

EFFECTS OF THE BOLSA FAMÍLIA PROGRAM ON INCOME AND CONSUMPTION IN BRAZILIAN MACROREGIONS

Abstract: This paper aims to analyze the impact of the Bolsa Família Program on the welfare, in terms of consumption, of Brazilian regions families, divided into ten income groups. The guiding hypothesis is that the rate of return of each real transferred to households through the Bolsa Família Program on GDP is positive and greater than unity. To achieve the proposed objectives, the analytical instrument used was the General Equilibrium Analysis Project of the Brazilian Economy (PAEG), an analytical set of static general equilibrium, multiregional and multisectoral. It was found that the government transfer to households via the Bolsa Família Program possesses minimum direct effects, nevertheless it raises the consumption of regional Brazilian families, especially those in the low income classes. The program has a negative impact on wages, which would reduce the effects of the smooth program in the long-term, suggesting the need to adopt policies aimed at labor market to maintain the program results.

Keywords: Social programs; income transfer; consumption; general equilibrium.

1. Introduction

The analysis of the efficiency of the social programs of income transfer in Brazil through Bolsa Família Program admits certain specificities: a) that Brazil is a country with a continental dimension; b) internally, the great Brazilian regions hold deep social and economic differences; c) the focus of the program allows its performance to be too concentrated in the regions with the largest number of people in the poverty situation (COTTA and PAIVA, 2010). Since the incidence of the Bolsa Família Program is different among the Brazilian regions, focusing on the poorest population (CURY and LEME, 2007), regional analysis becomes important. The evaluation of the welfare pattern of a society should consider the distinct aspects, however, due to the difficulty of operationalization, as well as to the complexity of such factors, the analytic focus has been restricted only to the income variable (SOARES et al 2007). Due to regional inequality, it is important to know the impact of transfers on welfare (through household consumption), and to analyze the multiplier effect on household income in different Brazilian regions.

Several studies show the positive and adverse sides of transfers, with differing opinions on the effects of the program. To improve the debate, the present research collaborates to analyze the asymmetric impact on each class of income (from the poorest to the richest) in each Brazilian region. The present study aims to analyze the impacts of the Bolsa Família Program on consumption of the Brazilian regions. The research hypothesis is that a rate of return of each dolar transferred from the government to the families through the Bolsa Família Program is larger than the unit.

The social programs of income transfer in Brazil have as central assumption the fact that the poverty cycle of reproduction can be interrupted when the children of poor families leave the street or labor to go to school, receiving for this a monetary transfer to offset the payment for child labor. It is an effort to articulate a compensatory policy (transfer of monetary income) with basic structuring policies such as education, health, work, etc. (SILVA, 2007). The literature on the subject has not yet given due attention

to the macroeconomic impacts of transfers in the "circular income stream". The impulse given to household consumption expenditures would stimulate the production of sectors and activities, which would generate higher remuneration and the beginning of a new cycle (NERI, SOUZA and VAZ, 2013, CURY and LEME, 2007).

Costa (2005) defends the importance of these programs to alleviate the injustice caused by the poor distribution of income in the country, considering two relevant factors: first is that the public policies represented by the social programs of income distribution are a short-term option to reduce poverty. Second, income provides an economic turnaround, making it possible for the entire contingent involved in the universe where the population benefited by various types of programs, for example, the family grant, to make gains. If the population has resources to employ in its survival, consequently, other people who have the instruments to be consumed or other way to use, will also benefit.

Soares et al. (2007) consider that the eradication of poverty and the substantial reduction of levels of inequality in Brazil could hardly be achieved without direct mechanisms of redistribution of income. Non-contributory income transfer programs, such as the Bolsa Família Program, are some examples of adopting such a mechanism. However, there is consensus among many researchers and segments of society that if the federal government's action is limited to the transfer of income and assistance to the poor, without promoting the increase of social investment as a whole, the potential benefits of the program are limited (MONTEIRO, 2008).

The Bolsa Família Program prioritizes the family as a unit of social intervention, aiming to ensure the human right to food, promote food and nutritional security and promote the conquest of citizenship. The program is basically structured around three axes: income transfer, conditionalities and complementary programs. The benefits of the program are transferred monthly and have a fixed and a variable part. The selection of beneficiary families is analyzed by the monthly per capita income criterion. These transfers allow immediate relief in the composition of family income, the value of which is not to discourage adult household members from working (BATISTA, 2012).

It is the first analysis of the impact of social programs using the PAEG, a regionalised general equilibrium model, which disaggregates the consumption of the families of the regions by income class as well as the income formation of each class. The PAEG database regionalized for the Brazilian economy for the year 2011 - PAEG 4.0, compatible with the database 9.0 of the GTAP9. The GTAP database presents Input-Output Matrices for 140 countries/regions, including Brazil, 57 sectors and five primary factors. Medeiros, Brito and Soares (2007) analyzed the two main income transfer programs in Brazil, the Continuous Benefit (BPC) and the Bolsa Família Program (BFP). They observed that the programs are fulfilling their function, perform well in international comparisons, and are cost compatible with Brazilian budgetary capacity. They did not find negative effects on the incentives for work and the social security contribution.

Zylberberg (2008), using a social accounting matrix as methodology, considers that income transfers, in the form of the PBF, can result in positive impacts on the distribution of income, both personally and regionally. The reductions presented for the Gini index vary between 0.70% and 0.99%, with the most intense reduction being in the poorer regions (N and NE). The consumption of the beneficiary families and in general has a concentrating bias, that is, the improvement of income distribution generated by

income transfer programs is generated by artificial mechanisms and not sustainable independently. Income transfer programs mitigate the problem of misery, but the search for improved income distribution must be aided by other mechanisms.

