Migratory effectiveness in the labor market: evidence from Brazil[1]

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ABSTRACT
This paper aims to analyze the importance of migratory or mobility effectiveness of formal workers in Brazilian microregions. Based on data for individuals, the methodology proposed here makes use of the hierarchical logit model, by taking into account differences in individual variables and destination for microregional variables. Main results obtained suggest that microregions that are historically successful in attracting migrants plays a major role in the mobility decision of individuals whether they are skilled or not, due to a higher previous knowledge of migrant destination. Wage loss expectation reflects smaller propensity to move for workers in general. As far as skilled labor is concerned, a positive wage expectation reduces labor migration, which reflects minor pecuniary effects of mobility. Some regional attributes prove to be relevant for mobility, such as GDP per capita, proportion of workers with complete higher education, rates of homicides, vehicles per capita and industrialization degree. These results are crucial for public policies aimed at reducing spatial inequalities of human capital by taking into account individual and regional attributes, as well as the migratory or mobility effectiveness.

Keywords: skilled labor mobility, Migratory Effectiveness Index, wage expectations, Brazil.

RESUMO
Este trabalho tem por objetivo analisar a importância da eficácia migratória ou a mobilidade dos trabalhadores formais em microrregiões brasileiras. Com base em dados de indivíduos, a metodologia aqui proposta utiliza o modelo logístico hierárquico de dois níveis, levando-se em consideração as diferenças nas variáveis individuais e de destino para as variáveis microrregionais. Principais resultados obtidos sugerem que microrregiões que são historicamente bem sucedidas em atrair migrantes desempenha um papel importante na decisão da mobilidade de trabalhadores, sejam eles qualificados ou não, devido a um maior conhecimento prévio com relação ao destino dos migrantes. A expectativa de perda salarial reflete menor propensão à mobilidade para os trabalhadores em geral. No que diz respeito à mão de obra qualificada, uma expectativa de ganho salarial reduz a migração laboral, o que reflete efeitos pecuniários menores à mobilidade. Alguns atributos regionais são relevantes para a mobilidade, como o PIB per capita, a proporção de trabalhadores com ensino superior completo, as taxas de homicídios, veículos per capita e o grau de industrialização. Estes resultados são cruciais para as políticas públicas destinadas a reduzir as desigualdades espaciais de capital humano, tendo em conta aspectos individuais e atributos regionais, bem como a eficácia migratória do destino.
Palavras-chave: mobilidade de trabalho qualificado, Índice de Eficácia Migratória, expectativa salarial, Brasil.

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1. Introduction

This paper aims to investigate the importance of Migratory Effectiveness Index - MEI for mobility of workers, as well as to propose a measure for it. This study also intends to check mobility of formal workers in the Brazilian microregions between 2004 and 2008. The relevance of wage expectation and regional attributes for labor mobility are focused as well.

In the last decades, migration has been intensively studied in social sciences. Mobility of skilled workers assumes a significant role in economic development as it is related to the possibility of conveying relevant technical knowledge to other firms and regions, allowing in this way interfirm and interregional knowledge spillovers (Feldman, 1999; Almeida and Kogut, 1999).

Although migration may come about as a result of factors connected with life cycle, social and political determinants, the economic study of migration has demonstrated the increasing relevance of social and information networks for migration flows, (Poot, 1996; Miguélez and Moreno, 2013; TerWal and Boschma, 2009; Bergman, 2009). In such a context, networks act as a facilitating mechanism of social assimilation and a reduction factor of migration costs (Lee, 1966; Sahota, 1968; Lucas, 1977; Carrington *et al.*, 1996).

The influence of social networks on the decision to migrate is widely recognized nowadays. Most of the literature states that family and friends networks of previous migrants encourage further migration (Davis and Winters, 2001; Winters *et al*., 2001; Munshi, 2003; Colussi, 2006). However, only few empirical research efforts have been made in Brazil aiming at identifying the magnitude of the above mentioned influence especially as far as the labor market is concerned. Migrant networks may facilitate further migration in different ways by providing information on the migration process in itself, as well as on its inherent difficulties. Such networks can also provide information on jobs in the destination and to contribute to the newcomers' adaptation to their new life conditions, in addition to allocating a financial aid so as to mitigate migration costs.

As far as migration is concerned, such networks function particularly grounded on mass media information and personal contacts as well. Migration networks are significantly important in conforming migration patterns due to restrained formal information sources. They may start up with an individual's pioneering migratory move then followed by his kin or other previous dwellers of the origin region. Such a migratory move is established following a positive feedback process. And, according to Poot (1996), information on this process is accumulated over time, which bears cumulative knowledge inertia.

In accordance with the idea underlying this statement, the proposed study starts with the premise that the Migratory Effectiveness Index component (or newcomer) – provided by the migration network existing in the destination – contributes significantly to the individual's choice to migrate. Therefore, highlighting this subject seems to be quite opportune for the Brazilian case. However, it is worth noting that most studies related to labor mobility neglect the influence of past mobility flows, i.e., the labor previous mobility effect. In this sense, our main goal is to explicitly introduce an Migratory Effectiveness Index component into the present study, which is expressed by an efficiency index of previous labour mobility, in addition to embed other individual and regional mobility controls. This variable shows the winners and losers regions in terms of net flows from entries and exits in each destination microregion in the last seven years prior to the decision to migrate.

As only few studies dealing with labor mobility in Brazil can be found, this work attempts to fulfill such an empirical gap by focusing on previous labour mobility. Most of other studies found in the Brazilian literature highlight individual or family migration by focusing on individual and regional determinants (Freguglia *et al*., 2014; Mendes *et al*., 2012; Ferreira and Matos, 2006). Motivated by intense mobility of workers in Brazil, the paper adds to the literature on the efficiency of Brazilian micro to attract or repel workers to insert in the analysis of migration patterns a measure that captures the extent to which regions are consistently successful in attracting immigrants that is, the efficiency rate of labor mobility in the past seven years.

For this purpose, information from the RAIS-MIGRA-MTE database for the period 2003-2008 is used here. Such data make it possible to identify the changing formal employment relation

between Brazilian microregions, as well as to longitudinally follow workers in the Brazilian formal labor market, by controlling in this way their individual characteristics, such as schooling degrees. Additionally, data from IBGE, UNDP, CAGED-MTE on individual workers' destination and those from IPEADATA were also incorporated in this study. This kind of data are suitable for our analysis for different reasons. Firstly, Brazil is characterized as a country having continental dimensions and intensive labor mobility among its microregions. Secondly, this study allows for an annual following-up of formal labor moves (census data, 2010).

As for the methodological aspects, individual conditions associated with wage expectations and work experiences, as well as regional attributes of labor mobility, are treated here by making use of a multilevel logit model containing two hierarchy levels – the individual level and the microregion level. At the individual level, variables were differentiated between a year previous to mobility and the year after mobility as for ability, proactivity and motivation, in order to control the non-observable individual effects, which could be correlated with experience and wage variables.

