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Then, we discuss the possible lying mechanisms relating the interest variables and individual migration decisions. Each mechanism differs according to the individual status, beneficiary of the program or not, income profile, specific characteristics of its home municipality and of potential destinations.

Among our results, the control variables appear in agreement with the main findings of migration literature, and the management of the program was revealed relevant to the beneficiary and potential beneficiary locational choices, specially the release of resources.

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JEL Codes: O15; R12; R23.

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1. Introduction

Migration and social programs have been intensely studied by the economic literature, although not so frequently together. Among a lot of results recorded for cash transfers programs in Brazil, especially regarding the *Programa Bolsa Família* (PBF), few times this matter was analyzed together with migration decision, and, as far as we are concerned, none of these studies approach the program management, neither the origin-destination flows. Therefore, we identify a lack of further investigation of the benefits spatial distribution and program management relations with individual decision of migrating for another municipality.

PBF size and relevance to Brazilian social policy are considerable. In 2015 the social assistance spent BRL 74 billion, of which BRL 27.6 billion were spent in the PBF (*Portal da Transparência*). It represents an expressive amount and affects about 50 million people directly, which constitutes almost one quarter of Brazilian population (IBGE). Other known effect of the PBF, beyond personal income inequality reduction, refers to decrease of regional income inequality, at least in the short term. Here we try to explore a related topic, i.e., the effects over migration of beneficiaries and potentially beneficiaries. Given the unequal spatial distribution of resources, possible migration effects are expected to be regionally more or less intensive.

The main sources of PBF impacts over migration are related to the grants of benefits, and the surveillance of self-reported information. The latter is also relevant in the recent debate on PBF focalization. Just like any other social program, the investigation of its effects is very important to support public policy strategies, to increase and correct its trajectory.

Schematically we consider that the PBF acts on migration decisions through three mechanisms. The first concerns a higher cost of migration for beneficiaries (cost mechanism), for example, for having to update

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information in your new municipality, to enroll your children in new schools, and even for the lack of knowledge that they can carry the benefit to the new location. The second acts through migration monetary costs financing (financing mechanism), because the program resources can alleviate financial constraints and release a previously intended migration movement. And the third, the expectation mechanism, which is the most complex of them. Eligible individuals (beneficiary or not), may search for locations where the grants are more generous, and/or the surveillance are softer, encouraging migration toward these locations. Unfortunately, the available data doesn't allow identification of each mechanism separately, but one can infer which one is dominating when some combination of results appears.

This research contributes to the migration and impact evaluation of PBF literature, analyzing the origin-destination flows, approaching national data with a municipality level of aggregation, and embedding spatial dependence in an origin-destination discrete choice model.

The spatial dependence inclusion on theoretical model gave us more efficient estimators. The relevance of proximity to migration decisions are obvious. Closer municipalities information can arrive quicker and in higher volume to the local population. Still, the features of neighbor municipalities can be enjoyed by residents of closer municipalities (spillover effects).

It is important to remark that, since we are dealing with variables of grants volume and surveillance in municipal aggregation, we are considering external effects to individuals. i.e., in his decision he will consider if other individuals are receiving benefits or being inspected. With that in mind, we differ from other studies that consider individual variables, often with likelihood models of migration propensity, and a dummy variable of beneficiary family.

Our results can open some space for studies focusing on how this regions that lose, receive, or retain migrants are affected, to propose local public policies considering local managers of the Program.

The structure of the paper is divided into three more sections. The next one presents a literature review with PBF registered results, and studies of the relation of social programs and migration in Brazil and other countries. Then, the theoretical model and econometric equations are derived, both naive and spatial dependent versions. Just after the model, we develop the arguments of the mechanisms of interaction between PBF and locational choice.

In section 4 we describe the variables, with special regard to the original contribution on the estimation of lagged origin-destination flows. We believe that the adopted procedure, although simple, is of great value for future researches on origin-destination migration with Brazilian data. Then, we present the results of the theoretical model estimation, in which we replicate some traditional findings of migration literature, for example the relations between migration and distance, density, employment and income. Finally, we show the relevance of the PBF management variables.

Before final remarks, in the last sub-section we comment the robustness tests results. The estimation with data of 10 years before, like a placebo test, and an individual migration likelihood model, dependent of individual and origin municipality characteristics.

2. Literature Review

2.1. The *Programa Bolsa Família* and its effects

The PBF is the biggest conditional cash transfer program to low income families in Brazil[3]. This group includes poor families with monthly per capita income between BRL 85.00 and BRL 170.00, and extremely poor with less than BRL 85.00. Nowadays, the average monthly benefit approaches BRL 178.00[4] by family.

[3] When we do not consider the *Benefício de Prestação Continuada*, payed to the elderly and deficient people, other programs like *Bolsa Verde* and the *Programa de Fomento às Atividades Produtivas Rurais* have a much smaller dimension, covering respectively 26 thousand people in July 2016 (*Ministério do Meio Ambiente*) and 142 thousand families between 2010 and 2014 (*Portal Brasil*).

[4] Values refer to 2017 January.

The PBF emerged in 2003, from the unification and amplification of existent cash transfer programs, *Bolsa-Escola*, *Cartão Alimentação*, *Auxílio Gás* and the *Bolsa Alimentação*. They were created in 2001, and together covered about 9.7 million people at that time, increasing to 27.4 million people in 2003 (Osório et. al., 2010) and continually until the recent 50 million people.

The total spent generated by the PBF is around BRL 27.6 billion, which represents 0.5% of the national GDP, i.e., we observe a robust evolution since the 0.2% of GDP spent in 2003 (nominal value of BRL 3.2 billion), the time of implementation. With another metric and different years, we also observe the same movement, with the share of the benefit on Brazilian income passing from 0.1% in 2001 to 0.7% in 2009 (Osório et. al., 2010).

Another characteristic of the program that is of interest to this research is the way of including beneficiaries. It may be related to the individual locational decision, as will be argued ahead. It is worthy to note that the selection to the PBF is done with respect to the *Cadastro Único*, a national register for social programs of Federal Government. The responsible for registering people is the municipality, nonetheless, the individual can present itself to the *Centro de Referência em Assistência Social* (CRAS) in order to be registered, which allow us to conclude that the register is not necessarily actively done by the municipality. Also, to be registered in the *Cadastro Único* is not enough to become a beneficiary, what only happens after automatized analysis by the Social Development Ministry (MDS).

Concerning the regional distribution of the program, the share of beneficiary families of the PBF was relatively stable across years. In 2008, the Middle-West resident families represented 5.4% of total beneficiary families, while the South-East had 50.7% (Satyro and Soares, 2010). Of course, these numbers are related with the total of poor resident families in these regions. To associate it with Regional Income Inequality we must also argue that there are differences in the share of beneficiaries in local populations in the big regions of the country. In 2010, North and Northeast had 28% and 38% of the beneficiary families, while in the other regions this share was around 10% (Baptistella, 2012). The discussion of this disparity must consider the share of poor families too.

In the literature, seems peacefully to assume that the PBF contributed to the reduction of income inequality between regions, at least on short term. With different shares of poverty and beneficiaries, it is reasonable to expect that the effects intensity be also unequal. In fact, Sátyro and Soares (2009), with national household survey (PNAD) make a factorial decomposition of Gini Index, by class of income. The paper concludes that along the *Benefício de Prestação Continuada*, the PBF was responsible for 88% of the fall in income concentration to Northeast states, and by 24% of the fall observed in South, Southeast and Middle-East (non-weighted averages).

