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Migration, Selection and Income Differentials in Brazilian Labor Market

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Abstract

Migration is understood in the economic literature as a decision based on prospects of better working conditions and the search for higher remuneration at the destination, compared to the origin of the workforce. In this sense, this article aims to test the hypothesis of favorable migratory selectivity in Brazil based on the model with sample selection bias correction proposed by Heckman (1979). Based on census information for the years 2000 and 2010, the aim is to analyze the population aged between 15 and 60 years who declared themselves to be employed in the Brazilian labor market. Suppose it is confirmed that migrants are a positively selected population group. In that case, they have unobservable characteristics that affect the decision to migrate and, consequently, labor earnings. The second step is to decompose the characteristics that affect the earnings differentials between migrants and non-migrants, considering those of an observable and non-observable nature. The results show that Brazilian intercity migrants make up a positively selected group. Concerning the breakdown of income differentials, labor income is more remarkable in favor of migrants, and the largest share of income differences between migrants and non-migrants is due to unobservable factors. Therefore, the implications of this study show that the migration of qualified human capital in Brazil, that is, those with the best professional performance in the labor market (positively selected), may end up deepening regional socioeconomic inequalities since migrants always seek opportunities in more economically dynamic regions. This suggests that policies be developed to reduce regional inequalities that aim, above all, to boost the growth of less developed regions so that their human capital has the opportunity to develop internally in their regions, contributing to the growth and development of the original region.

الهجرة الداخلية، الاختيار وفوارق الدخل في سوق العمل البرازيلي

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ملخص

تعرف الأدبيات الاقتصادية الهجرة الداخلية على أنها قرار يعتمد على احتمالات تحسين ظروف العمل والدخل. تهدف المقالة الى اختبار فرضية تحسن الانتقائية المواتية للقوى العاملة في البرازيل بناء على نموذج تصحيح انحياز اختيار العينة لهيكمان (1979) وبناءً على بيانات التعداد العام لعامي 2000 و2010. الهدف هو تحليل خصائص العاملين في سوق العمل البرازيلي بين سن 15 و60 سنة. في حال تم تأكيد فرضية اختيار المهاجرين بشكل إيجابي، في هذه الحالة لديهم خصائص تؤثر على قرار الهجرة لا يمكن ملاحظتها. وتتمثل الخطوة الثانية في تحليل الخصائص التي تؤثر على فروق الدخل بين المهاجرين وغير المهاجرين مع الاخذ في الاعتبار تلك التي لها طبيعة ملحوظة وتلك غير الملحوظة. تظهر النتائج أن المهاجرين البرازليين بين المدن يشكلون مجموعة مختارة بشكل إيجابي. وفيما يتعلق بالدخل، تظهر فروق الدخل مواتية أكثر للمهاجرين، وتعزى النسبة الأكبر من هذه الفروق الى عوامل لا يمكن ملاحظتها. لهذا تظهر هذه النتائج أن هجرة رأس المال البشري المؤهل في البرازيل، أي الذين يتمتعون بأفضل أداء مهني في سوق العمل وتم اختيارهم بشكل إيجابي قد يؤدي الى تعميق التفاوتات الاجتماعية والاقتصادية الإقليمية لأن المهاجرين يبحثون دائما عن فرص في المناطق الأكثر ديناميكية اقتصاديا. تستدعي هذه النتائج وضع سياسات للحد من التفاوتات الإقليمية بهدف تعزيز النمو في المناطق الأقل نموا بحيث تتاح الفرصة لرأس المال البشري للتطور داخليا في مناطقهم مما يساعد في نمو المنطقة الأصلية وتنميتها.

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1. Initial Considerations

Labor income differentials in the economic literature are analyzed in diverse ways and assume the most diverse possible hypotheses. Socioeconomic and demographic characteristics, however, have a relevant position in discussions that deal with inequalities in earnings from work around the world (Blinder, 1973; Bergman, 1974; 1986; Hirsch & Schumacher, 1992; Blau & Kahn, 2003; Neuman & Oaxaca, 2003; Basker, 2003;). Investment in human capital is the primary determinant of wages and is attributed to educational inequalities, a substantial portion of income differentials in the labor market, but associated with the low level of human capital; unobservable characteristics also reveal impacts on wage differentials (Ramalho, 2005; Freguglia, 2007).

Human capital and its characteristics associated with the low performance gained substantial support to justify income inequality in Brazil in the 1960s, 1970s, and 1980s, this being the central core of the discussion on inequality (Langoni, 1973; Amadeo et al.,1994; Netto Junior et al., 2008; Rocha et al., 2010). However, the empirical evidence from these years suggests that some inequality is associated with low human capital. However, it is not just this variable associated with inequality. Thus, several socioeconomic and demographic characteristics substantially impact this issue.

As a result, not only socioeconomic characteristics but also productive attributes can impact the population's labor earnings differentials, as well as income inequality (Figueiredo et al., 2012; Cavalcanti & Ramos, 2015). Empirical evidence for Brazil shows that self-effort from individual productive attributes is extremely important for the population's income differentials. Furthermore, the individual productive attribute attenuates the impacts of such inequalities when one considers that, even with the same chances, the results may be different, related to individual product characteristics or socially fair inequality (Rawls, 1971).

Empirical evidence has shown that individuals with the same levels of education face substantial barriers in the labor market. When employed, they earn incomes lower than those received by their peers (GAMA & MACHADO, 2014). These socioeconomic and demographic conditions that affect differentials in earnings from work express that a substantial portion of inequality may be related to characteristics other than just training and investment in human capital (Justo & Silveira Neto, 2008; Maciel & Hermeto, 2011).

These characteristics are partially observed since age, sex, education, region and sector of occupation, as well as the condition of residence and migration, among others, have a decisive role in the wage determination process (Maciel & Hermeto, 2011; Gama & Hermeto, 2017). However, unobservable characteristics affect earnings differentials, and only a portion of studies in the most recent economic literature, especially the empirical one, has been responsible for addressing such aspects and their impact on wage inequalities around the world (Heckman, 1976; 1979; Neuman & Silber, 1996; Oaxaca & Ramson, 1998; Neuman & Oaxaca, 2005). As a result, non-observable individual productive attributes

should be addressed in empirical studies that address the issue of inequality from the perspective of individuals' socioeconomic characteristics alone.