The results indicated that Migratory Effectiveness Index for mobility has had a positive impact on propensity to migrate in all estimated hierarchical regressions. Wage expectations reflected a minor likelihood to migrate for workers in general and a higher propensity for skilled workers. Workers' experience in turn appeared as an inhibiting factor to mobility for both skilled and unskilled workers. Some context variables – such as GDP per capita, proportion of workers having higher education, homicide rates, vehicles per capita and industrialization degree – were also significant for explaining mobility.

The present work comprises five sections including this introduction. The next section presents a brief literature review on labor mobility in which the role of Migratory Effectiveness Index, individual determinants of wage expectations and work experience, as well as migration regional attributes is highlighted. Section 3 presents the methodological aspects by means of which variables were constructed together with their description, in addition to the basic statistics used. Section 4 shows the application results followed by main conclusions that are presented in the last section.

2. Labor mobility: review of literature

2.1. Internal mobility: a look at the previous labor mobility issue

Distinct theories appear in the literature on population mobility, which attempt to explain its causes and effects[5]. Most of such works recognize the relevance of the role performed by social networks in the decision to migrate (Gottlieb, 1987; Grossman, 1989; Church e King, 1993; Massey and Espinosa, 1997; Orrenius, 1999; Zahniser, 1999; Davis and Winters, 2001; Winters *et al.*2001; Munshi, 2003; Colussi, 2006). As has been discussed before, previous migrants can facilitate further migration through social networks in this way attracting other migrants from the same geographic area. The former tend to attract migration of family members to their destination area (Bartel, 1989; Dunlevy, 1991; Jaeger, 2000).

The role played by social networks or interpersonal relationship has been focused on in the literature of mobility determinants, although in most of the studies reported the role of migratory or mobility effectiveness has not been measured explicitly (Lee, 1966; Kulu and Bilari, 2004; Lucas, 1977; Greenwood, 1973; Levy and Wadycki, 1973; Carrington *et al.* 1996; Dahl, 2004; Harbison, 1981; Massey *et al*., 1993). However, there is a consensus among authors on those labor migratory network help to reduce costs and risks inherent to migration, which also contribute to enhance expectations of migration return (Massey *et al*., 1993).

Access to information and personal contacts are crucial for the decision to migrate (Lee, 1966). According to Lucas (1977), access to a kinship network or other networks in a destination place makes people more disposed to migrate and choose to move to that place, as such networks may ease migrants' assimilation and lessen their migration costs. Previous migrants may attract new

[5] It is noteworthy, however, that the authors do not intend to establish a comparative assessment of the different theoretical approaches.

ones simply because the latter are more aware of migration advantages and can count on their help and information on jobs (Sahota, 1968).

Carrington *et al.* (1996) argue that labor migration costs are smaller in the presence of a stock of previously established migrants (earlier migrant networks) and that migration tends to follow past migration channels. This implies the idea that previous migration movements are a key element when choosing a given destination, suggesting that costs associated with migration to a certain region are lower when an earlier migrant network has been previously established.

Greenwood (1973), using India's census data for 1961, concluded that migrants were strongly inclined to migrate to localities that had previously attracted their regions' natives. For this author, disregarding the effect of previous migration flows can lead to an overestimation of a direct relation between migrant flows and variables like income and urbanization.

The hypothesis by Greenwood (1973) that earlier migrants influence the volume and direction of current migration flows was tested by Levy and Wadycki (1973) for the particular case of Venezuela. This study confirmed the hypothesis that past migration patterns do influence current migratory flows and that disregarding this factor leads to overestimate other variables explaining migration. Again according to these authors, the fact that Venezuela is not characterized by linguistic barriers among its states suggests that the effect of migrant stock variable on current migration can mainly provide a systemic network of informal information.

Recent studies support the idea that social networks have influence on job searching in a destination region. Based on samples of individuals from several "origin-communities" in Mexico over a long time period, Munshi (2003) measured each Mexican community network by the proportion of sampled individuals localized in their destination places in the USA and verified that individuals with higher chance to work in the latter country were those who had previously been related to immigration networks. Mackenzie and Rapoport (2004) studied the effect of the network financial support. These authors found empirical evidence of a U-shaped relation between immigration and inequality in Mexican communities based on migration rates at state level and the American labor market conditions. According to these authors, this result was consistent with the hypothesis that immigrant networks help newcomers immigrants by financing their migration costs.

Dolfin and Genicot (2010) in an attempt to investigate how community networks influenced migration – carried out empirical tests for network effects based on a simple migration model that allowed individuals to choose to migrate by their own or with the help of a coyote. By using a set of data on illegal Mexican immigrants in the US, they found that family members had encouraged them both to migrate by their own and by means of a coyote help.

In view of the arguments set above, it can be concluded that choosing a destination is not randomly pursued by individuals, but influenced by previous mobility flows. In this way, there exists inertia in labor mobility, based on which – as expected – the larger the previous migration flow to a given destination is, the larger the future mobility to the same destination. This hypothesis is to be tested in this work by controlling other individual and regional variables that can affect the decision-making of labor mobility. The idea of migratory effectiveness presented here refers to the existence of a previous labor migrant stock (or migrant networks) that makes it easier for formal workers to entry in the labor market due to availability of a greater information set including labor conditions, cost of living and migration return possibilities.

2.2. Relevance of individual factors: schooling, experience and wages

Researches on migration have used individual choice models which state that people migrate aiming to maximize their well-being. In accordance with the theory of human capital, such a choice is related to an individual's human capital (Sjaastad, 1962; Becker, 1962). Therefore, some of such results are agreed upon in the international literature on mobility, such as influence of schooling for likelihood of migration (Stark and Bloom, 1985; Hazans, 2003; Stambol, 2003; Sahota, 1968; Dahl, 2004 Zimmermann, 2004; Faggian & McCann, 2009).

The relevance of education for explaining systematic differences between individual likelihood to migrate, since educated individuals are considered as more flexible and susceptible to

move, as well as more innovative and attentive to opportunities to change. Additionally, high income regions generally show high rates of education. Educated people from an origin region must compete with educated people in a region of destination and, *ceteris paribus*, a high level of education in the destination may be an inhibiting factor for educated migrants. Therefore, one cannot predict, *a priori*, the influence of education in one way or the other (Sahota, 1968).

Skilled individuals' behavior is essentially determined by the same motivations and market forces acting upon those less-qualified individuals. However, more qualified individuals tend to differently distinguish the various aspects affecting their decision-making, due to the intrinsic characteristics of their own personalities and education background (Grubel and Scott, 1976).On the other hand, less-educated people seem to become strongly dependent on their families and friends in their regions of origin. The psychological costs of leaving their origin are thus higher, as they have lower opportunities to return home to visit relatives and friends, due to their lower income and budget restrictions (Faggian and McCann, 2009).

The risk associated with the choice to migrate is lower for educated people. Their chances to become unemployed are lower because – if jobs that are compatible with their schooling degrees are not available – these workers may accept inferior but well-remunerated positions, which are usually available for those less qualified workers. However, such costs become higher with distance, since information on labor market tends to become more available in nearby places.