Zylberberg (2008) merged data from *Contas Econômicas Integradas* with household surveys from IBGE, and applied a method with Interregional Input-Output Matrices. He concluded that part of income concentration reduction between 2001 and 2005 was due regional inequality reduction. Putting apart the direct and indirect effects of the transfers, he observed that the later has a concentrating impact, but it is more than compensated by the former. Azzoni et. al. (2007) also applied an Input-Output framework to PNAD and Family Budget survey data. Their conclusions point to contributions of PBF transfers in short-term to reduce the regional and personal income concentration.

Another present debate on PBF evaluation concerns the focalization, i.e., the inclusion of eligible beneficiaries and exclusion of non-eligible. Between 2003 and 2006, the number of families covered by the program has grown sharply, what could have resulted in the inclusion of non-eligible beneficiaries. Soares et. al. (2009) didn't find evidences on this direction. They used data from national household survey (PNAD) of 2004 and 2006, and computed the error of focalization elasticity to the amplification of the program. Your conclusions are that the founded errors are previous to the increase in the program, and part of these errors are due to income volatility, what should not be considered as an error, since there is a high probability of transitory earnings making these families non-eligible.

Relevant matters of the PBF, many times neglected in empirical analysis, refer to the possible neighborhood effects. Bastos and Muller (2015) used the elections datasets, and PBF coverage, to verify if the expansion of the program in a municipality affects the neighbor locations, once the voter can punish the mayor that

doesn't invest in the program, when your neighbors do so. In fact, the authors found effects supporting this rational.

About to complete 15 years, PBF had several other issues studied, for instance, its conditions and rules. In this brief review we focused on the main results that relates to our interest. In the next sub-section, we review the literature that crosses migration with social programs, the specific interest of our research.

2.2. Migration and Social Programs

Seminal papers of Sjaastad (1962), Lee (1966) and Todaro (1969) put in evidence the economic aspects of migration. Lee commented the regional factors of pull and push, and Sjaastad and Todaro put some focus on income differential. Another well-known influence on migration comes from the network approach: a pioneer migrates, and this movement influences the following decisions of potential migrants from the same origin location (Massey, 1988). Each factor of influence is incorporated in the analysis with appropriate choice of variables to represent it.

The relation between social programs and migration constitute a concern in various countries. Hagen-Zanker and Himmelstine (2012) made a review of some studies on this theme. The authors also commented some main channels through which the programs act on migration decisions. In majority, the data applied considered individual level. Only two studies in the review deal with aggregated flows. Results vary a lot according to the design of the program, and to the local characteristics.

Applying origin-destination aggregated flows, Sorensen et. al. (2007) investigated the New Deal influences on USA migration, and concluded that the higher the volume of transfers, lower the migration to other locations. The New Deal responded to almost 12% of migration observed between 1935 and 1940.

Parida (2016) evaluated the Indian program, Mahatma Gandhi National Rural Employment Guarantee Act, and its influences on beneficiaries' migration between two districts of Indian state of Odisha. She applied a Probit, and her results indicated that the program reduced the traditional migration between agriculture harvests.

Winters et. al. (2006) studied the effects of Honduras and Nicaragua programs on fertility and migration in the years of 2000, 2001 and 2002. They also applied an Probit model, but, in the other direction, they concluded that the programs increased the propensity of the beneficiaries to leave in the case of Nicaragua. For Honduras, the authors didn't find significant results.

Angelucci (2015) evaluated the probability of Mexican beneficiaries to migrate to USA, applying data of local Census of 1997 to 1999. Results supported that the program incentivized this migration.

Concerning the PBF, two studies tried to find effects on migration. Silveira-Neto and Azzoni (2009) applied data from national household survey, the PNAD of 2004. Also with a probability model, they found reductions on migration, even though no significant results appeared to return migration, defined as migrants that come back to their natural region. With similar method, but with data of the national Census of 2010, Gama (2012) found the same results to the state of Minas Gerais.

As these results show, the mechanisms and effects of social programs on migration can be very different. We propose to estimate it in a different way, aggregated and with variables that capture the management features of the program. Therefore, this paper constitutes a contribution to understand different effects of the PBF on migration. The two main factors analyzed in this paper concerns the release of resources for beneficiaries, and the surveillance of the program. The former relates to the decision to migrate of beneficiaries or eligible families, e.g., the reduction of poverty can affect both beneficiaries and non-beneficiaries. On the other hand, the surveillance can, for example, be negatively correlated to the evaluation of the local by part of individuals that are out of the eligible profile, but that desire or even already receives the benefits.

Both factors, concession and surveillance, interact and act on migration. On section 3.2 we explore further the mechanisms by which these factors act, and how they can be estimated departing from our database.

3. Theoretical Model, Method and Underlying Process

3.1 Choice Behavior and Spatial Interaction Models

Before introducing our model, we make a brief review of the two main structures behind our approach. They are the Spatial Interaction and Choice Behavior Models.

In Economics, the Choice Behavior Models are highly associated to McFadden, which between several papers developed the Conditional Logit in McFadden (1973). To introduce it briefly and focused to locational choice, let the random utility function of choosing locality *r* for the individual *i*, placed in origin *q*, depend on observable characteristics of destination, x_r, common to any origin that this individual could be, on origin-destination characteristics, x_{qr}, like distance between q and *r*, on non-observables ξ_{qr}, and finally on an idiosyncratic preference shock, ε_{ir}, assuming the form:

$$u_{iqr} = x_r\,\beta + x_{qr}\delta + \xi_{qr} + \varepsilon_{ir} \tag{3.1}$$

Using the axioms (Independence of Irrelevant Alternatives, Positivity, Irrelevance of Alternative Set Effect) proposed in McFadden, we can achieve the traditional choice probability equation:

$$P\left(Y_{iqr} = 1 \mid B_q\right) = \frac{\exp\left(x_r\beta + x_{qr}\delta + \xi_{qr}\right)}{\sum_{s=1}^{n_q}\exp\left(x_s\beta + x_{qs}\delta + \xi_{qs}\right)} \tag{3.2}$$[5]

In which Y_{iqr} is a dummy variable that assumes unity value when *i* chooses *r*, and zero otherwise. If one assumes that the sample is large enough, a method suggested by Berkson (1951) and generalized by Theil (1969) is to approach the left-hand side by aggregated[6] observed share of individuals of origin q choosing location *r*. Define the probability in the left as y_{qr}, taking logs on (3.2) gives us the following equation:

$$\ln\left(y_{qr}\right) = x_r\beta + x_{qr}\delta + \xi_{qr} - \ln\left(\sum_{s=1}\exp\left(x_s\beta + x_{qs}\delta + \xi_{qs}\right)\right) \tag{3.3}$$

This equation needs one last operation, to deal with the last term which is not observable and is correlated with the dependent variable by construction. The probability that any individual chooses its own origin is:

$$\ln\left(y_{qq}\right) = x_q\beta + x_{qq}\delta + \xi_{qq} - \ln\left(\sum_{s=1}\exp\left(x_s\beta + x_{qs}\delta + \xi_{qs}\right)\right) \tag{3.4}$$

So, it is possible to take the difference and achieve a linearly estimable equation:

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[5]McFadden (1973) proves that if ε_{ir} follows a Weibull distribution, the joint accumulated distribution satisfies equation (3.2) for choice probability, without the need of imposing the axioms.

