HIGH-SKILLED MIGRANTS AND REGIONAL INEQUALITY IN BRAZIL

Ricardo Sabbadini
Carlos R. Azzoni
Eduardo A. Haddad

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High-skilled migrants and regional inequality in Brazil*

Ricardo Sabbadini[1]
Carlos R. Azzoni[2]
Eduardo A. Haddad[3]

Abstract

The paper shows an overview of internal migrations in Brazil, with emphasis on migrants with Master and Ph. D degrees. Origin-destination matrices for high-skilled migrants are constructed for the 80s and 90s, allowing for the observation of an increase in the skill level of the migrants. Although migration flows are decreasing as a whole in the country, high-skilled migration flows are increasing. Some aspects of this process are highlighted, such as the fast growth in the supply of graduate programs in poorer regions, and the changing importance of migration flows.

Keywords: internal brain drain, educated migration, internal migration

1. Introduction

According to Pereira (2000), migrants account for 32.9% of Brazilian population. The migration process is fundamental for understanding the regional impacts of economic phenomena. Recent studies have shown important changes in migration trends within Brazil, such as increases in age, income and educational level of migrants. This study concentrates on the educational level, analyzing the possible existence of brain drain among Brazilian states.

This topic is typically studied in cross-country migration, with few studies on intra-country migration flows. This study focuses on migration flows of people with master and Ph. D. level in Brazil. This is a progress report on the preliminary stages of the study. At this point, only a general description of numbers and trends is provided, and some possible causes for them are suggested. In later stages of the study, econometric models will be estimated to assess the explanations for the trends observed.

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[1] Undergraduate Student, member of the Scientific Initiation Program, Faculty of Economics, Administration and Accountancy, Univeristy of São Paulo, Brazil
[2] Professor of Economics, University of São Paulo, Brazil
[3] Associate Professor of Economics, University of São Paulo, Brazil

This paper is organized in six parts. The next section presents some studies on migration in Brazil; the following section briefly reviews the literature on brain drain. Section 4 presents the data and the migration indicators used in the study. Section 5 presents and discusses the results, and the final section displays the conclusions.

2. A brief overview of internal migration in Brazil

According to Pereira (2000), internal migration is important in Brazil since 1930, and is related to the economic, social, and political transformations experienced by the country. But even well before the 30s migration flows were observed, such as the gold fever in the colonial era, or the rubber fever in the Amazon at the dawn of the XX Century. In the 1930s, 40s, and 50s migration flows were directed towards São Paulo state, in the Southeast of the country, pulled by the industrialization process taking place in that area. In the 60s a decline in migration flows towards São Paulo was observed, mainly diverted to the Mid-West, for the construction of Brasília, the country's capital city, and for the provision of labor for the moving agricultural frontier. In the 70s, however, the main metropolitan areas in the Southeast attracted large flows of migrants, expelled from agriculture in different regions of the country. In the 80s, those flows headed towards middle-size cities as well, given the higher costs and congestion problems in the larger cities. In the 90s migration flows were not as important as in the past.

However, important changes were observed, such as a decrease in the number and proportion of young migrants to São Paulo state, and an increase in their education level (Silveira-Neto, 2004). Analyzing migration flows in general in Brazil, Pereira (2000) finds that migrants are older, better educated, live in smaller households, and present higher income levels. This paper will concentrate on the education levels of migrants.

3. Brain drain

Gunnar Myrdal was a pioneer in indicating that migration is selective, attracting the best for the higher income level regions, in a process later labeled as brain drain (Myrdal, 1968). This subject is usually analyzed in the context of international migration, especially starting in the 1950s. Although the usual case is the poor-to-rich country movement, even rich-to-rich country situations were present. Portes (1976) indicates that 12% of British Ph. D. moved from the UK to the US in the early 60s.

This process has implications for the production levels of senders and receivers. Kwok-Leland (1982) stresses asymmetrical information as a cause for the phenomenon. Since employers in the sending countries have no information on the marginal productivity of college students studying abroad, they tend to offer wage levels based on the average productivity of workers in general. Receiving country employers, however, have better information on their marginal productivity, and offer corresponding wages. This information asymmetry generates brain drain, for the receiving country's employers will offer higher wages than in the sending countries. Therefore, they are able to hire the best foreign students, leaving no alternative for the not-so-good foreign students than to go back to the home country. There, they will have lower productivity than the ones that remained abroad, creating a productivity gap that will reinforce brain drain. The wage difference between poor and rich country would, therefore, be the consequence, and not the cause, of brain drain.

