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THE DETERMINANTS OF MIGRATION IN BRAZIL

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SUMÁRIO

RESUMO

Este trabalho tem como base teórica o modelo de capital humano. Esse modelo fundamenta as discussões sobre os determinantes da migração no Brasil. Os estudos empíricos foram feitos a partir da aplicação de um macro modelo de migração baseado no modelo gravitacional e na distribuição de Poisson. No modelo, o número de migrantes entre as mesorregiões brasileiras foi a variável resposta. Muitos aspectos socioeconômicos e criminais da origem e do destino dos migrantes foram usados como variáveis independentes. Também foram usadas como variáveis explicativas a distância entre essas duas regiões e dummies geográficas.

Este artigo contém sete seções. A primeira introduz o tema dos determinantes da migração. A seção seguinte discute brevemente alguns dos aspectos da desigualdade regional brasileira. Depois disso, são mostrados alguns dados quantitativos sobre o processo migratório. A seção subsequente apresenta o arcabouço teórico da analise, que é o modelo de capital humano, e apresenta alguns trabalhos similares a este aqui apresentado que foram feitos por outros autores. Em seguida, é discutido a metodologia de ajuste dos dados e o macro modelo de migração Por fim, são mostrados os principais resultados empíricos e as discussões finais e conclusões são apresentadas.

ABSTRACT

In the present study, the neoclassic human capital model was used as the theoretical foundation for the analyses of the determinants of migration in Brazil. The empirical studies were carried on with the application of a multiple regression macro model based on the gravitational model and on the Poisson distribution. In the empirical model, the number of migrants between Brazilian mesoregions was the response variable. Many socioeconomic and criminal aspects of the origin and the destiny of the migrants were used as explanatory variables. The distance between these regions and many geographical dummies were also used as independent variables.

This paper contains seven sections. The first one introduces some concepts that are related to the determinants of migration. The next section briefly shows some aspects of the Brazilian regional diversity. After this, some quantitative data about the process of migration is presented. The subsequent section discusses the theoretical models of the analysis, which is the human capital model, and presents some similar studies done by other authors. Then, is showed the methodology and the macro model of migration that were used in the empirical analysis. Finally, the main empirical results are shown and the final discussions and conclusions are presented.

JEL: R23, J11, J60

INTRODUCTION

In the last decades, Brazil, that was mainly a rural country in the beginning of the 20th century, became increasingly urban and, nowadays, most of its population lives in cities. Much has been discussed about the main features that promoted this process and, undoubtedly, one of the most important one was the rural exodus, when many migrants left the rural parts of the country and had as the most common destiny the main cities.

In the nineties, it was said that a new migratory dynamics was being developed with the reversion of this tendency of population concentration. It was discussed that the main urban centers were losing their power of population attraction in favor of medium size towns and other locations. Besides this, other phenomena, such as the increase in the power of population retention by the areas that historically lost population and the enhancement of the return migration due to life cycle aspects, were in part causing this new demographic pattern in Brazil. But these, as was shown by Golgher and Golgher (2000), were caused, at least in part, by aspects related to the conjuncture and not by structural ones.

The data from the last Census showed that many of the main urban centers in Brazil, such as São Paulo Metropolitan Region, the most populated one, continued to attract many migrants, but many others areas, including rural ones, were also absorbing a considerable number of immigrants.

These migratory movements can be directly associated to the evolution of many regional characteristics, such as regional inequalities in per capita income and population densities. Also related to these movements are some historical aspects of spatial distribution of population in Brazil that still have an influence on the promotion of migration today.

Many studies that dealt with migratory issues in Brazil quantified migration between regions, discussed the spatial allocation of population or characterized migrants. (Martine, 1994; Azzoni, 1986; Faria, 1983; Martine, 1992; Redwood, 1984). This paper presents another perspective of migration. It analyzes the determinants of migration in Brazil with the use of macro models of migration that are based in the methodology developed in Golgher (2001).

This paper contains seven sections. The first one is this introduction. The next section briefly shows some aspects of the Brazilian regional diversity. After this, some quantitative data about the migration process is presented. The subsequent section discuss the theoretical models of the analysis, which is the human capital model, and presents some works done by other authors that are similar to this one. Then, is showed the methodology and the macro model of migration that were used in the empirical analysis. Finally, the main empirical results are shown and the final discussions and conclusions are presented.

REGIONAL DIVERSITY IN BRAZIL

Brazil is one of the biggest countries in the world with more than 8 millions square kilometers, roughly the size of continental United States of America. It is divided in five macroregions and in 27 states: the North Region (Rondônia, Acre, Amazonas, Roraima, Pará, Amapá and Tocantins), the Northeast Region (Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe and Bahia), the Southeast Region (Espírito Santo, Minas Gerais, Rio de Janeiro and Saõ Paulo), the South Region (Paraná, Santa Catarina and Rio Grande do Sul) and the Center-West (Distrito Federal, Goiás, Mato Grosso do Sul and Mato Grosso).

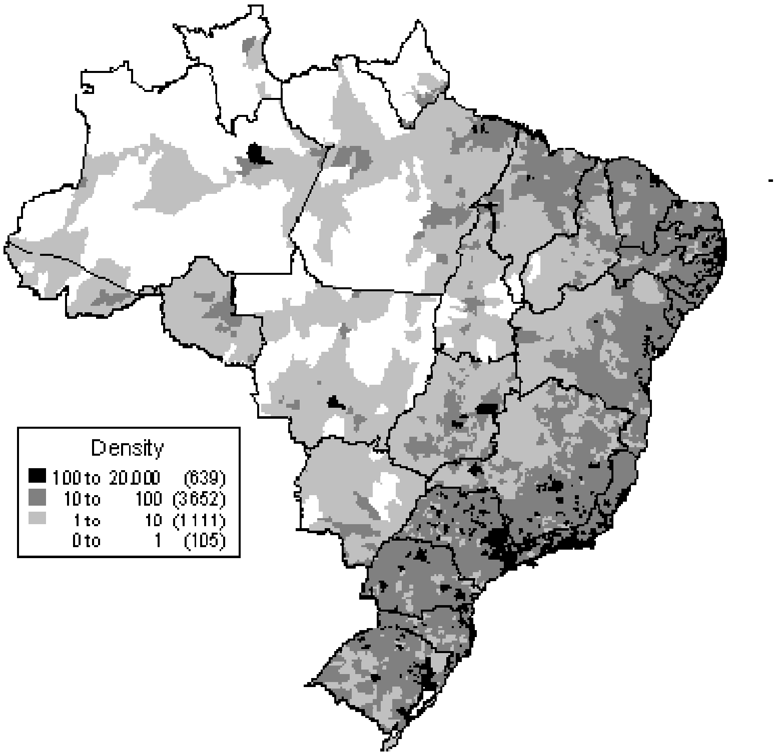
It presents a remarkable regional diversity in many aspects. The next two maps show some features of this diversity that are directly related to the migratory process: the density of population and the human development index (HDI).

The first map shows the density of population per square kilometer for the municipalities in Brazil in 2000. Due to the great number of these, 5507 in the 2000 Census, the boundaries between them are not shown. Only the states boundaries are shown in order to make the discussion and the comparison between maps easier.

Some main aspects are easily seen in the map. Most of the municipalities with high density, here defined as above 100 inhabitants per square kilometer, were located near the cost. Two regions are particularly dense, part of the Southeast Region, near the biggest urban centers in Brazil, São Paulo and Rio de Janeiro, and also part of the Northeast Region, between the urban centers of Recife and Natal. The majority of the municipalities with densities between 10 and 100 were also located near the coast in these two regions cited above and also in the South Region. On the order hand, 105 municipalities had less than one person per square kilometer. These were located mainly in the North Region, specially in the states of Amazonas, Pará, Roraima e Amapá, but also in the Center-West Region, where the less populated area is the north of Mato Grosso. Most of this area is the Amazon forest region. Some other features that can be seen in the map and deserve a commentary are: the higher density around the Amazon River when compared to the rest of the North Region; the state of Rondônia that is also more densely populated than the rest of the North Region; and the high density observed around the urban centers of Brasilia and Goiânia, located in the center of Brazil.