[6]On the aggregation problems of a non-linear model like Conditional Logit, McFadden warns the possible bias if the representative probability is not the same for every individual, and extents this problem to linear estimations proposed by Berkson (1951) and Theil (1969).

$$\ln(y_{qr}/y_{qq}) = (x_r - x_q)\beta + (x_{qr} - x_{qq})\delta + (\xi_{qr} - \xi_{qq}) \quad (3.5)$$

This last operation is a simple and special case of the Berry Inversion (Berry, 1994), and y_{qq} is viewed as the outside option where the utility is commonly normalized.

The second structure behind this paper is the Gravitational Model, that is reviewed in more detail in Sen and Smith (1995) and Patuelli and Arbia (2016). The later argue that this family of models are a very productive and promising research field again.

LeSage and Pace (2008) chose the Gravitational Model to derive the spatial econometric equations for an Origin-Destination structure. Although we chose here to derive them from a Choice Behavior model, both are closely related. To exemplify the specific relation between Gravitational Model and the Conditional Logit applied to locational choice, let the function of interaction between to elements q and r vary proportionally with variables of size of each element, X, and with some distance function between them, H:

$$\mu(q,r) = CZ_q^{\beta_O} Z_r^{\beta_D} H_{q,r}^{\gamma} \quad (3.6)$$

Taking logs on this gravitational equation gives us a linear relation

$$\ln(\mu(q,r)) = \ln(C) + \beta_O \ln(Z_q) + \beta_D \ln(Z_r) + \gamma \ln(H(q,r)) \quad (3.7)$$

Or, in matrix form

$$\ln(\mu_{OD}) = \ln(C)\, \iota_{n^2} + \ln(Z_O)\beta_O + \ln(Z_D)\, \beta_D + \ln(H_{OD})\gamma \quad (3.8)$$

The equation (3.2) can also be re-stated in matrix form as:

$$\ln(y_{OD}) - \ln(y_{OO}) = (X_D - X_O)\beta + (X_{OD} - X_{OO})\delta + (\xi_{OD} - \xi_{OO}) \quad (3.9)$$

With some additional assumptions, it is possible to derive the difference equation in (3.5) from an underlying gravitational equation as (3.6). Let's impose that $\beta_O = -\beta_D$, that can be seen as a kind of symmetry. Also, define $ln(C) = 0$, $X_D = ln(Z_D)$, $X_O = ln(Z_O)$, $(X_{OD} - X_{OO}) = ln(H_{OD})$. With these restrictions, we get a similar gravitational equation[7], but now, the same characteristic has opposite effect on interaction whether it is from origin, or from destination. A good characteristic in destination increases the interaction (migration) from q and r, while the same characteristic in origin q reduces the interaction (migration) from q and r.

$$y(q,r) = X_q^{-\beta} X_r^{\beta} \mathrm{e}^{(X_{qr} - X_{qq})\gamma} \quad (3.10)$$

[7] For a rigorous treatment and formal theory on the linkages between an Individual Choice Behavior Model (as Conditional Logit) and a Spatial Interaction System (as a Gravitational Model) see Smith (1975).

It is needless to convince one that migration choices have a deep spatial appeal. So, in the next section we also present the utilities and each resultant aggregated equation with these spatial dependences that leads us to spatial econometric models almost like those in LeSage and Pace (2009).

3.2 The Model

Consider an individual $i \in I$ living in the local $q \in Q$, evaluating the local $r \in Q$. The utility of choosing local r is given by

$$u_{iqr} = \alpha m_{qr} + \beta x_r + \gamma x_{qr} + \xi_{qr} + \varepsilon_{iqr} \tag{3.11}$$

Which depends on a fixed cost of migrating α, observable to the individual that chooses to migrate (captured by the *dummy* m_{qr}, equal to the unit when $q \neq r$), on features of the local $r \in Q$, x_r, on the specific features of the pair origin-destination x_{qr}, like the distance between q and r; on non-observable characteristics ξ_{qr}, equal to all individuals from the same origin evaluating the same destination; and on an idiosyncratic shock ε_{iqr}. When developing this model, named Conditional Logit, McFadden (1973), show that it can be expressed in an almost linear equation, and when we sort it in an origin-centric fashion, like proposed by LeSage and Pace (2009), it results on equation

$$\ln(y_{OD}) = M_{OD}\alpha + X_D\beta + X_{OD}\gamma + \xi_{OD} - \Theta_O \tag{3.12}$$

It is possible to show that the parameter θ_O is a constant for each origin, correlated with the explicative variables of the origin-destination pair, X_{OD}. Therefore, its omission results in bias on estimated parameters. With the same strategy from last section, we use the following equation

$$\ln(y_{OO}) = M_{OO}\alpha + X_O\beta + X_{OO}\gamma + \xi_{OO} - \Theta_O \tag{3.13}$$

To subtract from (3.12) and get the result

$$\ln(y_{OD}) - \ln(y_{OO}) = \alpha + (X_D - X_O)\beta + (X_{OD} - X_{OO})\gamma + (\xi_{OD} - \xi_{OO}) \tag{3.14}$$

In the study of migration, the inclusion of spatial dependence seems to be highly relevant. Even though the major part of mentioned studies neglected it, neighborhood effects like information spread, or the fact that the features of near places affect people of the local, should be treated. Depending on the nature of dependence, it can generate inefficient or even inconsistent estimates (Anselin, 1988).

The spatial econometric models in cross-section try to control three main different kinds of dependence: spillover effects of observable characteristics (the Spatial Lagged X, SLX), the spatial heterogeneity (Spatial Error Model, SEM) and the spatial interdependence (Spatial Autoregressive Model, SAR). Combinations of these models can lead us to more sophisticated spatial controls, although the identification of each effect can be more complex too (Anselin, 2003).

To derive the SLX, that includes the weighted neighborhood characteristics between the explanatory variables, one just need to make little modifications on utility function of the general place *r*

$$u_{iqr} = \alpha m_{qr} + \beta x_r \ + \ \lambda \sum_{s \in Q} w_{rs} x_s + \ \gamma x_{qr} + \ \xi_{qr} + \ \varepsilon_{ir} \tag{3.15}$$

The term w_{rs} is the weight of the neighbor $s \in Q$ to the local $r \in Q$, the term x_s is the set of explanatory variables of local *s*, i.e., the sum weights the characteristics of the neighborhood of the destination *r*. The aggregated counterpart is

$$\begin{aligned} ln(y_{OD}) - ln(y_{OO}) \\ = \ \alpha + (X_D - X_O)\,\beta + (W_D X_D - W_O X_O)\lambda + (X_{OD} - X_{OO})\gamma + (\xi_{OD} - \xi_{OO}) \end{aligned} \tag{3.16}$$

The neighborhood matrices are explained ahead. The next model with spatial dependence is the SAR[8]. With different modifications on utility function we have:

$$u_{iqr} = \rho_O \sum_{s \in Q} w_{qs}\,(u_{isr} - \varepsilon_{ir}) + \rho_D \sum_{s \in Q} w_{rs}\,(u_{iqs} - \varepsilon_{is}) + \alpha m_{qr} + \beta x_r \ + \gamma x_{qr} + \ \xi_{qr} + \ \varepsilon_{ir} \tag{3.17}$$

SAR can be motivated like a long-term process, that while evaluating a local $r \in Q$, the individual living in $q \in Q$ considers only the common part of the evaluation of *r* made by neighbors of q in past periods, and only the common part of utility of individuals of *q*, evaluating the neighborhood of *r* in past periods. Its aggregated counterpart, which is slightly different from traditional SAR[9], is

$$\begin{aligned} ln(y_{OD}) - ln(y_{OO}) \\ = \rho_O\,(W_O - W'_O)\ ln(y_{OD}) + \ \rho_D\,(W_D - W'_D)\ ln(y_{OD}) + \ \alpha + (X_D - X_O)\,\beta \\ + (X_{OD} - X_{OO})\gamma + (\xi_{OD} - \xi_{OO}) \end{aligned} \tag{3.18}$$

