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**Conference Paper**

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55th Congress of the European Regional Science Association: "World Renaissance: Changing roles for people and places", 25-28 August 2015, Lisbon, Portugal

**Provided in Cooperation with:**

European Regional Science Association (ERSA)

*Suggested Citation:* Ribeiro, Erika; Almeida, Eduardo (2015) : Are there evidences of race to the bottom and welfare migration in Brazilians municipalities?, 55th Congress of the European Regional Science Association: "World Renaissance: Changing roles for people and places", 25-28 August 2015, Lisbon, Portugal, European Regional Science Association (ERSA), Louvain-la-Neuve

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# **Are there evidences of race to the bottom and welfare migration in Brazilians municipalities?**

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## **ABSTRACT**

Despite having found papers on race to the bottom and welfare migration in the international literature, studies on these issues are very scarce in Brazil. The race to the bottom refers to the phenomenon in which municipal governments reduce their spending to a level below what is the socially optimal. For this phenomenon to occur, it would require two preconditions: spatial spillovers in welfare expenditure and migration. This migration could be individuals or companies. This paper analyzes the possible existence of race to the bottom generated by the "unwanted" welfare migration. Thus, this paper also seeks to answer questions such as: The Brazilian individuals decide to migrate to cities where welfare expenditure is higher? When deciding how much to spend on these functions, are Brazilian mayors considering the rate of immigration to the cities? Are there spatial spillovers of municipal welfare expenditure? The analysis was done for 5566 municipalities between the years of 2000 and 2010, using spatial panel data. The main results suggest the existence of welfare migration. However, when analyzing only the low-income individuals, unwanted welfare migration signals were not identified. Therefore, it is not possible to affirm the occurrence of a race to the bottom. The results also suggest that higher immigration rates increase the local population support to the welfare policies, giving evidence that a greater number of immigrants would increase competition for labor and wages and would make the local residents choose higher welfare expenditures.

## **1. Introduction**

In federal states like Brazil, there is a tendency to decentralization and hence, to the increased autonomy of states and municipalities. This autonomy would occur both when it comes to expenditures as to when it comes to tax collection. State and local governments could therefore take decisions on fiscal policy to increase the population's welfare.

One of the theories that discuss the decisions on public expenditure is called race to the bottom. According to this theory, some social and economic phenomena would cause governments to reduce spending on items such as education, health and social care. Two are

the possible preconditions for the occurrence of race to the bottom: spatial spillovers of local spending policies (or state) and migration.

The hypothesis of spatial spillovers suggests that local (or state) spending would be affected by the expenditures of municipalities (or states) neighbors. Thus, a reduction in spending of neighbors lead to a reduction in spending of certain municipalities (or states). Regarding the hypothesis related to migration<sup>1</sup>, it is known as the welfare migration phenomenon.

Oates (1972 *apud* Brueckner, 2000) argues that low-income individuals ("poor"<sup>2</sup>) tend to migrate to cities where the levels of welfare expenditure (as health, education and social assistance) were higher. This type of migration would be called "unwanted" welfare migration, for the "poor" individuals would be liquid "debtors" to the contribution system (they receive more public goods and services than what they would be able to contribute). Therefore, there would be a direct relationship between local public spending and "unwanted" welfare immigration.

This welfare expenditure could generate distortions in decisions relative to migration flows. Higher welfare expenditure tends to generate better living conditions and consequently attract individuals from other regions. When deciding to migrate, individuals probably would choose cities where welfare expenditure was higher. The welfare migration would only occur when the individuals' total incomes (salary plus benefits received from government) became equalized among all municipalities.

It should be observed that only the "unwanted" welfare migration would lead municipalities (states or countries) to reduce their public spending. If immigrants were more skilled and "non-poor" individuals, they would then contribute to the tax system, increasing government revenue and, consequently, the government could increase its welfare expenditure. Kunovich (2004), Finseraes (2008), Brady and Fanning (2014) argue that a greater number of immigrants would increase the perception of unemployment and the competition for labor and wages, causing the local residents to prefer "strong" welfare policies to compensate and protect them from economic competition and insecurity.

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<sup>1</sup> Regarding the migration hypothesis, some studies also analyse the migration of companies, rather than the population migration. This paper briefly deal with this issue in the section on the literature review, however, it will focus its tests in the event of spatial spillovers and welfare migration.

<sup>2</sup> In this paper, we call "poor" the individuals whose family income is less than one (1) minimum wage. Other aspects (or dimensions) of poverty as access to security, autonomy and dignity, approached by authors such as Codes (2008) will be disregarded for the simplification of the analysis.

From race to the bottom and from welfare migration two main problems may arise: the provision of public goods below the socially optimal in the sense that the goods offered are not sufficient to guarantee a minimum welfare for the needy population and a change in the migration pattern due to the influence of welfare expenditure. Thus, this paper innovates when checking for welfare migration between municipalities, as well as checking the evidence that the existence of an "unwanted" welfare migration would reduce the welfare expenditure in Brazilian municipalities (and therefore a race to the bottom) in the analyzed years.

At first, it is checked whether there are indications of welfare migration. Such analysis is divided into two parts. In the first part it is verified whether there are indications of welfare immigration in Brazilian municipalities, for this we used the proportion of immigrants in local population as dependent variable. The "unwanted" welfare immigration, on the other hand, is investigated having as dependent variable the proportion of low-income immigrants in the total population. Local welfare expenditures are used as variables of interest. A positive and significant coefficient for the variable on the local expenditure suggests that the increase in expenditures would cause an increase in immigration. There are, therefore, two specific estimates. The welfare migration will be the first hypothesis to be tested in this paper (**hypothesis 1**). And the "unwanted" welfare migration will be the second hypothesis (**hypothesis 2**).

In a second phase the race to the bottom is analyzed, in other words, it is tested if a municipality reduces its expenditures by observing the reduction in expenditures of neighboring municipalities to prevent the immigration of "poor" individuals. Thus, it is verified the existence of spatial spillovers of the welfare expenditures. This analysis is done by verifying if welfare expenditures of neighboring municipalities influence local welfare expenditures (i.e., it is verified if the coefficient related to welfare expenditures of the neighbors is statistically significant and positive). Such hypothesis will be called **hypothesis 3**. Another precondition is the existence of "unwanted" welfare immigration. Besides checking this phenomenon through **hypothesis 2**, it will also be checked if the migration of "poor" individuals makes municipalities reduce their welfare expenditures<sup>3</sup>, in order to discourage this migratory flow (**hypothesis 4**).

It should be emphasized that the existence of spatial spillovers of public expenditure, i.e., the existence of a direct connection between the public expenditures of a municipality with the expenditures of neighboring municipalities alone is not a sufficient condition for the

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<sup>3</sup> On one hand, welfare expenditures would attract immigrants, and on the other hand, the migration also affects the decisions of local politicians about the level of welfare expenditures (RAZIN and WAHBA, 2011 and GIULIETI and WAHBA, 2012).

existence of race to the bottom. Spatial spillovers may indicate even a dynamic increase in public expenditure. The existence of welfare migration of "poor" individuals would be another necessary condition for the race to the bottom. In this case, the municipalities would reduce their expenditure to prevent this migration (BRUEKNER, 2000). Therefore, it is important that hypothesis 4 is verified to say that there is evidence of race to the bottom.