Income is another important factor in determining workers' migration. An individual worker makes a cost-benefit analysis in order to determine if migration is worthwhile by weighing wage differentials in the origin and destination. An individual chooses to migrate, if expected income in the destination is higher than that in the origin (Borjas, 2000). Therefore, a decision to move to another region or urban center is made on the basis of comparison between current wage values of job opportunities in different places. Wage rate thus is the most important economic variable, since decision to migrate is not based on the average wage but on prospective earnings (Sahota, 1968).

Several authors have studied social and individual components of inter- and intra-regional skilled labor migration in different countries and regions in recent years. Their results indicated the relevance of sociological factors, such as social networks, in addition to asserting that individual components like age, gender and experience were nested in labor mobility. On the other hand, more qualified labor force was more susceptible to move to other places as compared to other workers (Bover and Arellano, 2002; Stambol, 2003; Dahl, 2004; Kulu and Bilari, 2004; Nakosteen and Westerlund, 2004; Mitchell, 2008).

In this way, it is worth noting that decisions to migrate are significantly influenced by expectations of future gains and seniority. Education is thus an important element of prospective returns obtained with migration.

2.3. Main regional attributes influencing labor mobilty

Migration is a complex phenomenon that comprises an interaction between social contexts with individual beliefs and wishes (Kulu and Bilary, 2004). As for the features of destination places, many factors make labor attraction to increase or decrease, since economic factors are considered the most important ones as compared to non-monetary factors (Golgher, 2004). The following factors are highlighted: wage differentials among regions; different job availability; costs of living and housing.

However, non-pecuniary variables have been increasingly relevant in migratory flows, mainly for skilled labor, which are named amenities and defined as any local geographic attribute, due to which a potential migrant would be willing to acquire, even if there is no way how to buy a portion of such an attribute (Garber-Yontes, 2004).

As for the geographic distribution of labor force in the USA in the last three decades, Moretti (2011) highlighted the fact that skilled workers had been increasingly concentrated in cities with high costs of living, while unskilled workers, conversely, had increasingly preferred to move to centers with low costs of living. This fact might be associated with the fact that amenities could be more easily found in the skilled labor destinations.

In their study of domestic mobility in Finland, Ritsilä and Haapanem (2003) emphasized the highly educated individuals' preference for densely populated and urbanized centers with better job opportunities. Hazans (2003) found a quite different result for Baltic countries when analyzing migrants' response to wage and unemployment differentials among regions. This author concluded that a high unemployment rate in the origin region encouraged people's exit, while high wages gave rise to an opposite effect. People were less inclined to move to more urbanized regions or regions presenting higher population density.

Aldashev and Dietz (2014) analyses economic and spatial determinants of interregional migration in Kazakhstan using panel data on region to region migration in 2008–2010. The authors have focused on racial segregation and conclude that people are more likely to move to regions where incomes are higher. According to the authors, mobility is higher among the most populated and nearby regions. In addition, investments in public and social infrastructure can facilitate the convergence of regional income in Kazakhstan and improve living standards in depressed regions.

As for Brazil – generally characterized as a country of continental dimensions – internal migration is a remarkable phenomenon. According to Ferreira and Matos (2004), migration has guaranteed real wages for workers. These authors analyzed labor mobility in the Brazilin formal labor market based on data from Rais-Migra– 1995-2003. Results showed that a higher dynamism found in labor markets in localities other than those in great urban agglomerations has improved attraction of more qualified labor force. Such a move has been verified in medium-size urban centers and even smaller localities in the Brazilian Center-South region.

According to Queiroz and Golgher (2008), nonpecuniary determinants of the decision to migrate associated with regional characteristics has become increasingly important for skilled labor in the face of economic aspects. Skilled workers have been seeking regions with urban amenities, such as good climate conditions, housing and leisure availability, as well as absence of negative urban conditions, such as problems of traffic congestion, crime and pollution. Other regional factors that are relevant for the decision to migrate made by skilled or unskilled labor force in Brazil are described by Mata *et al.* (2007): income differentials between origin and destination, life expectation, housing conditions, salubriousness, conditions and quality of work places, cultural environment, comparable habits and customs between origin and destination regions, proximity to seacoast, less rigorous climate conditions and infrastructure.

Netto Júnior and Moreira (2003) estimated the relation between migratory flows and income per capita differentials and found signs of a strong and positive relation between migration and income level among Brazilian states, which suggested that states showing higher income levels were greater migrant receivers.

Migration determinants of highly skilled workers in Brazil were inequalities between origin and destination places as regions presented opportunity, remuneration differentials, as well as survey conditions (Sabadini and Azzoni, 2006).

Based on the aforesaid, the present study is to approach a series of issues that are considered strategic for the decision to migrate. For all the reasons mentioned above, there is need to consider such features (pecuniary or not) in destination regions that have made them attractive to the immigrants' decision to migrate.

3. Methodology and data

3.1. Empirical model: multilevel approach

Hierarchical models are used with the aim to investigate phenomena whose data show a hierarchically organized structure with data variability embedded in more than one hierarchy level. In a multilevel analysis, data are arranged in levels assuming that the dependent variable is measured in the most disaggregated level. Independent variables, however, can be specified at the first level or at higher levels.

The method adopted here allows violating the hypothesis of error terms independently and identically distributed (i.i.d.), an outcome of dependence among individuals within the same unit. Additionally, this method allows avoiding the problem of ecological and atomistic fallacies arising

from data aggregation or disaggregation that consist in analyzing data in one level and formulate conclusions in another level (Raudenbush and Bryk, 2002). The ecological fallacy occurs when interpreting aggregated data at the individual level, by confusing the individual effect with the aggregate effect. The atomistic fallacy happens when conclusions are extracted from an aggregate hierarchical level in analysis carried out at the individual level (Hox, 2002).

According to Hox (2002), the best approach to this issue is that which recognizes the relevance of all hierarchical levels when investigating a phenomenon. Goldstein (1995) stated that the explicit modeling of each hierarchical level is advantageous from the statistical viewpoint. As the error structure is partitioned for each hierarchical level, standard errors may be more precisely estimated resulting in more efficient estimates of coefficients, which make it possible to construct a more robust significance test.

This approach also allows us to control heterogeneity of intercept and slope coefficients, since independent variables at the second level and random error terms as well may affect the estimated coefficient levels at the first level. In this way, the first level coefficients become variables due to the nesting of coefficients, which can be explained by variables at the second level.

For this study, the aforesaid model assumes here the form presented in (1) for the first level equation, containing different variables at this level. The reason for this is to make it possible the control of eventual unobservable individual effects that might be correlated with individual variables, such as abilities, proactivity and motivation:

$$\eta_{ij} = \beta_{0j} + \beta_{1j}X_{1ij} + \beta_{2j}X_{2ij} + \varepsilon_{ij} \quad (1)$$

where η_{ij} is a binary variable that assume value 1 if the individual *i* has migrated and 0 otherwise. Migration is defined as the worker's moving from one microregion to another where he/she had employment relations between 2003 and 2008[6], in which subscripts *i* and *j* represent individuals and microregions, respectively. Additionally,

i = 1...N are the units of level 1, individuals in this case;

j = 1...J are the units of level 2, microregions in this case;

X_{1ij} = wage expectation;

X_{2ij} = experience.