In the discussions that guide the neoclassical theory on migration, in a large number of necessary empirical studies, this phenomenon is treated from the perspective of individual decision, and it is the unobservable characteristics of individuals that make them a positively selected group of the population of a country (Sjaastad, 1962; Taylor, 1999). This sample of the population is not random, and unobservable characteristics make them more likely to migrate and, consequently, more likely to earn higher incomes from work than their non-migrant counterparts since these unobservable attributes may also contain unobservable productive characteristics. Observables higher than that of non-migrants.

From this point of view, not only do the socioeconomic and demographic characteristics of the population confer higher earnings from work than migrants, but there are unobserved components capable of enabling them to obtain higher earnings. These unobservable characteristics of the population affect wage inequalities; even with the same levels of education, occupied in the same sectors of activities, and with similar demographic characteristics, income differences persist (Gama & Machado, 2014).

Therefore, this article aims to test the hypothesis that Brazilian migrants make up a positively selected population group. If the hypothesis is confirmed, using the sample selection bias correction model proposed by Heckman (1979), an attempt is made to decompose the income differentials by the observable characteristics and the unobservable attributes of migrants and non-migrants based on the construction of counterfactuals.

Suppose the hypothesis of positive migratory selection of Brazilian migrants is confirmed. In that case, the national migratory movement can accentuate regional inequalities since the positively selected (more productive) form of work seeks opportunities in regions of greater economic dynamism, which can deepen existing regional economic disparities. In this sense, the results of this study can serve as a basis for the adoption of measures to mitigate migration, as a way of promoting regional economic growth, based on the use of productive human capital in originating regions, through the development of regional economic activities that can provide opportunities for growth and development through the use of domestic production factors.

Following these initial considerations, the second section of this article seeks to present some findings in the economic literature on income differentials due to individuals' most diverse observable and unobservable characteristics. In the third section, the methodological procedures used are presented. The empirical results are presented in the next section, and finally, in the fifth section, the final considerations are made.

2. Income Differentials in the Labor Market and Migratory Selection: a Literature Review

The theoretical discussion about income differentials in the labor market is treated in the international and national literature under different observation forms. A consensus, however, is on the fact that socioeconomic and demographic characteristics influence income differentials to a greater or lesser extent, depending on the country or region analyzed. The impacts are as diverse as possible and affect different ethnic-racial, age groups and differences in the human capital of the workforce (Neuman & Silber, 1996; Oaxaca & Ramson, 1998; Heckman, 1976; 1979; Funkhouser, 1996; Marcoullier et al., 1997; Márquez & Pages, 1998; Freije, 2001; Ribeiro, 2001; Corbacho, 2000; Corseuil et al., 2002a; Corseuil et al., 2002b; Neuman & Oaxaca, 2005; Orellano & Pazello, 2006; Camargo, 2006).

The classic determinants of wage differentials are also found in the migration condition of the labor force available in the market, one more attribute that can have favorable or unfavorable effects on this population group. The leading international (Borjas, 1987; Axelsson & Westerlund, 1998) and national (Santos Junior, 2002; Ramalho, 2005; Freguglia, 2007) empirical evidence, among many others, show that migrants make up a positively selected group of the population in the original regions and that unobservable attributes affect them in such a way that they also have unobservable productive characteristics that condition them, in addition to a greater probability of migrating, when they migrate, they give them better returns in the labor market, compared to non-migrants.

From this perspective, the originating regions present a loss of workforce with superior productive characteristics, and the receiving regions gain a contingent of the workforce with productive characteristics not observable through migration (Borjas, 1997; Chiswick, 1999; Taylor, 1999; Green et al., 2001; Ribeiro & Bastos, 2003; Ramalho, 2005; De Lima, Silva Filho & Cavalcanti, 2019). This movement of people provides substantially high performance in the labor market of the receiving regions. It corroborates low-performance rates in the labor market in the originating regions since the workforce with more productive characteristics migrates to other regions (Borjas, 1987; Santos Junior, 2002; Dustmann & Glitz, 2011).

In the labor market, empirical evidence shows that, in the places of destination, there is pressure on unemployment rates and nominal wages (Card, 2001a; 2001b) since the supply of labor increases and those with higher incomes stand out with superior productive characteristics. Thus, the unobservable characteristics that favor migration can also affect work and, thus, provide a higher rate of employability and, consequently, better income from work in the destination places.

In the national literature, controversies about the practical results of migratory dynamics are as diverse as possible. On the one hand, some defend, based on empirical

evidence, that migration causes income convergence since transfers arising from transfers issued by migrants to their families in the destination region have a meaningful impact on regional income in the areas broadcasters (Lewis, 1969; Ferreira & Diniz, 1995; Graham, 1977; Green et al., 2001; Cambota & Pontes, 2012; Fiess & Verner, 2003; Menezes & Ferreira Junior, 2003; Freguglia & Menezes-Filho, 2012). On the other hand, some argue that the migratory dynamic ends up accentuating regional disparities since the most productive workforce migrates seeking job opportunities in more prosperous regions, and this impacts by increasing income in the destination regions and not in the regions of origin (Ramalho, 2005; Dustmann & Glitz, 2011).

Income convergence based on migration processes in Brazil has also been addressed in the literature (Ferreira & Diniz, 1995; Ramalho, 2005; Cambota & Pontes, 2012). The results show that there is no convergence of earnings, for the most part. It is observed that the non-observable characteristics of migrants give them positively differentiated wage returns in their favor. In this way, what is done is to confirm that migrants are positively selected in terms of their characteristics and that the returns come from these productive characteristics in the labor market, which corroborates an increase in average income in the destination places and not at the origin (Cançado, 1999).