Finally, the third form of dependence, when the unobservable variables are spatial correlated (SEM) can be motivated by spatial heterogeneity. Although the OLS estimators remain consistent, they are inefficient. The presence of amenities not observed and spatial correlated, like weather and topography, are enough to support a process like this. The modified utility equation can be written like:

$$u_{iqr} = \alpha m_{qr} + \beta x_r \ + \gamma x_{qr} + \ \eta_{qr} + \psi_O \sum_{s \in Q} w_{qs} \xi_{sr} + \psi_D \sum_{s \in Q} w_{rs} \xi_{qs} + \ \varepsilon_{ir} \tag{3.19}$$

Where $\eta_{qr}$is the random shock, common to all individuals in q evaluating *r*. The other terms are the neighbors of the destination shocks, and the neighbors of the origin shocks, both multiplied by its weights and parameters. In this case, the origin neighborhood, can be thought as individuals of neighbor places having the same guess to amenities of the destination local.

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[8] The development of standard Conditional Logit can be found in McFadden (1973), and, for spatial versions, one can request to the authors.

[9] We don't report SAR estimate in results section. Since its difference equation is different from traditional SAR, further reflections and attention should be payed to select properly the instruments for the GMM.

The aggregated difference equation is:

$$\begin{aligned}\ln(y_{OD}) - \ln(y_{OO}) &= \alpha + (X_D - X_O)\beta + (X_{OD} - X_{OO})\gamma + (\eta_{OD} - \eta_{OO}) + \psi_O(W_O - W_O')\xi_{OD} \\ &+ \psi_D(W_D - W_D')\xi_{OD}\end{aligned} \tag{3.20}$$

The neighborhood matrices, W_D and W_O, follow the proposed form of LeSage and Pace (2009), and here they are computed with a Queen matrix, defined by contiguity of municipalities. In matrix notation, they can be expressed as:

$$W_D = I \otimes W, \qquad W_O = W \otimes I$$

Both W and the identity matrix have dimension $n \times n$. Since $\otimes$ is the Kronecker Product, W_D and W_O have dimension $n^2 \times n^2$. The derived matrices W_D' and W_O' are composed by lines of respectively W_D and W_O that refer to origin of the correspondent block.

Since we have the aggregated linear equations, we estimated these models using the General Method of Moments procedure, proposed by Kelejian and Prucha (1999). In the case of the SEM, we imposed $\psi_O = \psi_D$, and the matrices W_D and W_O were summed and divided by two, to adequate the structure to the procedure developed for only one spatial weight matrix.

3.3 Mechanisms of influence of PBF on Migration

In the aggregated approach of origin-destination flows, each municipality assumes simultaneously the role of origin and destination. So, the estimated parameters capture net effects. A municipality in the role of origin has forces of retention and evasion of its residents. The same municipality has forces of attraction and repulsion on the other municipalities residents. Taking any two municipalities, there is both the probability of a flow from the first to the second, and the probability of a reverse flow, from the second to the first. Therefore, what helps to determine the coefficients of the linear model is the difference of this probabilities.

The PBF can influence the decision of migration both by the release of resources, and by the surveillance of the program. In the point of view of individuals, we can classify in groups of beneficiary status, in case of receiving the benefit, or not beneficiary. With the income conditions of the program, we can also classify them as eligible to the benefit, or not. Combinations gives us four groups of interest.

To understand the effects on each group, consider first the eligible beneficiaries: the fact that the individual, as he migrates, must update his information in the register, to enroll children in new schools, and even the fear of losing the benefit, as it is possible that he doesn't know the possibility of carrying the benefit, can discourage the intended migration. In this case, the PBF has the effect of retaining the beneficiary by the motive called cost. It also repulses him of the determined destination by the same motive. On the other hand, in the case of this individual having interest in migrating, but with no resources to finance it, as he become beneficiary, the benefit can make possible this moving plan, incentivizing migration. In this other case, the PBF would be evading the beneficiary of his origin municipality, by the motive called "financing" The net effect can be ambiguous.

Now, considering the group of not eligible to the program, it is possible to infer that the surveillance acts on the decision of migrating retaining individuals on its origin municipalities and repulsing from the destination: even if the destination has a smaller surveillance, the individual would still have to present himself to update information in the register, what increases the chance of identifying his non-eligible

condition. While on his origin municipality, his beneficiary condition suggest that the local surveillance is already low enough to sustain this wrong payment.

Turning into the non-beneficiaries group. If we suppose that all individuals would like to become beneficiary, each one could evaluate the coverage observed in the evaluating municipality as a proxy to the probability of receiving the benefit. Therefore, if one observes in the origin a high coverage, the PBF retains the individual, incentivizing his migration in the other case. The effects are inverse in the presence of a higher coverage in the evaluating destination, when the PBF attracts this potential migrant. The Frame 1 resumes the entire discussion

Frame 1: Effects of PBF on migration propensity

	Beneficiary			***Non-beneficiary***			
	Origin		***Destination***	***Origin***		***Destination***	
Eligible	Retention Evasion	Motive Cost Motive Financing	Repulsion (Cost)	Retention Evasion	If coverage higher in origin; If coverage higher in destination;	Attraction Repulsion	If coverage higher in destination; If coverage higher in origin;
Non-eligible	Retention	Motive Cost					

The problem to the estimation and identification of each specific channel comes from the non-observation of the group of each individual in the moment of the decision, but only of his current situation.

Differently, models like Probit a Logit applied to migration deals with the choice between two alternatives, migrate or not, according to the characteristics of the individual, what becomes a problem if the local characteristics play a crucial role. Something that is possible to do, and we do that in the robustness section, is to include the characteristics of the origin municipality of each individual.

In what follows, we present the data used, some descriptive statistics and the main results obtained with the models' estimations and robustness tests proposed.

4. Data and Results

4.1. Data, description and some statistics of variables

The data used in this paper comes from national Demographic Census of 2000 and 2010, from *Instituto Brasileiro de Geografia e Estatística*. Concerning the number of beneficiaries and other characteristics of municipalities, it is used the dataset of *Ministério de Desenvolvimento Social e Agrário* (MDS). Variables of development and employment came from *Instituto de Pesquisa Econômica e Aplicada* (IPEA), and from a yearly report of social information of the *Ministério do Trabalho e Emprego* (MTE).

When constructing some variables, reporting descriptive statistics, and estimating the models, we have classified individuals between six *per capita* family incomes. The first profile consider income from BRL 0 to BRL 70, the second from BRL 70 to until BRL 255, the third from BRL 255 until BRL 510, the fourth from BRL 510 to BRL 1020, the fifth from 1020 to BRL 3060, and finally, above BRL 3060.

We describe the most relevant variables[10] to this study in what follows:

PBF Coverage 2008: to calculate a variable that maintain some relation with the probability of having the resource released, we used the number of beneficiaries and divided by the number of families registered in *Cadastro Únic* in the municipality.

[10] In all regressions, all variables are computed in logarithmic scale, except for political parties and regional dummies, and the previous origin-destination flows.