MAP 1

Density of population per square kilometers for municipalities in Brazil in 2000

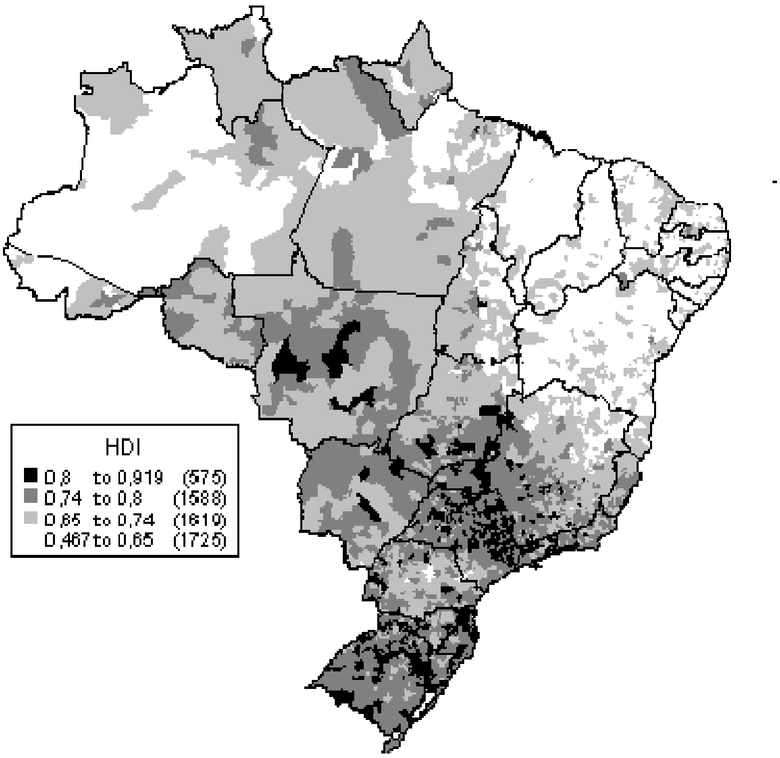


Source: www.ipeadata.gov.br.

The next map shows the Human Development Index (HDI) also for the municipalities in Brazil in 2000. As can be easily seen, Brazil could be roughly divided in some regions according to this index. One region composed of the Northeast Region, the north of Minas Gerais state and the east of Tocantins with nearly all municipalities with an HDI lower than 0.65. Another one with low HDI located in the west parts of the states of Amazonas, the biggest in Brazil, and Acre. On the one hand, some other regions had a better index. The one that counted with the state of São Paulo, the west part of Rio de Janeiro, southwest portion of Minas Gerais state, including the capitals of these there states, and also Brasilia, Brazil’s capital, the south of Goiás and north of the state of Mato Grosso do Sul. Another region with higher HDI is the one located in the two states located in the southern part of Brazil, Rio Grande do Sul and Santa Catarina. One last area that has a good index, north than the other two, is the one in the center-north of Mato Grosso state.

MAP 2

Human Development Index for municipalities in Brazil in 2000



Source: www.ipeadata.gov.br.

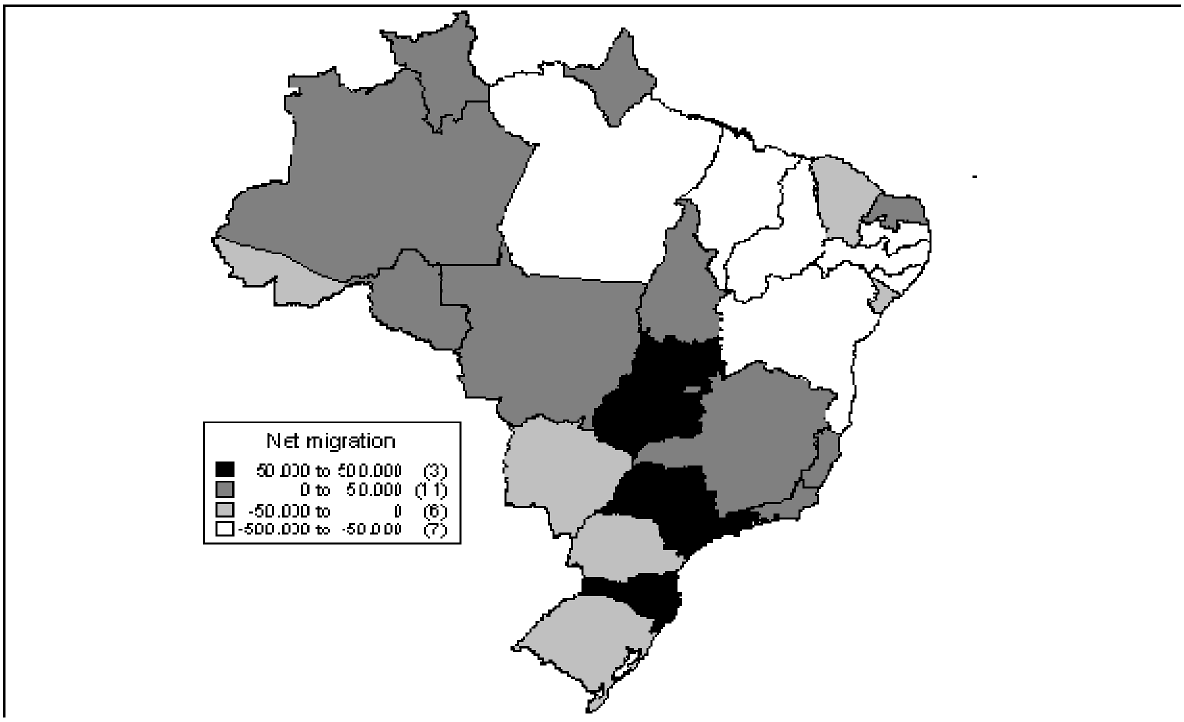
MIGRATORY DATA

The next two maps show some quantitative data about the migratory process in Brazil also in 2000. The first one presents the net internal migration by state. The data was obtained directly from the Brazilian Census from the following question: "In which municipality did you live five years ago?" The information obtained for all the municipalities was aggregated for the states in Brazil. So this data does not include international migrants.

It can be seen in the map that approximately half of the states had a positive net migration (13) and the other half (14) showed negative numbers. Only three states, Santa Catarina, São Paulo and Goiás, had a positive net migration above 50 thousand people. These first two states, as can be seen in the maps above, are densely populated and have relative good HDI. Among the other states that had a positive number for net migration there are some with good development index, such as Rio de Janeiro and Minas Gerais, and some with low density, as Mato Grosso, Amazonas, Roraima and Amapá. Conversely, seven states had a net migration between –500000 and –50000, six of them from the Northeast Region, the one with the lowest HDI in Brazil.

MAP 3

Net migration for internal migration for states in Brazil in 2000



Source: FIBGE, 2000b.