In Brazil, the vast majority of empirical studies show that migrants make up a positively selected group of the country's population, and internationally, most of the works consulted ratify selectivity and confirm that the income of migrants is higher than that of non-migrants (Ramalho, 2005; Netto JúnioR et al., 2008; Freguglia & Procópio, 2013; Graham, 1977; Wood, 1982; Borjas, 1998; Taylor, 1999; Chiswick, 1999; Cutillo & Ceccarelli, 2012). They have unobservable productive characteristics that condition them substantial differentials from the decision to migrate to the wage returns earned by them (Ramalho, 2005; Lima et al., 2011; Maciel & Hermeto, 2011; Gama & Machado, 2014; Lima et al., 2011; Gama & Hermeto, 2017). Therefore, the receiving regions obtain productivity gains with the additional workforce with high productivity rates. The evasive regions remain in processes of continuous loss of the productive workforce resulting from migratory processes.

Borjas (1987), Ramalho (2005), and Dustmann & Glitz (2011) understand that the population of migrants residing in a given region is positively selected. That is, they have unobservable characteristics that are positively favorable to their better performance when compared to a native in the same region. In this way, the impacts of migration are negative for the regions of origin since they lose a workforce with positive characteristics and better performance, and they are positive for the destination regions, given that they achieve better performance in their functions when compared to non-migrants.

Santos Junior et al. (2002), using data for the year 1999, show that Brazilian migrants are a positively selected group when considering the same in the destination

region[1]. The authors control for socioeconomic and demographic characteristics of individuals and conclude that migrants have higher average wages than non-migrants in Brazil. That is, unobservable characteristics of individual natures give them more significant returns on earnings from work than those earned by non-migrants, even when controlled for all possible observable characteristics.

Ramalho (2005), using data from the 2000 demographic census, shows positive migration selection when considering migrants residing in Brazilian metropolitan areas. The author considers as attributes of favorable selectivity the higher differentials in earnings from work for migrants compared to non-migrants. In addition, the author partially attributes income inequality in interregional spheres to the entry of qualified migrants in metropolitan areas and those with greater economic dynamism. Thus, the results converge with the model presented by Dustmann & Glitz (2011), which proposes loss of labor with more dynamic characteristics for the regions of origin and gain for the regions of destination, which, in a way, corroborates the inequality of the regional income.

Santos & Ferreira (2007) reach conclusions that differ slightly from those previously observed. The authors use PNAD data and show that migration corroborates the rise in average income in Brazilian states, with the exception of those with the most incredible economic dynamism – São Paulo and Rio de Janeiro. Thus, migration promotes the reduction of regional income inequality and positively affects regional income convergence in the long term. The results, however, differ from those achieved by Cançado (1999) when analyzing data for Brazil between 1960 and 1991. This author came to the conclusion that Brazilian migrations had null effects on the hypothesis of income convergence in the studied period. Furthermore, the positive migration balance contributed to an increase in per capita income, which suggests positive migration selection. That is, migrants are more skilled and earn higher incomes than non-migrants in the receiving regions, which increases the average regional income at the destination and not at the origin.

Furthermore, Freguglia's (2007) work shows that migrants are positively selected. For the author, unobservable characteristics of the Brazilian migrant population provide income differentials in their favor with non-migrants. These characteristics corroborate the hypothesis of favorable migratory selectivity. However, it is essential to observe that the Brazilian migratory dynamics of recent years present substantial transformations in the reasons for people leaving and entering the country's municipalities. Income control may not capture other socioeconomic issues of migrants in destination places.

However, Maciel & Oliveira (2011), using data from PNAD (2008), show that there is no favorable migratory selectivity among internal Brazilian migrants since the unobservable characteristics of migrants were not able to interfere in the differentials of labor earnings. For the authors, the high wage returns for migrants come from the returns

[1] The studies that deal with migratory selectivity approach it, for the most part, from the perspective of income. That is, the theoretical model suggests that non-observable characteristics of immigrants place them in better conditions than natives concerning income from work. That is, they have higher wages than non-migrants.

on migration investments. That is, the returns to migration are positive and increase as the conditional distribution of wages in the country grows. Thus, only some unobservable characteristics provide yield differentials, but the returns on migration investment.

Silva et al. (2016) tested the hypothesis of favorable migratory selectivity for the North region of Brazil based on data from the 2010 demographic census. The authors show that it is impossible to validate the hypothesis of migratory selectivity for the region since, only for short-term migrants, that is, those who migrated less than five years ago, it was possible to observe income differentials with a non-migrant. In addition, the authors show that each year that migrants stay in the North of the country implies a reduction that converges around 0.05% concerning that of non-migrants. Thus, classifying migrants from the North by the length of stay, only the most recent earn relatively higher income from work than non-migrants. Overall, there are no income differentials between migrants and non-migrants.

Thus, it is essential to pay attention to the fact that the high economic disparities in Brazil are one of the leading causes of migratory dynamics. The main reason for internal migration is caused by the movement of the workforce across the national territory (Silva Filho et al., 2017). This substantial concentration of large-scale production also strongly pressures unemployment rates (Card, 2001b) in the most dynamic regions, especially in periods of economic crisis or low performance. In this way, the more incredible performance of production at regional levels can have a solid contribution to the pressure on unemployment rates, as well as on nominal wages in the labor market, and this has repercussions on the hypothesis of migratory selection.

Since Brazilian regional disparities are one of the main causes of the migratory dynamics and the pressure on unemployment rates and wages in the country's labor market, reducing these disparities could have substantially positive effects on employment and labor income. In countries with high socioeconomic disparities, migration is largely determined by the search for better working conditions. In a situation of free mobility of the labor force, the adjustment of unemployment rates happens due to migration (Lewis, 1969). Poverty, given by disparities, substantially affects the economic performance of the workforce at origin and puts pressure on unemployment rates in destination places, especially in situations where the economy undergoes cyclical movements (CARD, 2001b). Thus, the process of positive migration selection can be due to issues inherent in the search for better working conditions for the country's population.

3. Methodological Procedures

In this article, we try to test the hypothesis of positive migratory selection through Heckman's (1979) sample selection bias-corrected model. If the hypothesis that migrants are a positively selected group of the population is proven, the second step is to resort to the decomposition of Oaxaca (1973) and Blinder (1973), with corrections proposed by Neuma & Oaxaca (2006) and Cutillo & Ceccarelli (2012), from the earnings equation (Heckman's

second stage). With the estimates of the income equation method, the objective is to observe, from the decomposition, which attributes corroborate proportionally more significant income differentials between migrants and non-migrants.