$\beta_{0j}$is the mean result for the jth unit;

$\varepsilon_{ij}$is the random effect related to level 1;

The specification for level 2 is presented by equation (2):

$$\beta_{0j} = \gamma_{00}\sum_{s=1}^{8}\gamma_{0s}Z_{sj} + u_{0j} \quad (2)$$

where γ_{00} corresponds to the mean result for all individuals and u_{0j} is the random effect related to level 2. It was assumed that u_{0j} and ε_{ij} were independent and showed a normal distribution with zero mean and constant variances, σ^2_{u0} and σ^2_{e}, respectively.

where,

Z_{1j}= Migratory Effectiveness Index;

Z_{2j}= GDP per capita;

Z_{3j}= population;

Z_{4j}= proportion of workers with higher education;

Z_{5j}= vehicles/population;

[6]Analyzing the directionality aspect of labor mobility becomes impossible when migration is defined based on administrative units. Another restraint is that a survey area for skilled workers tends to be non-circular, asymmetric and elongated toward the dominant urban center. Conversely, as for scarcely qualified workers, such directionality aspect tends to be more evenly distributed through space (Faggian et al., 2013).

Z_{6j}= homicide rate;
Z_{7j}= industrialization degree;
Z_{8j}= Dummies for the region;

Based on the estimation of the null model, it is possible to estimate the intraclass correlation ρ[7]:

$$\rho = \frac{\sigma^2_{u0}}{\sigma^2_{u0}+\sigma^2_e} \quad (3)$$

where σ^2_e and σ^2_{u0}, respectively, represent the variability within and between groups 2.

According to Raudenbush and Bryk (2002), coefficient ρ indicates the proportion of variance explained by the group-structured population. This coefficient represents the proportion of variance at the group level as compared to total variance.

After estimating the unconditional multilevel model and verify whether the variance is significantly different from zero, the explaining variables corresponding to the intercept[8] are gradually placed turning the model into a conditional one. The significance of such variables lies in that the average likelihood of labor force to migrate is different between microregions due to the contextual features within which the worker is inserted.

A randomness test of coefficients involves estimating the model assuming that they are random coefficients. A null hypothesis of randomness should not be rejected in case the contextual variance components are significantly different from zero.

A two-level hierarchical[9] logit model is to be estimated in order to treat the binary dependent variable, which assumes value 1 in case the individual has migrated and value 0, if not. The first level refers to individual characteristics and the second level refers to information on the 558 Brazilian microregions. In accordance with the scope of the study, the multilevel approach was chosen which incorporates the nested data structure in different levels each of which is considered as a submodel. This allows analyzing the relation between variables at the aggregate level (microregions) and the variable at the individual level (likelihood to migrate). In this study, the dependent variable is represented at the lowest aggregation level (level 1), while the explaining variables refer to both levels.

3.2. Description of database and variables

The data used in this work come from the RAIS-MIGRA (from the Brazilian Labor Ministry), IPEADATA and UNDP datasets. RAIS is a very broad base which follows up approximately 75 million workers in the Brazilian formal labor market each year and includes their personal features, such as age, gender and schooling. It also includes information on employers, such as size of establishment and sector of activity, in addition to information on geographical and sectoral aspects and on yield as well.

As for multilevel approach used, the data comprise the workers' sample (level 1) and the geographic unit analyzed – 558 Brazilian microregions (level 2). Mobility is defined as the worker's move among microregions in which he/she had labor relations in the years between 2003 and 2008.

[7] The question is whether incorporating more than one hierarchical level is econometrically justifiable, i.e., whether including a second level helps to explain variability of data used in the model.

[8] It is worth noting that including explaining variables in the equation of the model at level 2, except for that representing the coefficient β_{0j}, leads to the emergence of interaction terms between variables present in both levels of the model. This means that a group characteristic can modify the effect of an individual characteristic in the response variable.

[9] The generalized linear hierarchical model is estimated by means of the restricted PQL (Penalized Quasi-Likelihood) method. The HLM 6.08 was the statistical software used.

We built a 10% random sample due to the high number of individual observations included in the RAIS-MIGRA database[10]. Therefore, we obtained a sample containing 7,542,930 observations for individuals – migrants or not – who had any schooling degree, from illiteracy to complete higher learning. Based on this sample, eight subsamples were constructed for the following two-year periods: 2005-2004, 2006-2005, 2007-2006, 2008-2007[11], out of which four included general workers comprising 1,257,155 individuals in each (table 1), and the remaining four included skilled workers. The number of the latter increased over time, since – as soon as individuals had completed their higher education in the course of years – they started taking part in the sample of skilled individuals in the following years (table 2).

Table 1 shows information on the number of migrants and nonimmigrants for the considered year combinations in the Brazilian formal labor market for general workers in the period 2003-2008[12], according to the RAIS-MIGRA. Migrants comprised approximately 3.41% of total workers in the Brazilian formal labor market as for the two-year periods considered. Approximately 21% out of the migrant labor force were skilled workers.

Table 1: Structure of subsamples for workers in general constructed based on RAIS-MIGRA

Couple of years	Migrants	Non-migrants	Total (Migrants + Non-migrants)
2005-2004	44,800	1,212,355	1,257,155
2006-2005	44,055	1 ,213,100	1,257,155
2007-2006	42,059	1 ,215,096	1,257,155
2008-2007	40,976	1,216,179	1,257,155
Total	171,890	4,856,730	5,0286,20

Source: Prepared by the authors based on RAIS-MIGRA-MTE.

As for skilled labor samples, the absolute number of migrant workers was slightly increased, although its percentage is practically the constant.

Table 2: Structure of subsamples for skilled workers constructed based on RAIS-MIGRA.

Couple of years	Migrants	Non-migrants	Total (Migrants + Non-migrants)
2005-2004	8,383	228,436	236,819
2006-2005	9,185	241,514	250,699
2007-2006	9,255	253,195	262,450
2008-2007	8,559	268,849	277,408
Total	35,382	991,994	1,027,376

Source: Prepared by the authors based on RAIS-MIGRA-MTE.

As for all samples, differences in variables at the individual level are considered in accordance with the two-year period in question with the aim to control the unobserved individual

[10] A possible bias could arise if a random sample of individuals maintaining their formal work relation in the period analyzed is withdrawn, i.e., individuals who have not left the database. This sample could not be avoided as it would be needed in order to construct a migration variable between t and t-1, as well as in the following-up of such individuals through time.

[11] The absence of estimates for the 2004-2003 hierarchical model is justifiable, as the individuals are not considered migrants in 2003, i.e., only the origin microregion of all individuals can be considered for that year as they can only be taken as migrants from the year 2004 and on.

[12] It is worth noting that the migration period focused extended from 2004 to 2008. For this reason, a difference appears as for the number of individuals from 2003 to 2008 (7,542,930) and that from 2004 to 2008 (5,028,620).

abilities, such as capability, proactivity and motivation. Such individual characteristics may be correlated with work experience and wage variables, i. e., they may be endogenous.

Therefore, hierarchical models were estimated – though not shown – including variables such as sex, age, age-squared, which were considered as relevant for the decision to migrate. However, due to the relevance for controlling fixed effects by working with data on first-differences at the individual level, such variables were suppressed in the models presented in this paper. Nevertheless, these variables were still under control, even though their respective marginal effects were not made explicit.