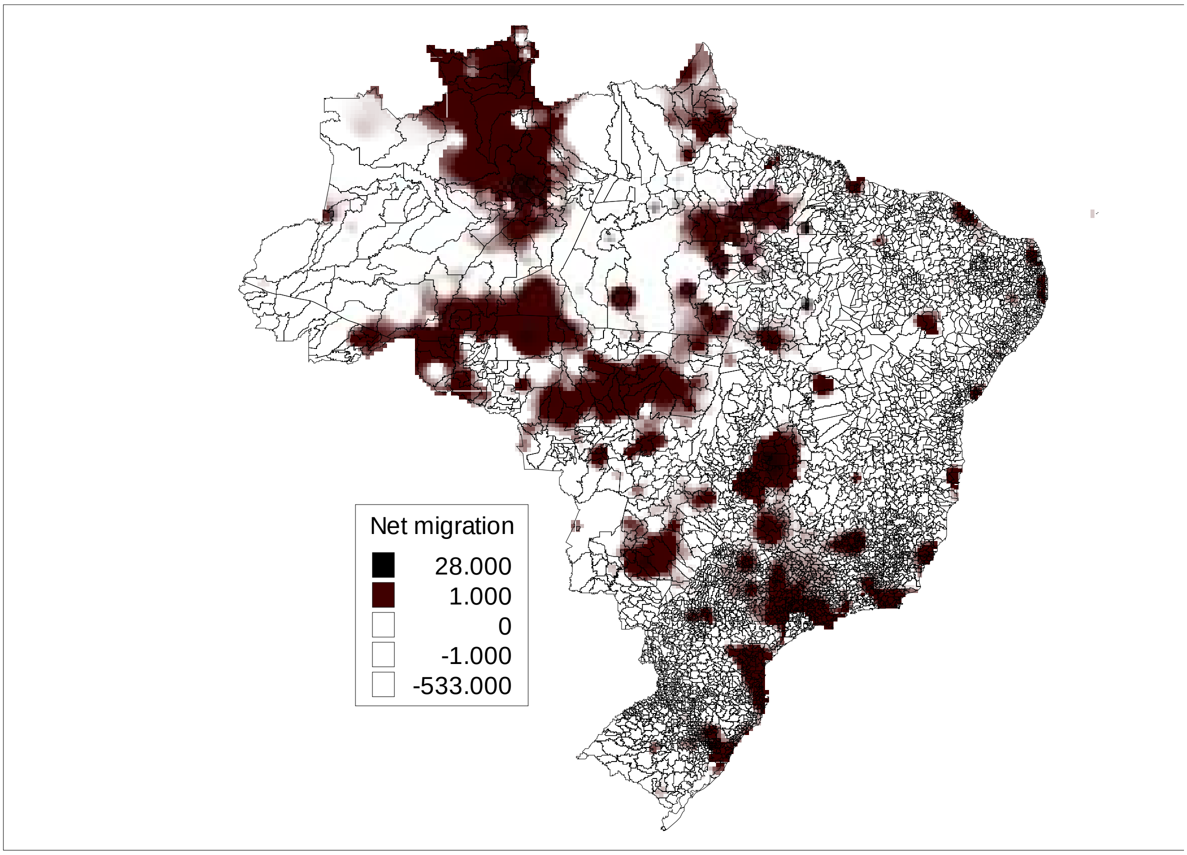
The next map show the same data but for municipalities. The map was done by another technique with the use of gradients. The darker areas are the regions with positive net migration. There are many of these areas and some of them are cited below. The first is the one located in northern part of the country. It can be seen that this is a quite big region composed by the area around Manaus, one of the two big urban centers in the Amazon River area, and the state of Roraima up north. A little more south from this region there is another one that is also quite extensive, located in the south of the Amazon region, in the west part of Acre, northwest of Rondônia and the south of the state of Amazonas. A third big area of population attraction is seen a little more south and east from this last one in the Mato Grosso state. Notice that this region is basically the same as the one with high HDI in this state. From this last region in the north direction, it can be seen three others areas of population attraction: one in the south of Pará, another in the center-east of this same state and the last in Amapá state. These six areas were the main regions of population attraction in the north of Brazil.

Other regions also showed a positive net migration. In the most southern state in Brazil, the area around Porto Alegre, the Rio Grande do Sul capital. There are many other areas with positive net migration, most of them capitals of states or urban centers. Among these it can be seen three extensive areas: one of them, a little further north from the Porto Alegre region, in Santa Catarina and Paraná states; another one is observed also in the north direction around the municipality of São Paulo, part of this area is Metropolitan Region of São Paul[1]; and the other one is located a little north from this last one with the urban centers of Brasilia and Goiânia.

[1] The nucleus of the Metropolitan Region shows a negative net migration mainly due to the intraurban migration with the outskirts of this area.

MAP 4

Net migration for internal migration for municipalities in Brazil in 2000



Source: FIBGE, 2000b.

These last two sections presented some descriptive data about Brazil. In the next part of the text is discussed the human capital model and some works done by other authors that used a similar model.

HUMAN CAPITAL MODEL

The human capital model, as applied to migratory studies, is briefly presented below: first from a macro point of view and them from a micro one.

The human capital model in a macro perspective assumes that migration is caused by regional heterogeneity in the demand and in the supply of labor force (Massey et al, 1998). In places where a surplus of labor supply exists, normally the salaries are low. On the other hand, regions with a high capital to labor ratio tend to have higher salary. These differences would promote the preferential migration of individuals from the former areas to the latter ones. The consequence of the migration process would be the tendency of convergence of regional capital/labor ratio (Evans, 1990; Graves and Mueser, 1993; Harrigan and Mcgregor, 1993; Schater and Althaus, 1993). But, as Frey noticed (1995), if the migration is selective, this might not happen.

In a micro point of view, the migration is an investment made by workers in order to improve their position in the labor market or to enhance their life quality. The rational individual decides if he (she) will migrate if the difference in the expected gains in the destiny and origin are superior to the costs. The following equation clarifies this proposition:

$$\mathbf{G_{ij} = (V_{ij} - V_{ii}) - C_{ij} > 0,}$$

Where G_{ij} are the net gains of migration, V_{ij} and V_{ii} are respectively the expected benefits in the destiny and in the origin analyzed till the end of the temporal horizon of analysis, and C_{ij} are the costs of migration. The migration will only occur if the net gains are positive (Congdon, 1991).

The expected gains both in the origin and in the destiny depend on many regional aspects that would contribute to the relative attractiveness of a place when compared to others (Stillwell and Congdon, 1991). Among them are: economic features (unemployment ratios, rent prices, salaries, residential market, presence of industrial activities etc); social characteristics (low criminality, urban amenities, good educational opportunities, ample range of leisure activities etc); environmental aspects (low levels of pollution, weather, quality of the environment, quantity of sunshine etc); and others. In most studies, the main factors considered important in explaining migration are the economic ones, but some authors also pointed out to the importance of the non-economic regional disparities (KNAPP ET AL, 1989, GREENWOOD, 1985, PORREL, 1982).

The equation above shows that the propensity to migrate will be increased if the individual utility in his origin is low. In this case, the **push** factors were decisive to the promotion of migration. Conversely, this enhancement in the propensity to migrate also occurs if the expected utility in the destiny is high. It is said that the **pull** factors determined the change of place of residence. Normally, persons in the bottom of the social pyramid are more influenced by the push factors and individuals with higher earnings are particularly touched by the pull factors.

The costs are also decisive in the analysis if the migration will occur or not. If the costs are low, any small positive difference in the expected benefits between the destiny and the origin would promote the migration of the person. On the contrary, if the costs are very high, the probability that the change of residence will take place is much smaller. The costs of migration can be related to many different aspects: material ones, costs of information search, psychic costs, costs of opportunity, costs due to the adaptation process etc. It is believed that the distance is well correlated to the costs and this variable is normally used as a proxy of it.

Many hypotheses concerning the migratory process can be made based on the human capital model and some of them will be cited here. Individuals will preferentially migrate from regions with lower per capita income to places with higher salaries and better opportunities in the labor market. Poorer persons will give particular importance to the economic conditions in the origin, while richer ones will be relatively more influenced by the destiny's characteristics and by non-economic aspects. Migration between close regions are more numerous due to the lower costs associated to the migratory process. Persons with higher income can handle the costs of migration more effectively and this enables them to migrate to further places. The previous migration of individuals from a specific place to another can be decisive in the present formation of the flux of migrants between these same places, especially for the poorer population, because strong social nets may exist and this can decrease the costs of migration.

Many authors discussed the determinants of migration for other countries in studies similar to the one presented here. Among then can be cited: Todaro (1980), Porrel (1982), Gabriel and Justman (1987), Flowerdew and Lovett (1988). Some of their results are summarized below. Some of their findings were also obtained in a study with only one of the Brazilian states (Golgher, 2001).

Todaro (1980) reviewed many studies about the determinants of migration including data from India, Tanzania, Kenya and Venezuela. In his work, he pointed out that most of the migrants originated from regions with low average incomes and as destiny areas with higher mean income.

Porrel (1982) studied the determinants of migration in the USA. The pull factors were much more important than the push ones that were nearly non-significant. He found that the migrants were driven to regions not only with better economic conditions but also with better climate (this point is much less important in Brazil, a tropical country) and that had a more favorable group of urban amenities. This last point is probably becoming more important in Brazil for the upper classes in defining were to live. For instance, the levels of many types of violence are very high and increasing in the medium and big urban centers.

Gabriel and Justman (1987) analyzed the proportion of migrants in various regions in Israel. They verified the importance of the gravitational model variables and also observed the importance of the regional differentials of income in the promotion of migration, as observed by Todaro (1980). One important finding of these authors was that the migrants were risk averse when migrating.

Flowerdew and Lovett (1988) observed, for data from Great Britain, the importance of geographical variables. They analyzed the importance of the contiguity of the units of analysis in enhancing the expected number of migrants and they also described the power of attraction of naval bases. In Brazil, as was seen above in the section about migratory data, many areas, such as some of the fringes of the Amazon Forest, might have the similar impact of receiving a greater number of migrants than expected by the other variables.