3.1 Database, Variable Averages, and Time Frame.

The data are from the Brazilian demographic censuses of the years 2000 and 2010 and work with inter-municipal migration on a geographic and fixed-date scale. The sample is composed of 6,889,619 and 6,889,607, in 2000 and 2010, respectively. The sample size was previously defined, based on the databases. All those who failed to answer any of the questions used in this article were excluded; and, from that, it was decided to use equal samples in both years, with a loss of 12 observations in the year 2010.

Table (1: Description of the Variables Used and Standardized in the 2000 and 2010 Censuses

Migra	Binary (1) for people who said they lived in another municipality in 1995 and 2005, in the 2000 and 2010 censuses, respectively; (0) otherwise.
Sexo	Binary (1) for male; (0) for female
Racacor	Binary (1) for White; (0) for blacks, browns, and yellows (indigenous people were excluded from the sample).
Idade	Age of the reference person in the research. Age squared was also used in the estimates, as indicated in the literature.
Seminstfundinc	For people who declared to have no education or to have at least incomplete primary education.
Fundcompmedinc	For people who declared having completed primary education and incomplete secondary education.
Medcompsupinc	For people who declared having completed high school and incomplete higher education.
Supcomp	For people who declared having completed higher education.
Estadocivil	Binary (1) for people who declared to be married; and (0) for singles
Chefedom	Binary For people who declared to be responsible for the household.
Filho	Binary For people who said they occupy the position of son in the household.
NO	Binary for people who said they live in a municipality in the North region of the country.
NE	Binary for people who said they live in a municipality in the Northeast region of the country.
SE	Binary for people who said they live in a municipality in the Southeast region of the country.
SU	Binary for people who said they live in a municipality in the southern region of the country.
CO	Binary for people who said they live in a municipality in the Midwest region of the country.
Rendatrab	Total declared income from main job or other jobs.

Source: Author's elaboration based on data from the 2000/2010 demographic censuses

Table 1 above shows how the variables used in this article were constructed. The 2000 and 2010 censuses were standardized to make the variables compatible and comparable throughout the study.

Table 2 presents the variables used and their average values. The results show that, on average, migrants are younger than non-migrants, and migrants have higher percentages than non-migrants concerning higher levels of education.

Table (2): Descriptive Statistics of the Variables Used in this Study for Brazil: 2000/2010 Censuses

Variáveis	2000		2010	
	Não Migrante	Migrante	Não Migrante	Migrante
Sexo (Masculino)	63.1	65.7	59.4	63.1
Racacor (Branco)	54.8	55.0	48.6	47.9
Idade	34.5	31.7	35.9	32.6
Instrução				
Seminstfundinc	54.6	54.8	40.6	37.6
Fundcompmedinc	16.8	17.2	18.2	19.1
Medcompsupinc	25.8	24.6	30.3	30.4
Supcomp	2.8	3.3	10.4	12.7
Domicílio				
Estadocivil (Casado)	46.3	42.0	42.4	36.6
Chefedom	49.2	52.3	44.8	47.6
Filho	25.7	14.0	23.1	10.5
Região				
NO	6.5	8.6	7.6	9.5
NE	27.1	22.0	26.6	20.9
SE	38.7	34.5	39.8	37.5
SU	19.7	21.4	17.3	18.1
CO	8.2	13.6	8.7	14.0
Trabalho				
Rendatrab	1,131.02	1,198.24	1,072.60	1,284.46

Source: Author's elaboration based on data from the 2000/2010 demographic censuses

Furthermore, married migrants are relatively less in percentage terms than non-migrants, which may result from the effort in search of better opportunities, even before the formation of family nuclei. In addition, they are relatively majority-heading households since the migration of young people and alone are the majority in the country. There are relatively fewer lookouts that occupy the position of children in Brazilian households. In addition, it should therefore be noted that earnings per hour of work are higher for migrants than for Brazilian migrants.

3.2 Empirical Model Used

Migration studies present several theoretical hypotheses for migration decisions and their socioeconomic impacts on post-migration living conditions. However, one of the most common errors in studies on migration and income differentials between migrants and non-migrants is the fact that it is stated, in principle, that investment in migration is a determining factor in the acquisition of higher wages in their favor, which may carry sample selection bias in these analyses, as there may be a non-linear relationship not captured by simple methods.

Due to the neoclassical theoretical approach and the dissemination of studies on Brazilian migrations, the presence of non-observable productive characteristics intrinsic to migrants, such as aggressiveness, ambition, determination, enthusiasm at work, and motivations, cannot be captured, or at least verified, without a more robust empirical exercise that can correct the selection bias about migrants. Thus, when it is stated that the probability of migrating and the possible effects on income differentials are due to the more significant investment in human capital inherent to migrants, one may be omitting the migratory selectivity bias found in classic international studies and more recent studies nationwide (Borjas, 1997; Chiswick, 1999; Santos Junior, 2002; Fiess & Verner, 2003; Ribeiro & Bastos, 2005; Maciel & Hermeto, 2011; De Lima et al., 2019; Gama & Hermeto, 2017).

Because of this, it is essential to test the hypothesis of positive migration selection and, with that, to analyze the income differentials between migrants and non-migrants without neglecting the existence of unobservable characteristics, that is, the selection biases that affect the decision to migrate (Heckman, 1979). Thus, the procedure instituted by Heckman in two stages with the correction of sample selection bias is used. The objective is to observe the characteristics that directly impact the migration decision. That is, if migrants are, in fact, a positively selected group of the Brazilian population.