Blomqvist (1986) considers the possible reduction in welfare in the sending country due to the loss of educated people. Using a dynamic capital accumulation model, the author indicates that migration could either diminish or augment the sending country product, for the possibility of out-migration could represent an incentive to potential migrants to acquire more education. If this effect is big enough, the sending country could benefit from the possibility of sending educated people abroad. This can only happen if the marginal productivity of human capital is higher than the marginal productivity of physical capital.

Miyagiwa (1991) indicates that the receiving country experiences increases in its education and income levels. The main damages in the sending country accrue to people with average education levels. The model stresses economies of scale in education in the receiving countries, for the attracted brains will help creating synergies in a larger pool of educated people. Their productivity will be even higher due to these positive externalities.

In a sociological study, Portes (1976) deals with three different determinants of brain drain. The primary factor is inequality of conditions, for richer countries can afford to offer better wages and social conditions for research. The quantitative and qualitative differences in labor demand and supply between countries are the secondary factors. The tertiary factor is related to individual differences, involving schooling, social group to which the individual belongs, etc. A well educated person belonging to a social group that values migration will have a larger probability to migrate.

Few studies are available in Brazil about brain drain, and they were developed many years ago, such as Schwartzman (1972) and UNESCO/UNO (1978), both dealing with the 70s. More recently, Guimarães (2002) studies internal migration of Brazilian researchers,

based on questionnaires. He concludes that researchers moved to research institutions in the South and Southeast in search for better working conditions. However, quality of life aspects were also involved, for large flows were observed to places with less scientific reputation. Over time, migration of researchers has augmented.

4. Methodology and data

4.1. Data and operational definition of brain drain

Based on micro data of the 1991 and 2000 population censuses, two interstate migration matrices were constructed. All persons with master or Ph. D. degree are considered. For the state of origin we considered the state in which the person was born. Thus, we first considered as subject of brain drain those persons which lived in a state different from the state of birth. However, this is too broad a definition, for it includes people that moved to a different state and their received education. We wanted to consider brain drain when a person completes education in one state and then moves to other state. Considering the limitation in the data source, we have defined as a subject of brain drain a person that

i) was born in another state;

ii) the difference between the individual's age (I) and the expected education completion age (EI) must be larger than the number of years living in the state (TM). That is, the expected time after graduation (I – IE) must be larger that the elapsed time after migration, that is **(I – IE) ≥ TM (1)**

Unfortunately, the census does not provide information on the age the person was enrolled in graduate courses. For that, the expected age at which a person is supposed to complete graduate studies was set to 30 years, based on a survey of 101 graduate students of Economics at the University of São Paulo. For those students, the average age for completion of a master program was 31.8 (median = 31). We chose 30 in order not to underestimate the number of people subject to brain drain. The operational definition of brain drain in this study is a stock notion: we deal with the total of cases up to 2000. Therefore, the number of cases in the 2000 Census includes those of the 1991 Census. Any marginal change in these numbers of cases will mean important variations in the flow values. Since the states of Acre, Amapá,

Rondônia and Roraima dif not offer graduate programs in 2000, all immigrants with a graduate degree qualified as subjects of brain drain.

4.2. Indicators

The final matrix is composed of 28 lines (27 states and the rest of the world), and 27 columns (origins). Some indicators are calculated based on this matrix.

$$M = \begin{bmatrix} Origin/Destination & 1 & 2 & \dots & j & \dots & 27 \\ 1 & m_{1,1} & m_{1,2} & & m_{1,j} & & m_{1,27} \\ 2 & m_{2,1} & m_{2,2} & & m_{2,j} & & m_{2,27} \\ \dots & & & & & & \\ i & m_{i,1} & m_{i,2} & & m_{i,j} & & m_{i,27} \\ \dots & & & & & & \\ 28 & m_{28,1} & m_{28,2} & & m_{28,j} & & m_{28,27} \end{bmatrix}$$

With m_{ij} **= number of migrant from state** i to j; E_i = total number of out-migrants from state i; I_j = total number of in-migrants to state j; $E_i = \sum_{j=1}^{27} m_{ij}$ **;** $I_j = \sum_{i=1}^{28} m_{ij}$

A second indicators is migration efficiency, and is defined as

$$IEM = \frac{I - E}{I + E}$$

With: I = number of in-migrants; E = number of out-migrants. The numerator indicates the net result of migration, and is positive for states that receive more graduates than send to other states. The denominator is the total flow of migrants in and out the state. The larger the positive IEM, the more the state is a net receiver of graduated migrants, proportionally.