As for the regional level, the variables considered were those present in the destination place. The samples referred to those individuals who did not migrate in the period and to the destination of individuals who have migrated between the periods of years analyzed. An individual having a complete higher learning was considered as a skilled worker. A binary dependent variable was constructed for each two-year period, in which value one (1) was attributed to the individual who had migrated in the last year of the difference in question, and zero otherwise. Value (1) was determined in the destination, not in the origin, i.e., after verifying change in labor relation. Regional characteristics are related to the microregion of destination in the base year used in differentiating variables at the individual level.

The theory on labor interregional mobility justifies the focus on the characteristics of the worker's destination place in detriment of those in the origin. This theory states that destination place is the local exerting a higher influence on the decision to migrate as compared to that of the origin (Massey *et al.*, 1993). The modeling of labor mobility between regions carried out in empirical studies tends to point out such mobility in the destination (Pekkala, 2003; Kulu and Bilari, 2004). Chart 1 describes individual and regional variables.

Chart 1: Description of variables

Variables	Description
Level 1	
Experience	Number of months worked under the same labor relation. RAIS-MIGRA.
Wage delta	Difference between average wage of labor occupation in the origin microregion and that found in the destination place. RAIS-MIGRA.
Level 2	
Migratory Effectiveness Index - MEI	The ratio between the migratory balance in the last seven years (subtraction of entries and exits) divided by the volume of migrants (addition of entries and exits) in the destination microregion (prepared by authors based on the Rais-Migra).
Higher education	Labor stock having complete higher education divided by total labor in the microregion. RAIS.
GDP per capita	Income per capita in the microregion. IPEADATA.
Population	Number of inhabitants. IPEADATA.
Industrialization degree	Proportion of workers in extractive and manufacturing industries divided by total labor force in the economy (prepared by the authors from the Rais-Migra).
Vehicles/population	Number of automotive vehicles divided by the population. Data taken from there gistration system of national automotive vehicles (*Sistema de Registro Nacional de Veículos Automotores* - RENAVAN / DENATRAN).
Homicide rate	Total of homicides divided by 100,000 inhabitants (IPEADATA).

Source: Prepared by the authors.

The variable wage delta[13] reflected the mobility wage expectation. This variable was constructed based on the difference between the average wage of the individual's occupation (four digits) in *t* and the individual's wage also in *t*. Constructing this variable is justified by the fact that the worker – ex-ante mobility – did not count on any precise information on wages at the destination in case of an eventual job change. Therefore, as the destination wage was not observable ex-ante, workers were at best supposed to compare their earnings to the average wage of their occupations both measured before changing their labor relation. This proxy for the wage benefit of mobility was equally estimated for workers who did not move from their microregions with the aim to capture eventual job proposals the individuals might have received from other microregions.

The labor experience variable was measured by taking into account the number of months worked under the labor relation prior to mobility. This variable measures the commitment to the current employer and the negative relation between experience and propensity to mobility suggested that workers having more tacit knowledge were less inclined to move to other microregions as compared to those with lower level of experience.

We proposed to measure efficacy labour mobility by using an index that was constructed based on Baeninger (2000) who analyzed migration among regions through time in Brazil. The variable of mobility – Migratory Effectiveness Index – was created based on the argument that migration networks bear an inertial behavior in migration and mobility. Such variable was constructed by the balance of workers received (immigrants) and sent (emigrants) for the destination microregion in the last seven years before mobility divided by the volume of migrant workers. The related index varies from -1and 1 whose values near to 1 indicate high absorption capacity. On the other hand, values near to -1 suggest high capacity of population exit, while values near to zero point to equilibrium between entries and exits in a given microregion. This indicator allows us to compare microregions irrespectively of absolute volume of entries (immigration) and exits (emigration).

$$MEI = Entries - Exits/(entries + exits) \quad (4)$$

The positive sign of this variable's coefficient suggested that the destination places with more significant Migratory Effectiveness Index mobility efficiency had attracted an increased number of migrants.

A variable was created viewing to determine the competitiveness degree the worker would be facing in the labor market when moving between microregions. The variable higher education represented the relation between labor stock with higher education (proportion of labor with complete higher education) and total labor stock in a microregion. The negative sign of this variable indicated that the larger the amount of professionals with complete higher education, the smaller the propensity to move as competitiveness for jobs tends to be higher in the destination (Beals *et al*. 1967). On the other hand, cities having abundant human capital can be attractive due to human capital spillovers (Moreti, 2011).

The GDP per capita variable comprised the economic prosperity degree in a given microregion. The higher the income level in a region is, the higher the probability of labor mobility toward this region.

The population variable was related to the size of the city and availability of services, as well as employment opportunities[14]. A higher number of people going to a destination place could reflect over population and this would discourage labor mobility. A negative sign of this variable may suggest that people are less inclined to move to more urbanized regions with higher population density (Hazans, 2003).

[13] This variable was created based on the solution presented by Mendes *et al.* (2012) for inter-firm labor mobility in formal Brazil.

[14] The unemployment rate could be used as a proxy for employment opportunities in a destination region. However, these statistics are not available at a regional level in Brazil, mainly in the period analyzed.

The industrialization degree variable was constructed based on data from the RAIS-MIGRA, which constituted the ratio between total labor in manufacturing and extractive industries and total labor force in the economy. In case of positive sign, highly industrialized microregions can attract labor force and vice-versa. This variable captures the industrial development degree of the region in question.

The vehicles/population variable acted as a proxy for traffic congestion and CO_2 emission, reflecting the pollution level in the microregion. The higher this proportion is, the lower the probability that this microregion receives migrant labor force. The homicide rate variable was an indicator of quality of life. High criminality can be understood as a relatively short life expectation. There is a negative relationship between the rate of crimes and the degree of attractiveness of a region for migrant people (Mata et al., 2007).

As for the advantage of using the RAIS-MIGRA database, it should be emphasized that this database makes it possible to follow-up individual labor relations each year, which conveys information on origin and destination microregions, as well as on migrant labor skillfulness.

4. Results

4.1. Migratory Effectiveness Index - mobility in Brazil for the period 2003-2008: characteristics of the formal labor market