Therefore, Heckman's study (1979) is based on the study, which proposes a model with sample selection bias correction to capture the effects of unobservable characteristics that affect individuals' decisions. With this, the estimation of the earnings from work equation is based on the classic Mincerian equation for determining wages, using observable variables that affect earnings (Mincer, 1971), in which:

$$\ln W_i = \beta X_i + \delta I_i + \mu_i \quad (1)$$

$\ln W_i$is determined as the logarithm of the salary of the employed workforce with $W_i > 0$, $X_i$if it refers to the set of observable socioeconomic and demographic characteristics that affect the earnings of the employed workforce; $I_i$is defined as a variable Bináriathat assumes 1when the individual responds to being born in another municipality and living in the current municipality for less than five years at the time of the survey, that is, being a fixed date migrant, and , otherwise 0; $\mu_i$is defined as the stochastic error term of the model.

In this study, it is assumed that migrants are not a random sample of the population residing in a Brazilian municipality, that is, migrants have unobservable characteristics that have a positive impact on the decision to migrate. Thus, adding the wage determination equation, another sample selection bias correction equation instituted by Heckman (1979) is necessary. Whatever:

$$I^* = Z_i\gamma + \varepsilon_i \quad (2)$$

In this equation, Z_i is defined as a set of unobservable characteristics that impact an individual's decision to migrate i. These characteristics confer a differentiated status on the migrant and classify him as a member of a positively selected group. Thus, these characteristics affect the decision to migrate and, consequently, to be in another Brazilian municipality, different from where it was five years before the census survey. Furthermore, if the individual migrates $(I = 1)$, then $(I^* > 0)$. In these terms, the probability of migration will be associated with net earnings from work higher than 0in the place of destination of the migrants.

When considering that migrants are a positively selected group and not a random sample of the population of a country, the first stage of the procedure proposed by Heckman (1979) is used, with the correction of sample selection bias, which can be estimated through a model Probit, where the characteristics that influence the migration decision can be estimated from the mathematical instruments presented in the equation (3). By this equation, the probability of an individual ibeing migrant can be expressed as follows, based on Cameron & Trivedi (2005, chapter 16, pages 539 to 543), Greene (2012) and presented in Maciel & Hermeto (2011):

$$\begin{aligned} \Pr_i(I = 1) = \Pr_i(I^* > 0) &= \Pr_i(Z_i\gamma + \mu_i > 0) \\ &= \Pr_i(\varepsilon_i > -Z_i\gamma) \end{aligned} \quad (3)$$

Here, the instrument proposed by Heckman (1979) is used, in which the vector of variables Xcontains the observable socioeconomic and demographic characteristics that affect the migration decision, and certainly maintains characteristics in common with those contained in the vector Zthat contains the variables that are determinants in the earnings equation, that is, the wages of the workforce employed with $W_i > 0$. However, at least one of the variables contained in X(vectors with variables determining the probability of migrating) must not be in Z(vectors of variables that influence earnings from work).

Thus, of the variables contained in the first equation, the migration decision, only the variables Estadocivil, Chefedomand Filhoare not contained in X, that is, the wage equation, as they are not considered in the literature as relevant variables in determining earnings from work. In the first stage, the probability of migrating is estimated where the variable Migrais the dependent one; in the second stage, the income equation is estimated, where o ln _rendatrabis the variable to be explained, conditioned to migrants (I=1).

From this, the wage equation can be rewritten as follows[(2)], when one has $\ln W_i$observed, if and only if, $(\varepsilon_i > -Z_i\gamma)$such that the stochastic errors of the wage migration equations (μ_i e ε_i)are normally distributed with zero mean and correlation ρ. In this way, the equation of wages from work can be restated as follows:

$$\begin{aligned} S[\ln W_i | I^* > 0] &= S\langle \ln W_i | \varepsilon_i > -Z_i\gamma \rangle = \beta X_i + \delta I_i + S\langle \mu_i | \varepsilon_i > -Z_i\gamma \rangle \\ &= \beta X_i + \delta I_i + \rho\sigma_u \lambda_{i(\alpha_\varepsilon)} \\ &= \beta X_i + \delta I_i + \gamma_\lambda \lambda_i(\alpha_\varepsilon) \end{aligned} \quad (4)$$

Understanding that:

$$\begin{aligned} \alpha_\varepsilon = \left(\frac{-Z_i\gamma}{\sigma_\varepsilon}\right) \text{e } \lambda(\alpha_\varepsilon) = \left[\frac{\phi(Z\gamma_i/\sigma_\varepsilon)}{\Phi\left((Z\gamma_i/\sigma_\varepsilon)\right)}\right]; S[\ln W_i | \varepsilon_i > -Z_i\gamma] + v_i \\ = \beta X_i + \delta I_i + \gamma_\lambda \lambda_i(\alpha_\varepsilon) \\ + v_i \end{aligned} \quad (5)$$

Thus, if the expectation of the errors of the equation 1is not equal to zero, the estimates by Ordinary Least Squares (MQO)will be biased, since $\rho \neq 0$. Therefore, the omission of the Inversa da Razão de Millsone represented by λwould not allow estimating the equation without capturing the sample selection bias (correction instituted by Heckman, 1979). Thus, the second stage of Heckman's model (1979) with correction for sample selection bias suggests that the equation of earnings that are influenced by Ncharacteristics between different groups be estimated as follows:

[(2)] See Cameron & Trivedi (2005, chapter 16, pages 539 to 543).

$$\ln W_i = \beta X_i + \boldsymbol{\gamma\lambda_i} + v_i \quad (6)$$

where $\ln W_i$is the natural logarithm of wages derived from migrant work; $X_i$is a vector of control variables that is composed of socioeconomic and demographic variables; and, $\lambda_i$is theInverso da Razão de Mills (IRM), with correction for sample selection bias; $v_i$is a stochastic error vector of the fitted regression. This equation is adjusted only for the migrant group (I=1). Analogous adjustment was performed for the non-migrant group. That is, in the first stage, the probability of being a non-migrant was adjusted and, in the second stage, the income determinants controlled by IRMthe non-migrant selection function.

Therefore, the first and second stage estimations were corrected, and the results of the coefficients will not be biased. Controlling for selection bias allows for robust parameter estimates for this type of study.