Finally, some empirical evidence indicated by Kunovich (2004), Finseraes (2008) and Brady and Fanning (2014) suggest that an increase in immigration rise the support of the local population health policies, since a greater number of immigrants increase competition for labor and wages. Hence, the locals choose welfare policies to protect them from economic competition. This hypothesis will be tested by checking if the proportion of immigration in relation to the municipality's population causes an increase on welfare expenditures. This hypothesis is called in the literature of hypothesis of compensation (**hypothesis 5**).

The analyses are made from the municipalities in 2000 and 2010, through spatial panel data with spatial correction. The econometric model consider the non-observed effects caused by cultural and institutional differences specific to each municipality and the issue of spatial dependence. The use of a spatial weighting matrix of inverse distance<sup>4</sup> allows the control of the fact that public expenditures policies from the closest neighboring municipalities tend to influence more strongly the local expenditures than policies adopted by further distant cities.

The main results provide indications on welfare migration, since such higher expenditures increase the proportion of immigrants. Nevertheless, there is no evidence of "unwanted" welfare immigration, meaning that higher welfare expenditures would not attract poor immigrants. Results suggest spatial spillovers of such kind of expenditures, however, as there are no indicatives of "unwanted" welfare migration, it is not possible to confirm the existence of race to the bottom. Moreover, it is possible to observe the occurrence of a kind of "compensation". Highest proportions of immigrants in the population rise the preference for higher expenditures on health, education and social assistance.

This paper is organized as follows: section 2 presents the literature review on race to the bottom and its preconditions (spatial spillovers of public welfare expenditures, welfare migration and tax competition). The third section talks about the data, empirical strategy and empirical models used. The results obtained through the estimates are discussed in section 4. Finally, concluding remarks are made in section 5.

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<sup>4</sup> The construction of this matrix will be explained in section 3 which provides data and empirical strategy adopted

## 2. Literature Review

Two preconditions for the existence of the race to the bottom can be found in the literature. One of them is related to the strategic interaction of local expenditure policies, that is, there would be a spatial spillover of public expenditures of municipalities for their neighbours. Reductions in local expenditures would reduce expenditures in the near municipalities. The other precondition is concerning the migration of individuals or companies. In the latter case, the race to the bottom could be caused by "unwanted" welfare migration (low-income individuals migrate to regions where the benefits offered by the government were more abundant and, to avoid this "unwanted" immigration, rulers restrict their welfare expenditures) or by tax competition<sup>5</sup>.

This literature review focuses on texts on race to the bottom and on welfare migration. Firstly, hypotheses related to migration are presented just after the studies dealing with spatial interaction of local public expenditures policies are presented.

### *Welfare migration*

Several local aspects can affect the flow of immigration. Individuals can choose where to live considering the average salary of the city, population, income inequality, unemployment and the degree of security, for example. Mata *et. al.* (2007) has done a study in Brazil, considering the impact of these issues on the number of immigrants in Brazilian municipalities. However, another important aspect is the government expenditure on health, education and social assistance, i.e. welfare expenditures. Several authors, such as Brown and Oates (1987), argue that major expenditures on social welfare would attract more immigrants, who were in search of a better life. This type of migration is called welfare migration.

Oates (1972 *apud* Brueckner, 2000) argues that, at certain times, the expenses related to welfare would be smaller than the socially optimal expenditures. This would occur to avoid "unwanted" welfare migration (*welfare magnets*). The low-income individuals ("poor"<sup>6</sup>) would be attracted to municipalities whose levels of welfare expenditure (as health, education and social assistance) were higher. The attraction of more low-income individuals would cause local

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<sup>5</sup> In this case, the rulers, when concerned to attract further investment to the county (or state) would reduce their tax burdens. Since the proceeds from the collection of taxes help finance local expenditure, a cut in taxation would lead to a reduction in the supply of public goods and services.

<sup>6</sup> Are treated as "poor" the individuals whose family income is less than the minimum wage. Other aspects (or dimensions) of poverty as access security; autonomy and dignity approached by authors such as Codes (2008) will be disregarded for simplification of the analysis.

tax revenue to increase in order to finance greater expenditure derived from immigration beneficiaries. However, when choosing the level of expenditure, the higher-income residents ("non-poor") ignore the social benefits of increased expenditure and because they have greater bargaining power<sup>7</sup>, expenditures would be kept below the socially optimal level.

The higher the welfare expenditures, the higher would be the poor individuals' migration to the location and, consequently, expenditures would have to be increased more and more. The "generosity" of higher income individuals would then be more "expensive" with the "unwanted" welfare migration and would lead non-poor individuals to prefer lower expenditure levels and lower tax burden. As a result, to restrain this migration, each municipality would be less generous than in the absence of such migration and the result would be a phenomenon called "race to the bottom" (BRUECKNER, 2000).

Instead, some authors as Kunovich (2004), Finseraes (2008) and Brady and Fanning (2014) argue that immigration might increase the support of local population to social welfare policies. This would occur because a greater number of immigrants would increase the perception of unemployment and competition for labor and wages, causing local citizens to prefer more caring welfare policies to compensate and protect the economic competition and insecurity.

Several authors empirically analyse the existence of welfare migration, such as Southwick (1981), Borjas (1999), Meyer (2000), Berry, Fording, and Hanson (2003), McKinnish (2007), Fiva (2009), Giorgi and Pellizzari (2009), Razin and Wahba (2011) and Brady and Finnigan (2014).

It is noted the concern of the literature about the effects of different levels of social expenditures on migration, given that the benefits received tend to change individuals total income. It is also noted a concern almost widespread among the studies, about controlling the problem of endogeneity, since decisions concerning social expenditures levels can also be affected by the migration flow. However, from the aforementioned works, none considers the spatial dependence and the possible effect of public expenditures of surrounding towns on immigration for a certain location.

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<sup>7</sup> The aim of the rulers is the maximization of the votes in their favour and this could be achieved by meeting the demands of the poor and non-poor voters. Demand from poor voters can be met through the provision of meritorious goods such as education and health. However, demand from non-poor voters would be served either with expenditures in other areas such as security, and as through economic prosperity. However, the non-poor individuals have greater bargaining power, because in general, they are paying taxes, these taxes needed to finance public goods.

Overall, the studies indicate the existence of welfare migration in the United States (SOUTHWICK, 1981; BORJAS, 1999; Meyer, 2000; and MCKINNISH, 2007) and in Europe (FIVA, 2009; RAZIN and WAHBA, 2011; BRADY and FINNIGAN, 2014). It should be noted that no studies were found that verify the welfare migration in Brazil.

### *Spatial spillovers of public welfare expenditures*

Another approach examines the existence of race to the bottom in a different perspective. Instead of the analysis fall directly on the existence of welfare migration or tax competition, we seek evidence of spatial spillovers of public expenditures. To avoid "unwanted" welfare migration, whether a particular municipality reduces its expenditures, its neighboring municipalities should adopt the same strategy and, therefore, there would be a race to the bottom between the municipalities of the same neighborhood. Thus, there would be a strategic interaction between expenditures policies in the welfare of the municipalities (BRUECKNER, 2000).