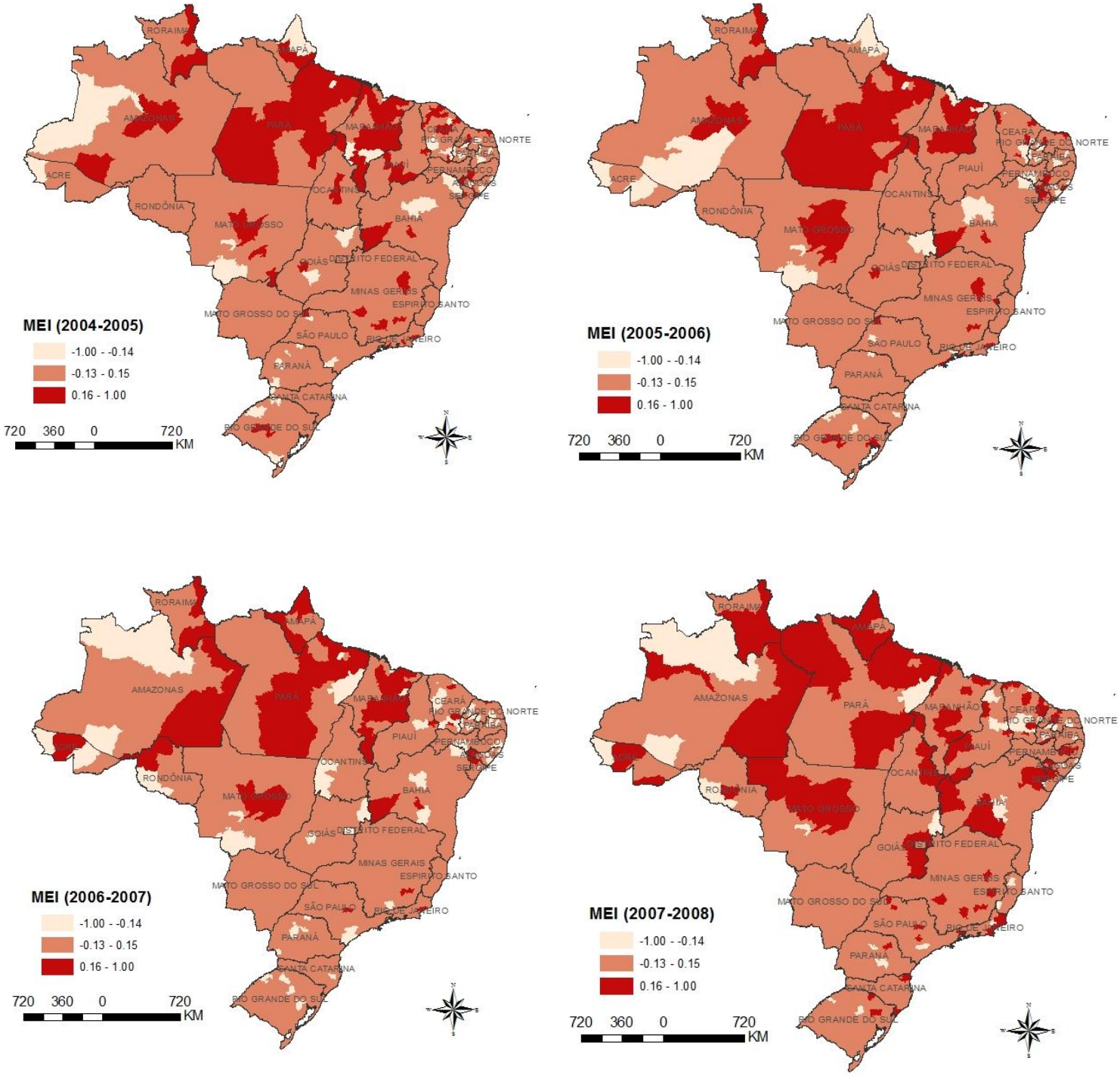
Migratory Effectiveness Index mobility indices of formal workers in 2003-2008 can be seen in Figure 1. First of all, areas characterized as turnover areas prevailed in all two-year periods considered, i.e., areas showing equilibrium between formal labor entries and exits. On the other hand, those microregions characterized as sending areas were mostly localized in the North and Northeast regions, and in the South regions as well. In the North, the state of Pará, which showed the highest volumes of immigrants and emigrants in the region, proved to be predominantly characterized as a labor attracting area.

The states of Amazonas, Acre and Rondônia were highly heterogeneous, since they had microregions characterized as both labor attracting areas and turnover areas and, conversely, as sending areas; a fact that evidenced alternate functions over the years. On the other hand, the state of Amapá –which due to efficiency indices in 2003-2005, was ranked as a labor sending area – turned out to be mostly attractive in the following two-year periods. Roraima and Tocantins could be seen as population attracting areas and labor turnover areas.

Microregions in the Northeast region were mostly characterized as showing labor turnover patterns. Microregions containing state capitals in the Northeast were predominantly ranked as labor turn over areas all through the analyzed period. Maceió, Salvador, Fortaleza, João Pessoa, Recife, Natal and Aracaju showed to have their migratory effectiveness indices near zero, except for São Luis, the capital of the state of Maranhão. The latter was predominantly a labor sending area in 2004-2007, while it presented an previous turnover pattern in the last biennium, 2007-2008. On the other hand, the microregion containing Teresina, the capital city of Piauí state, was characterized as a labor turnover area in the first three biennial periods, while in the last two years it proved to show labor attractiveness.

As for the Southeast region, distinct roles were observed for the microregions encompassing its state capitals. The state of Minas Gerais, traditionally a population sending space, was ranked as a labor turnover area. The state of Rio de Janeiro, once a population receiver, had its capital city ranked as a turnover space all through the period studied. Similarly, São Paulo and Espírito Santo were considered areas where labor turnover prevailed, although having their capital cities ranked as receivers of large labor contingents and at the same time classified as senders of many workers to the remaining Brazilian microregions.

Figure 1: Migratory Effectiveness Index–MEI (2003- 2008)



Source: Prepared by the authors based on Rais-Migra.

The South region –the smallest among Brazilian regions – comprises three states – Paraná, Santa Catarina and Rio Grande do Sul. As observed for almost all capital cities mentioned before, the microregions encompassing the capital cities of the southern states – Curitiba, Florianópolis and Porto Alegre – were areas with large movement of formal workers characterized by labor turnover. A traditional population sender, the state of Paraná proved to be converted predominantly into a labor turnover state. As for Rio Grande do Sul, its capital city was observed as a labor turnover area, while some microregions that counted on smaller labor opportunities –like Soledade and São Gerônimo – appeared to be labor senders. Similarly, Santa Catarina was observed as a predominantly labor turnover region, except for the microregion of Tabuleiro, where labor had mostly moved out.

The Center-West region is comprised of the states of Mato Grosso, Goiás and Mato Grosso do Sul, in addition to the Federal District – Brasília, the Capital of Brazil. Most of their microregions were ranked as formal labor turnover areas, including their capital cities – Campo Grande, Cuiabá, Goiânia and Brasília as well.

4.2. Empirical results

Individual and regional conditions for the likelihood to migrate of general labor were estimated together with first level variables by taking into account the differences between the respective two-year pairs, as follows: 2005-2004, 2006-2005, 2007-2006 e 2008-2007, which constitute 4 hierarchical models with 7 specifications each (Table 3). As microregional variables were included, it could be concluded that an average of 20% of the variability of migration likelihood of workers in general was a result of regional characteristics.

As for individual characteristics, labor cumulative experience was negatively related with mobility likelihood in all models and significant at 1%. This suggested that a higher opportunity cost associated with mobility for experienced individuals in relation to those less-experienced or inexperienced workers, because of their previously acquired experience. This result was in accordance with that found by Dahl (2004) in a study of mobility for Denmark in which cumulative experience along years of work was less liable to be transferred.

The sign of the wage variable coefficient that reflected mobility expectation was positive and significant at 1% in all models for workers in general. This suggested that workers whose wages were below the average of the occupations in the microregion were more likely to move as their wages encouraged them to look for better job opportunities.