Then, after verifying that migrants make up a positively selected group of the Brazilian population, the decomposition method was used, based on the construction of a counterfactual for equations for non-migrants, with the dependent variable being ln _rendatrab. The covariates are the same ones used in the migrant earnings equation. From the calculation of counterfactual earnings, it must be decomposed by characteristics, the impacts of each of the observable variables and the non-observable productive attributes on labor earnings. The decomposition takes the following form (Neuman & Oaxaca, 2005):

$$\overline{Y}_m - \overline{Y}_{nm} = \overline{X}'_{nm}\left(\hat{\beta}_m - \hat{\beta}_{nm}\right) + \hat{\beta}_m(\overline{X}_m - \overline{X}_{nm})' + \left(\hat{\theta}_m\hat{\lambda}_m - \hat{\theta}_{nm}\hat{\lambda}_{nm}\right) \quad (7)$$

The subscripts mand nmare assigned to migrant individuals and non-migrant individuals, respectively; the matrices $\overline{X}$are composed of the average characteristics of migrants and non-migrants; the vector βreturns the characteristics contained in the matrix $\overline{X}$; o $\overline{Y}_{im}$represents the average return on the migrant's earnings from work; $\overline{Y}_{inm}$the average return to labor income of non-migrants used as a counterfactual.

Rewriting the equation above, the decomposition is maintained from observable and non-observable characteristics, eliminating with the selectivity bias subtracted from the income values.

$$(\overline{Y}_{im} - \overline{Y}_{inm}) - \left(\hat{\theta}_{im}\hat{\lambda}_{im} - \hat{\theta}_{inm}\hat{\lambda}_{inm}\right) = \overline{X}'_{inm}\left(\hat{\beta}_{im} - \hat{\beta}_{inm}\right) + \hat{\beta}_{im}(\overline{X}_{im} - \overline{X}_{inm})' \quad (8)$$

From the equation, 8the results are presented with the decomposition of the observable characteristics of each vector βand the average characteristics instituted in the matrix $\overline{X}$that aggregates the average values of the variables. Thus, on the left side, there is the sum of total inequalities minus the selection bias; on the left side, there is the sum of the

inequality component attributed to the differences captured by $\beta`_s$ and the characteristic effect arising from the differences between Brazilian intercity migrants and non-migrants.

4. Results and Discussions

Due to the observable characteristics of the Brazilian population, it was possible to present, in Table 1, those that may influence the probability of intercity migration in the country. The estimates presented in Table 3 shows that the classic variables widely discussed in several empirical studies stand out in the probability of an individual being a migrant. Men are more likely to be migrants compared to women in both years. It is pertinent to point out that the value of the coefficient of the variable for the year 2010 increases compared to the year 2000, showing that, in addition to the probability being more excellent, it is still increasing. Concerning race/color, despite being statistically significant, the coefficients are markedly low, showing that there is no substantial influence of race/color on the probability of migration in the country, these results being convergent with those found by Maciel and Hermeto (2011); Silva et al., (2016); Gama and Hermeto (2017).

In the year 2000, being of a white race/color increased the probability of being a migrant compared to being a non-white. In 2010, the sign of the variable's coefficient changed, and the probability of a white individual being a migrant was reduced with a non-white individual. The sign change may only reflect the increase in the number of self-declarations of race/color in census surveys, given by the greater awareness of the population with ethnicity. Furthermore, the low values assumed by the coefficients show that race/color does not present substantial differences in inter-municipal migration between banks and non-whites in the inter-census period.

The coefficients and signs assumed by the variable indicate a reduced probability of migrating. That is, one more year reduced by four percentage points in 2000 and by three percentage points in 2010 the probability of an individual being an intercity migrant in Brazil. In addition, concerning the probability of being a migrant, according to the level of education, it is possible to see that using the uneducated and with incomplete primary education as a reference category, the probability of being a migrant is reduced for those with complete primary education and incomplete average in both years, but it rises for those with complete secondary education and incomplete higher education, albeit slightly. Those who have completed higher education are more likely. For these, the probability is 18 percentage points in the first year and 22 percentage points in the last year, compared to those with less schooling. That is, the probability of intercity migration in Brazil is recorded at the extremes of schooling. It is damaging for those who have completed elementary school and incomplete high school; and favorable for those with at least secondary education, converging with the findings of Gama and Machado (2014) for the state of Minas Gerais and Silva Filho and Resende (2021) for the Northeast region.

Table (3): Estimates of the Probability of Migration to Brazil in the 2000 and 2010 Censuses

Variável dependente = Migra	2000	2010
Constante	-0.198***	-0.416***
	(0.007)	(0.008)
Sexo (Masculino)	0.129***	0.142***
	(0.002)	(0.002)
Racacor (Branco)	0.017***	-0.003**
	(0.001)	(0.002)
Idade	-0.037***	-0.033***
	(0.0000)	(0.0004)
$Idade^2$	0.0002***	0.0001***
	(0.00000)	(0.00001)
Fundcompmedinc	-0.018***	-0.002
	(0.002)	(0.002)
Medcompsupinc	0.010***	0.016***
	(0.002)	(0.002)
Supcomp	0.178***	0.217***
	(0.004)	(0.002)
Estadocivil (casado)	-0.152***	-0.162***
	(0.002)	(0.002)
Chefedom	-0.093***	-0.067***
	(0.002)	(0.002)
Filho	-0.793***	-0.826***
	(0.002)	(0.002)
NO	0.222***	0.196***
	(0.003)	(0.003)
SE	0.071***	0.124***
	(0.002)	(0.002)
SU	0.159***	0.166***
	(0.002)	(0.002)
CO	0.365***	0.360***
	(0.002)	(0.003)
R^2	0.417	0.3853
Observations	6,889,619	6,889,607

Nota: $*** p < 0,01; ** p < 0,05; * p < 0,1$

Source: Author's elaboration based on data from the 2000/2010 demographic censuses

It is essential to highlight that marital status, head of household, and child status reduce the probability of an individual being an intercity migrant in Brazil. The effect of marital status on the reduction in the probability of being a migrant is 15 percentage points in the first year and 16 percentage points in the last year under analysis. Having a child in the household reduces the probability of being a migrant by 79 percentage points and 82 percentage points in 2000 and 2010, respectively, compared to the category omitted from

the model. Empirical studies also present similar results in the international and national literature (Mincer, 1978).