Neri, Vaz and Souza (2013) through a Social Accounting Matrix for the year 2009, conclude that the transfers that favor the poorest families have the greatest multiplier effects. The PBF presented the best numbers among the seven social transfers. The results support the hypothesis that the social transfers directed to the poorest play an important positive role for the Brazilian macroeconomic dynamics, contributing to the reduction of poverty and inequality.

Muniz (2008) developed an interregional general equilibrium model based on the "standard CGE model", provided by the International Food Policy Research Institut (IFPRI), using an Interregional Social Accounting Matrix to analyze the impact of the Program The Family Grant Program on inequality in Brazil, and concluded that Bolsa Família programs reduce inequality only momentarily and artificially, external to the economic system and therefore not sustainable independently, considering that such policies have an inherent Its origin, which is determined by the finite resources to which the Government has access.

Silva (2014), with the objective of analyzing the economic developments of the Benefit of Continuous Benefit and Bolsa Família Benefit transfer programs between 2005 and 2012, using a computable general equilibrium model with four distinct closures to calculate three long-term simulations and A short-term one, concludes that a reduction of the GDP occurs when the macroeconomic adjustment of the model is via investments or trade balance; GDP only grows when there is external indebtedness; Real household consumption increases in all simulations; The GDP of the poorest regions increases; Income transfer programs increase consumption in poorer regions and households.

2. The general equilibrium

In economic analysis it is possible to study a single market, that is, without considering the influence of the other markets. In this sense, it is a partial equilibrium analysis. However, it is known that this does not reflect the reality of modern economies, since markets are interdependent. When analysis portrays this interdependence, one enters into the domain of general equilibrium (SANTOS, 2006).

Differently from partial equilibrium analysis, the general equilibrium analysis determines simultaneous prices and quantities in all markets, and it explicitly takes into account the feedback effects. The feedback effect is the adjustment of prices or quantities in a given market caused by price or quantity adjustments in related markets (PINDYCK and DIXIT, 1994).

The basic principle presupposed in the general equilibrium is that the exchange process is considered not as a continuous process, but reduced to an instant and to a specific place where the products are arranged in an equally specific way and have prices for each function performed, to Every time it is changed, state of nature. Families, when they start exchanging, have a basket of products to make the exchange for the profits of the firms. In equilibrium it is assumed that prices are given, and can

not exceed receipts obtained through sales made by families in this process (SILVA, 2009).

Barros, Corsseuil and Cury (2000) used a General Equilibrium Model (MAEG) with 20 sectors, 8 factors, 8 types of work, 9 family classes, 7 urban income classes and 7 rural income classes to estimate the impact of Minimum wage on poverty in Brazil. The authors believe that increases in the minimum wage have a negative effect, however small, on the degree of poverty when the social security adjustments are not considered and when these adjustments are considered, the effect of the minimum wage is positive.

Cury and Leme (2007) consider that analyzing the impacts of social transfer and income programs using general equilibrium is beneficial because it allows analyzing the second order effects on employment, as well as allowing the testing of alternative measures. In assessing the impact of income transfer programs on reducing inequality between 2001 and 2005, taking into account the effects of general equilibrium on household income, the authors use a General Equilibrium Model (MAEG) based on Cury, Coelho and Corsseuil (2005) with changes by Cury and Coelho (2006), and concluded that all families earn (or lose less) by cutting expenses than by raising taxes - which is a concern since this source effectively participated Of the financing or increase of transfer expenses.

Paes and Siqueira (2008) using a General Equilibrium Model propose and analyze a fiscal reform that seeks regional equity, through equalization in the distribution of tax revenues between states and consider that only six states would lose with the implementation of the proposal: GO, SC, SP, ES and AM and the major beneficiaries would be: MA, DF, RR, PA, AL and PI. Santos (2008), based on a general equilibrium model (MAEG), analyzed the impacts of alternative policies on the redistribution of income in the Brazilian economy, as well as its effects on consumption levels in four income classes. He concluded that transfers were important to reduce the degree of income inequality in the Brazilian economy in recent years. Compared with other policies, such as tax reduction and agricultural export promotion policy, income transfers were higher.

3. Methodology¹

To achieve the proposed objectives, the analytical instruments used will be of a quantitative nature, an Applied Model of General Equilibrium. According to Najberg, Rigolon and Vieira (1995), this type is able to portray both direct and indirect effects caused by changes in economic policies, as well as technological changes, income distribution, taxes, subsidies. Therefore, the use of this model allows to obtain the total variation in the level of consumption in response to a social income transfer program.

The analytical set used was PAEG, an analytical set of static general equilibrium, multiregional and multisectoral and was elaborated based on GTAPinGAMS (Rutherford and Paltsev, 2000; Rutherford, 2005). In the PAEG, the data base for the Brazilian economy was disaggregated to represent its five major regions (Central West,

¹ Based on: Pereira and Teixeira (2013) and Gurgel et. al. (2011).

North, Northeast, South and Southeast), keeping GTAP data intact for other regions of the world, and data from trade flows between Brazil and other regions of the world.