The following indicator scales the importance of the flows between to states in relation to the aggregate flows, that is

$$\%Fluxos = \frac{m_{i,j}}{\sum_{j=1}^{27}\sum_{i=1}^{27} m_{i,j}} \cdot 100$$

Another interesting information relates to the importance of brain drain to any specific state. It relates the cases of brain drain to the stock of graduates in the sate. The higher the

ratio, the more dependent is the state in terms of qualified in-migration flows. The last indicator is a variation of the previous one, for it includes in the numerator the qualified out-migrants. That is, the numerator is the sum of in-migrants (attracted brain drain cases) and out-migrants (lost brain drain cases).

5. Results

Table 1 presents general information on the number of graduates and people subject to brain drain, according to the operational definition applied in this study. The share of graduates in total population is generally small, 0.1% in 1991 and 0.18% in 2000, but the growth rates are impressive, over 8.4% per year. The share of brain drain cases increased slightly, from 13.1% to 13.4% of the number of graduates.

Table 1 – Number of graduates and brain drain cases in Brazil

	1991	2000	Annual growth rate
Total number of graduates	151,207	304,716	8.1%
Brain Drain cases	19,778	40,930	8.4%
Brain Drain percentage	13.1%	13.4%	-

Figure 1 presents the distribution of graduates by state in 1991 and 2000. It is clear that there is a concentration in the South and Southeast states, although in 2000 the distribution was more even, with an increasing participation of Bahia and Alagoas, in the Northeast. Figure 2 presents the share of graduates on the state's population, and shows a similar pattern, with the exception of the Northern state of Roraima, in which the presence of federal employees is particularly important, for military reasons.

Figure 1 – Quartiles of number of graduates, 1991 and 2000.

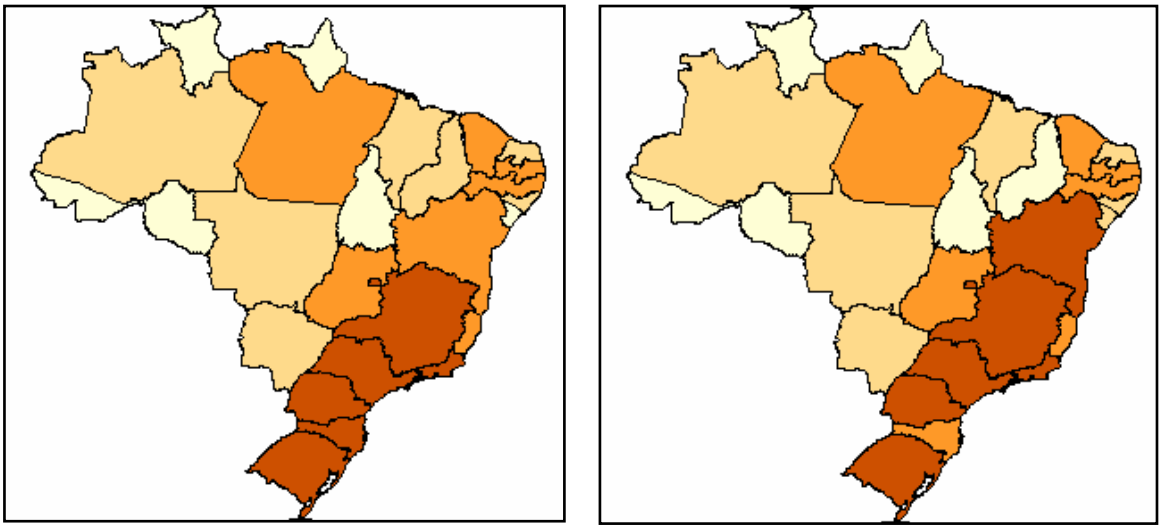
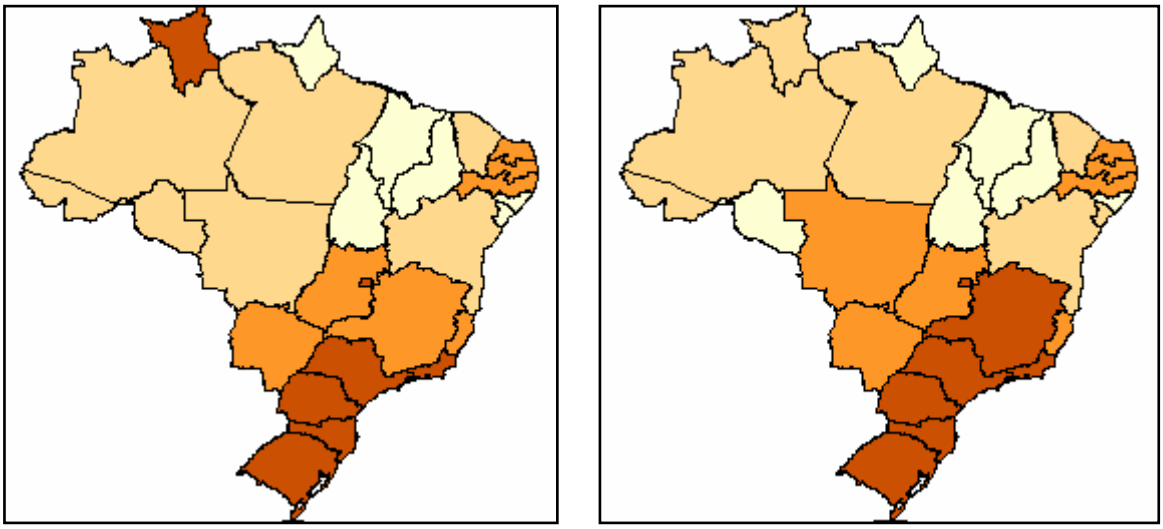