The Migratory Effectiveness Index mobility had a positive impact on propensity to migrate in all estimated models, confirming the initial hypothesis that previous migration flows toward the destination region chosen by the individual affected positively the decision to migrate. This fact occurred in view of the reduced risks associated with the decision to move away (Sahota, 1968; Massey *et al*., 1993; Carrington *et al*., 1996). That is, the chance to migrate was higher when the destination microregion showed a larger previous migrant stock. When the Migratory Effectiveness Index was increased by a standard deviation, an increase of 7% in the chance to move away could be observed from the odds ratio of this variable, which was represented by odds ratio for standard deviation.

Such results showed that the coefficient of the variable vehicles/population was negative and significant in two subsamples for the period studied, indicating that migrant workers sought job opportunities in microregions with smaller fleet of vehicles and traffic congestion, which meant less pollution indices.

It can be noted that the output per capita affected mobility positively, meaning that microregions having higher economic prosperity were more attractive to immigrants. The proportion of individuals with complete higher education had a negative impact on the mobility of workers in general as it represented a higher level of competition for the latter. And this is because qualified individuals were better-off than less-educated people as for job opportunities in a competitive labor market.

Table 3: Results of the best hierarchical models for labor mobility likelihood for workers in general in Brazil.

Dependent Variable Migrate =1 ; non-migrant = 0	Best Hierarchical Model for the years 2005-2004		Best Hierarchical Model for the years 2006-2005		Best Hierarchical Model for the years 2007-2006		Best Hierarchical Model for the years 2008-2007	
Fixed component	coef.	Odds-Ratio	coef.	Odds-Ratio	coef.	Odds-Ratio	coef.	Odds-Ratio
Intercept	-3.519	0.029	-3.641	0.026	-3.749	0.023	-3.683	0.025
	(0.000)		(0.000)		(0.000)		(0.000)	
Migratory Effectiveness Index	0.068	1.070	0.029	1.092	0.082	1.085	0.067	1.089
	(0.044)		(0.365)		(0.009)		(0.043)	
Vehicles/population	-0.007	0.993	-0.059	0.942	-0.097	0.908	-0.127	0.881
	(0.890)		(0.257)		(0.053)		(0.015)	
GDP per capita	0.148	1.160	0.154	1.167	0.175	1.190	0.246	1.279
	(0.000)		(0.000)		(0.000)		(0.000)	
Homicide rate	0.013	1.142	0.078	1.081	0.045	1.046	0.043	1.045
	(0.000)		(0.008)		(0.106)		(0.127)	
Higher education	-0.062	0.940	-0.062	0.940	-0.045	0.955	-0.048	0.952
	(0.036)		(0.045)		(0.106)		(0.104)	
Industrialization degree	0.082	1.086	0.087	1.092	0.076	1.079	0.086	1.089
	(0.008)		(0.006)		(0.013)		(0.007)	
Population	-0.041	0.959	-0.020	0.979	-0.021	0.979	-0.027	0.973
	(0.159)		(0.493)		(0.448)		(0.338)	
North	0.111	1.117	0.324	1.382	0.253	1.288	0.162	1.176
	(0.286)		(0.002)		(0.013)		(0.122)	
Southeast	0.259	1.296	0.349	1.418	0.458	1.581	0.307	1.360
	(0.007)		(0.001)		(0.000)		(0.002)	
South	0.029	1.030	0.149	1.162	0.207	1.229	0.035	1.036
	(0.805)		(0.222)		(0.077)		(0.767)	
Center-West	0.389	1.476	0.458	1.581	0.528	1.696	0.339	1.404
	(0.001)		(0.000)		(0.000)		(0.004)	
Experience	-0.017	0.983	-0.018	0.982	-0.015	0.985	-0.016	0.984
	(0.000)		(0.000)		(0.000)		(0.000)	
Wage delta	0.179	1.196	0.162	1.177	0.089	1.093	0.054	1.055
	(0.000)		(0.000)		(0.000)		(0.000)	
Random Component	σ^2	p-valor	σ^2	p-valor	σ^2	p-valor	σ^2	p-valor
Coefficient null model	0.362	0.000	0.358	0.000	0.319	0.000	0.359	0.000
Coefficient complete model	0.293	0.000	0.303	0.000	0.271	0.000	0.287	0.000
% Of variance explained	19.061		15.363		15.047		20.056	
Number of observations								
Level 1	1257154		1257154		1257154		1257154	
Level 2	558		558		558		558	

Note: variables were standardized for estimation [(variable- average) / standard deviation] for all cut-offs analyzed. Therefore, the odds ratios were expressed in terms of standard deviation and not marginal variation of the variable in question.

Note: we have tested models not containing the variable of Migratory Effectiveness Index mobility index and noted a marginal percentage contribution of the models.

Source: Prepared by the authors based on the models' results.

It is worth noting that the wage delta variable captured slight portion of the effect that cities having large numbers of skilled workers caused on qualified people. As for our case, the sig was negative for skilled labor delta. That is, they moved, despite wage losses. Non-pecuniary reasons could be more relevant for those with higher schooling levels. As for the general sample, if we look at its effect, the higher education variable seems to difficult migration (negative sign) and the wage issue seems to attract (positive sign) migrants. Therefore, as the general worker's wage was controlled, competition seemed to occur in both cases. Destination places with large numbers of skilled people repel both types of labor force.

The coefficient of the homicide rate variable was positive and significant in two subsamples and this could be reflecting the onus for better job opportunities on microregions with higher crime rates; however, this result is different from the previous Brazilian evidence (Mata et al., 2007). The variable of industrialization degree revealed a positive relation to labor mobility likelihood in general, which indicated preference for more developed destination places. As compared to the

Northeast region, the Southeast and Center-West regions showed higher chances of being receivers of labor force. The population variable does not affect the decision of general workers to migrate.

Table 4 shows the results for skilled individuals. When contextual variables were included, the explained data variability was significantly increased in all models – 32% in average, which was higher than that verified for workers in general. Therefore, microregional features affected the mobility likelihood of skilled labor force.

Table 4: Results of the best hierarchical models for skilled labor mobility in Brazil