The general structure of the PAEG suggests that domestic production ($vomir$) is distributed among exports ($vxmdirs$), international transport services ($vtldr$), intermediate demand ($vdfmijr$), private consumption ($vdpmir$), investment ($vdimir$) and government consumption ($vdgmir$). The accounting identity for domestic production is represented by the following equation:

$$vom_{ir} = \sum_s vxmd_{irs} + vst_{ir} + \sum_j vdfm_{ijr} + vdpm_{ir} + vdg_{ir} + vdim_{ir} \quad (1)$$

Imported goods ($vimir$) are used in intermediate consumption ($vifmijr$), private consumption ($vipmir$) and government consumption ($vigmir$), therefore:

$$vim_{ir} = \sum_j vifm_{ijr} + vipm_{ir} + vigm_{ir} \quad (2)$$

Yir production includes intermediate inputs, both domestic and imported, mobile production factors (vfm_{fir} , f , m) and government consumption (public agent) ($vdgmir$). The income of the factors of production is distributed to the representative agent. The equilibrium of the market of factors of production is given by the following equation (where the value of the payment of the factors of production is related to their income):

$$\sum_i vfm_{fir} = evom_{fr} \quad (3)$$

The equilibrium conditions in international markets (between supply and demand) imply that exports of goods i by region r ($vxmirs$) equals imports of the same good by all other trading partners ($vxmdirs$), as follows:

$$vxm_{ir} = \sum_s vxmd_{irs} \quad (4)$$

The aggregate supply of transport service j , vt , is equal to the value of transport services in exports:

$$vt_j = \sum_r vst_{jr} \quad (5)$$

In the transport services market, the balance between supply and demand equals the supply of these services to the sum of bilateral flows of transport services acquired in imports of goods, $vtwrjisir$:

$$vt_j = \sum_{isr} vtwr_{jisr} \quad (6)$$

Tax flows consist of indirect taxes on production and export ($RirY$), consumption (RrC), government demand (RrG) and imports ($RirM$). Government income still includes direct taxes on the representative agent, HH, represented by $RrHH$, as well as transfers abroad, vbr . Thus, the government's budget constraint can be described as:

$$vgm_r = \sum_i R_{ir}^Y + R_r^C + R_r^G + \sum_i R_{ir}^M + R_r^{HH} + vbr \quad (7)$$

The budgetary constraint of the representative agent, HH, relates the income of production factors, discounted from tax payments, to consumption and private investment expenditures, as follows:

$$\sum_f evom_{fr} - R_r^{HH} = vpm_r + vim_r \quad (8)$$

In previous identities, we visualize market equilibrium (supply equals demand for all goods and factors of production) and income balance (net income equals net expenses). A third set of equations represent net operating profits in sectors of the economy. Considering an economy in perfect competition and constant returns to scale, where the costs with intermediate inputs and factors of production and equals the value of production, and economic profits, to zero. This condition is applied to each of the productive sectors and activities.

The equilibrium condition of production equals the value of the aggregate product (vomir) to the sum of the payments of the net primary factors of the tax (vfmfir) plus the sum of the imported aggregate (vifmjir) and domestic intermediate (vdfmjir) demands and the taxes double the production (Rir Y):

$$Y_{ir}: \sum_f vfm_{fir} + \sum_j (vifm_{jir} + vdfm_{jir}) + R_{ir}^Y = vom_{ir} \quad (9)$$

The total value of imports (vimir) shall be equal to the value of exports of goods (vxmdisr) plus the sum of international transport services (vtwrjisir) and import tariffs (RirM), as follows:

$$M_{ir}: \sum_s \left(vxmd_{isr} + \sum_j vtwr_{jisr} \right) + R_{ir}^M = vim_{ir}; \quad (10)$$

The condition of equilibrium of private consumption is established in the equality between private expenditure (vpmr) and the sum of domestic (vppmir) and imported (vipmir) demands plus private consumption taxes (RirC):

$$C_r: \sum_i (vdpm_{ir} + vipm_{ir}) + R_{ir}^C = vpm_r; \quad (11)$$

In government consumption, equilibrium requires that government spending (vgmr) be equal to aggregate domestic government demands (vdgmir) and imported (vigmir) plus government consumption taxes, as follows:

$$G_r: \sum_i (vdgm_{ir} + vigm_{ir}) + R_{ir}^G = vgm_r; \quad (12)$$

The equilibrium condition of the investment equals the total value of the investments (vimr) to the sum of the domestic value of the investments (vdimir), as follows:

$$I_r: \sum_i vdim_{ir} = vim_r; \quad (13)$$

The equilibrium in the factor market implies that the equality of factor income (evomfr) must be equal to the value of factor payments, as follows:

$$FT_{fr}: \quad evom_{fr} = \sum_i vfm_{fir} \quad f \in s; e \quad (14)$$

In the transport sector, the value of international trade margins should be equal to both the international transport service and the value of international transport sales:

$$YT_j: \quad \sum_r vst_{jr} = vt_j = \sum_{irs} vtwr_{jirs} . \quad (15)$$

The relationships presented above show the economic identities of the model, however, do not describe the behavior of economic agents. To understand the functioning of the model, it is necessary to describe how the agents and sectors behave

The model represents the production and distribution of goods and services in the world economy. Each region is represented by a final demand structure, composed of public and private expenditure on goods and services. The model is based on optimizing behavior, when consumers seek to satisfy their needs (maximization of welfare, subject to budget constraint), considering fixed levels of investment and production of the public sector.

The productive sectors combine intermediate inputs and primary factors of production - capital, labor (skilled and unqualified), land and natural resources - in order to minimize costs, given the technology. The database includes bilaterais flows of trade between countries and regions, as well as transport costs, import tariffs and export taxes (or subsidies).

The supply of firms is defined by an optimization problem and aims at minimizing unit costs, by combining primary input inputs and intermediate inputs, domestic and imported. At first, firms decide the combination of primary factors that will be employed, and the decision is made based on the elasticity of substitution between the factors of production that make up the added value. Afterwards, companies acquire intermediate input baskets, deciding between domestic and imported goods taking into account the elasticity of substitution.