METHODOLOGY

The neoclassic human capital model presented in the last section was used as the theoretical foundation for the empirical studies of the determinants of migration in Brazil. The empirical analysis was done with the application of multiple regressions macro models based in the gravitational model and Poisson distribution. This section discusses the methodology that was employed and will be divided in two parts: the first one presents the model that was used in the empirical analysis; and the second one specifies some features about the dependent and independent variables in the model.

The empirical model

Macro models of migration are normally used in studies that analyze the relationship between regional characteristics of the origin and the destiny of the migrant and the existence of fluxes of migrants. The general idea of this kind of model can be expressed by the equation below:

$$\mathbf{M_{ij} = Af(i)g(j)h(d_{ij}),}$$

Where M_{ij} is the dependent variable related to the migratory process; A is a scale constant; f(i) is a function of the characteristics of the origin of the migrant, which includes the population and many socioeconomic variables; g(j) is a function similar to f(i) but for the destiny's characteristics; the costs of migration are represented by $h(d_{ij})$ that is a function of the distance between the origin and destiny of the migrant (Stillwell and Congdon, 1991). The functions f(i) and g(j) indicate the power of attraction/repulsion/retention of population of the region.

In this work, the model above has the specific following basic structure:

$$\mathbf{Mij = exp(\beta_0 + \beta_1 lnPi + \beta_2 lnPj + \beta_3 lndij + \Sigma\beta iXi + \Sigma\beta jXj) + \varepsilon i}$$

Where Mij is the number of migrants between the origin, i, and the destiny, j; βs are the parameters obtained by the multiple regression analysis; Pi and Pj are the populations of i and j; dij is the distance between them; and Xi and Xj are respectively the other independent variables of i and j[2].

Normally, models based in the Poisson distribution are much superior to the ones based on the normal distribution when used in studies similar to this one. However, the process of migration shows some features that are not well explained by this first distribution. Some of them are cited below. An individual do not always migrate as an independent entity. When a member of a family migrates to a specific destiny, the probability that another member will do the same is increased. Persons from the same place have a tendency to migrate to similar localities due to the existence of social networks. Besides this, different individuals can show different propensities to migrate. These and other phenomena causes an over dispersion of the data used as the response variable (Flowerdew, 1991; Congdom, 1991).

In order to overcome this difficulty, Congdon (1991) presents as an alternative the use of models still based in the Poisson distribution, but that also counts with an extra specification of the error fixing the *deviance* as equal to the degrees of freedom. This proposed model was the one used here in the empirical analysis.

The data

Most of the variables used in the empirical analysis were obtained directly from the microdata of the Brazilian Demographic Census of 2000 (FIBGE, 2000b) that is a sample of roughly 10% of the households in the country and presents a very rich range of information.

In 2000, Brazil had 5507 municipalities and these were grouped in nearly a thousand microregions, many of them with a small population. Instead of using any one of these as a geographical unit of analysis, it was chosen to use the data more aggregated by mesoregion. There were 137 of these in Brazil in 2000.

[2] Other independent variables were also included in some of the empirical models. These are related to geographical/historical characteristics of Brazilian spatial distribution of population and economic activity. The interaction between them and the distance in the migratory process was also considered in the model.

So, the response variable in the model was the number of migrants between two mesoregions in Brazil. In the Brazilian Census there is the following question that was used to generate this information. “In which municipal district did you live five years ago?” The information obtained for municipalities, in a 5507 x 5507 matrix, was aggregated in mesoregions. With this data, was constructed a 137 x 137 matrix and all the individuals that had the same mesoregion as origin and as destiny were not considered migrants in this study[3]. The first group of analysis was done with these fluxes and had as the main objective to determinate the socioeconomic, demographic, criminal and regional characteristics that influenced the formation of them. A second group of regressions were made with two specific groups of migrants in different income strata: the ones that had a familiar per capita total income below 0.5 Brazilian minimum salary (MS) and the others that had an income above 5 MS. The main purpose of this last group of analysis was to investigate the differences in the migration process for different income strata in order to possibly differentiate the impact of the push and pull factors on them.

The independent variables could approximately be divided in four groups. The first one is composed by the gravitational model variables. These are the logarithms of the origin’s population, the same for the destiny and the logarithm of distance between these two places. These variables are used as a parallel of the classical gravity force problem. The expected is that the number of migrants (force) is proportional to the populations (masses) and inverse proportional to the distance (Gauss law in R^2).

The second group tries to determinate the relative attractiveness of different places. It is composed by socioeconomic variables that were also obtained from the Census, such as: urbanization degree, proportion of workers in the population, unemployment ratio, average income, population schooling, proportion of workers in primary, in industrial or in services activities etc. This group of variables counts also with data for violent criminality that was obtained from the external causes of the system of mortality information from SUS. The inclusion of these last variables is justified by the recent sharp increase in violence observed in many places in Brazil[4].

The third group includes many geographical dummies. The first one, the contiguity between mesoregions, tries to overcome some of the difficulties that arise with the use of this specific geographical unit of analysis instead of smaller units such as municipal districts. Municipal districts that are neighbors but that are located in different mesoregions are normally much closer than is specified in the models, which use approximately the mean distance between the mesoregions. Other important aspect in the migratory process is that many urban centers in Brazil have a particular strong effect of regional polarization that influences decisively the exchange of products, services and population. In order to deal with this phenomena four dummies were considered in the analysis for each one of the urban centers that polarize in a national scale (São Paulo and Rio de Janeiro) and one dummy was included for each urban center that had a regional and micro regional influence (Belo Horizonte, Porto Alegre, Curitiba, Recife and 22 others (FIBGE, 2000a)).

Many regressions were done with the above variables and the analysis of the residuals was used to build this last group of variables. The interaction between the distance and the polarization effect was one important aspect included as the first surely influences the last. Besides this, some features of the recent past that have an impact on the promotion of the fluxes of migrants were included, such as the significant social networks that exists between many places in the Brazilian Northeast and São Paulo.

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[3] They are considered migrants in the Brazilian Census, because they have changed the municipality of residence.

[4] After the first analyses some of this variables were discarded in the final models.

MAIN EMPIRICAL RESULTS

The main results obtained in the empirical analysis will be discussed below for many different types of models. For each model, firstly, the findings attained with all the migrants will be discussed and them some commentaries about the observed differences in the determinants of migration for individuals of different income strata will be made. The discussion will begin with the gravitational model, the simplest one and then more sophisticated models will be presented.

Gravitational model and contiguity

As discussed above, the first model that will be briefly discussed is the gravitational one. The results are showed in table 1. When not specified, the variables are significant in a 1% basis. As expected, the bigger the population in the origin and in the destiny the more numerous were the fluxes of migrants. The coefficients for all migrants were respectively 0.84 and 0.83. If the interchange of migrants were exactly proportional to the populations, the coefficients would be 1. The results for the distance showed that the numbers of migrants decreased when the distance between the origin and the destiny increased. However, the coefficient, -0.64, was well below –1. This last finding can be partially explained by the non-linearity of the costs of the migration in relation to the distance due to the differences between real and perceived distances (Cadwallader, 1992; Bell et al, 1990): short distances would be over dimensioned and the long ones would be underestimated.

The last two columns in table 1 compares migrants in different strata of family per capita income. It can be seen that the distance coefficient is basically the same, indicating the same effect of deterrence due to the distance for both income strata. As was discussed above in the human capital model, this was not expected: normally the lower income strata have a smaller (greater modulus) coefficient. Some differences can be seen in the other variables. The higher per capita family income migrants have their population coefficient closer to one. This shows that the fluxes of migrants of higher income are approximately a proportion of the origin's and destiny's populations. For the other migrants this is less true. The fluxes between places grow in a lower rate than their population.

TABLE 1
The determinants of migration: gravitational model

Variable	All the migrants	Lower per capita family income migrants	Higher per capita family income migrants
Intercept	-12.8	-13.1	-19.2
Population in the origin	0.84	0.81	0.90
Population in the destiny	0.83	0.82	1.06
Distance between origin and destiny	-0.64	-0.63	-0.65

Source: FIBGE, 2000.