Furthermore, it is essential to highlight that residing in any Brazilian region increases the probability of being a migrant, having as a reference a resident in the Northeast region (the Northeast region is omitted in the model). That is, residing in the North of the country increases the probability of being a migrant by 22 percentage points, against 20 percentage points when residing in the Northeast, in 2000 and 2010, respectively. Furthermore, residing in the Southeast increases the probability of being a migrant by seven percentage points and 12 percentage points in the first and last year, respectively, compared to a resident in the Northeast. Living in the Midwest had the highest coefficient compared to a resident in the Northeast. That is, residing in the Midwest region increased the probability of being a migrant by 37 percentage points in the first and 36 percentage points in the second year under analysis.

Based on the results, although the Northeast has entered the process of reversing its migration rates, reducing its share among the migrants' places of origin and maintaining high return migration rates (Oliveira & Jannuzzi, 2005; Justo et al., 2012), the probability of an individual being a migrant living in any other region of the country is even more outstanding compared to an individual residing in the Northeast, which defines other regions as potential recipients of migrants.

In the earnings equation (Table 4), the data reveal substantial differentials in earnings arising from the individual characteristics of the population. The person variable has a high coefficient, showing that the income differentials between men and women are discrepant, in addition to having increased its value in the year 2010 compared to the year 2000. In the first year, a male-employed migrant received 45 percentage points more income from work than a female individual in the same condition. In the second year, the gap rises to 47 percentage points, converging with a large number of empirical studies carried out at the international and national levels (Brown et al., 1980; Macpherson & Hirsch, 1995; Neuman & Weisberg, 1998; Gama & Hermeto, 2017).

Concerning race/color, the coefficient assumed by the variable shows that the gap is reduced since, in 2000, a white individual had an income 18 percentage points higher than a non-white individual. In 2010, race/color still affected the income log by 13 percentage points in favor of those who declared themselves white, compared to non-whites, with the results converging with the international and national literature (Reimers, 1983; Soares, 2000; Crespo & Reis, 2004; Kim, 2010; Gama & Hermeto, 2017; Silva Filho & Resende, 2021). It is essential to point out that although the probability of migration is slightly affected by race/color, this variable is of crucial importance in determining the salary of migrants in the country, according to the results of the coefficients presented.

With regard, this variable showed coefficients indicating that one more year increased income by ten percentage points in 2000 and 7 percentage points in 2010. A had a negative sign, indicating an inverted U relationship between income and age. The results

converge with those in the literature, showing that age is essential in determining earnings, which may be associated with an increase in workforce experience over the years. Nevertheless, income starts to decline after a certain age.

Table (4): Heckman's Second Stage Estimate of the Determination of Labor Income of Migrants in Brazil – 2000/2010

Variável dependente = ln_rendatrab	2000	2010
Constante	3,968***	4,553***
	(0.011)	(0.013)
Sexo (Masculino)	0.460***	0.466***
	(0.002)	(0.002)
Racacor (Branco)	0.184***	0.126***
	(0.002)	(0.002)
Idade	0.096***	0.071***
	(0.000)	(0.001)
Idade²	-0.001***	-0.001***
	(0.000)	(0.000)
Fundcompmedinc	0.415***	0.271***
	(0.003)	(0.003)
Medcompsupinc	0.994***	0.608***
	(0.002)	(0.002)
Supcomp	1,911***	1,449***
	(0.005)	(0.003)
NO	0.252***	0.225***
	(0.004)	(0.004)
SE	0.395***	0.323***
	(0.003)	(0.003)
SU	0.280***	0.295***
	(0.003)	(0.003)
CO	0.318***	0.346***
	(0.003)	(0.004)
Inverse Mills Ratio	-0.296***	-0.199***
	(0.006)	(0.005)
rho	-0.365	-0.266
sigma	0.8109	0.7491
R^2	0.4053	0.3853
Observations	6,889,619	6,889,607

Nota: $*** p < 0,01$; $** p < 0,05$; $* p < 0,1$

Source: Author's elaboration based on data from the 2000/2010 demographic censuses

The coefficients for schooling, regarding individuals without education and with incomplete primary education, show that schooling is essential for wage returns in the labor market (ROCHA et al., 2010; SILVA FILHO & RESENDE, 2021). Having completed high school and having incomplete higher education increases *log* income by 174% in the first and 84% in the second year under analysis[(3)]. concerning those employed with complete higher education, income from work was approximately six times higher in 2000 and 3 times higher in 2010 compared to an individual without education and with incomplete primary education. In the first year, the income from work of an individual with a university degree was approximately 600% higher than that of an individual with no education and incomplete primary education (reference category). In 2010, the gap was reduced to approximately 300%.

The returns on investment in human capital, despite still being high compared to those with a lower level of education, are substantially reduced over the years. There is a compression in earnings from work, reducing the gap between more educated and less educated migrants employed in the country. This reduction was recorded at approximately 50% for migrants employed with higher education courses in the inter-census period.

Also, in Table 4, it is worth mentioning the fact that he is working in more dynamic geographic regions for wage returns in the labor market. Taking the employed in the Northeast as a reference category (omitted variable), migrants in the North received, on average, 25 percentage points in 2000 and 22.5 percentage points in 2010 more than an employed migrant in the Northeast. Migrants employed in the Southeast have the highest earnings from work compared to those employed in the Northeast, and in 2000, the gap reached 40 percentage points. In the second, despite the reduction, it still recorded 32 percentage points, the region with the most significant income differentials in the country, and comparatively to the income from work earned by those employed in the Northeast Brazilian.

The values remained practically constant in the South region, approximately 28 percentage points in the first year and 30 percentage points in the second year. The Center-West increased the gap in 2010 compared to the year 2000. In this region, an employed migrant earned 32 percentage points in the first year and 36 percentage points in the second year, more than an employed migrant in the Northeast. It was one of the only regions in the country that showed an increase in the already existing gap in labor income for employed migrants, in addition to being one of the regions that have attracted the most migrants in recent years (Guimarães & Leme, 2002; Brito, 2006; Juttel, 2007).