The production block represents the combination of goods and services for consumption by the model households. This block combines domestic and imported commodities to form an aggregate consumption index for each of the 10 family classes in each sub-region of Brazilian regions. This means that it is possible to represent the consumption preferences specific to each family class.

The aggregate regional consumption block, specific for households in Brazilian regions, aggregates the total consumption basket of each household in the same region into a single regional total consumption, priced by the consumer price index. The consumption of each family depends on its income formulation. The sum of the consumption of each income class of the region forms the total consumption. Thus, if any shock that increases the remuneration of a specific factor, increases the budget of families who have in the formulation of income such factor, increasing the consumption of that income class.

The aggregate government consumption block, block g, which as the household consumption block, combines domestic and imported commodities to form an aggregate government consumption index. The production block aggregates bilateral imports originating in different regions and transport trade expenditures. This block shows that the aggregate of imports that is formed by the commodities produced in the different regions, considering the subsidies and taxes on exports in the producing regions to the importing region and the tariffs on imports charged by the importing region of the goods originating in the region.

In the production block responsible for allocating factors between different regions, in response to changes in the economy, factor type allocations from all regions are available as inputs to be transformed into regional factors that will be used specifically in each of the regions. The inputs (factors) presented have elasticity of substitution equal to zero, that is, Leontief.

The elasticities define that the categories of the different regions are always combined in fixed proportions, according to an initial regional allocation, and then distributed to as several different rules a Cobb-Douglas function of transformation between regions, that is, it is not possible to free movement of capital or labor from one region to another, rather than differences in factor remuneration, since the characteristics and composition of the factors in each region are not the same. However, this block makes it possible to represent the degree of factor mobility between regions, as there is a change in the remuneration relative to one region in relation to more.

The optimization problem presented here defines a production function with constant elasticity of substitution (CES), in which added value components (primary production factors) can be substituted, being such a process determined from an elasticity of. The intermediate inputs and added value are combined from a Leontief function, in which they can not be substituted for each other. Each intermediate input in this Leontief function is a combination of a domestic and imported portion of the same good, from a CES function of substitution elasticity.

The consumption of public administration is represented in the model by a Leontief aggregation composed of domestic and imported goods. The different composite goods are not interchangeable, however, domestic and imported components of each good respond to prices and are substitutable. The consumption of the private agent can be represented by a problem of minimization of the cost of given level of aggregate consumption, as follows:

The final demand of the model is characterized by a Cobb-Douglas function among composite goods, formed by the aggregation of domestic and imported goods. The mathematical relationships presented above describe the various optimization processes that occur in the general equilibrium model to be used in the present study. Besides these relations it is worth mentioning that the conditions of equilibrium between supply and demand in the markets, zero profit and equilibrium between income and expenses of agents complete the process of computational equilibrium

In the PAEG model, the measurement of results is given through parameters and calculations of the impacts of the implemented scenario. The measure of equivalent

variation² is the parameter that stores the result of the percentage change in welfare, this measure makes it possible to indicate the increase in the utility of domestic consumers in terms of increased consumption. The variable that denotes the level of activity of the block of production of private consumption, represents the welfare index of the model.

The closure of the PAEG model considers the total supply of each production factor fixed, but ensures mobility between sectors, within a region. Mobility can be total, partial or non-existent, and the present study will analyze all three situations. The land factor is specific to the agricultural and livestock sectors, while natural resources are specific to some sectors (mineral resource extraction and energy).

The model considers that there is no unemployment; therefore, factor prices are flexible. From the demand side, investments and capital flows are kept fixed, as well as the balance of payments balance. Thus, changes in the real exchange rate must occur to accommodate changes in export and import flows after shocks. Government consumption may change with changes in the prices of goods, just as revenue from taxes will be subject to changes in the level of activity and consumption.

Data on the scope of the Bolsa Família Program (BFP) in each region were obtained from the Ministry of Social Development and Fight against Hunger (MDS, 2015), data on the amount spent with the PBF in each region were obtained in the reports of the Office of the Comptroller General (CGU, 2015), and the amount of family income from the PBF was obtained from the 2008-2009 Household Budgets Survey (IBGE, 2010).

In order to obtain the income of the families of each region, the POF 2008-2009 files were used, disaggregating the income formation by income class, updating for the year of 2011, dividing income formation between capital income, labor income, transfers, retirement and savings, income classes were defined as follows³:

- Class 1 - up to US\$ 239.52
- Class 2 - more than US\$ 239.52 up to US\$ 359.28
- Class 3 - more than US\$ 359.28 up to US\$ 598.80
- Class 4 - more than US\$ 598.80 up to US\$ 718.56
- Class 5 - more than US\$ 718.56 up to US\$ 958.08
- Class 6 - more than US\$ 958.08 up to US\$ 1197.60
- Class 7 - more than US\$ 1197.60 up to US\$ 1796.41
- Class 8 - more than US\$ 1796.41 up to US\$ 2395.21
- Class 9 - more than US\$ 2395.21 up to US\$ 3592.81
- Class 10 - over US\$ 3592.81

Income was disaggregated by income class so as not to alter the original net household income by region, which includes: a) income from primary factors; b) transfer between government and families; c) household savings (if negative means that households are "lending" to the financial system, and are not using to consume, if positive, means that households are owed, ie borrowing to consume).