Some articles verify the existence of spatial spillovers of public welfare expenditures. In the international literature, it is possible to list Figlio, Kolpin and Reid (1997), Saavedra (1998), Berry, Fording and Hanson (2003) and Baicker (2005). Such studies make the analysis for the United States. Most articles are direct relationships between local welfare expenditures and neighboring welfare expenditures.

Pontes (2009)<sup>8</sup>, on the other hand, analyses the existence of public spatial spillovers in the Brazilian states, also finding spatial spillovers on welfare expenditures. However, it is noteworthy that the author analyses the spatial interactions of expenditures in Brazilian states, but does not refer to the phenomenon of race to the bottom, and does not check any of the other two preconditions, namely welfare migration and tax competition.

Mattos *et. al.* (2014) are the authors of the seminal paper about race to the bottom for Brazilians municipalities. Authors seek to investigate the existence of a strategic behavior among Brazilians municipalities using housing policy data (for years 2004, 2005 e 2008). The results confirmed that there is a strategic behavior; specifically they found evidences that municipalities respond positively to the amount of neighbors policies. It is important to note that the authors only checked the existence of spatial interaction among housing policies, but

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<sup>8</sup> Is worth mentioning that the author analyses the spatial spillovers in expenditures for Brazilian states, but does not refer to the phenomenon of race to the bottom, and does not check any of the other two preconditions, namely welfare migration and tax competition.



they did not test if poor individuals' migration influenced housing policy. Therefore, they leave a gap given that only check one precondition of race to the bottom.

It is also noted that the American authors analyze mostly public expenditures on social benefits (in this case, with the AFDC program<sup>9</sup>). The exception is Baicker (2005), who makes the analysis considering the total public expenditure. As for methodology, there is a concern with endogeneity and to work around the problem, the authors use instrumental variables and simultaneous equations (FIGLIO, KOLPIN and REID, 1997; BERRY, FORDING and HANSON, 2003; and BAICKER, 2005). In general, are found evidences of spatial interaction in the expenditures of the states.

The present paper therefore aims to reduce this gap in Brazilian literature, making an analysis of spatial spillovers of public expenditures on the welfare of Brazilian municipalities, highlighting the issue of spatial spillovers being a precondition for the "race to the bottom". To avoid inconsistent and biased results, effects not observed and the spatial dependence will be considered in the analysis.

### **3. Empirical Strategy, Empirical Model and Data Description**

This section presents a summary of the empirical strategy used, the empirical models and the description of the data used on race to the bottom and welfare migration models.

The empirical strategy consists on testing the hypothesis of spillovers in welfare expenditures and welfare migration. In both tests, the data correspond to the years of 2000 and 2010<sup>10</sup> in 5566 municipalities<sup>11</sup>. Some of the variables can be found in the Atlas Brazil 2013, prepared by the UNDP (United Nations Development Programme) and has as source the Brazilian Institute of Geography and Statistics (IBGE), the others are provided by the National Treasury Secretariat (STN) by Census (IBGE) and the Datasus.

The aim is to control the problems of endogeneity of unobserved variables, heteroscedasticity<sup>12</sup>, spatial dependence and spatial heterogeneity. This empirical strategy consists of estimating, at first, a model for pooled ordinary least squares (POLS). In a second step, we estimate a model in first differences (DIF)<sup>13</sup>. The DIF model allows considering

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<sup>9</sup> AFDC (Aid to Families with Dependent Children) is a social benefit program offered in the United States to its low-income residents.

<sup>10</sup> Census years were chosen for the increased availability of variables, especially regarding the poverty and vulnerability variables

<sup>11</sup> The shape (digital map) is used for municipalities, version of 2007.

<sup>12</sup> To overcome the problem of heteroskedasticity are estimated robust standard errors according the correction through the White matrix.

<sup>13</sup> *A priori*, the Breusch- Pagan test will be performed to check the existence of non-observed effects. If it is rejected the null hypothesis of non-existence of these effects, the Hausman test is used to identify the type of

constant and specific effects in the municipalities' time (such as cultural issues, institutions and values).

In order to verify the spatial dependence problem, Moran's  $I$  and the Pesaran CD<sup>14</sup> (PCD) tests are used. In the latter test (PCD), the statistic is calculated for all variables dependent and explanatory. The test Moran's  $I$ , however, is performed for residues every year<sup>15</sup>. If the presence of spatial dependence is verified, it is estimated a model with spatial correction. The spatial weighting matrix used for model is the inverse distance-weighting matrix. Using this matrix is important because it considers that closer municipalities exert major influences on a particular location and the influence of other cities decreases while the distance between them increases. Thus, the further away is a municipality from another, the smaller will be the impact of the expenditures of a municipality on the other's immigration.

Empirical models used in the estimations of race to the bottom and welfare migration are presented in equations (2), (3), (4) and (5). The welfare migration is checked in regressions whose dependent variable is the proportion of immigration and the proportion of poor people's<sup>16</sup> immigration in the local population (equations 2 and 3). And the race to the bottom is checked in regressions whose dependent variable is expenditure on social welfare (4 and 5)

$$imit_{i,t} = \alpha + c_i + \lambda Wimit_{i,t} + \eta exp_{i,t} + \tau Wexp_{i,t} + X_{it}\beta + \varepsilon_{it} \quad (2)$$

$$imip_{i,t} = \alpha + c_i + \lambda Wimip_{i,t} + \eta exp_{i,t} + \tau Wexp_{i,t} + X_{it}\beta + \varepsilon_{it} \quad (3)$$

where  $imit_{i,t}$  indicates the proportion of immigrants in the total population of the municipality  $i$  at time  $t$ ;  $imip_{i,t}$  indicates the proportion of immigrants in "poor" population (individuals born in another municipality with monthly family income below a minimum wage) in the city  $i$  at time  $t$ ; the  $exp_{i,t}$  variable refers to welfare expenditures in the municipality  $i$  in the period  $t$ ;  $\eta$  concerns the coefficient of the variable  $exp$ ;  $Wexp_{i,t}$  refers to welfare expenditures in neighbouring municipalities in period  $t-1$ ;  $X_{it}$  is the matrix of variables of control;  $\lambda$  and  $\tau$  are spatial coefficients;  $\beta$  is the vector of coefficients relative to the variables of control<sup>17</sup>; and  $\varepsilon_{it}$  indicates the term of error in the municipality  $i$  at time  $t$ .

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effect, if fixed or random. The null hypothesis of the Hausman test indicates that the random effects model is the most suitable (WOOLDRIDGE, 2002).

<sup>14</sup> The null hypothesis of the CD test is the independence in cross-sectional units.

<sup>15</sup> The null hypothesis of the test  $I$  of Moran is the absence of spatial dependence.

<sup>16</sup> We considered as poor the individuals whose monthly family income is equal to no more than one (1) minimum wage.