Figure 2 – Share of graduates on state's population (quartiles), 1991 and 2000.



Tables 2 and 3 show the shares of total graduate migration flows for each pair of regions. The rich Southeast region is a net receiver of migrants, for it accounts for 44.5% of total in-migrants, and only 34.2% of out-migrants in 1991, but its share has diminished between the censuses. The poor Northeast region sent 19.8% to other regions, and received only 11.8% in 1991, but over the decade the region sent less and received more people. The share of foreigners in migration flows dropped from 26.6% 1991 to 20.2% in 2000.

Table 2 – Regional shares of total graduate migration, by macro region, 1991.

Origin/Destination	Mid-West	Northeast	North	Southeast	South	**Total out-migrants**
Mid-West	1,3%	0,0%	0,2%	0,8%	0,0%	2,2%
Northeast	5,1%	4,5%	2,3%	6,9%	1,0%	19,8%
North	0,7%	0,1%	0,7%	1,1%	0,2%	2,8%
Southeast	10,5%	3,1%	2,2%	14,5%	3,9%	34,2%
South	2,8%	0,9%	0,8%	5,1%	4,7%	14,4%
Other countries	3,5%	3,1%	1,0%	16,0%	2,9%	26,6%
Total in-migrants	23,8%	11,8%	7,2%	44,5%	12,7%	100,0%

Table 3 – Regional shares of total graduate migration, by macro region, 2000.

Origin/Destination	Mid-West	Northeast	North	Southeast	South	**Total out-migrants**
Mid-West	1,0%	0,2%	0,1%	1,3%	0,3%	2,9%
Northeast	3,5%	5,3%	1,7%	6,1%	0,8%	17,4%
North	0,6%	0,4%	0,4%	1,2%	0,2%	2,9%
Southeast	11,0%	4,5%	2,4%	16,7%	6,5%	40,9%
South	3,1%	0,9%	0,8%	5,9%	4,9%	15,7%
Other countries	1,8%	2,5%	1,1%	11,6%	3,2%	20,2%
Total in-migrants	20,9%	13,7%	6,7%	42,9%	15,8%	100,0%

The disaggregated migration matrices presented in the appendix indicate that main migration flows are concentrated between Distrito Federal (Brasília) and the states of Rio de Janeiro, São Paulo, Minas Gerais, Rio Grande do Sul and Paraná. The inter-state flows remained relatively stable between 1991 and 2000. Considering the migration efficiency indicators presented in Figure 3, and the net migration rates, presented in Figure 4, it can be observed that the results are quite similar. In 1991 the biggest gainers of brain drain were the states of Acre, Amapá, Rondônia, Roraima, Tocantins (all without any graduate program), Mato Grosso do Sul and Distrito Federal. The bigger losers were Maranhão, Piauí, Ceará, Alagoas, Sergipe and Rio Grande do Sul. In 2000, Mato Grosso replaces Mato Grosso do Sul among the gainers, and Ceará, Sergipe and Alagoas improve their situation. However, Pará, Minas Gerais and Paraíba face a loss.

Figure 3 – Migration efficiency, 1991 and 2000.