The strategy for disaggregating net household income by region into the PAEG database was as follows:

² See Varian (1992)

³ It was used the exchange rate of US\$ 1.00 = R\$ 1.67 (value for the year 2011)

- Distribute the original PAEG data of income from each source (Capital, Labor and Transfers) according to the share of each of these sources by family in the total source of income of the families of the region. The share of each of the sources was obtained by the breakdown of the income formation of the POF 2008-2009;

- After applying the portion of these sources to obtain the income of each of the sources for each family, the income of all these sources for each family was added, in order to define the gross income of the families;

- As the net income must be equal to the total consumed, thus, the difference between the consumption and the gross income of the families was calculated, this difference was considered the saving (or debt) of each family.

Household consumption was extracted from POF 2008-2009 for each region (North, Northeast, South, Southeast and Midwest) according to each income class adopted, in the format of 110 products, and grouped into the PAEG, The grouping was done taking into account the sectors of the GTAP.

The update of the Regionalized Input-Output Matrix was made based on the evolution of the Gross Value Added of the major regions and states, between 2004 and 2011, values obtained in the System of Regional Accounts (IBGE, 2012). Then, the final regional demands by product were calculated for the year 2011. As there are no growth rates for all economic activities, some of them (Food, Miscellaneous Industry and Services were obtained residually, Growth of regional final demand to the sum of other existing growth rates).

Considering the hypothesis that the technical coefficients of the Input-Output Matrix remain fixed, it is possible to obtain the vector of the Gross Value of Production updated for the year 2011, as follows:

$$X' = [1 - A]^{-1} \cdot Y' , \quad (16)$$

where, Y 'is the final regional demand vector, updated for the year 2011; A, is the matrix of technical coefficients for 2004; Obtaining 'X', which is the Vector of Gross Value of Production for the year 2011.

The original PAEG aggregation shown in Table 1 was maintained.

Table 1 - Aggregation between regions and sectors for PAEG

Sectors	Regions
Rice (pdr)	Brazil - North Region (N)
Corn and other cereals (gro)	Brazil - Northeast Region (NE)
Soybeans and other oilseeds (osd)	Brazil - Central-West Region (CE)
Sugar cane, beet, sugar industry (c_b)	Brazil - Southeast Region (SE)
Meat and live animals (oap)	Brazil - South Region (SUL)
Milk and dairy products (rmk)	Rest of Mercosur (RMS)
Other agricultural products (agr)	Venezuela (VEM)
Food products (foo)	United States (USA)
Textile Industry (tex)	Rest of NAFTA (RNF)
Clothing and footwear (wap)	Rest of America (ROA)
Wood and furnishings (lum)	Europe (EUR)
Paper, pulp and paper industry (ppp)	China (CHN)
Chemicals, rubber and plastic industry (crp)	Rest of the world (ROW)
Manufactured (man)	
Electricity, gas, water distribution (siu)	
Construction (cns)	
Trade (trd)	
Transportation (otp)	
Services and Public Administration (adm)	

Source: Research Data

4. Results

4.1 Impact of the Bolsa Família Program on the income of families in the Brazilian regions

The Bolsa Família Program was withdrawn from each income class according to its share of the total income from government transfers through social programs for each income class of each region of Brazil. The magnitude of the withdrawal (the applied shock) of this transfer can be seen in Table 2.

Table 2 - Participation of the Bolsa Família Program in total transfers through social programs * for families in the Brazilian regions

Income Class	Midwest	Northeast	North	Southeast	South
1st	20.31%	57.39%	42.62%	23.12%	12.09%
2nd	11.98%	39.91%	46.73%	19.62%	14.02%
3rd	17.86%	28.09%	27.00%	17.08%	10.06%
4th	8.97%	17.72%	23.37%	13.91%	8.05%
5th	7.21%	14.31%	17.32%	6.8%	3.60%
6th	5.57%	9.22%	12.32%	5.31%	3.43%
7th	2.63%	5.46%	8.02%	1.77%	1.28%
8th	1.95%	2.71%	4.69%	1.03%	0.56%
9th	0.61%	2.18%	2.52%	0.45%	0.67%
10th	0.28%	0.70%	0.64%	0.09%	0.13%

* Income transfers from federal social programs according to POF (2008-2009): Bolsa Família; Continuous Benefit and Child Labor Eradication Program.

Because it is a social program aimed at low-income families, the Bolsa Família Program must reduce its share of family income coupled with social transfer government programs as household classes increase, however, since the program is made available according to per capita income, it is understandable that this participation decreases, but does not reach zero, as the following situation occurs: families from a certain region may be larger, so the family income of the last income class, being Divided by the members of each family assure the benefit ceded by the government.

It can be seen from Table 2 that, in general, families from all income classes receive the Bolsa Família Program, this happens, therefore, Bolsa Família is passed on to families by income per capita, and the Family Budget brings the data as total household income. Analyzing the table, it can be observed that families in the income classes from 1 to 6 have a significant portion of transfers from the Bolsa Família program, ranging from 12.32% to 57.39% of total government transfers to households. The regions where the poorest families are most dependent on the program are the Northeast and North, the region where the program has the least impact on transfers is the South region, with less than 13% of the transfers to the poorest families coming from Bolsa Familia.

In general, the withdrawal of the Bolsa Família Program had a positive impact on the participation of labor in the formation of family income in the same proportion for the income classes of each region: 0.057% in the Northeast region, 0.013% in the North, 0.0039% in the Southeast, 0.0037% in the Midwest and 0.0008% in the South, that is, the regions where the Bolsa Família Program has a greater share of the income formation of the poorest families, increases the participation of Income from work with the withdrawal of the Program.