<sup>17</sup> The variables that will be included as controls are: Local employment rate, employment rate in neighboring municipalities, average salary, average salary in neighboring municipalities, the proportion of families headed by women and local GDP *per capita*.

Table 1.a: Description of variables

Variable	Acronym	Description	Source
<b>Per capita welfare expenditures</b>	exp	<i>Per capita</i> amount of the sum of expenditures on education <sup>18</sup> , health <sup>19</sup> and social care <sup>20</sup> .	STN
<b>Spatially lagged per capita welfare expenditures</b>	Wexp	Geographically weighted average of welfare expenditures in the neighboring municipalities.	STN
<b>Immigration ratio of the local population.</b>	imit	Ratio of the number of residents born in other municipalities in relation to local people.	Census/IBGE <sup>21</sup>
<b>Immigration ratio of "poor" population.</b>	imip	Ratio of the number of residents born in other municipalities, whose monthly family income is up to the minimum wage in relation to the local population.	Census/IBGE
<b>Per capita Income<sup>22</sup></b>	inc	Ratio of the sum of income of all individuals living in permanent private households and the total number of these individuals.	PNUD/IBGE
<b>Population<sup>23</sup></b>	pop	Number of inhabitants of the municipality.	IBGE
<b>Proportion of people of extremely low-income (1)</b>	elow1	Proportion of people with <i>per capita</i> household income equal to or less than R\$ 70.00 monthly	PNUD/IBGE
<b>Proportion of people of extremely low-income (2)</b>	elow2	Proportion of people with <i>per capita</i> household income greater than R\$ 70.00 and not greater than R\$ 140.00 monthly	PNUD/IBGE
<b>Proportion of vulnerable to poverty</b>	vpoo	Proportion of people with <i>per capita</i> household income greater than R\$ 140.00 and less than or equal to R\$ 255.00 monthly	PNUD/IBGE

Obs.: All variables (which are in monetary values) are deflated by the IPCA. All variables are used in their logarithmic forms.

Source: prepared by the author.

Equation (2), whose dependent variable is the total immigration (*imit*), allows assessing the existence of welfare migration. Equation (3) allows verifying the existence of "unwanted" welfare immigration. The dependent variables used in the regression (2) and (3) are constructed

<sup>18</sup> Are included the expenditures according to rubric Education and Culture that exceed 25% of net current revenues.

<sup>19</sup> Are differentiated the expenditures according to rubric Health and Sanitation that exceed 15% of net current revenues.

<sup>20</sup> Are differentiated the expenditures according to rubric: Assistance and Welfare.

<sup>21</sup> Data referring to immigration were collected at the economy laboratory ECONS/UFJF.

<sup>22</sup> It was also tested the variable squared income *per capita*, but it was not significant.

<sup>23</sup> It was also tested the variable squared population, but it was not significant.

from Census data, concatenated by income level. Likewise, the variable on public welfare expenditures is the sum of expenditures on education, health and social assistance, which source is the National Treasury Secretariat (STN). As whether to check the policy decisions of local governments, the construction of the dependent variable assumes that only expenditures above the minimum level determined by the Federal Constitution ("constitutional surplus") would be discretionary. Thus, we just added the health expenditures above 15% of net current revenue and education expenditures over 25% of net current revenue of municipalities. The control variable matrix includes the unemployment rate (*une*), average income (*inc*), population (*pop*), Gini index (*gini*), homicide rate (*hom*) and average years of schooling (*sch*). The inclusion of these variables follows the construction of empirical models proposed by Fiva (2009), Giorgi and Pellizzari (2009) and Mata *et. al.* (2007), having the IBGE as a source of these variables.

Equations (4) and (5) are used to evaluate the existence of spatial spillovers in welfare expenditures, unwanted welfare migration hypothesis and compensation hypothesis.

$$exp_{it} = \alpha + c_i + \lambda W exp_{it} + \eta imit_{it} + X_{it}\beta + \varepsilon_{it} \quad (4)$$

$$exp_{it} = \alpha + c_i + \lambda W exp_{it} + \eta imip_{it} + X_{it}\beta + \varepsilon_{it} \quad (5)$$

where  $exp_{it}$  represents the sum of expenditures on education, health and social care in the municipality  $i$  at time  $t$ ;  $\alpha$  is a constant,  $c$  is the non-observed effects invariants in time,  $W$  indicates the spatial weighting matrix;  $imit$  indicates the proportion of immigrants in the total population,  $imip$  is the proportion of individuals who were born in another municipality whose family income was less than the minimum wage,  $\eta$  is the coefficient of the variable immigration,  $X_{it}$  is the matrix of control variables;  $\lambda$  and  $\tau$  are the spatial coefficients;  $\beta$  is the vector of coefficients relative to the explanatory variables; and  $\varepsilon_{it}$  indicates the term of error of the municipality  $i$  at time  $t$ .

The dependent variable is the *per capita* welfare expenditures<sup>24</sup>. The explanatory ones are the proportion of immigrants relative to the total population (*imit*), the proportion of "poor" immigrants in the total population (*imip*), welfare expenditures of neighboring municipalities, income (*inc*) *per capita*, squared income *per capita* (*inc2*), population (*pop*), population squared (*pop2*), proportion of extremely poor people - 1 (*elow1*), proportion of extremely poor people - 2 (*elow2*), proportion of people vulnerable to poverty (*vpob*), unemployment rate (*une*), *per capita* transfers from the Municipal Participation Fund (*fpm*)<sup>25</sup>, proportion of young people

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<sup>24</sup> For the construction of this variable are added up the constitutional surplus of the expenditures on education and health and the expenditures on social assistance.

<sup>25</sup> FPM is a Brazilian intergovernmental transfer.

(under 15 years) in population (*you*), proportion of elderly (over 65 years) in population (*sen*), proportion of men in population (*pop*) and illiteracy rate (*ill*).

The variables proportions of the extremely poor people-1 (*elow1*), extremely poor people-2 (*elow2*) and vulnerable to poverty people (*vpoo*) and unemployment rate (*une*) are included to verify if the vulnerability affects public welfare expenditure, it is expected for increased vulnerability to be related to higher public welfare expenditures. The *per capita* income (*inc*) is included in the model to test whether the amount of resources available in the locality positively influences expenditures. Also included are proportions of young (*you*) and senior people (*sen*) to check if the dependence rises the expenditure on health, education and social assistance. Lastly, it is expected that higher the illiteracy rate, the higher is the education expenditure and, consequently, higher are the welfare spending.

Table 1b: Description of variables

Variable	Acronym	Description	Source
<b>Unemployment rate</b>	une	Percentage of unemployed in the economically active population.	PNUD/IBGE
<b><i>Per capita</i> Fundo de Participação Municipal*</b>	fpm	<i>Per capita</i> Funds received from an intergovernmental transfer called FPM <sup>26</sup> .	STN e IBGE
<b>Homicide rate</b>	hom	Number of homicides.	Datasus
<b>Average years of schooling</b>	sch	Average years of schooling of the local population.	PNUD/IBGE
<b>Proportion of young people</b>	you	Ratio of population less than 15 years in total local population	PNUD/IBGE
<b>Proportion of elderly people</b>	sen	Ratio of population more than 65 years in total local population	PNUD/IBGE
<b>Illiteracy rate</b>	ill	Ratio of the population aged 15 or older who can not read or write a simple note and the total of people in this age group multiplied by 100.	PNUD/IBGE

Obs.: All variables (which are in monetary values) are deflated by the IPCA. All variables are used in their logarithmic forms.