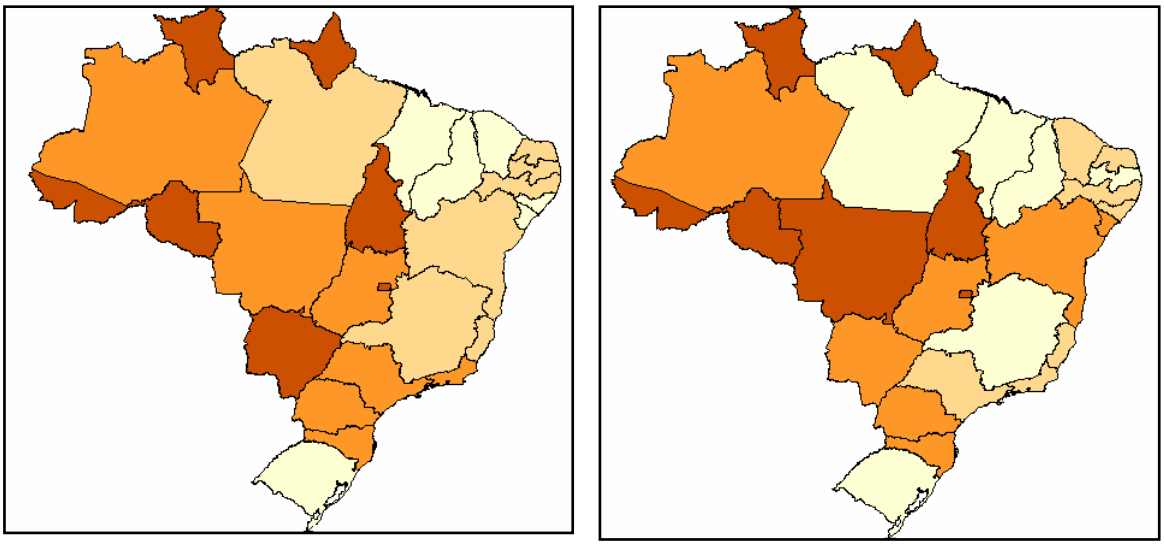


Figure 4 – Net migration rates, 1991 and 2000

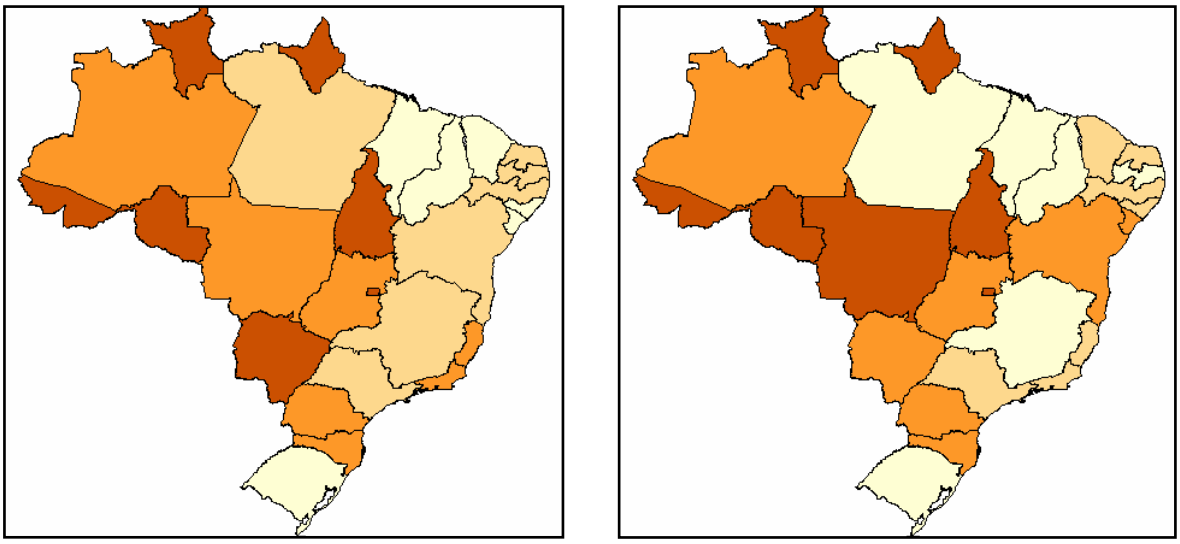


Figure 5 presents the changes in the migration efficiency index and in the net migration rates. A positive change indicates that the region improved its situation; a negative change indicates deterioration. Only the Northeast and South regions have improved, more strongly in the first case. However, as the figures in Table 4 indicate, the Northeast region still presented negative values in 2000, and the South region changed from negative to approximate zero.

Figure 5 – Changes in migration between 1991 and 2000.