Dependent Variable Migrate =1 ; non-migrant = 0	Best Hierarchical Model for the years 2005-2004		Best Hierarchical Model for the years 2006-2005		Best Hierarchical Model for the years 2007-2006		Best Hierarchical Model for the years 2008-2007	
Fixed component	coef.	Odds Ratio	coef.	Odds Ratio	coef.	Odds Ratio	coef.	Odds Ratio
Intercept	-3.163	0.042	-3.409	0.033	-3.430	0.032	-3.534	0.029
	(0.000)		(0.000)		(0.000)		(0.000)	
Migratory Effectiveness Index	0.093	1.098	0.100	1.105	0.148	1.160	0.105	1.111
	(0.060)		(0.032)		(0.002)		(0.025)	
Vehicles/population	-0.273	0.761	-0.433	0.648	-0.361	0.697	-0.271	0.763
	(0.000)		(0.000)		(0.000)		(0.000)	
GDP per capita	0.031	1.032	0.058	1.059	0.081	1.085	0.143	1.153
	(0.463)		(0.173)		(0.028)		(0.000)	
Homicide rate	0.052	1.053	-0.060	0.942	-0.055	0.946	-0.030	0.970
	(0.125)		(0.095)		(0.095)		(0.360)	
Higher education	-0.084	0.919	-0.065	0.936	-0.025	0.975	-0.072	0.931
	(0.003)		(0.039)		(0.350)		(0.009)	
Industrialization degree	0.099	1.104	0.092	1.096	0.161	1.175	0.071	1.074
	(0.012)		(0.026)		(0.000)		(0.067)	
Population	-0.057	0.945	-0.046	0.955	-0.053	0.948	-0.040	0.961
	(0.035)		(0.128)		(0.041)		(0.121)	
North	0.404	1.497	0.586	1.797	0.366	1.442	0.451	1.571
	(0.007)		(0.000)		(0.011)		(0.002)	
Southeast	0.596	1.815	1.014	2.755	0.866	2.376	0.589	1.804
	(0.000)		(0.000)		(0.000)		(0.000)	
South	0.463	1.589	0.835	2.304	0.587	1.798	0.364	1.438
	(0.002)		(0.000)		(0.000)		(0.010)	
Center-West	0.684	1.983	0.873	2.394	0.832	2.297	0.648	1.912
	(0.000)		(0.000)		(0.000)		(0.000)	
Experience	-0.015	0.985	-0.016	0.984	-0.012	0.988	-0.013	0.987
	(0.000)		(0.000)		(0.000)		(0.000)	
Wage delta	-0.079	0.923	-0.151	0.859	-0.098	0.907	-0.073	0.929
	(0.001)		(0.000)		(0.000)		(0.000)	
Random Component	σ^2	p-valor	σ^2	p-valor	σ^2	p-valor	σ^2	p-valor
Coefficient null model	0.333	0.000	0.467	0.000	0.360	0.000	0.313	0.000
Coefficient complete model	0.237	0.000	0.300	0.000	0.233	0.000	0.218	0.000
% Of variance explained	28.829		35.760		35.277		30.351	
Number of observations								
Level 1	236686		250561		262290		277203	
Level 2	558		558		558		558	

Note: variables were standardized for estimation. Therefore, odds ratios were expressed in terms of standard deviation and not in terms of marginal variation for the variable in question.
Source: Prepared by the authors based on the models' results.

As for the variables at level 1, the coefficient of the variable of experience revealed the same sign found for that of unskilled workers. Differently from the sample for unskilled workers, the wage variable coefficient– which reflected expectation of pecuniary change – was negative and significant This indicated that the propensity to move for skilled labor decreased the higher the wage was, as compared to the occupation average wage. This could mean a lower impact of pecuniary variables on the mobility of skilled labor force or that these workers would initially accept reduced wages.

A previous migrant network enhanced the chance of skilled labor mobility, suggesting that past migratory flows would act positively on current moves all through the years considered. This

result was similar to that associated with subsamples for workers as a whole.[15] This variable was in turn the one with the highest positive impact on the chance to migrate for both labor force groups; an evidence also found in previous works (Greenwood, 1973; Levy and Wadycki, 1973).

It should be noted that the variable of vehicles/population presented a similar result to that found for estimated models for workers as a whole, which indicated that skilled labor also sought less-congested regions. However, the negative impact on mobility likelihood was higher for skilled workers.

The variables of GDP per capita and proportion of skilled individuals – similarly to the results for workers in general – had a positive and negative influence, respectively – on mobility likelihood of skilled workers. This result suggested that these workers tended to move to more prosperous regions having less-skilled individuals, which reflected migrant workers' concern about competition for jobs in the microregions of destination.

The homicide rate did not prove to be related to likelihood to migrate in general, except for one subsample in which a negative and significant coefficient at 10% was evidenced, as showed by Mata et al. (2007). An even higher propensity to migrate for destinations showing higher industrialization degree and lower population density should be emphasized. All other regions – as compared to the Northeast region – presented higher propensity to receive skilled workers.

As can be seen, regional factors were more important for skilled labor than for unskilled workers (34% against 21% of the explanatory variability of the intercept). Skilled labor was subject to wage loss with mobility, while workers in the general sample showed prospective wage increase. For both kinds of workers, migratory effectiveness index was a determinant of mobility likelihood, being the main variable as far as the magnitude of positive marginal effect was concerned. Robustness testing was carried out in order to control spatial autocorrelation in all subsamples analyzed in this study.

The several temporal cut-offs used in this work served as a robustness test. For testing the stability of estimated coefficients, the confidence intervals coefficient has been used. Based on such an analysis, we conclude that the estimated coefficients for the different cross-sections were statistically identical.

5. Conclusions

This study aimed to verify the role played by Migratory Effectiveness Index mobility, wage expectation and regional attributes in labor mobility of individuals – educated or not – in order to understand the different nuances and features found in the spatial mobility of these two groups. The present study was carried out using a multilevel logit model in which the first differences were focused at the individual level in order to capture unobservable effects that could be correlated with the remaining variables present in this level.

For this, a data containing information from the *Relatório Anual de Informações Sociais – Migração* (RAIS-MIGRA – annual report on social data of the Brazilian Ministry of Labor and Employment – MTE) for the period 2003-2008 was constructed at the individual level. As for the regional context (level 2), the data used were those from IBGE (the Brazilian census data and statistics agency), UNDP (United Nations Development Programme), CAGED-MTE (register for employed and unemployed labor of MTE) and IPEADATA. (information from the Brazilian institute for applied economic research).

The hierarchical model approach confirmed the relevance of Migratory Effectiveness Index mobility for studying labor spatial mobility, regardless the worker's schooling degree due to the previous higher knowledge stock to which the potential migrant has access to in view of the destination to be chosen.

[15] As was the case for the remaining workers, the effect of a standard deviation increase in this variable was given by the expression [exp(1* 0.093)] x100 for the 2005-2004 sample. The authors concluded that the effect of this variable was statistically identical to that observed for general workers.

Individual attributes, wage expectations and experience have proved to influence the likelihood to migrate in all samples analyzed. Labor experience was an inhibiting factor of migration both for skilled labor and workers in general, which restrained the intrinsic tacit knowledge transfer to the labor force as a whole. The labor wage variable has distinctly contributed for the decision to migrate by workers in general and skilled labor. The former were encouraged to move to the extent that their earnings were lower than their occupations' average wage. On the other hand, skilled workers were more likely to move when their earnings were above the average wage, which revealed that the pecuniary advantage was less relevant for labor mobility.

When the context variables were included, the explanatory variance of the intercept increased in all estimated models for general labor force and also for skilled workers, confirming the relevance of contextual features in determining the mobility of migratory flows. In addition to being relevant in both labor force samples, regional factors were particularly important as far as skilled workers were concerned.

Finally, understanding labor mobility determinants between the Brazilian microregions is relevant when designing public policies intended for reducing human capital spatial inequalities. In this context, the dynamics of labor mobility should be understood so as to predict its effects, as well as to act on motivations and guidance of such flows. In view of these targets, the present analysis combines individual and regional attributes, in addition to joining the migratory effectiveness index.

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