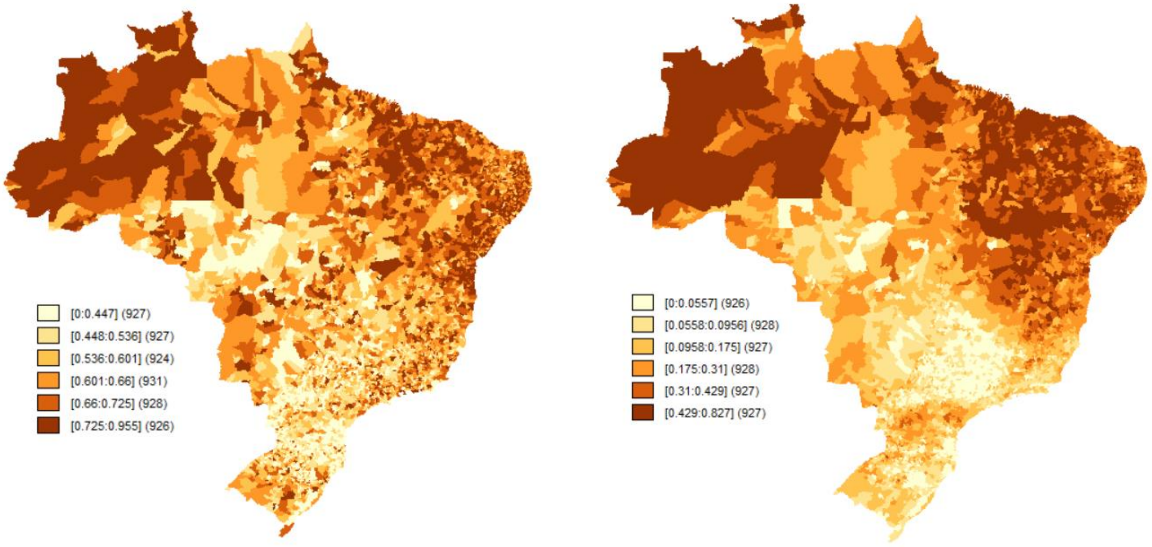
Outdated Rate of *Cadastro Único* 2008: the MDS releases for 2008 the number of valid and updated registers with income minor than half minimum wage (BRL 255.00), that corresponds to the registers with all information complete, included or updated in the system in the last two years. Separately, it also releases the number of valid registers with the same income range, which corresponds to registers with all information complete. As a matter of fact, we know that to be considered updated, the register must also be valid. So, the only group of registers that can become valid non-updated, is the valid and updated, because if a non-valid becomes valid, automatically, it is also updated. Putting it in a more direct way, the variable is computed as the ratio of valid non-updated in 2008 over valid in 2006.

This variable is considered in this paper as a proxy for surveillance of the PBF, since the information updating can be done both by the beneficiary and by the local manager.

Previous Flow: computed by the estimated number of individuals that migrated between 2006 and 2008 from determined origin to determined destination, over the estimated population that chose to remain in the origin in 2006. This variable somehow incorporates the idea of migration streams, in which a pioneer migrant arriving in the destination sends back information, reducing the next potential migrant's costs. It couldn't be included in logarithmic, in face of being composed of a lot of zeros. If so, it would reduce the sample substantially.

To motivate the geographic and spatial appeal of the studied problem, the maps[11] of Figure 1, with proportional release of resources of PBF and the share of extreme poverty (people with income below BRL 70.00) in each municipality, show some regional patterns across the country.

Figure 1 – Maps of PBF Coverage 2008 (left), and Extremely Poor 2000 (right)



Moran Index (left) = 0.49 (p-value = 0.001)
Moran Index (right) = 0.83 (p-value = 0.001)

As the left map reveals, the darker color for North and Northeast municipalities, that corresponds to a more intense release of resources of PBF to eligible individuals. With the right map, one can realize that the share of extreme poverty seems to be associated to places that had major releases of the program. This association is confirmed with the next descriptive statistics.

The coefficients of OLS regressions reported in Table 1 seem in general as expected.

[11] In all maps shown, should not be considered the Lagoa dos Patos and Lagoa Mirim, both in the state of Rio Grande do Sul. We inserted the null value for all their variables.

Table 1 – Regressions of Management Variables of PBF in 2008

Coverage BF 2008	**Dependent**	-0.72***	0.08***	0.52***
Register Coverage 2008	-0.34***	**Dependent**	-0.03*	0.15***
Valid Registers Var. 2008	0.03***	-0.03*	**Dependent**	-0.48***
Outdated. Reg. Rate 2008	0.03***	0.02***	-0.07***	**Dependent**
Occupation Rate 2007	0.01**	0.01***	0.01	-0.01
Formalization Rate 2000	-0.01	-3E-3	-0.01	0.1***
EDI 2000	-0.15***	-0.12**	0.06	0.1
HDI 2000	0.01	0.06	-0.09	-0.18
IDI 2000	-0.12**	-0.22***	0.01	-0.21
Residential Capital pc 2000	-0.04**	-0.07***	-0.07***	0.23***
Poors Share 2000	0.08***	0.03**	0.02	-0.12***
Urbanization Rate 2000	0.01	0.05***	0.01	-0.1***
Pop. Density 2000	0.02***	-0.04***	0.03***	0.11***
Area (km²)	0.02***	-0.03***	0.03***	0.15***
Old-aged Share 2008	0.29***	0.38***	-0.04**	-0.28***
In-Flow Migrants 2006-2008	-2E-3	0.06***	0.03***	0.06**
Out-Flow Migrants 2006-2008	0.01**	0.05***	-0.01	-0.04
PT elected 2008	1E-3	-0.01	-0.03**	0.05
PSDB elected 2008	-0.01	0.01	-0.01	0.01
North	0.03**	-0.04*	0.07***	-0.1*
North-east	4E-4	0.05***	-0.02	0.03
South-east	-0.04***	2E-3	-0.01	0.04
South	-0.14***	0.04**	-0.1***	0.11**
Intercept	0.19***	1.33***	-0.07	-4.11***
n	**5426**	**5426**	**5426**	**5426**
R^2	**0.60**	**0.45**	**0.18**	**0.16**

Significance: (*) 10%, (**) 5%, (***) 1%

We observe in the first column of Table 1 that places with a lot of individuals registered also had less proportional release of resources, while the stock of valid registers variation exhibits a positive result (0.03), i.e., places that included or made valid existent registers had more resources released. It is interesting to note the positive correlation between outdated rate and release of resources, because if the outdated registers really had a temporary block, we should expect a negative correlation.

In the second column, we observe that places with higher coverage of the registers, has smaller stock variation, because, in the limit, even if the manager wants to include more people in register, the public that wants or accept to be registered to the program may be exhausted. These relations can reflect an initial effort to include the extremely poor in the program, that in a faster process can have the resource released. On the other hand, as more families are registered, more families non-eligible may be included. This is confirmed in Table 2. The negative correlation between outdated rate and stock variation may be thought as needless of updating, since a lot of registers are already new. The share of extremely poor in 2000, just like we observed in the maps are confirmed as positively related to the resources releases, but negatively with the outdated rate, what suggest a major fear of beneficiaries of losing the benefit, rising their compromise in keeping updated information.

With the local current relevance concerning the focus of the program, in descriptive character, in Table 2 we report results of regressions of the shares of beneficiaries in each one of the six income profiles, against the management variables of the municipality.

Places with higher inclusion of valid registers in 2008 show an increasing elasticity from profile 1 to profile 4 (from 0.03 until 0.12), which means that when one includes a lot of families, maybe some loss of focus takes place. Also, higher outdated rates show positive correlations with the share of non-eligible

beneficiaries, what can be interpreted as limited resources being miss-allocated, in detriment of the target families.