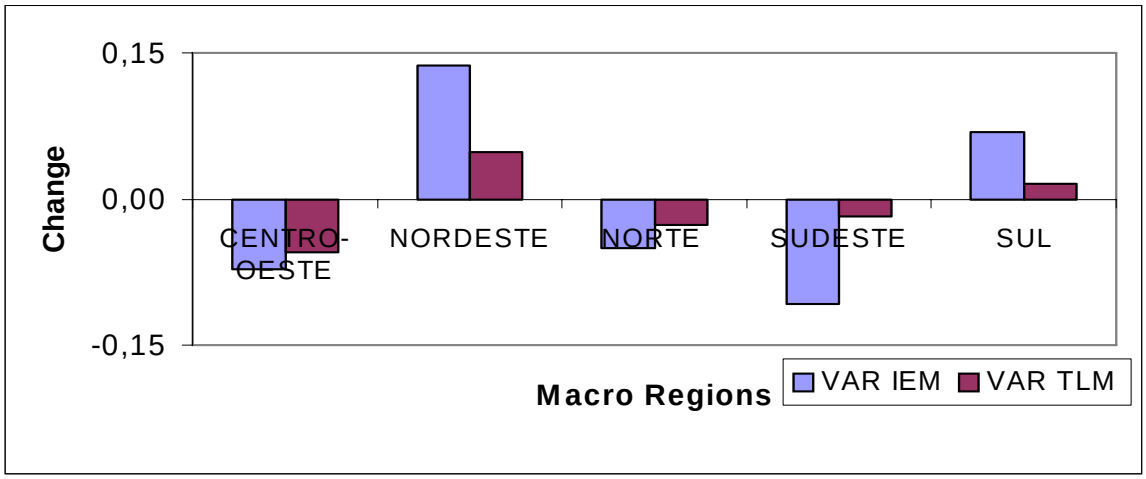


Table 4 – Migration efficiency and net migration rates, 1991 and 2000

	1991		*2000*	
	Migration Efficiency	Net Migration Rate	Migration Efficiency	Net Migration Rate
Mid-West	0,83	0,37	0,76	0,31
Northeast	-0,25	-0,09	-0,12	-0,04
North	0,44	0,19	0,39	0,17
Southeast	0,13	0,02	0,02	0,00
South	-0,06	-0,01	0,01	0,00

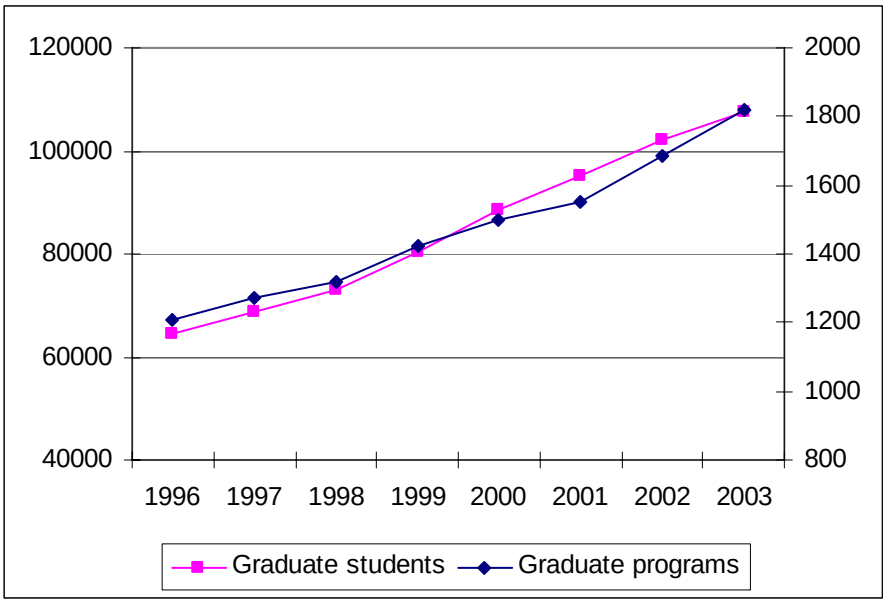
From these results we can infer that migration of educated people is helping creating a more even distribution of such sort of individuals in national territory. The most important areas, such as the states of Sao Paulo, Rio de Janeiro, and Brasilia, and their respective regions are experiencing a deterioration in their migration indicators, and poorer regions are acting otherwise. One way to see this is to observe the changes in the Gini inequality index, presented in Table 5. Both the regional distribution of the number of graduates by state, and the share of graduates in the state's population became more even.

Table 5 – Gini index for selected variables

	1991	*2000*	*Gini decline*
Number of graduates by state	0,701	0,689	1,7%
Share of graduates in population in the states	0,424	0,389	8,3%

This reduction in inequality is a consequence both of changes in migration flows, and of the changing conditions to generate graduates within the states. As Figure 6 indicates, the number of graduate students jumped from 64,432 in 1996, to 107,400 in 2003, a rate of increase of 6.6% per year. The number of graduate programs moved from 1,209 to 1,802 in the same period, a change of 5.2% per year. This increase has happened with a better geographical distribution as compared to the previous situation. That is, the supply of new graduate students in poorer regions is growing at a higher rate than in the already established regions.