Source: prepared by the author.

This way, the objectives of this paper will be tested as follows: i) the welfare migration (**hypothesis 1**) is checked if  $\eta$  is significant and positive in 2; ii) the unwanted welfare migration (**hypothesis 2**) is tested if  $\eta$  is significant and positive in 3; iii) to test the hypothesis of spatial interaction between welfare expenditures will be necessary to check if the  $\lambda$  coefficient (in equation 4) is statistically significant and positive. If this coefficient is positive, there has been

<sup>26</sup> This is a name of an intergovernmental transfer that exists only in Brazil. It is a constitutional transfer (CF, Art. 159, I, b) of the Union to the municipalities, composed of 23.5% of the collection of Income Tax (IR) and the Tax on Industrialized Products (IPI)

evidence of the preconditions of the race to the bottom (case 3). This positive relationship between the variables occurs because if a municipality reduces their welfare expenditures, immigration to this municipality tends to decrease. To avoid "unwanted immigration", the neighboring municipalities also decrease their expenditures. That is, if the coefficient is statistically significant and positive we have an evidence of race to the bottom; iv) to check the compensation hypothesis (**hypothesis 5**), it is expected for the coefficient related to the *imit* variable to be significant and positive. In this case, a larger number of immigrants would be increasing local welfare expenditures; and v) the **hypothesis 4**, "unwanted" welfare immigration, is tested in the equation as an explanatory variable that includes poor individual's immigration. It is expected that the coefficient is significant and negative. In the following Table 1 are listed the variables used.

Table 2 presents descriptive statistics of dependent variables. As it can be seen, welfare expenditures (*exp*) higher than expected by Federal Constitution, on average, have increased significantly over the years. There was also an increase in total immigration (*imit*), however, the same trend was not observed with the immigration of low-income individuals (*imip*).

Table 2: Descriptive statistics of the dependent variables

Variable	Number of observations	Average	Standard deviation
exp_2000	5566	93.50	154.83
imit_2000	5566	0.07	0.30
imip_2000	5566	0.01	0.02
exp_2010	5566	289.55	201.39
imit_2010	5566	0.11	0.28
imip_2010	5566	0.01	0.03

Obs.: i) all variables were deflated by the IPCA; and ii) the acronyms *exp*, *imit* and *imip* correspond respectively to *per capita* welfare expenditures, proportion of immigrants in the population and proportion of 'poor' immigrants in the population.

Source: Original compilation based on data from the IBGE and STN.

#### 4. Results and Discussion

The results and discussion thereof are presented below. First, we discuss the hypothesis regarding the welfare migration. In a second step, we discuss the results for the race to the bottom and the compensation hypothesis.

### *Welfare migration (hypothesis 1 and 2)*

Following the empirical strategy proposed, at first, are estimated models of pooled ordinary least squares considering the dependent variable immigration of "poor" people (POLS1) and total immigration (POLS2). Breusch Pagan (BP) test indicates that there are non-observed effects (statistics equal 173.69 and 112.33 for POLS1 and POLS2, respectively) and Hausman test (HAU) indicates that such effects are specific and fixed over time and that local institutions like values and culture can interfere with migration decisions for a specific municipality (with statistics statistically significant equal to 485.39 and 133.91) (table 3).

To verify the existences of spatial autocorrelation and of dependence of residues are used the tests Moran's *I* and Pesaran CD (PCD). Moran's *I* (whose statistics were significant) warns of the presence of spatial dependence in residues from DIF1 and DIF2 models in the two years of analysis, considering arrays from 1 (one) to 20 (twenty) nearest neighbors and also the spatial weighting matrix of inverse distance, once the test's null hypothesis is rejected. Furthermore, the dependence of data is checked through the PCD test (with statistically significant statistics and equal to 188.14 and 697.73 to regressions DIF1 and DIF2, respectively). Thus, it becomes necessary to estimate a spatial correlation model.

The estimated models consider the spillovers of the dependent variables (*Wimip* and *Wimit*) and also the variable related to welfare expenditures (*Wexp*). For the construction of these variables it was used a spatial weighting matrix of inverse distance, so the closer the cities, the greater their influence and the more distant, the less. The residues from ESP1 and ESP2 models were tested using the test *I* of Moran, finding no evidence of spatial dependence.

The correction of spatial dependence is very important because if it does not happen, the coefficients tend to be biased and inconsistent. Thus, the analyzed models will be those that correct for spatial dependence, ESP1 and ESP2.

Two main hypotheses are verified in this subsection. **Hypothesis 1** searches welfare migration indications, i.e. checks if individuals move throughout the Brazilian territory, seeking cities where welfare expenditures are higher (BROWN and OATES, 1987). **Hypothesis 2** considers whether, specifically, poor individuals migrate to cities where these expenditures are higher. This immigration would be "undesirable" because poor migrants would be net "debtors" of the tax system (OATES, 1972 *apud* BRUECKNER, 2000).

Table 3: Results of the models without correction and with spatial correction

<b>Dependent variables: poor immigration - imip (POLS1, DIF1 and ESP1) and total immigration - imit (POLS2, DIF2 and ESP2)</b>						
	<b>POLS1</b>	<b>POLS2</b>	<b>DIF1</b>	<b>DIF2</b>	<b>ESP1</b>	<b>ESP2</b>
<b>Wimip</b>					0.713*** (0.053)	
<b>Wimit</b>						0.705*** (0.042)
<b>Wexp</b>					0.027 (0.018)	-0.041** (0.019)
<b>exp</b>	0.012*** (0.004)	0.014*** (0.004)	0.003 (0.003)	0.005 (0.004)	0.003 (0.002)	0.005** (0.002)
<b>inc</b>	-0.012 (0.116)	0.297*** (0.090)	0.147 (0.125)	0.910*** (0.131)	-0.039 (0.087)	0.357*** (0.091)
<b>une</b>	0.028* (0.017)	0.026** (0.012)	-0.050*** (0.016)	-0.049*** (0.017)	-0.049*** (0.011)	-0.034*** (0.012)
<b>pop</b>	-0.172*** (0.045)	-0.253*** (0.039)	0.154 (0.196)	0.341 (0.205)	0.075 (0.137)	0.215 (0.143)
<b>gini</b>	0.440*** (0.158)	-0.616*** (0.161)	0.381* (0.206)	-0.668*** (0.215)	0.472*** (0.144)	0.020 (0.151)
<b>hom</b>	-0.061 (0.038)	0.043 (0.034)	-0.062 (0.039)	-0.116*** (0.041)	-0.080*** (0.027)	-0.097*** (0.029)
<b>sch</b>	0.101 (0.084)	0.363*** (0.068)	0.362*** (0.080)	0.255*** (0.083)	0.221*** (0.056)	0.108* (0.058)
<b>BP</b>				173.69***		
<b>HAU imip</b>				485.39***		
<b>PCD</b>				188.14***		
<b>BP</b>				112.33***		
<b>HAU imit</b>				133.91***		
<b>PCD</b>				697.73***		