Another interesting result from Table 2 occurs for the average municipality income variable in 2000 (IDR). The coefficient increases with income profile. A possible explanation can come from a higher living-cost, that is widely recognized as correlated with the income level. This could diminish the embarrassment and raise the need of the resource, even if the family is not eligible by the national criteria.

Table 2 – Regressions of Income Profile Share in the group of Beneficiaries 2010

Dependent Variable: Benef. Share Censo 2010	**Profile 1 Coef.**	**Profile 2 Coef.**	**Profile 3 Coef.**	**Profile 4 Coef.**	**Profile 5 Coef.**	**Profile 6 Coef.**
Coverage BF 2008	-0.12**	0.38***	0.72***	0.74***	0.36***	0.14
Register Coverage 2008	-0.85***	-0.42***	0.17***	0.3***	-0.28***	-0.53***
Valid Registers Var. 2008	0.03	0.05***	0.09***	0.12***	0.04	-0.25*
Outdated. Reg. Rate 2008	-0.02***	-0.04***	0.01*	0.07***	0.02	0.03
Occupation Rate 2007	-0.08***	0.03***	0.02***	-2E-3	-0.03*	-0.05
Formalization Rate 2000	-0.02	-0.03**	-0.02	-0.12***	-0.01	0.03
EDI 2000	0.24***	-0.12*	0.29***	0.79***	0.67***	-0.04
HDI 2000	-0.18**	-0.02	0.15**	0.32**	0.05	0.14
IDI 2000	-0.9***	0.41***	0.69***	0.99***	0.93***	0.52
Residential Capital pc 2000	-0.15***	-0.1***	-3.00E-04	0.08	0.03	0.17
Poors Share 2000	0.39***	0.22***	-0.13***	-0.3***	-0.3***	-0.27***
Urbanization Rate 2000	-0.03*	0.05***	0.05***	-0.03	-0.15***	-0.25***
Pop. Density 2000	0.01*	-0.04***	-0.01	0.01	-0.16***	-0.39***
Area (km²)	0.05***	-0.05***	-2E-3	0.04***	-0.17***	-0.4***
Old-aged Share 2008	0.26***	0.07**	-0.13***	-0.28***	-0.13**	0.29**
In-Flow Migrants 2006-2008	-3E-3	-1E-3	0.09***	0.19***	0.08***	0.03
Out-Flow Migrants 2006-2008	0.01	-3E-3	-0.02*	-0.03	-0.06**	0.04
PT elected 2008	0.05***	-0.04***	-0.04***	-0.09***	-0.1***	-0.08
PSDB elected 2008	0.01	-0.01	-0.01	0.01	-0.01	-0.15*
North	0.26***	-0.01	-0.22***	-0.16***	0.16***	0.12
North-east	0.51***	0.05**	-0.23***	-0.25***	-0.09	-0.14
South-east	0.09***	0.08***	-0.17***	-0.39***	-0.14***	-0.09
South	0.09**	0.03	-0.16***	-0.26***	0.15***	0.1
Intercept	-2.53***	-0.1	-1.53***	-3.68***	-3.9***	-1.61**
n	**5304**	**5421**	**5421**	**5246**	**2858**	**460**
R^2	**0.81**	**0.55**	**0.39**	**0.39**	**0.37**	**0.64**

Significance: (*) 10%, (**) 5%, (***) 1%

So far, we have shown that management variables seem to be related to each other, and to the focus of the program. We argued possible reasons for these relations. So, we have the landscape in which the individuals are choosing their locations, what contributes to the comprehension of the next and main results of the paper.

4.2 Determinants of migration flows, and the *Bolsa Família* effects

Before reporting results, we make some remarks on traditional endogeneity problems that threat the estimator's consistency, like reverse causality and omitted variable bias. Concerning the management variables of the program in 2008, the migration considered occurs after this data, so, it would exist a problem if one thinks that the municipal (for the case of inclusion of registers and update of information) or federal (for the case of release of resources) actions on the program considered the attraction and retention forces on migration. But this seems to overestimate the ability of prediction and control of the managers. On the bias of the other variables, when working with the Census, in a municipal level of

aggregation, it very common to have data only for periods that are not the desired by the researcher. This is the case for many variables used for 2000, 2007 and 2008. Anyway, we always select variables equal or previous to 2008, that is the moment of migration decision considered on the estimations.

As an attempt to make clear the dimension of the effects of variables and parameters, taking a municipality with a non-migrant population of 1000 people and 100 migrants for determined destination, we have a dependent of -2.30, and the anti-log of 0.10. With a parameter equal to the unity and an increase of one unity on the independent variable, exogenous by assumption, would cause an increase in the dependent for -1.30, which gives an anti-log of 0.27, and with the numbers of this example, one can expect a change for 272 migrants to that destination and the same 1000 non-migrants, or a reduction for 359 non-migrants and the same 100 migrants for that destination. Also, any combination of these two cases can also happen, since the dependent is kept in -1.30. Now, it is clear enough the systemic characteristic of this problem, since the migration can be deviate of other municipalities not involved in the shock of the dependent variable.

Departing from the interest variables of this research, on Table 3 it is noted that always when the PBF Coverage difference is significant, it appears positively evaluated by the individuals, and can be interpreted as a higher probability to observe that specific flow. As remarked on the theoretical section, by the double identity of each municipality (origin and potential destination), the positive sign must be interpreted solely as a characteristic positive evaluated by the individual. When thinking on resources release as poverty alleviation, it makes sense to believe that the Coverage is also positive evaluated by individuals non-eligible to the PBF.

Table 3: Results - Ordinary Least Squares

Dependent Variable ln(yod) - ln(yoo)	**All Coef.**	**Profile 1 Coef.**	**Profile 2 Coef.**	**Profile 3 Coef.**	**Profile 4 Coef.**	**Profile 5 Coef.**	**Profile 6 Coef.**
Intercept	-7.08***	-5.16***	-5.83***	-6.06***	-6.11***	-5.73***	-4.56***
Coverage BF 2008	0.02	-0.02	0.19***	0.09***	0.09***	0.08***	0.15**
Register Coverage 2008	0.01	-0.06**	0.11***	0.06***	0.04***	0.05**	0.07
Valid Registers Var. 2008	0.04***	0.01	0.02*	0.02**	0.03**	0.03	0.08*
Outdated. Reg. Rate 2008	0.01**	0.02**	-2E-4	0.01	0.01**	-0.01	0.03
Occupation Rate 2007	0.01***	0.04***	0.06***	0.06***	0.05***	0.05***	0.05
Formalization Rate 2000	0.01	-0.05***	-0.05***	5E-3	0.1***	-0.01	-0.05
EDI 2000	0.02	0.05	0.18**	0.31***	0.96***	1.27***	0.38
HDI 2000	0.12***	0.17**	0.11**	0.15***	0.45***	0.05	0.06
IDI 2000	0.51***	0.04	-0.18**	0.73***	1.63***	2.36***	3.08***
Real Estate Capital pc 2000	0.02	-0.02	-0.15***	-0.05**	0.03	0.04	-0.07
Poor Share 2000	-2E-3	0.57***	0.1***	-0.03***	-0.05***	-0.01	0.07*
Rich Share 2008	-0.01**	-0.01	-0.01***	-0.02***	-0.02**	0.01	-0.01
Urbanization Rate 2000	-0.01	-0.06***	0.04***	0.04***	-0.01	-0.01	-0.17**
Pop. Density 2000	0.58***	0.63***	0.57***	0.56***	0.54***	0.57***	0.68***
Area (km²)	0.6***	0.65***	0.6***	0.58***	0.56***	0.6***	0.7***
Old-aged Share 2008	0.04***	0.16***	0.09***	0.04**	-0.07***	-0.07***	0.08
In-Flow Migrants 2006-2008	0.13***	0.14***	0.09***	0.13***	0.16***	0.18***	0.26***
Out-Flow Migrants 2006-2008	-0.05***	0.01	-0.02**	-0.08***	-0.1***	-0.09***	-0.03
Capital of the State	0.07***	0.35***	0.35***	0.2***	0.01	0.05**	0.2
PT elected 2008	0.01*	-0.01	-4E-3	4E-3	0.02**	0.01	0.01***
PSDB elected 2008	0.01**	-1E-3	-0.01	-2E-3	0.04***	-3E-3	0.03***
Reelection 2008	2E-3	-0.01	-0.01**	-0.02***	-0.02***	-0.02**	0.03***
Distance (1000 km)	-1.67***	-1.22***	-1.45***	-1.46***	-1.22***	-1.33***	-1.74***
Distance²	0.48***	0.32***	0.43***	0.44***	0.37***	0.37***	0.47
Flow 2006-2008 / Non-migr. 2006	64.8***	-5.31**	16***	20.24***	31.21***	25.78***	15.01
n	**169707**	**27438**	**54323**	**63324**	**56233**	**36423**	**11001**
R^2 Adjust.	**0.73**	**0.68**	**0.68**	**0.74**	**0.74**	**0.72**	**0.72**