Figure 6 – Evolution the number of graduate programs students, 1996-2003



6. Final comments

In this paper we have provided a general overview of the importance of people with master or doctoral degrees in Brazil in the last two decades, and some traces of the migration paths of such qualified people. The share of graduate people in total population is highly unequal among Brazilian states, although inequality is diminishing. The same can be said about the presence of graduate programs and graduate students.

In order to measure brain drain in Brazil, an operational definition had to be developed, given data constraints. The analysis of the indicators reveals that migration has contributed to a better distribution of qualified people in the country. However, the full

analysis of the movement of qualified people has to take into account that the total supply of such personnel has increased at impressive rates in Brazil over the period analyzed, and this growth has benefited poor regions the most. Therefore, poor states have increased their share of graduate students, what influences the results in terms of brain drain.

This is a first report on an on-going research. The results are already interesting, but further analysis must be directed towards more refined measures of brain drain, and to assess the causes of such phenomenon.

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Table 1A – Origin/Destination Matrix of graduates, 2000

	AC	AL	AP	AM	BA	CE	DF	ES	GO	MA	MT	MS	MG	PA	PB	PR	PE	PI	RJ	RN	RS	RD	RO	SC	SP	SE	TO	
AC	0,0	0,0	0,0	0,0	0,0	0,0	16,9	0,0	0,0	0,0	0,0	0,0	0,0	24,7	10,9	0,0	0,0	0,0	19,6	0,0	0,0	8,4	0,0	0,0	0,0	0,0	0,0	**80,5**
AL	0,0	0,0	0,0	0,0	27,6	8,4	60,7	0,0	10,8	0,0	0,0	0,0	13,3	0,0	0,0	7,7	37,5	0,0	91,4	0,0	20,3	0,0	0,0	10,3	63,3	8,1	0,0	**359,5**
AP	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	22,3	0,0	0,0	0,0	0,0	9,0	0,0	10,4	0,0	0,0	0,0	0,0	0,0	0,0	**41,7**
AM	11,2	0,0	0,0	0,0	0,0	10,8	64,9	0,0	5,9	9,6	0,0	0,0	0,0	6,7	5,7	0,0	20,8	0,0	74,8	10,0	0,0	0,0	4,4	11,4	39,5	0,0	0,0	**275,7**
BA	0,0	18,9	0,0	8,8	0,0	35,2	176,6	8,5	9,8	28,9	22,3	0,0	50,0	14,6	40,3	40,7	65,5	0,0	211,7	7,0	48,0	21,2	0,0	24,7	189,7	61,0	6,3	**1089,8**
CE	14,2	4,8	8,4	0,0	66,1	0,0	231,0	11,4	51,6	14,6	26,8	0,0	38,7	74,2	41,6	25,2	99,7	15,0	161,5	96,3	10,5	43,3	25,4	14,2	143,8	8,9	7,3	**1234,7**
DF	0,0	0,0	0,0	0,0	0,0	8,7	0,0	9,4	43,3	0,0	0,0	0,0	13,5	0,0	0,0	0,0	0,0	10,4	41,9	0,0	0,0	0,0	8,3	9,1	9,3	0,0	0,0	**153,9**
ES	0,0	0,0	0,0	0,0	20,7	0,0	96,9	0,0	0,0	0,0	0,0	0,0	80,9	0,0	0,0	17,7	0,0	6,7	222,9	0,0	32,6	62,5	0,0	12,6	95,4	18,7	0,0	**667,9**
GO	9,8	0,0	10,0	9,3	9,9	9,7	162,4	6,8	0,0	10,5	36,6	0,0	48,5	0,0	0,0	37,5	0,0	0,0	77,9	0,0	0,0	10,0	5,0	0,0	101,3	0,0	0,0	**545,3**