The next model, presented in table two, includes the contiguity between mesoregions dummy. As expected for all migrants, the contiguity dummy was significant and positive (2.13) and had an impact in the distance coefficient (-0.64 in the first model discussed and –0.40 in this model). This result shows that the fluxes between neighbor areas are more numerous than expected. This is explained by the fact that the real distances associated to the migration with origin and destiny in mesoregions that are contiguous are in average much smaller than the distances between the most important municipal districts in the mesoregion that were used to build the distance variable.

When migrants of different income are compared, it can be seen that the contiguity dummy has a higher value for the low income one, indicating that low distance migration is proportionally more important do this strata than for the higher income one. Conversely, the distance coefficient is greater for this first group.

TABLE 2

The determinants of migration: gravitational model and contiguity dummy

Variable	All the migrants	Lower per capita family income migrants	Higher per capita family income migrants
Intercept	-15.4	-15.8	-21.1
Population in the origin	0.87	0.83	0.92
Population in the destiny	0.85	0.84	1.09
Distance between origin and destiny	-0.40	-0.38	-0.49
Contiguity dummy	2.13	2.22	1.76

Source: FIBGE, 2000.

Gravitational model, contiguity, urbanization degree and average income

In the last table, we discussed a simple model with only four variables. Here, in this second subsection, we will include some socioeconomic variables in the model. The main results obtained by three other models are discussed below. The first one of these analyzed the impact of the urbanization degree of the origin and the destiny. The second discussed the influence of the average labor regional income in these two regions and the third one included these four variables in the same model.

The coefficients of the gravitational model were nearly the same in the three models for the three types of migrants. The origin’s population coefficients were well below one for the nine models, nearly one for the destiny and around –0.40 for the distance. The contiguity dummy also showed a similar result in all the models and the coefficient had a similar value to the one presented by the model in table 2, with lower values for the higher income strata.

The coefficients for the urbanization degree were similar for all the migrants and for the ones with lower per capita family income as can be seen in table 3. The model showed that the urbanization degree was positively correlated to the number of migrants for the origin and the contrary was observed for the destiny. This shows that the common sense of rural exodus is not confirmed in this model, to the contrary. As was show in the section of migratory data, many of the areas of population attraction are located in the North Region of Brazil, and some of these do not show a very high degree of urbanization. On the other hand, for the higher income strata both coefficients were positive, showing that for this type of migrant the preferential migration is between two highly urbanized areas.

TABLE 3

The determinants of migration: gravitational model, contiguity dummy and the urbanization degree

Variable	All the migrants	Lower per capita family income migrants	Higher per capita family income migrants
Intercept	-15.3	-16.1	-20.2
Population in the origin	0.74	0.75	0.69
Population in the destiny	0.95	0.97	0.95
Distance between origin and destiny	-0.41	-0.39	-0.44
Contiguity dummy	2.15	2.21	1.81
Urbanization degree in origin	0.017	0.012	0.031
Urbanization degree in destiny	-0.014	-0.016	0.017

Source: FIBGE, 2000.

The next table show a similar model but with the average income instead of the urbanization degree. As can be seen, the coefficients related to income were positive for the origin and negative for the destiny, both significant for migrants in general and for the lower income strata. This indicates that the higher the income in the origin the bigger the flux, and the contrary was true for the destiny. As was discussed in the human capital model, this was not expected in a first and preliminary analysis: for the origin was expected a negative coefficient and for the destiny the contrary. These were the results obtained by Golgher (2001) in a study with only one of the Brazilian states.

Some explanations can be given to address this finding. One possibility is the existence of multiple stage migration due to the continental size of Brazil. Migrants would make many changes of place of residence between their first origin and their final destiny. An example of this type of migration is a two step migration: the first one from one urban center to another; the second one from this last urban center to less urbanized areas with lower average income in a short distance step. Other aspect could be the possibility of the return of migrants to their place of origin at the end of the productive cycle or by reasons of poor evaluation of the destiny and high turnover. Brazil has also a frontier of recent occupation in areas south and east of the Amazon Forest; regions with low urbanization degrees and low average income, but that receive many immigrants. One last point that can be included is that a proportion of the intraurban migration is done between mesoregions, normally from a richer more urbanized central urban center to less urbanized and poorer areas. All these phenomena were observed empirically in quantitative studies.

It can be noticed that for the higher income strata the migration is mostly between high-income areas. Some of the factors cited above do not apply for this type of migrant such as the first, the second and the last.

TABLE 4

The determinants of migration: gravitational model, contiguity dummy and average income

Variable	All the migrants	Lower per capita family income migrants	Higher per capita family income migrants
Intercept	-14.8	-16.2	-16.8
Origins population	0.70	0.73	0.63
Destiny's population	0.96	0.98	0.91
Distance	-0.40	-0.39	-0.41
Contiguity dummy	2.16	2.23	1.82
Average income in origin	0.292	0.198	0.480
Average income in destiny	-0.201	-0.249	0.269

Source: FIBGE, 2000.

The next model includes all these four variables in the same analysis. It can be noticed that most of the results are similar. Only one difference was noticed for all migrants that was the coefficient for the average income in the destiny that was no longer significant. This suggests that the low average income in the destiny has no impact on migration when the urbanization degree also in the destiny is considered.

TABLE 5

The determinants of migration: gravitational model, contiguity dummy and socioeconomic variables

Variable	All the migrants	Lower per capita family income migrants	Higher per capita family income migrants
Intercept	-14.4	-15.8	-17.6
Origins population	0.70	0.72	0.62
Destiny's population	0.96	0.98	0.90
Distance	-0.40	-0.39	-0.41
Contiguity dummy	2.16	2.22	1.82
Urbanization degree in origin	0.007	0.007	0.013
Urbanization degree in destiny	-0.015	-0.015	0.005
Average income in origin	0.207	0.108	0.349
Average income in destiny	0.003**	-0.042*	0.211

Source: FIBGE, 2000.
Note: * significant in 5%; **not significant

Gravitational model, contiguity, urbanization degree, average income, labor market variables and homicide rate

This subsection will present two models that are extensions of the last one discussed. The first one of these, presented in table 6, includes the proportion of workers in the primary sector and in the industry both for the origin and for the destiny.

The majority of the coefficients of the variables that were already in the model did not change when these new variables were considered. One coefficient that did change was the urbanization degree in the origin that was positive and significant and became negative or non-significant. This can be at least partially explained by the negative coefficient for the proportion of workers in the primary sector, also in the origin. A reasonable proportion of persons that work in primary activities are linked to the earth, whether they own it or not.

For the destiny, it can be seen that the urbanization degree coefficients did not change so much. The coefficients for the proportion of workers in the primary sector were negative for the origin, but were significant and also negative for the lower income strata migrants in the destiny. The negative coefficient suggests that these migrants have as preferential destiny regions that are not highly urbanized but have a more developed service sector with a greater proportion of workers in these economic sectors.

All the coefficients for workers in the industrial sector were negative and significant. This indicates, as was seen in Golgher (2001), that workers in industry normally show less mobility. One possible explanation is that they have specific human capital that cannot be used effectively in many other places. For the services sector the result is normally different. Many of the jobs in the services sector in Brazil are informal with low salaries what justifies in part a greater mobility.

TABLE 6

The determinants of migration: gravitational model, contiguity dummy and socioeconomic variables

Variable	All the migrants	Lower per capita family income migrants	Higher per capita family income migrants
Intercept	-11.2	-11.7	-14.4
Origins population	0.68	0.70	0.60
Destiny's population	0.90	0.92	0.87
Distance	-0.43	-0.42	-0.46
Contiguity dummy	2.24	2.30	1.91
Urbanization degree in origin	-0.005**	-0.006*	-0.004*
Urbanization degree in destiny	-0.010	-0.014	0.016
Average income in origin	0.287	0.213	0.374
Average income in destiny	0.207	0.170	0.333
Proportion of workers in the primary sector in the origin	-0.0155	-0.0175	-0.0245
Proportion of workers in the primary sector in the destiny	-0.0025**	-0.0073	0.0041**
Proportion of workers in the secondary sector in the origin	-0.0227	-0.0286	-0.0276
Proportion of workers in the secondary sector in the destiny	-0.0627	-0.0644	-0.046

Source: FIBGE, 2000.
Note: * significant in 5%; **not significant

The next model includes all the variables of the last one and also homicide rate in the origin and in the destiny. As can be easily noticed, all the coefficients in the models that were also present in table 6 are nearly the same and do not deserve any extra explanation.