The inverse behavior is observed in the capital, the income of capital in the formation of household income decreases in the same proportion in the income classes in the different regions, and the greatest (negative) impact is observed in the Northeast region with a 0.027% Income of capital in the formation of family income, and the lowest is in the income of families in the North region with a very low value, 0.0001%. The impact of the withdrawal of the Bolsa Família Program from government transfers on Regions is presented in Table 3.

Table 3 - Impact of BFP⁴ withdrawal on household income in Brazilian regions*

Income Class	Midwest	Northeast	North	Southeast	South
1st	-1.51%	-6.22%	-3.74%	-1.29%	-0.15%
2nd	-0.88%	-3.77%	-3.87%	-1.44%	-0.34%
3rd	-0.99%	-2.35%	-2.47%	-0.85%	-0.17%
4th	-0.48%	-1.25%	-2.14%	-0.58%	-0.09%
5th	-0.26%	-0.76%	-1.31%	-0.027%	-0.06%
6th	-0.20%	-0.40%	-0.68%	-0.20%	-0.04%
7th	-0.09%	-0.16%	-0.36%	-0.05%	-0.02%
8th	-0.03%	-0.05%	-0.13%	-0.02%	-0.007%
9th	-0.01%	-0.03%	-0.05%	-0.008%	-0.008%
10th	-0.003%	-0.01%	-0.01%	-0.004%	-0.005%

* Real change in income.

⁴ Bolsa Família Program

First-class families, in general, suffer the greatest reduction in family income due to the withdrawal of Bolsa Família benefits, since these families have a large portion of the Bolsa Família, and although income from work increases in the formation of family income, it is not enough to cover the benefits of Bolsa Família from the poorest families.

The families with the lowest incomes in the Northeast are the ones with the greatest negative impact on income, with a reduction of 6.22% in family income, followed by the Northeast, with -3.74% reduction of income, are those that do not have a large participation of Bolsa Família in the formation of family income, the families of the South region, with a decrease of 0.15% in family income.

As family income increases, the impact of Bolsa Família withdrawal on income is reduced, but even the families of the higher income classes suffer a reduction in income in all regions, one reason is the decrease in the price of capital, presented in Table 4, which is the main source of income of families with higher incomes.

Table 4 - Impact of Bolsa Família withdrawal on factor prices

Factor	Variation	Midwest	North	Northeast	Southeast	South
Capital	change (%)	-0.004	0.00	-0.027	-0.006	-0.005
Labor	change(%)	0.004	0.014	0.057	0.004	0.001

With the withdrawal of transfers from the Bolsa Família Program, the government's consumption in capital-intensive sectors increases, which reduces the price of this factor, raising labor factor prices. Analyzing the converse, considering that government consumption in capital intensive sectors reduce with the implementation of Bolsa Família, and at the same time there is an increase in the consumption of products of the same sector (due to the transfer), there is a rise in the factor price Capital, reducing the price of labor, the main source of income for lower income classes.

It is observed that the negative effects on labor income are more predominant in the regions that received the greatest contribution of the program (North and Northeast). In the North region the withdrawal of the family grant program would have a positive impact on the labor income of 1.4%. In the Northeast this impact would be even greater, 5.7% increase in labor income.

The amount of the withdrawal of transfers from the Bolsa Família Program is reallocated in government spending in the form of consumption of final goods. These expenditures, due to the government's pattern of consumer preferences, are directed primarily to the service sector, which is labor-intensive. Thus, as households consume relative to government a variety of products that are more capital-intensive, the effect of withdrawal is due to the increase in the price of the labor factor and a decrease in the price of the capital factor. On the other hand, the inclusion of transfers causes a decrease in the price of the labor factor and a rise in the price of the capital factor.

For Cavalcanti et al (2016), who analyzed the salary differential between beneficiaries and non-beneficiaries, they also observed a decrease in work income related to the Bolsa Família program. As an explanation they raised four conjectures to try to explain this effect: a) the understatement of the beneficiaries; b) escape of formal contracts; c) disincentives to work ("lazy effect"); d) beneficiaries accept less paid jobs.

However, they point out that this effect may not be related to the program itself but to be directly related to the labor market.

Cacciamali and Camillo (2009) point out that labor income is the main source of income for low-income families. Moreover, it represents, over time, the main mechanism of inequality reduction. If the effects of the government transfer through Bolsa Família are to some extent overlapped by the decrease in labor income, the desired effects of reducing inequality are compromised.

Thus, in the long term, the effects of the program tend to be mild, precisely because it interferes negatively in the price of the important factors in the income formation of low and high income families, which was also pointed out by Cardoso, Domingues and Brito (2015) Which claim that in the long run, by the income of capital being extremely concentrated in the upper income families, the trend would be a cooling off of the distributive effects of politics.

As shown in Table 3, the impact of the withdrawal from the Bolsa Família Program is significant, up to the fifth income class, mainly in the North and Northeast regions, where the income formation of these families depends more on the benefit. The families of the second income class in the North are those with the greatest income reduction, 3.87%, followed by the Northeast with 3.77% and the Southeast with -1.44%. In the other regions (Center-West and South), the impact on the income of families of the second income class is less than 1%.

Zylberberg (2008) emphasizes that income transfer programs, such as the Bolsa Família Program, should be considered emergency programs, since their effects would not be sustained in the long term, a conclusion shared by Muniz (2008), who states that the impacts of the Bolsa Família Program Reduce income inequality only momentarily. In this way, the results related to income formulation, corroborate the view that, in the long run, if the families that benefit from the program can not emerge from income class, the effects of the program would be artificial, with a certain period of time , And would not sustain themselves.