Significance: (*) 10%, (**) 5%, (***) 1%

The Coverage of Register also appears as something good for individuals. Probably, this positive sign doesn't come from attraction effect, since it seems strange to argue that the individual prefers to migrate to get registered than simply presenting itself to the municipality manager.

Places that made higher effort in last two years to include new registers or make valid existent ones also are positive evaluated by individuals. A softer surveillance represented by the outdated registers rate seem to be positive for individuals, around profiles 3 and 4, that constitute the non-eligible, but still low incomes. So, the benefit can still be important for these families. One should be careful in analyzing this last result, since this variable can capture non-observable characteristics of the local manager, that influence other social programs and public services.

The variable of Previous Flow 2006-2008, appear as significant in all profiles above 1. This variable can also reflect the effects of many variables before 2008, even stealing significance from the included ones. Anyway, given the available data and problem approach, your inclusion was revealed as extremely important.

With Table 3 regressions residuals we computed the Lagrange Multiplier tests using the destination matrix, the origin matrix, and an average of both. We also computed tests with residuals of the SLX, but the conclusions remained unchanged.

Table 4 – LM tests in the OLS

Profile	LMψ (Wd)	LMρ (Wd)	LMψ (Wo)	LMρ (Wo)	LMψ ((Wd+Wo)/2)	LMρ ((Wd+Wo)/2)
1	481.4***	560.6***	68.6***	22.4***	500.3***	495.2***
2	1706.5***	2001.5***	479.8***	228***	2088.9***	1811***
3	2526.6***	1809.4***	794.9***	472.2***	3187.2***	1950.9***
4	2419.3***	1446.6***	666.2***	435.3***	2913.3***	1648.6***
5	1973.1***	936.5***	360.6***	183.8***	2134.9***	981.9***
6	229***	233.8***	21.6***	12.2***	217.1***	223.7***

Significance: (***) 1% according to critical values of Chi-Square distribution

All tests had statistical significance, and in majority suggest that the more adequate model is the Error Model (LMψ > LMρ), although the tests for Autoregressive Model was almost as many significant. Fortunately, general results point to same direction independent of the model used.

With the spatial specification recommended by the tests above, the Table 5 shows the same results previously commented, what should already be expected, since the spatial error gains only efficiency in comparison to the least squares (Anselin, 2001).

Table 5 – Results – Spatial Error Model

Dependent Variable ln(yod) - ln(yoo)	**Profile 1 Coef.**	**Profile 2 Coef.**	**Profile 3 Coef.**	**Profile 4 Coef.**	**Profile 5 Coef.**	**Profile 6 Coef.**
Coverage BF 2008	-0.03	0.17***	0.09***	0.1***	0.08***	0.24***
Register Coverage 2008	0.04	0.14***	0.08***	0.05***	0.06***	0.13***
Valid Registers Var. 2008	0.04**	0.05***	0.02*	0.04***	0.04**	0.1***
Outdated. Reg. Rate 2008	0.02**	1E-3	2E-3	0.01**	-0.01	0.05***
ψ	-1.15	-0.72	-0.3	-0.21	-0.18	-1.08
n	**27438**	**54323**	**63324**	**56233**	**36423**	**11001**
R^2 Adjust.	**0.59**	**0.59**	**0.67**	**0.68**	**0.67**	**0.46**

Significance: (*) 10%, (**) 5%, (***) 1%

The main results of the paper are for release of resources variables (PBF Coverage), management and surveillance of the registers (Register Coverage, Valid Registers Stock Variation and Outdated Registers Rate), because both specifications, OLS and SEM, when significant, showed always the same direction, with only one exception, of the Registers Coverage for profile 1 in Table 3.

We believe we accomplished the aim of estimated interest relations, in a different manner that was already done in the international literature, and considered here more appropriate if the focus is on the management

of the program. Results also call the policy makers attention to the existence of important effects of the management on migration.

In the next section, we present some of the robustness tests done, to sum evidences in direction of already mentioned results.

4.3 Robustness Tests

We apply a different approach to the studied relation, with individual probability of being migrant, estimated through a Logit, which results are presented on Table 6. Although it is similar to the approach already taken in literature, we include here the origin characteristics, that capturing so, average retention forces of each one.

The individual and family variables come from Census of 2010, therefore after the decision moment of individuals, what demands caution for the analysis. By the descriptive character we aggregated the profile 1 and 2, 3 and 4 and 5 and 6.

Table 6 –Logistic Migrant Regression

Dependent Variable Migrant 2008-2010	**Profiles 1 e 2 Coef.**	**Mg. Eff.**	**Profiles 3 e 4 Coef.**	**Mg. Eff.**	**Profiles 5 e 6 Coef.**	**Mg. Eff.**
Beneficiary Family	-0.14***	-0.005	0.06***	0.002	0.31***	0.013
Coverage BF 2008	-0.28***	-0.010	-0.2***	-0.007	-0.08***	-0.003
Register Coverage 2008	-0.17***	-0.006	2E-3	6E-5	-0.06***	-0.002
Valid Registers Var. 2008	-0.11***	-0.004	-0.11***	-0.004	0.03***	0.001
Outdated. Reg. Rate 2008	-0.03***	-0.001	-0.03***	-0.001	0.02***	0.001
Intercept	-0.02		0.1***		0.36***	
N (millions)	**25.6**		**49.9**		**18.1**	
LR chi²(29)	**257974.9**		**849580.5**		**418221.7**	
Pseudo-R²	**0.03**		**0.05**		**0.06**	

Significance: (*) 10%, (**) 5%, (***) 1%

Table 6 shows that being beneficiary is associated to a smaller probability of having migrated to profiles 1 and 2, what goes toward the Silveira-Neto and Azzoni (2009) results. We should also consider that the fact of presenting itself to the register, lye the income, and taking risks, possibly is associated to positive selection for migration, what cans justify, at least in part, the positive coefficient for profiles 3 to 5. The PBF Coverage in individual origin, the inclusion and stock of registers, and the outdated registers rate, also appear as retention factors, except for income profiles 5 and 6.