The coefficients for the homicide rate in the origin where negative and significant. This means that, when the other variables are considered, a higher rate of homicides promotes less numerous fluxes of migrants. Some explanations can be given but all need further investigation and are highly exploratory. This result may be also spurious due to other correlated variables[5]. One possible explanation is that more developed areas that show a greater power of population attraction/retention may have better documentation of homicides or deaths due to external causes. So, regions that have lower rates in the data may have higher real rates than reported. Another explanation is that violence is composed of many types of crime. Homicides may not be positively correlated to other types, such as robberies, and overall crime rates may be more decisive on the migratory process.

For the destiny, all the coefficients were non-significant showing that, at least for the migration between mesoregions, they do not impact in the promotion of migration.

TABLE 7
The determinants of migration: gravitational model, contiguity dummy and socioeconomic variables

Variable	Migrants	Lower per capita family income migrants	Higher per capita family income migrants
Intercept	-11.1	-11.6	-14.2
Origins population	0.69	0.71	0.63
Destiny's population	0.91	0.92	0.87
Distance	-0.43	-0.43	-0.46
Contiguity dummy	2.24	2.30	1.91
Urbanization degree in origin	-0.005*	-0.007	-0.006
Urbanization degree in destiny	-0.010	-0.014	0.015
Average income in origin	0.291	0.219	0.369
Average income in destiny	0.211	0.173	0.336
Proportion of workers in the primary sector in the origin	-0.0174	-0.0192	-0.0294
Proportion of workers in the primary sector in the destiny	-0.0031**	-0.0077	0.0032**
Proportion of workers in the secondary sector in the origin	-0.0253	-0.0311	-0.0333
Proportion of workers in the secondary sector in the destiny	-0.0637	-0.0648	-0.0467
Homicide rate in the origin	-0.0017	-0.0016	-0.0038
Homicide rate in the destiny	-0.0005**	-0.0002**	-0.0003**

Source: FIBGE, 2000.
Note: * significant in 5%; **not significant

Gravitational model, contiguity and geographical variables

The focus of the analysis changes in this subsection. We return to the models presented in table 2 with only the gravitational model variables and the contiguity dummy. Then, as showed in table 8, geographical dummies are included; one for each of the urban centers that had a national, regional or micro regional polarization effect (FIBGE, 2000a). The dummies were one if the flux of migrants was between the urban center and its area of influence.

[5] In the last model presented in this study, it was observed a non-significant coefficient.

As can be seen, one important feature of these models is that nearly all the regional polarization dummies were statistically significant and positive. For the model with all migrants, only four exceptions were noticed that were not significant in a 5% basis. These were the urban centers of Aracaju, Campinas, Ribeirão Preto e Santos, the last three in São Paulo state. The first one is a medium size urban center located between two other urban centers, Salvador and Recife, with greater polarization effect that might disturb the much weaker polarization effect of Aracaju. The same aspect can be said of the other three urban centers, all located near the Metropolitan Region of São Paulo, the biggest urban conglomerate in Brazil.

These positive coefficients for the urban centers dummies suggest that the costs of migration are lowered by the past interchange of products, services and population. The existence of social networks and better channels of information change between the hinterland of urban influence and the urban center seems to be decisive in the promotion of migration.

For the lower and higher income strata migrants the coefficients were similar, mostly positive and significant. For the first group, there were three exceptions all in São Paulo’s state that were the urban centers cited above. In the other income group, there were four exceptions one from this same state and three other from Northeast Region, Aracaju, Maceio and São Luis, as was said in the section about regional diversity, this is the poorest region in Brazil. The last two of these urban centers are located in states that are among the less socially developed ones in Brazil, Maranhão and Alagoas. This indicates that these urban centers do not have a significant polarization effect upon the higher income strata. The other urban center that showed a non-significant coefficient was Aracaju, which was already discussed.

But the main point to emphasize here for the differences between the income strata is that for the majority of the urban centers located in the North or Northeast of Brazil the coefficient for the lower income strata group is bigger than for the other group showing a greater power of attraction of these cities for this kind of migrant. The contrary was observed for the urban centers in South, Southeast and Center-West of Brazil, including Porto Velho, which is located in the North, but is close to this last region and has strong economical ties with it. This show that Brazil could be divided in two areas of preferential polarization: the North and Northeast Regions for the low-income strata and the South, Southeast and Center-West for the other group.

TABLE 8
The determinants of migration: gravitational model, contiguity dummy and geographical dummies

Variable	All the migrants	Lower per capita family income migrants	Higher per capita family income migrants
Intercept	-15.68	-16.26	-20.91
Origins population	0.89	0.86	0.93
Destiny's population	0.81	0.81	1.01
Distance	-0.34	-0.32	-0.41
Contiguity dummy	1.82	1.93	1.43
São Paulo city dummy	0.75	0.73	0.88
Rio de Janeiro city dummy	0.82	0.72	1.20
Belo Horizonte dummy	0.57	0.45	0.61
Porto Alegre dummy	1.25	0.97	1.53
Curitiba dummy	1.70	1.53	1.95
Campo Grande dummy	2.50	2.39	2.84
Cuiabá dummy	2.21	2.13	2.68
Goiânia dummy	1.76	1.64	1.76
Brasília dummy	2.24	2.13	2.23
Porto Velho dummy	2.66	2.63	2.91
Rio Branco dummy	2.77	2.64	2.55
Manaus dummy	1.89	1.93	1.61
Belém dummy	2.07	2.17	1.82
São Luis dummy	0.67	0.82	0.27**
Teresina dummy	0.79	0.92	0.39
Fortaleza dummy	1.90	2.00	1.32
Natal dummy	2.12	2.18	1.80
João Pessoa dummy	1.28	1.32	1.16
Recife dummy	0.69	0.81	0.54
Maceió dummy	0.41*	0.59	0.39**
Aracaju dummy	0.40**	0.36	-0.38**
Ribeirão Preto dummy	0.12**	-0.06**	0.44
Campinas dummy	0.27	0.20	0.58
Santos dummy	-0.16**	-0.26**	0.28**
São José do Rio Preto dummy	0.03**	0.00**	0.32

Source: FIBGE, 2000.
Note: * significant in 5%; **not significant

The next model includes all the variables of the last one and also six other dummies, three for the city of São Paulo and the same three for the city of Rio de Janeiro. These are the two biggest urban centers in Brazil and have historically been the destiny for many migrants, especially from the Northeast Region of Brazil, a phenomenon that is still observed nowadays, but mostly for São Paulo. The dummies are specifically for: the flux between this region and the cited urban centers; for all the flux with origin in one of these urban centers; and the same for the destiny.

The variables that were already in the last model had all, approximately, the same coefficient. The dummy São Paulo-Northeast was positive and significant for all migrants and for lower and higher income strata. This indicates that the fluxes between these two regions are bigger than expected by the other variables in the model. Notice that this region is included in the area of polarization of São Paulo. This positive coefficient indicates that the effect of the influence is stronger for this specific region. For Rio de Janeiro, the variable was smaller and significant only for the migrants in general and for the lower income group. This suggest that this center, although it continues to be a focal point of attraction, is not so powerful as a destiny as São Paulo, specially for the population with higher income.

The dummies for origin showed a negative sigh for both urban centers indicating that, even after considering all the other variables in the model, these two urban centers have a strong power of population retention. For the destiny, only the variable for São Paulo showed a positive and significant coefficient indicating an extra the power of attraction for all regions in Brazil only for this urban center.