The families of the third income class of the North are the ones that suffer a greater reduction in the formation of family income, a reduction of 2.47% due to the withdrawal of the Bolsa Família Program, those of the Northeast have a reduction of 2.35% in In the Central-West region, families reduced total income by 0.99%, in the Southeast region 0.85% and in the South region 0.17%. The families of the fourth income class suffer a greater reduction in income also in the North, a reduction of 2.14, in the Northeast families have a 1.25% reduction in income, in other regions the reduction in income is less than 0.60%, the highest observed in the Southeast region, 0.58%.

From the sixth income class, families in all regions suffer a negative impact of less than 0.70%, but since families in the North are, in general, those most benefited by the Bolsa Família program, the reduction In income is higher in the families of this region, except for the first income class (which suffers a larger reduction in the Northeast). Families in the South region, in all classes of income, have the smallest impact on household incomes.

5.2 Effects of the Bolsa Família program on the consumption of families in Brazilian regions

Since the Bolsa Família Program is a direct monetary transfer to families, it has a direct impact on the degree of utility of the consumption of those who receive it, the effects of the Bolsa Família Program in consumption of the families of the Brazilian regions can be observed in Table 5.

Table 5 - Impacts of the withdrawal of the Bolsa Família Program on consumption* of families in the Brazilian regions

	Midwest	North	Northeast	Southeast	South
Class	consumption	consumption	consumption	consumption	Consumption
1st	-1.51	-6.21	-3.74	-1.29	-0.15
2nd	-0.88	-3.77	-3.87	-1.44	-0.34
3rd	-0.99	-2.34	-2.47	-0.86	-0.18
4th	-0.48	-1.25	-2.14	-0.59	-0.09
5th	-0.26	-0.76	-1.32	-0.03	-0.06
6th	-0.20	-0.41	-0.69	-0.21	-0.05
7th	-0.09	-0.17	-0.37	-0.06	-0.02
8th	-0.04	-0.05	-0.14	-0.02	-0.01
9th	-0.01	-0.03	-0.05	-0.01	-0.01
10th	-0.0001	-0.02	-0.01	-0.01	-0.01

*percentage change

It can be observed in the table that the families of the first income classes, those who have a larger portion of the Bolsa Família Program in income, are those that have the greatest reduction in consumption, and consequently a negative impact of economic welfare. As income classes increase, that is, the higher the family income, the lower the impact of the Bolsa Família Program on income formation, and the lower the impact on the consumption the families, however.

Although the effects of withdrawal from the Bolsa Família Program are negative in the consumption of families in all regions, these effects are practically the same as the effects of the withdrawal from the Program of income formation (presented in Table 2). It would be the same as if we analyze the gains in terms of consumption, generated by an increase in income derived from the Bolsa Família, to affirm that the multiplier effects of transference to family consumption are very low, their direct impacts are minimal.

The results are in agreement with those of Resende and Oliveira (2008), which indicate that income transfer programs increase the consumption of the lower income families, representing an immediate improvement in the consumption of the poorest families. Rocha (2004, 2006) and Silva (2014) agree on the increase of the most significant consumption for the poorest families and regions, that is, that income transfer programs fulfill the function of alleviating poverty, increasing consumption and well-being of the families of the lowest income classes, the greater the insufficiency of income, the greater the benefits produced by the Bolsa Família Program.

5.3 Multiplier effect of the Bolsa Família Program for GDP

Once the effects of the transfer of government (via the Bolsa Família Program) on the consumption of families in the Brazilian regions have been analyzed, it is important to know the effect of each transference dollar on GDP, the multiplier effect of the Bolsa Program Family transfers from government to households in GDP and their main aggregates can be observed in table 6.

Table 6 - Effects of the Bolsa Família Program on GDP and the main aggregates in the Brazilian regions (in US\$ billions and percentage variation)

Region	Multiplier	C (Δ%)	G (Δ%)	I (Δ%)	X (Δ%)	M (Δ%)
Midwest	1.10	0.15 (0.15)	0,13 (- 0.93)	-	0.007 (0.02)	0.008 (0.02)
Northeast	1.05	1.30 (0.83)	1,25 (- 5.03)	-	0.07 (0.21)	0.06 (0.14)
North	1.14	0.66 (0.95)	0,58 (- 6.22)	-	0.04 (0.15)	0.03 (0.13)
Southeast	1.08	0.59 (0.10)	0,55 (- 0.65)	-	0.05 (0.02)	0.06 (0.03)
South	1.11	0.05 (0.03)	0,04 (- 0.15)	-	0.005 (0.008)	0.01 (0.01)

When analyzing the effects of the Bolsa Família Program on the aggregates of GDP, the model's assumptions must be taken into account, since it is an open (multiregional) economy with a flexible exchange rate, the consumption generated by the transfer of government to the Families is divided into private consumption and consumption of imports, which tends to rise. It is important to point out that government spending is negative for all regions because it represents government spending with the Bolsa Família Program, assuming that this spending is no longer invested in other sectors of the economy to become a transfer to families.

Another important factor is the analysis of initial equilibrium, so the trade balance of a region may present negative at the first moment or be almost in equilibrium, for example. In the case analyzed, the trade balance of the Northeast region presents a deficit of US\$ 12.90 billion, that is, the foreign market gains that the Bolsa Família Program brings to the region are insufficient to supply this deficit, which contributes to the Effect of the Program on GDP is low, of 1.05.

The effect of each real transferred from the government to the families via Bolsa Família Program is higher in the North region, being 1.14%. The effect of Bolsa Família on consumption is US\$ 0.66 billion, which means a 0.95% increase in consumption in the region, government spending has a negative impact of - US\$ 0.58 billion, Which means higher government spending, representing a 6.22% increase in spending. There is an increase in imports of US\$ 0.03 billion and an increase of US\$ 0.04 billion in exports.