Obs.: i) All variables are deflated by the IPCA and used in their logarithmic forms; ii) the values in brackets refer to standard deviations; iii) the panel has  $n = 5566$ ,  $t = 2$  and  $N = 11132$ ; iv) the symbols \*\*\*, \*\* and \* indicate that these coefficients are statistically significant to, respectively, 1%, 5% and 10%; v) The acronyms correspond to: exp - *per capita* welfare expenditures, inc - *per capita* income, une – unemployment rate, pop - population, gini - Gini index, hom - homicide rate, sch - average years of schooling, and W means that the variable was spatially lagged; and vi) the dependent variable in the regressions POLS1, DIF1 and ESP1 is the poor people immigration rate (imip), and in the estimates POLS2, DIF2 and ESP2 is the total immigration rate (imit).

Source: Original compilation based on data from the IBGE and STN.



The ESP2 regression uses as dependent variable proportion of immigration in the total population, that is, are analyzed the determinants of immigration of all income levels individuals. The statistically significant coefficient and equal 0.005 of the *exp* variable suggests that the increase in 1% of welfare expenditures rises by 0.005% the proportion of immigrants. Thus, it can be said that there is evidence of welfare migration in Brazilian municipalities in the review period (**hypothesis 1**). An increase in health, education and social assistance expenditures in a given municipality generates a growth in immigration.

Nevertheless, there is no evidence of "unwanted" welfare migration once the "poor" people tend not to take their migration decisions based on welfare expenditures (vide not statistically significant coefficient of the variable *exp* in ESP1 regression). Thus, the hypothesis 2 is not checked. Similar results were found by Brady and Fanning (2014).

It is also noted a negative impact of *Wexp* variable in ESP2 regression, suggesting that higher welfare expenditures neighboring municipalities reduce immigration to a certain municipality. Similar results were not found in ESP1 regression. It is observed that the decision of the low-income immigrant ("poor") does not depend on welfare expenditures in the destination city. Golgher, Rosa and Araujo (2005) analyze the theory called *push-pull* (to Brazilians municipalities) that interprets that the decision to migrate depends on characteristics (such as economic, social and political) of the municipalities of origin and destination. Destination municipalities would present the factors that attract migrants (*pull factors*), and in the source municipalities, the *push factors* would be more relevant. This theory is based on the fact that the migrant's profile determines which factor (*push* or *pull*) is more relevant to the decision to migrate. The authors argue that the repulsion factors (*push*) are more important for lower income migrants. The coefficients for variables *exp* and *Wexp* in ESP1 regression are in accordance with the provisions of the *push-pull* theory, once the decisions of migrating of poor individuals are less affected by welfare expenditures in the destination municipalities.

Moving on to examine the control variables, it is expected that municipalities with the highest *per capita* incomes to be more attractive. It is noted that the variable related to municipal income (*inc*) does not interfere in the decisions of poor immigrants, although influencing immigrants in general (vide coefficient statistically significant of *inc* in ESP2, but not significant in ESP1). In ESP2 regression, the increase of 1% in the income increases about 0.36% the proportion of immigrants. When are considered immigrants from all income groups, the local income appears to be a factor in attracting in the destination municipality. It is interesting to observe, therefore, that Brazilian immigrants are more guided on the possibility of receiving higher incomes than in the amount of expenditures on health, education and social

welfare generated by the municipalities. Thus, one can say that migration in Brazil has a character more connected to the labor market than the welfare expenditures.

As for the unemployment rate (*une*) in both estimates, the result is in agreement with the hypothesis of immigrants seeking to migrate to the cities with the lowest unemployment rate. It is observed that, as verified by Mata *et. al.* (2007), labor market performance has an extremely important role for migratory performance of Brazilians municipalities.

The coefficient of variable “population” (*pop*) was not significant in any of the estimates, suggesting that population of the destination municipality does not affect the migration decisions. This result may reflect a change in the migration of recent years where individuals have chosen to migrate to medium-sized cities rather than large urban areas (and small towns as well).

It also noted that, in general, immigration is not affected by the level of income inequality when considering the total of immigrants (ESP2). However, regression ESP1 suggests that "poor" individuals tend to migrate more to municipalities which Gini index (*gini*) is higher. Once again, there is evidence that "poor" immigrants tend to take more into consideration the characteristics of the origin municipalities than the characteristics of the destination municipalities when deciding where to live. It is also interesting to observe that this result may reflect simultaneity between inequality and migration of the poor individuals, that is, higher immigration of poor individuals would cause a rise in income inequality.

Additionally, regardless of income level (regression ESP2), individuals choose municipalities where the homicide rate is lower. This reflects the idea that migrant chooses locations with lower social instability and less violence. Similar results were found by Mata *et. al.* (2007).

Highest average of schooling (*sch*) in the destination municipalities attract both "poor" and "non-poor" immigrants. Mata *et. al.* (2007) found similar results in their analysis and, according to the authors, these results may indicate that the municipalities value the human capital that was incorporated by migrant in its municipality of origin.

The analysis in this subsection indicates occurrence of welfare migration, however, there is no evidence of "unwanted" welfare migration. Overall, in Brazil, individuals seem to decide to migrate considering more other aspects as income, unemployment rate, homicide rate and average of schooling than welfare expenditures.

*Race to the bottom (hypothesis 3 and 4) and compensation hypothesis (hypothesis 5)*

Table 4: Results of the models without correction and with spatial correction

Dependent variable: welfare expenditure ( <i>exp</i> )						
	POLS1	POLS2	DIF1	DIF2	ESP1	ESP2
<b>Wexp</b>					0.559*** (0.045)	0.564*** (0.036)
<b>imip</b>	0.098*** (0.027)		0.077** (0.038)		0.061** (0.027)	
<b>imit</b>		0.055** (0.024)		0.048 (0.037)		0.049* (0.026)
<b>inc</b>	-0.541*** (0.073)	-0.547*** (0.072)	0.854** (0.341)	0.863** (0.341)	0.060 (0.239)	0.049 (0.239)
<b>pop</b>	0.529*** (0.047)	0.518*** (0.047)	3.834*** (0.536)	3.862*** (0.536)	2.558*** (0.376)	2.564*** (0.376)
<b>fpm</b>	0.591*** (0.008)	0.591*** (0.008)	0.641*** (0.009)	0.641*** (0.009)	0.637*** (0.006)	0.637*** (0.006)
<b>une</b>	0.054 (0.045)	0.054 (0.045)	0.066 (0.047)	0.064 (0.047)	0.054 (0.033)	0.053 (0.033)
<b>you</b>	-1.712*** (0.043)	-1.736*** (0.043)	-0.370 (0.835)	-0.342 (0.836)	-0.326 (0.586)	-0.300 (0.586)
<b>sen</b>	-0.307* (0.166)	-0.311* (0.166)	1.091* (0.629)	1.129* (0.629)	0.436 (0.441)	0.447 (0.441)
<b>men</b>	1.802** (0.523)	1.075* (0.522)	7.118 (4.562)	7.175 (4.563)	6.262* (3.202)	6.285* (3.202)
<b>elow</b>	-0.178** (0.073)	-0.165** (0.073)	-0.039 (0.130)	-0.035 (0.130)	-0.106 (0.091)	-0.103 (0.091)
<b>elow2</b>	-0.547*** (0.145)	-0.561*** (0.145)	0.035 (0.241)	0.039 (0.214)	0.049 (0.150)	0.053 (0.150)
<b>vpov</b>	1.082*** (0.190)	1.112*** (0.190)	0.778*** (0.239)	0.810*** (0.239)	0.267 (0.168)	0.290* (0.168)
<b>illi</b>	0.484*** (0.116)	0.510*** (0.116)	-0.043 (0.455)	-0.062 (0.456)	0.220 (0.320)	0.203 (0.320)