TABLE 9

The determinants of migration: gravitational model, contiguity dummy and geographical dummies

Variable	All the migrants	Lower per capita family income migrants	Higher per capita family income migrants
Intercept	-11.48	-11.49	-19.93
Origins population	0.79	0.74	0.96
Destiny's population	0.63	0.61	0.92
Distance	-0.41	-0.39	-0.42
Contiguity dummy	1.83	1.95	1.44
São Paulo - Northeast dummy	2.65	2.82	0.91
São Paulo origin	-0.17	-0.14*	-0.14
São Paulo destiny	1.16	1.30	0.36
Rio de Janeiro - Northeast dummy	1.05	1.15	0.02**
Rio de Janeiro origin	-0.50	-0.51	-0.30
Rio de Janeiro destiny	0.03**	-0.03**	0.38
São Paulo city dummy	0.24	0.14	0.79
Rio de Janeiro city dummy	1.21	1.17	1.18
Belo Horizonte dummy	0.77	0.68	0.67
Porto Alegre dummy	1.37	1.12	1.57
Curitiba dummy	1.76	1.61	1.96
Campo Grande dummy	2.28	2.14	2.78
Cuiabá dummy	2.06	1.95	2.64
Goiânia dummy	1.80	1.69	1.77
Brasília dummy	2.24	2.13	2.24
Porto Velho dummy	2.44	2.38	2.85
Rio Branco dummy	2.37	2.18	2.45
Manaus dummy	1.86	1.90	1.59
Belém dummy	2.14	2.26	1.83
São Luis dummy	0.75	0.91	0.28**
Teresina dummy	0.71	0.84	0.37*
Fortaleza dummy	1.95	2.07	1.34
Natal dummy	1.94	1.98	1.76
João Pessoa dummy	1.26	1.31	1.16
Recife dummy	0.76	0.92	0.56
Maceio dummy	0.49	0.68	0.40**
Aracaju dummy	0.40*	0.38*	-0.36**
Ribeirão Preto dummy	0.25**	0.09**	0.47
Campinas dummy	0.39	0.36	0.60
Santos dummy	-0.12**	-0.21**	0.28**
São José do Rio Preto dummy	-0.05**	-0.11**	0.32

Source: FIBGE, 2000.
Note: * significant in 5%; **not significant

The next model considers all the variables cited above and two other groups of geographical variables. The first one is the interaction between the distance and the regional dummies that were included in the models in table 8. Six other specific dummies were also included in the model after the analysis of the residuals. Three of them were dummies that were specific for three types of fluxes of migrants: between the mesoregion that includes São Paulo and the states of Bahia, Pernambuco and Maranhão. The three other dummies represented some local flux. Two of them between specific regions in the state of Mato Grosso do Sul and one in the south of Minas Gerais State.

When the models in table 10 are compared to the ones in table 9, it can be seen that most of the geographical dummies continued to be positive, although the values were a little higher, showing, one more time, the effect of regional polarization in lowering the costs of migration. Only Campo Grande and Aracaju, two urban centers with a small area of polarization, showed negative sighs in their coefficients and very different values. This can be explained by the interaction coefficient.

As can be seen for the interaction coefficients in table 10, most of them were negative. This suggests that the polarization effect is relatively more powerful when the distance between the regions is big. When the areas are far apart from each other, the number of migrants is less numerous due to the high costs migration but the effect of polarization in lowering this costs is more decisive. The exceptions were the two that showed a negative sigh in the geographical model, Campo Grande and Aracau, both with positive coefficient. The other urban center that showed a positive coefficient for the interaction was Cuiabá. This urban center also showed a positive coefficient for the geographical dummy, indicating that it might be exchanging many migrants with distant states. Empirical data showed that this occurred between the area near Cuiabá and the Paraná state in the south of Brazil.

Now we will discuss the six other dummies include in the model. The ones that represent the fluxes between São Paulo and Bahia and between São Paulo and Pernambuco had a positive sigh. This means that, although many other variables in the models such as São Paulo destiny, São Paulo-Northeast and São Paulo dummy showed that the population change between São Paulo and the Northeast Region was remarkably numerous, this was even more noticed between this urban center and these two states. The contrary was observed for Maranhão that showed a negative coefficient. Quantitative analysis showed that this last state, partially due to its proximity to the North Region, did not exchange population with São Paulo as all the others States in the Northeast Region.

The three other dummies represented local fluxes in Mato Grosso do Sul state and in the south of Minas Gerais state. All the coefficients were negative and significant, indicating that these local fluxes were less numerous that expected by the other variables in the model. Local and detailed analysis should be done in order to identify specificities of these areas.

Some differences were notice when the migrants from different income strata were compared. The interaction variables were positive for the higher income strata for Rio de Janeiro, Brasilia, Belém and Ribeirão Preto, indicating a relative stronger effect of long distance polarization for this type of migrant.

TABLE 10

The determinants of migration: gravitational model, contiguity dummy and geographical dummies

Variable	All the migrants	Lower per capita family income migrants	Higher per capita family income migrants
Intercept	-10.89	-10.89	-19.81
Origins population	0.79	0.74	0.96
Destiny's population	0.61	0.58	0.92
Distance	-0.44	-0.43	-0.44
Contiguity dummy	1.99	2.10	1.53
São Paulo - Northeast dummy	2.37	2.48	0.88
São Paulo origin	-0.24	-0.21	-0.19
São Paulo destiny	1.17	1.29	0.36
Rio de Janeiro - Northeast dummy	1.04	1.12	0.08
Rio de Janeiro origin	-0.41	-0.40	-0.29
Rio de Janeiro destiny	0.18	0.13	0.41
São Paulo city dummy	2.38	2.43	1.59
Rio de Janeiro city dummy	2.33	2.55	0.46
Belo Horizonte dummy	5.91	6.50	1.73
Porto Alegre dummy	16.83	17.82	10.02
Curitiba dummy	10.05	10.14	8.20
Campo Grande dummy	-58.99	-67.03	-41.05
Cuiabá dummy	1.63	1.22	2.50
Goiânia dummy	6.53	6.64	3.88
Brasília dummy	2.78	3.12	0.77
Porto Velho dummy	9.89	9.45	14.91
Rio Branco dummy	2.21	2.03	2.37
Manaus dummy	6.13	6.21	1.69
Belém dummy	2.36	2.80	1.59
São Luis dummy	6.68	7.91	2.26
Teresina dummy	1.54	1.05	4.74
Fortaleza dummy	6.39	6.70	7.32
natal dummy	5.04	4.65	9.36
João Pessoa dummy	11.34	11.50	9.25
Recife dummy	2.88	3.00	2.71
Maceio dummy	11.47	12.36	12.05
Aracaju dummy	-19.32	-20.01	-19.96
Ribeirão Preto dummy	1.20	0.15**	-1.40
Campinas dummy	1.05	0.68	0.90
Santos dummy	-0.26**	-0.34**	0.19**
São José do Rio Preto dummy	-0.15**	-0.19**	0.26**
São Paulo city interaction	-11.48	-12.19	-4.46
Rio de Janeiro city interaction	-7.00	-8.49	3.59
Belo Horizonte interaction	-29.32	-33.07	-6.36
Porto Alegre interaction	-84.17	-90.95	-45.93
Curitiba interaction	-45.20	-46.36	-34.32
Campo Grande interaction	365.68	412.88	261.90
Cuiabá interaction	2.52	4.39	0.87
Goiânia interaction	-27.84	-29.06	-12.55
Brasília interaction	-3.44	-5.68	7.01
Porto Velho interaction	-43.00	-40.67	-69.95
Rio Branco interaction	0.00**	0.00**	0.00**
Manaus interaction	-30.05	-30.34	-0.85
Belém interaction	-1.89	-3.73	1.06
São Luis interaction	-35.79	-42.10	-12.21

Teresina interaction	-4.98	-1.79	-22.87
Fortaleza interaction	-23.80	-24.75	-32.43
Natal interaction	-15.96	-13.81	-38.90
João Pessoa interaction	-50.97	-51.42	-40.93
Recife interaction	-9.83	-9.74	-9.89
Maceio interaction	-50.63	-54.09	-55.42
Aracaju interaction	97.99	101.56	98.85
Ribeirão Preto interaction	-6.18	-0.94	10.28
Campinas interaction	-3.10	-1.53	-1.34
Santos interaction	0.00**	0.00**	0.00**
São José do Rio Preto interaction	0.00**	0.00**	0.00**
São Paulo - Bahia	0.84	0.91	0.32
São Paulo - Pernambuco	0.73	0.82	0.28
São Paulo - Maranhão	-0.60	-0.54	-0.53
Mato Grosso do Sul 1	-0.60	-0.71	-0.16
Mato Grosso do Sul 2	-0.64	-0.65	-0.60
South of Minas Gerais	-1.51	-1.69	-0.87

Source: FIBGE, 2000.
Note: * significant in 5%; **not significant

The last models discussed include all the variables that were discussed in all the previous models and will be compared with the ones showed in table 7 and in table 10. Most of the variables presented in the complete model of table 11 have the same sigh and approximately the same values as the ones in these other two tables. The main differences observed are discussed below.

