.br/dados/receitadata/estudos-e-tributarioseaduaneiros/estudos-e-estatisticas/carga-tributaria-no-brasil/cargatributaria2013.pdf

SILVA, D. I.; FERREIRA FILHO, J. B. S. *Impactos dos programas de transferência de renda Benefício de Prestação Continuada (BPC) e Bolsa Família sobre a economia brasileira: uma análise de equilíbrio geral*. Anais do 43 Encontro Nacional de Economia. Florianópolis, 2015.

SOARES, F.; SOARES, S.; MEDEIROS, M.; OSÓRIO, R. *Programas de transferência de renda no Brasil: impactos sobre a desigualdade*. Brasília: IPEA, 2006. 41p. (Texto para discussão, 1228).

SOARES, S. S.; OSORIO, R.G. ; SOARES, F. V.; Medeiros, M. ; ZEPEDA, E. . Conditional Cash Transfers in Brazil, Chile and Mexico: impacts upon inequality. *Estudios Económicos* (México), v. n.ex., p. 207-224, 2009.

ZYLBERBERG, R. S. *Transferência de renda, estrutura produtiva e desigualdade*: uma análise inter-regional para o Brasil. Universidade de São Paulo, Faculdade de Economia, Administração e Contabilidade, São Paulo, 2008. (Dissertação de mestrado).