Obs.: i) All variables are deflated by the IPCA<sup>27</sup> and used in their logarithmic forms; ii) the values in brackets refer to standard deviations; iii) the panel has  $n = 5566$ ,  $t = 2$  and  $N = 11132$ ; iv) the symbols \*\*\*, \*\* and \* indicate that these coefficients are statistically significant to, respectively, 1%, 5% and 10%; v) the acronyms correspond to: *exp* - *per capita* welfare expenditures, *inc* - *per capita* income, *une* – unemployment rate, *pop* - population, *gini* - Gini index, *hom* - homicide rate, *sch* - average years of schooling, and *W* means that the variable was spatially lagged; and vi) the dependent variable are welfare expenditures.

Source: Original compilation based on data from the IBGE and STN.

<sup>27</sup> IPCA is a Brazilian index of consumer prices.

Table 4 shows the regression results of the models of pooled ordinary least squares (POLS1 and POLS2), of the models in the first differences (without the inclusion of spatially lagged variables) DIF1 and DIF2, and spatial models, ESP1 and ESP2, that include the spatially lagged variables.

The models POLS1, DIF1 and ESP1 use as explanatory variable **immigration of poor individuals** (*imip*). Whereas, the models POLS2, DIF2 and ESP2 include the explanatory variable **total immigration** (*imit*).

As described by the section empirical strategy, there were first estimated the models of pooled ordinary least squares (POLS1 and POLS2). Since the Breusch Pagan test (BP) detected the presence of non-observed effects in both estimates, being statistically significant (statistics found concerning POLS1 and POLS2 estimates are respectively 3.20 and 3.06). The presence of non-observed effects suggests that local characteristics such as culture and local institutions can interfere with the results of the estimates and therefore it is important to consider them. Hausman test (HAU) gives indications that such non-observed effects are fixed, i.e. not vary over time. Statistically significant values of 193.07 and 194.34 statistics in both DIF1 and DIF2 models (respectively) indicate that one should reject the null hypothesis that the effects are random. Table 5 shows the results of Breusch Pagan, Hausman and Pesaran CD tests.

Considering the discussed tests so far, the models of first differences would be most suited to the analyzed hypothesis. However, it is necessary to verify the existence of spatial dependence. Spatial dependence on panel data is verified via Pesaran CD test (PCD). As for the model that includes immigration of poor individuals (DIF1), as for the model that includes total immigration (DIF2) the statistics of this test were statistically significant (748.22 and 748.21, respectively). Besides, the results of Moran's *I* test indicate the presence of spatial autocorrelation considering all matrixes (matrixes of up to twenty closest neighbors and inverse distance). Hence, it was estimated the spatial models ESP1 and ESP2.

In both regressions (ESP1 and ESP2), the coefficient of the variable *Wexp* is statistically significant and positive (and equal to 0.559 and 0.564, respectively), i.e. there is a direct relationship between local welfare expenditures and neighboring cities welfare expenditures. This result is consistent with the **hypothesis 3**, indicating that reductions (increases) in expenditures from neighboring municipalities reduce (raise) the local expenditures. A decrease (increase) of 1% in the average expenditures of the neighbors tends to decrease (increase) by approximately 0.56% local expenditures. The verification of hypothesis 3 alone is not a sufficient condition for the existence of race to the bottom caused by welfare migration, because it suggests that reductions in expenditures of neighboring municipalities make the municipality

also reduce its expenditures, and indicates that increases in expenditures of neighbors lead an increase of expenditure of that municipality.

Thus, to have indications of race to the bottom is also necessary to verify whether local governments choose to lower expenditures if there is an increase in the proportion of poor immigrants. According to Oates (1972 *apud* BRUECKNER, 2000), to suppress this migration, each municipality would be less generous than in the absence of this type of migration and the result would be a race to the bottom. In this case, it is checked the coefficient of the variable related with poor immigration (*imip*) in the ESP1 regression. The 1% increase in the proportion of poor people in the total population increases by 0.061% the local welfare expenditures. Then, it is not checked the hypothesis 4 that predicts that the local governments reduce their welfare expenditures to avoid the poor migration. Thus, since the precondition of "unwanted" welfare immigration is not verified, there is no race to the bottom indicative in Brazilian municipalities in the period of analysis.

On the other hand, the positive and significant coefficients of *imip* and *imit* variables (ESP2 and ESP1, respectively) give indications that local people prefer compensation policies (**hypothesis 5**). Brady and Fanning (2014) found similar results in their analysis for European countries. This growth on welfare expenditures as a result of increment in immigration may be related to the fact that the population, when realizing increased competition for jobs, prefers policies that ensure greater security in their living standards. The ESP2 regression also verifies the compensation hypothesis (**hypothesis 5**). An increase of 1% of the total immigration (i.e., regardless of the income of immigrants) generates an increase of 0.049% of welfare expenditures.

Table 5: Results of Breusch Pagan, Hausman and Pesaran CD tests

Teste	Modelos	Valor
<b>BP</b>		3,20**
<b>HAU</b>	<b>POLS1, DIF1 e ESP1</b>	193,07***
<b>PCD</b>		748.22***
<b>BP</b>		3,06**
<b>HAU</b>	<b>POLS2, DIF2 e ESP2</b>	194,34***
<b>PCD</b>		748.21***

Obs.: i) the symbols \*\*\*, \*\* and \* indicate that these coefficients are statistically significant to, respectively, 1%, 5% and 10%; ii) the acronyms BP, HAU and PCD indicate, respectively, the Breusch Pagan tests (for non-observed effects), Hausman (for fixed or random effects) and Pesaran CD (for the independence of panel data).

Source: Original compilation based on data from the IBGE and STN.