When compared the models of table 7 and 11, it is verified that the coefficient for urbanization degree in the origin and in the destiny that were negative for all migrants and for the lower income strata became positive. This indicates that when the geographical dummies and the interactions are included in the model, the preferential origin and destiny are the more urbanized areas instead of the more rural ones. This may have been also caused due to the correlation between the urbanization degree and the proportion of workers in the primary sector that showed in table 11 a non-significant coefficient for the origin and a positive coefficient for the destiny, instead of negative sighs for both. The homicide rate coefficients were all non-significant showing that, at least in this analysis, that they do not have a significant impact upon migration. In another study that analyzed intraurban migration (Golgher, 2000), some types of crimes influenced the migratory process. This indicates that crime may have an impact in intraurban migration but not in an interregional change of place of residence.

Some differences can also be noticed when the models in tables 10 and 11 are compared. The main difference observed in the geographical variables was for the Rio de Janeiro destiny dummy that became negative. This suggest that, when all the variables are included in the model, that the city of Rio de Janeiro do not have any more a strong power of population attraction as it seemed to have had in the recent past.

TABLE 11

The determinants of migration: all the variables included

Variable	All the migrants	Lower per capita family income migrants	Higher per capita family income migrants
Intercept	-12.70	-12.73	-17.26
Origins population	0.64	0.64	0.68
Destiny's population	0.76	0.75	0.76
Distance	-0.45	-0.45	-0.41
Urbanization degree in origin	0.006	0.006	0.005
Urbanization degree in destiny	0.012	0.011	0.031
Average income in origin	0.318	0.226	0.434
Average income in destiny	0.217	0.159	0.370
Proportion of workers in the primary sector in the origin	0.002**	0.000**	-0.012**
Proportion of workers in the primary sector in the destiny	0.021	0.018	0.019
Proportion of workers in the secondary sector in the origin	-0.018	-0.026	-0.031
Proportion of workers in the secondary sector in the destiny	-0.051	-0.053	-0.040
Homicide rate in the origin	0.002**	0.001**	0.000**
Homicide rate in the destiny	0.002**	0.002**	0.000**
Contiguity dummy	2.07	2.15	1.69
São Paulo - Northeast dummy	2.40	2.46	1.27
São Paulo origin	-0.23	-0.13	-0.26
São Paulo destiny	0.94	1.09	0.26
Rio de Janeiro - Northeast dummy	1.14	1.14	0.49
Rio de Janeiro origin	-0.76	-0.73	-0.60
Rio de Janeiro destiny	-0.48	-0.50	-0.10
São Paulo city dummy	2.09	2.06	0.90
Rio de Janeiro city dummy	2.01	2.07	1.40
Belo Horizonte dummy	5.51	5.83	3.06
Porto Alegre dummy	13.96	14.29	8.60
Curitiba dummy	8.82	8.81	7.17
Campo Grande dummy	-44.54	-49.25	-27.23
Cuiabá dummy	1.02	1.05	2.49
Goiânia dummy	6.90	6.90	5.28
Brasília dummy	1.32	1.77	0.00
Porto Velho dummy	8.84	8.55	14.15
Rio Branco dummy	2.18	1.96	2.28
Manaus dummy	7.08	7.19	3.30
Belém dummy	3.03	3.36	4.39
São Luis dummy	7.00	8.05	3.45
Teresina dummy	2.38	1.91	5.37
Fortaleza dummy	6.18	6.39	6.87
Natal dummy	6.56	6.17	9.62
João Pessoa dummy	12.38	12.17	12.17
Recife dummy	2.75	2.77	2.91
Maceio dummy	11.62	12.33	14.42
Aracaju dummy	-18.30	-18.57	-21.65
Ribeirão Preto dummy	0.39	-0.83	-0.05
Campinas dummy	0.31	0.09	0.58
Santos dummy	-0.02	0.00	-0.12
São José do Rio Preto dummy	-0.23	-0.30	0.02
São Paulo city interaction	-11.14	-10.95	-1.87

Rio de Janeiro city interaction	-5.08	-5.63	-1.88
Belo Horizonte interaction	-26.72	-29.00	-12.98
Porto Alegre interaction	-69.12	-71.57	-39.05
Curitiba interaction	-38.31	-38.21	-30.32
Campo Grande interaction	275.97	303.83	171.98
Cuiabá interaction	4.35	4.16	-3.09
Goiânia interaction	-30.62	-31.02	-22.23
Brasília interaction	-0.44	-2.80	3.61
Porto Velho interaction	-39.41	-37.84	-67.06
Rio Branco interaction	0.00	0.00	0.00
Manaus interaction	-36.33	-37.22	-9.57
Belém interaction	-4.58	-6.42	-12.40
São Luis interaction	-38.57	-44.78	-13.93
Teresina interaction	-9.21	-6.89	-22.68
Fortaleza interaction	-20.63	-21.66	-25.70
Natal interaction	-22.40	-20.68	-38.65
João Pessoa interaction	-56.16	-55.19	-55.80
Recife interaction	-9.31	-9.42	-9.46
Maceio interaction	-52.53	-55.96	-64.36
Aracaju interaction	93.07	94.11	108.84
Ribeirão Preto interaction	-2.23	4.74	0.15
Campinas interaction	1.05	2.57	-0.20
Santos interaction	0.00	0.00	0.00
São José do Rio Preto interaction	0.00	0.00	0.00
São Paulo - Bahia	0.85	0.87	0.63
São Paulo - Pernambuco	0.74	0.80	0.40
São Paulo - Maranhão	-0.81	-0.77	-0.35
Mato Grosso do Sul 1	-0.74	-0.84	-0.56
Mato Grosso do Sul 2	-0.80	-0.80	-0.87
South of Minas Gerais	-1.60	-1.75	-0.64

Source: FIBGE, 2000.
Note: * significant in 5%; **not significant

FINAL DISCUSSIONS AND CONCLUSIONS

In the human capital model, regional characteristics interact with individual aspects and all these variables have a decisive influence on the determinants of migration. When the migrant change its place of residence it: pursue a better position in the labor market; looks for places with a higher quality of life and better educational opportunities etc. It can be said that migration has a significant impact on the person's life.

However, migration also changes regional characteristics. The migratory process, besides the impact on the rates of population growth, has also an effect on population composition, and on human and physical capital distribution. It is believed that the migratory process benefit some regions, while others may lose in the process. Normally, regions that attract a great number of migrants have a higher proportion of young adults than other regions. Some places might absorb qualified persons, while other may receive manual works.

Brazil was one of the main destinies for international migrants in the World between 1890 and 1910 (Golgher, 2004; data from Koerner, 1990). During the most part of last century, this country continued to absorb more immigrants than it lost emigrants. In the last decades of the twentieth century this changed. For instance, between 1991 and 2000, the net balance of migration in Brazil just for young persons with an age between 24 and 33 years was minus 1.3 million (Prefeitura do Município de São Paulo, 2002). The main reasons cited in this publication to explain this phenomenon were the poor conditions in the labor market and the increasing violence. This population and brain drains will have a strong impact in many socioeconomic characteristics of Brazil in the near future.

Brazil is also regionally very heterogeneous and this has promoted intense internal fluxes of migrants. In the twentieth century, many numerous fluxes were observed from rural areas to the main urban centers. These fluxes, in conjunction with the past high fertility rates, were responsible for the formation of populated urban centers that present today many scale diseconomies. Besides this, other regions that received many immigrants were the states of North of Brazil with a direct impact on the deforestation of the Amazon Forest.

As fertility rates approximate and fall below the replacement level in Brazil, internal migration will became crucial in the analysis of the spatial distribution of population. To better understand the determinants of migration will help the comprehension of how the Brazilian population will be distributed in the near future, and this will have direct impact upon the effectiveness of social public policies.

The models used in the empirical analysis showed very robust results and may help to bring new insights on the determinants of migration in Brazil and related topics. Due to the continental size of this country and its regional heterogeneity, there are also many different types of migrants and regions that can be analyzed in more focused studies, such as local migrants, intraurban migrants, return migrants, low income migrants, elderly migrants etc. The determinants of migration can also be related to other specific topics as migration and deforestation in the Amazon Forest, migration and droughts in Northeast Region, migration and urban crime, migration and rural poverty etc.

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