Table 5 shows the data referring to the decomposition of earnings differentials between migrants and non-migrants employed in the Brazilian labor market in the years 2000 and 2010. For analytical simplicity, Neuman & Oaxaca (2005) suggest isolating the

[(3)]The calculation is made from the coefficients presented by the variables, according to the Table, using the following expression: Exp(Coefficient)-1, as indicated in the literature.

effect of selectivity in income differential, interpreting only the remaining portion due to observable and unobservable factors. Thus, the contribution percentage was calculated only for the differential portion after excluding the selectivity component contribution.

The results show that the unobservable effects are primarily responsible for the income differentials between migrants and non-migrants. These contribute to a higher income for migrants than non-migrants, corroborating the hypothesis of favorable selectivity. In the year 2000, the effects of unobservable characteristics (coefficients) of migrants contributed to an increase by approximately 0.63 the average income log of migrants with non-migrants, that is, in percentage terms, 88% more. In 2010, although with a reduction, the non-observable characteristics increased by 0.57 the average income log in favor of migrants. That is, 77% of wage differentials. The observable characteristics corroborated higher incomes in favor of non-migrants to the detriment of migrants in the same year. In both years, these observable characteristics corroborated differentials of 2% in earnings from work in favor of non-migrants, higher than those recorded for migrants. Considering the total effects, migrants had, on average, 1% of characteristics that corroborated better earnings from work compared to a non-migrant in the year 2000 and 11% in the year 2010.

Table (5): Decomposition of the Marginal Effects of Observable and Non-Observable Characteristics on the Income Differentials of Non-Migrants and Migrants - 2000/2010

Efeitos	2000		2010		Variação (10 − 00)
	Absoluto	Relativo	Absoluto	Relativo	
Sexo	0.013		0.034		0.021
Racacor	-0.006		-0.009		-0.003
Idade	-0.096		0.041		0.137
Idade^2	-0.043		-0.095		-0.051
Fundcompmedinc	-0.028		-0.012		0.016
Medcompsupinc	-0.004		-0.011		-0.007
Supcomp	-0.001		0.009		0.010
NO	-0.002		-0.002		0,000
SE	-0.042		-0.041		0,000
SU	-0.022		-0.021		0.001
CO	-0.009		-0.009		-0.001
Efeito Coeficientes	0.627	104	0.5687	96	-0.058
Efeito Características	-0.023	-4	0.0244	4	0.047
Seletividade	-0.596		-0.480		0.116
Diferença total	0.008	100	0.113	100	0.105

Source: author's elaboration based on estimates based on data from the 2000/2010 demographic censuses.

Based on the results, migrants show unobservable characteristics such as ambition, persistence, determination, enthusiasm, and daring, in addition to non-measurable productive attributes in the labor market that give them higher incomes than non-migrants in both years under analysis. As a result, in addition to being positively selected in the region of origin, given that they have characteristics that make them more prone to migration when they migrate, they still earn better income in the labor market than non-migrants.

5. Final Considerations

This article aimed to analyze whether Brazilian intercity migrants are a positively selected population group. A two-stage Heckman procedure was used with sample selection bias correction for data from the 2000 and 2010 censuses.

The results showed that Brazilian intercity migrants are a positively selected group of the country's population. The inverse of the Mills ratio shows statistical significance at 0.001, confirming the hypothesis of positive migratory selection for Brazilian fixed-date migrants in the two censuses under analysis.

Heckman's first stage shows that the probability of migration is more remarkable for white men in 2000 and non-white men in 2010. The probability decreases with increasing age and increases with schooling, with higher associated coefficients to the probability of migration for those who have completed higher education in the two censuses under analysis. If individuals have a university degree, the probability of being an intercity migrant is approximately 18 percentage points in the first and 22 percentage points in the second year studied.

Regarding marital status, the probability decreases with marriage and with the position of head of household, as well as among those with the position of the child in Brazilian municipal households. These results converge with those of the international literature, which indicates that the decision to migrate after the marital union becomes of a family nature and that those responsible for the household or spouses with stronger family ties end up having a lower probability of becoming a migrant in Brazilian territory.

Concerning the region of residence, residing in the North, Southeast, South, and Midwest increases the probability of being a migrant compared to a resident in the Brazilian Northeast. The values assumed by the coefficients show that, even though the Northeast is a potentially receiving region for returned migrants in recent years, its characteristic of an expulsion region prevails. That is, the probability of a resident in other regions of the country being a migrant is much greater than that of a resident in the Northeast since the region was, for many decades, one of the central regions of migratory evasion throughout the country.

In the income equation, Heckman's second stage, the results converge with those of the national and international literature, showing that income is higher in favor of men of white race/color and grows with age but in a decreasing way. In addition, income increases

with schooling, showing that investment in human capital is a crucial way to earn better income from work in the country. Furthermore, the region of occupation has an important influence on the labor income of migrants. Being employed in the Southeast and Midwest of Brazil provides the highest wage returns compared to those employed in the Northeast. In addition, those employed in the North and South also earn higher incomes than those employed in the Northeast.

Thus, the results presented by the decomposition corroborate that migrants make up a positively selected group of the population and that, in addition to having a greater probability of migrating and of better income from work, when they migrate, the unobservable characteristics give them a more significant share in the income of the work, showing that they are more motivated, persistent and productive in the Brazilian labor market.

From this, it is opportune to point out that the favorable migratory selectivity in Brazil can accentuate the problems faced by regional socioeconomic inequalities. As evidence of selectivity denounces, migrants are more motivated, persistent, ambitious, and consequently more productive in the labor market than non-migrants. Therefore, the migration of the productive Brazilian workforce occurs from less dynamic regions to more economically dynamic ones. Therefore, the most productive human capital impacts the destination regions, increasing their productivity and accentuating inequalities in the region of origin.

In practical terms, the contribution of this study is to propose policies to reduce regional economic disparities, by encouraging the development of economic activities, according to their potential, in all regions of the country. With this, the reduction of the migratory flow of productive human capital to more dynamic regions must be reduced in such a way that they can contribute to the growth and economic development of their original regions since the policies to promote the reduction of regional inequalities in Brazil must list measures for the development of potential economic activities in each of its macro-regions.

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