As another robustness test, we estimated the same origin-destination model, but with the dependent of 2000. With some remarks[12] we can say that result reverted for the PBF Coverage, although maintained and appearing stronger for the Outdated Registers Rate. As mentioned, this last variable can capture non-observable characteristics of municipal management, that can last along the years.

[12] Specifications were slightly different because the inexistence of same data for periods before 2000, and even the computation of flows of 2 years was not possible, because difference on the query applied in that year.

Table 7 – Robustness with Census of 2000 - OLS

Dependent Variable ln(yod) - ln(yoo)	All	Profile 1 Coef.	Profile 2 Coef.	Profile 3 Coef.	Profile 4 Coef.	Profile 5 Coef.	Profile 6 Coef.
Coverage BF 2008	-0.23***	-0.19***	-0.06***	-0.29***	-0.35***	-0.31***	-0.49***
Register Coverage 2008	-0.15***	-0.1***	0.02	-0.19***	-0.27***	-0.15***	-0.37***
Valid Registers Var. 2008	0.11***	0.06***	0.08***	0.11***	0.14***	0.15***	0.17***
Outdated. Reg. Rate 2008	0.03***	0.04***	0.05***	0.04***	0.05***	0.04**	-0.03
Unemployment Rate 2000	0.02***	-0.2E-2	0.4E-2	0.02	0.01	0.02	0.12
Formalization Rate 2000	0.08***	-0.06**	0.08***	0.21***	0.31***	0.32***	0.07
EDI 2000	-0.35***	0.02	-0.17*	0.05	0.31*	-0.12	-0.76
HDI 2000	0.11***	0.06	0.1	0.29***	0.4***	0.2	0.01
IDI 2000	0.69***	1.46***	0.82***	2.21***	4.3***	5.87***	-0.81
Real Estate Capital pc 2000	0.19E-2	0.07**	-0.13***	-0.15***	-0.23***	-0.26***	-0.18*
Poor Share 2000	-0.05***	0.78***	0.05***	-0.15***	-0.06***	0.11***	0.02
Riches Share 2000	-0.03***	-0.05***	-0.07***	-0.12***	-0.18***	-0.11***	0.85***
Urbanization Rate 2000	-0.04***	-0.04	0.11***	0.07***	0.11***	-0.09*	0.12
Pop. Density 2000	0.51***	0.52***	0.48***	0.47***	0.47***	0.49***	0.46***
Area (km²)	0.53***	0.53***	0.51***	0.49***	0.51***	0.53***	0.47***
Capital of the State	0.04***	0.17***	0.22***	0.07***	-0.08***	-0.06***	-0.04
Distance (1000 km)	-0.6E-3***	-0.8E-3***	-0.7E-3***	-0.5E-3***	-0.5E-3***	-0.5E-3***	-0.6E-3***
Distance²	0.1E-6***	0.2E-6***	'0.2E-6***	0.1E-6***	0.1E-1***	0.1E-1***	0.2E-1***
Intercept	-7.45***	-5.51***	-6.4***	-6.43***	-6.23***	-6.03***	-5.13
n	**123808**	**21239**	**48172**	**41608**	**31115**	**21081**	**7366**
R² Adjust.	**0.67**	**0.59**	**0.62**	**0.70**	**0.71**	**0.70**	**0.66**

Significance: (*) 10%, (**) 5%, (***) 1%

5. Final Remarks

This research explored the relations between cash transfers, represented by the program named Bolsa Família, and migration between the 5563 Brazilian municipalities from 2008 to 2010. We used data from national Demographic Census of 2000 and 2010, and from reports of *Ministério de Desenvolvimento Social e Agrário*, to investigate if different managements of the PBF and of the registering process, concerning the release of the resources and the surveillance of the program, project some effect on the migratory flows. The relation of the PBF with migration was the object of two studies so far, but the present is the first to consider aggregated flows, spatial dependence and to focus on management variables.

We used a theoretical structure of Discrete Choice Models, in which departing from a utility function with random shock, we incorporated three main kinds of Spatial Dependence and achieved the aggregated origin-destination equations to be estimated. We believe that this spatial foundation on origin destination conditional logit constitutes a piece of the contribution of this paper. Concerning the estimation, we followed procedures presented by LeSage and Pace (2009) to compute the origin and destination neighborhood matrices, and applied the GMM of Kelejian and Prucha (1999).

From the obtained results, in vast majority of the times that parameters appeared significant, the program coverage variables were positively associated with the choice of determined destination, measured as the flow from that origin to that destination, over the origin population estimated in the moment of decision, i.e., 2008.

Concerning the eligibility criteria adjacent profiles, the profiles 2 and 3, the average of reported coefficients for coverage variable is 0.14, which means that an increase of 10% in the release of resources suggests that 1.4% of individuals that would leave the place, choose to stay, or that 1.4% individuals that would not migrate, or would migrate to another place, decide to migrate to that specific destination. Still, any combination of these two effects can also happen, highlighting the systemic character of migration.

Besides the positive effect found in variables associated to the release of resources, the outdated rate of register information also appeared as positive evaluated, especially for the profile 4, that is considerably above the criteria, but still represents a low enough income, so that the benefit is still representative for the family. Although with a smaller magnitude effect, and less robust result, its sign is in accordance with the mechanisms presented. For this result, we can also recall the Logit model, that also supports the direction of the result. Despite these arguments, it is important to remark that non-observable municipal management characteristics may be associated to this variable, then, some extra caution is needed.

As secondary but still important results, for the management variables presented we concluded that the share of resources releases appeared positively related to the extremely poor share in 2000, and we didn't find political party bias in it. Also, places with major registers stock variation had more non-eligible beneficiaries. Beyond this conclusion, we found a positive relation between the outdated registers rate and non-eligible beneficiaries, while appearing a negative relation with the eligible. This last result can suggest that scarce resources are being allocated in the wrong way, at least considering the declared target of the PBF.

The research didn't have the aim of judging the nature of found effects, but showed that with the applied approach and data, the resources of the *Program Bolsa Família* and its management are not neutral in the location choice process of individuals. From the estimation and argumentation developed, we concluded that the PBF contributes to reduce migration, both considering the benefit receiving and the self-declared information surveillance. We didn't throw away the idea that non-beneficiaries are attracted for other municipality to become a beneficiary, although it seems that this would demand a higher grade of information for the individual.

The effects of federal resources release for a given municipality, and the local management of the PBF and the register named *Cadastro Único*, must be considered by the policy maker, because if exogenous shocks like these, change migration movements that the theories predicted that happen in a way to compensate an income differential, it is possible and probably that there are development consequences in the local and even individual level.

Computational issues put apart methods like Maximum Likelihood and Tobit models, that could address the zero flows problem. The origin-destination structure also seems to complicate spatial discrete choice GMM methods (Pinkse and Slade, 1998), and Spatial Panel models, since neighborhood matrices are not constant across origin (that would play the role of time in this strategy).

For future research, we indicate room to develop an adaptation of the LM tests, and the development of some method to put apart the attraction and repulsion effects, together with Monte Carlo simulations to evaluate the model skills in capturing effects in small samples, with a lot of missing flows.

As a step further, we can decompose the direct and indirect effects proposed by LeSage and Thomas-Agnan (2015). It also seems interesting, to upgrade the estimations in the presence of more precise variables to measure surveillance, like the number of visits to the beneficiaries, and benefits blocks, that until now were not available.

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