Table 6: Results of the spatial models for two samples

<b>Dependent variable: welfare expenditure (exp)</b>				
	<b>RED1</b>	<b>RED2</b>	<b>INC1</b>	<b>INC2</b>
<b>Wexp</b>	0.427*** (0.054)	0.418*** (0.057)	0.509*** (0.033)	0.510*** (0.022)
<b>imip</b>	0.152** (0.076)		0.029** (0.025)	
<b>imit</b>		0.107 (0.075)		0.074*** (0.024)
<b>inc</b>	-1.378* (0.761)	-1.455* (0.765)	1.040*** (0.218)	1.003*** (0.218)
<b>pop</b>	1.248 (1.144)	1.267 (1.143)	2.212*** (0.344)	2.204*** (0.393)
<b>fpm</b>	0.421*** (0.012)	0.420*** (0.012)	0.505*** (0.008)	0.505*** (0.008)
<b>une</b>	0.007 (0.068)	0.001 (0.068)	0.027 (0.034)	0.027 (0.034)
<b>you</b>	2.104 (1.988)	2.318 (1.988)	0.234 (0.524)	0.264 (0.524)
<b>sen</b>	-0.773 (1.526)	-0.816 (1.528)	0.710* (0.394)	0.664* (0.393)
<b>hom</b>	5.087 (12.362)	4.928 (12.377)	3.656 (2.814)	3.648 (2.813)
<b>elow</b>	0.296 (0.295)	0.288** (0.295)	-0.131 (0.082)	-0.135 (0.082)
<b>elow2</b>	0.667 (0.460)	0.707 (0.460)	0.098 (0.137)	0.102 (0.136)
<b>vpov</b>	0.896*** (0.551)	0.931 (0.551)	-0.290* (0.152)	-0.269* (0.152)
<b>ill</b>	0.255 (1.004)	0.284 (1.005)	0.878 (0.291)	0.856** (0.291)

Obs.: i) All variables are deflated by the IPCA<sup>28</sup> and used in their logarithmic forms; ii) the values in brackets refer to standard deviations; iii) the panel has  $n = 5566$ ,  $t = 2$  and  $N = 11132$ ; iv) the symbols \*\*\*, \*\* and \* indicate that these coefficients are statistically significant to, respectively, 1%, 5% and 10%; v) the acronyms correspond to: exp - *per capita* welfare expenditures, inc - *per capita* income, une – unemployment rate, pop - population, gini - Gini index, hom - homicide rate, sch - average years of schooling, and W means that the variable was spatially lagged; and vii) the dependent variable are welfare expenditures.

Source: Original compilation based on data from the IBGE and STN.

In addition to these hypotheses, it is important to analyze the results for the control variables. In both regression (ESP1 and ESP2), increases in population rises welfare

<sup>28</sup> IPCA is a Brazilian index of consumer prices.

expenditures. These results are in agreement as what was expected by the Wagner (1893 *apud* HENREKSON, 1993) which says that urbanization would lead to a very complex society that need greater regulation and protection of the state as well as higher spending on infrastructure.

Besides, a 1% increase in FPM (*fpm*) grows the welfare expenditure in 0.637% (in both regression). Once there is no evidence of any impact of income over expenditure (given the insignificant coefficient of *inc*), it conforms with flypaper effect theory<sup>29</sup>. This hypothesis holds that intergovernmental transfers are captured more than income and therefore the impact of transfers (*fpm*) are higher (elasticity of intergovernmental transfer is bigger than elasticity of income).

It should be emphasized that the results although suggesting the existence of spatial spillovers showed no evidence that local people tend to prefer less welfare expenditures, aiming to curb immigration of "poor" individuals. Thus, there is no indicative of race to the bottom caused by unwanted "welfare" immigration to all Brazilians municipalities. Moreover, the results suggest that people tend to prefer increasing welfare expenditures facing migration. Probably these higher expenditures serve to compensate for the economic competition and competition for job openings caused by a higher level of individuals in the city. The rise in welfare expenditures would serve to reduce the insecurity caused by increased economic competition.

It is remarkable that there is an important limitation on used model. The explanatory variables are included as exogenous, and this could not represent the real relation between the variables. Nevertheless, to resolve this problem, we would need good instruments and this is not feasible with the available data. In fact, this problem is also found in Mattos *et. al.* (2014).

Finally, since unwanted welfare immigration was not found for all municipalities, it was decided to separate the municipalities in two samples: one with municipalities whose expenditures reduced between 2000 and 2010<sup>30</sup> and another whose expenditure increased. These results are present in table 5. The regressions RED1 and RED2 show the results to municipalities which reduced their welfare expenditure, and the INC1 and INC2 show the results to municipalities, which increased their welfare expenditure.

Mattos *et. al.* (2014) argue that could be others possible explanations to the spatial coefficient positive and significant statistically, as the yardstick competition. In this phenomenon, to signal their skills, the local governments increase the welfare expenditure since the neighboring municipalities also increase.

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<sup>29</sup> For more details about Flypaper Effect Theory, vide Henderson (1968) e Gramlich (1969).

<sup>30</sup> 821 municipalities reduced their welfare expenditure in the analyzed period.

Even when we separate the municipalities in two samples, we also have positive coefficient to poor immigration. This indicate that there is no evidence of welfare migration and, consequently, no evidences of race to the bottom. However, the variable *Wexp* has coefficients positive in all regression and, therefore, there is evidence of yardstick competition. Similar results are found by Mattos *et. al.* (2014).

## 5 Conclusions

Fiscal decentralization led to greater responsibilities for municipalities regarding the implementation of welfare expenditures, especially in relation education, health and social assistance. This makes these expenditures, which are of great importance especially for the poorest people, the focus of discussion and studies. Therefore, this paper aimed primarily to check for welfare migration. This phenomenon is important, since the local welfare expenditures can affect the internal migration, being this migration "desired", when immigrants are contributing to the local tax system or "unwanted" when immigrants become "debtors" to the local tax system. In a second moment, the paper aimed to check for race to the bottom, testing two preconditions: spillovers of the welfare expenditures and "unwanted" welfare migration. The analysis of the race to the bottom is relevant because if it occurs, welfare expenditures may be at a level below the socially optimal.

The analysis made for Brazilian municipalities in 2000 and 2010 aimed to correct the problems of spatial dependence and the non-observed effects using data on spatial panel. The main results suggest the existence of welfare migration, but not the "unwanted" welfare migration. Thus, despite the verification of spatial interaction of the welfare expenditures of the Brazilian municipalities, it cannot be said that there is evidence of race to the bottom. Furthermore, it was verified that higher proportions of immigrants in the local population increase the local expenditures on health, education and social assistance. This preference of the locals for higher welfare expenditures despite the largest proportion of immigrants may reflect an insecurity of individuals in relation to increased competition for job openings and good wages.

It is important to note, therefore, that the welfare expenditure works as a factor of attraction for migrants in Brazilian municipalities, as well as the average schooling and less social instability (here measured by the homicide rate). There is evidence that public expenditures on health, education modify the internal migration.

Finally, this paper is the first study about welfare migration and the second study about race to the bottom for Brazilians municipalities. Hence, these are very important results about



welfare expenditure e migration patterns in Brazil. However, it is noteworthy that there is a possible precondition for race to the bottom that has not been tested directly by this paper: tax competition. Therefore, a suggestion for future studies is the analysis of this hypothesis to the municipalities

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