In the South region, the multiplier effect of Bolsa Familia on GDP is US\$ 0.06 for each real invested in the program. Government spending has a negative impact of US\$0.04 billion, which represents a 0.15% increase in government spending. There is an increase in consumption of US\$ 0.05 billion, a positive impact of 0.029%. Exports increase by US\$ 0.011 billion while imports increase by US\$ 0.01 billion.

The Midwest region has a GDP multiplier effect of 1.10. Consumption in the region has a positive impact of US\$ 0.15 billion, an increase of 0.157% in initial consumption. Government expenditures increased by US\$ 0.13 billion, a 0.09% change on government spending. There is an increase of US\$ 0.005 billion in exports, the same impact on imports from the region.

The GDP multiplier in the Southeast region is 1.08. Consumption increases by US\$ 0.60 billion, an overall increase of 0.10% in consumption in the region. Government expenditures increase by 0.65%, an increase (negative impact) of expenditures of US\$ 0.55 billion. Exports increased US\$ 0.05 million and imports increased US\$ 0.06 billion in the region.

The Northeast region, although it is the one that has the greatest increase in consumption, US\$ 1.3 billion (0.83% more), is the one with the lowest GDP multiplier, 1.05, so that each real expenditure by the government with the Bolsa Família Program generates an increase of US\$ 0.62 in GDP. Government spending has an impact of 5.03%, an increase in expenses of US\$ 1.26 billion. Imports increased by 0.14%, to US\$0.04 billion, with exports increasing by US\$ 0.07 billion, an increase of 0.21%.

The analysis of the macroeconomic effects of the Bolsa Família Program on the GDP of the regions suggests that consumption is not only internal, considering the flexible exchange rate, the effects of the program also have unfolding in the external market of the region. It is necessary to analyze that the fact that the government spends on transfers causes at the same time spending in other sectors of the economy to reduce. Such facts justify that the effects of a real spending by the government in the Bolsa Família Program on the GDP of the Brazilian regions are low, but positive and greater than unity, which confirms the guiding hypothesis of the research.

Neri, Vaz and Souza (2013), consider that if the expansion of the transfer is compensated by an equivalent reduction in government spending, the multiplier effects in the product tend to be small, even if it contributes to the reduction of inequality, justifying that This is due to the fact that other government expenditures would have a direct impact on the product, while the Bolsa Família transfers would first impact household incomes and subsequently influence the production of economic activities.

Previous research (Mostafa, Souza and Vaz, 2010; Neri, Vaz and Souza, 2013) conclude that the multiplier effects of the Bolsa Família Program on GDP are positive, superior to unity if we consider the impact on the Brazilian economy; This study, considering the influence of the external market on the regional economy, refutes the authors' analysis when they affirm that the regional multiplier effects of the Bolsa Família Program on GDP would be greater.

Conclusions

Only in a first moment the program is efficient in promoting the fight against inequality, since it is an in kind monetary transfer that has as immediate impact the increase of the income and the consumption of the poorest families. It does not harm the other families, those not served by the program, not reducing the capacity of consumption or reducing the income of these families. However, the direct effects on dependent families in terms of consumption are virtually the same as those of government transfers to households, government transfers have small effects on households.

The changes in the price of observed factors showed a worrisome impact of the Bolsa Família Program on household income. The transfers reduced the labor price, the factor with the largest participation in the income of the poorest families, and raised the price of capital, which has a greater participation in the formation of the income of families with high incomes. In other words, the effects of the program in the long run, in addition to becoming milder, increase the chasm between the richest and poorest sectors of society. While lower-income families rely on the assistance of the Program, they have guaranteed the consumption, but at the same time reduce the ability to increase income due to the devaluation of wages.

It is notorious that transfers from the Bolsa Família Program are linked to policies in the labor market, with the professional qualification of those who receive them, for example, since a less qualified workforce tends to receive a lower salary. Consideration should be given to the ability of families to move up from the income class, requiring less and less (or all) income transfers over time, and for future research it is suggested to analyze the capacity of the To raise the families of income class, which would collaborate with the theme in order to verify if the impact has the capacity to increase the income to the point of making the beneficiary family change class, thus avoiding the dependence of the families that receive the benefit And reducing their impact on inequality.

The analysis of the research in the light of the PAEG model suggests the acceptance that the model is inserted in a scenario of perfect competition and full employment in the use of the factors of production. In addition, it is a static model and, therefore, without the evolutionary characteristics of the investment to increase the productive capacity. Thus, for future research it is suggested to analyze the program's ability to raise families of income class in a dynamic general equilibrium model, which would collaborate with the theme when verifying that the impact has the capacity to increase income To the point of making the beneficiary family change class, thus avoiding the dependency of families receiving the benefit and reducing their impact on inequality.

The analysis of the macroeconomic effects of the Bolsa Família Program on the GDP of the regions suggests that consumption is not only internal, considering the flexible exchange rate, the effects of the program also have unfolding in the external market of the region. It is necessary to analyze that the fact that the government spends on transfers causes at the same time spending in other sectors of the economy to reduce. Such facts justify that the effects of a real spending by the government in the Bolsa Família Program on the GDP of the Brazilian regions are low, but positive and greater than unity.

The results show that there are undesirable effects on the income of the factors, which may affect the income distribution of the program in the long term. On the other hand, the mechanisms by which these effects occur are still not properly understood. There is a need to deepen the analysis about the way the labor market organizes itself in the face of the financial contributions of the Bolsa Família program to better guide the program and thus be possible to propose measures for its improvement.

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