MA	0,0	0,0	9,3	8,4	0,0	14,3	119,3	12,5	18,9	0,0	0,0	0,0	9,0	62,3	0,0	11,1	10,3	34,3	69,5	0,0	0,0	38,2	9,2	0,0	67,6	0,0	12,0	**506,1**
MT	0,0	0,0	0,0	0,0	0,0	0,0	41,4	13,6	8,0	0,0	0,0	6,5	0,0	0,0	0,0	13,0	10,5	0,0	65,0	0,0	34,7	8,8	0,0	0,0	41,1	0,0	0,0	**242,5**
MS	0,0	0,0	0,0	0,0	0,0	0,0	45,1	0,0	12,1	0,0	47,9	0,0	24,2	0,0	0,0	15,8	10,3	0,0	34,1	0,0	0,0	0,0	0,0	0,0	56,9	0,0	0,0	**246,4**
MG	9,5	23,3	10,9	73,5	222,8	47,1	996,0	225,2	309,9	43,7	69,3	88,2	0,0	64,6	27,5	198,7	85,6	0,0	990,8	9,2	52,6	63,4	10,9	67,0	1160,1	31,5	43,3	**4924,7**
PA	0,0	7,3	97,5	28,8	10,0	48,2	107,8	0,0	47,5	17,4	0,0	11,4	56,2	0,0	0,0	32,1	24,0	11,1	209,2	0,0	26,3	17,4	0,0	8,9	131,9	0,0	4,3	**897,3**
PB	3,9	23,1	0,0	0,0	79,5	73,2	171,5	19,8	0,0	1,8	34,0	4,2	18,6	6,1	0,0	38,8	151,3	18,5	152,1	71,6	0,0	60,1	28,9	3,7	109,9	21,5	0,0	**1092,2**
PR	18,0	0,0	0,0	20,2	15,4	18,7	205,3	9,4	8,4	0,0	49,0	46,0	52,4	0,0	11,5	0,0	13,3	0,0	142,0	0,0	84,6	78,3	10,5	200,3	440,5	12,0	0,0	**1435,5**
PE	0,0	12,7	0,0	19,2	103,1	56,9	261,0	22,3	19,2	0,0	0,0	9,5	56,9	21,7	185,5	17,2	0,0	7,5	331,1	92,1	8,3	33,3	0,0	12,1	171,9	29,9	22,4	**1494,0**
PI	0,0	0,0	7,4	13,9	38,5	112,3	88,9	22,8	7,4	29,9	0,0	0,0	40,6	30,8	8,0	23,5	8,3	0,0	55,4	17,5	16,0	0,0	0,0	10,7	72,7	17,8	8,3	**630,8**
RJ	15,9	74,0	12,8	58,1	139,2	76,7	1078,3	163,5	131,4	10,7	65,2	67,4	525,3	57,2	55,9	329,2	129,1	0,0	0,0	68,1	172,6	29,6	27,9	272,4	1297,3	49,1	23,1	**4930,0**
RN	0,0	16,2	7,3	18,0	18,9	45,2	51,1	0,0	0,0	0,0	5,8	0,0	0,0	0,0	18,2	0,0	44,3	11,1	108,9	0,0	0,0	0,0	0,0	0,0	39,5	0,0	0,0	**384,6**
RS	25,3	11,6	0,0	45,7	86,1	43,4	488,6	20,7	95,3	0,0	80,7	109,3	114,3	42,0	47,9	501,8	49,2	0,0	700,4	0,0	0,0	44,8	20,2	777,0	581,9	9,0	0,0	**3895,2**
RD	0,0	0,0	0,0	0,0	0,0	0,0	8,9	0,0	0,0	0,0	5,2	0,0	0,0	13,6	0,0	0,0	0,0	0,0	9,3	0,0	0,0	0,0	0,0	0,0	10,7	0,0	0,0	**47,8**
RO	0,0	0,0	0,0	0,0	0,0	0,0	11,1	0,0	0,0	0,0	0,0	0,0	25,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	**36,7**
SC	0,0	0,0	0,0	20,8	24,8	0,0	102,1	10,1	20,6	0,0	33,5	23,5	20,0	0,0	0,0	332,5	24,9	0,0	104,5	11,8	98,2	19,2	0,0	0,0	228,8	0,0	0,0	**1075,3**
SP	45,0	31,6	9,3	81,8	276,9	121,5	886,4	100,8	284,8	9,2	141,7	276,4	778,4	65,1	55,1	954,0	115,8	11,1	1176,6	25,8	212,9	110,7	43,0	320,1	0,0	44,7	0,0	**6178,6**
SE	0,0	0,0	0,0	0,0	53,4	23,0	41,6	0,0	0,0	0,0	0,0	0,0	21,8	0,0	7,0	0,0	7,9	0,0	72,3	0,0	0,0	0,0	0,0	0,0	44,7	0,0	0,0	**271,9**
TO	0,0	0,0	0,0	0,0	0,0	0,0	8,9	0,0	34,8	0,0	5,6	0,0	13,3	0,0	0,0	0,0	0,0	0,0	10,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	**72,7**
EX	36,2	51,3	27,0	183,4	286,3	139,0	439,0	85,4	115,6	66,1	110,9	53,7	547,2	165,8	124,9	653,2	235,6	17,4	1361,3	51,4	440,5	26,8	28,1	218,2	2770,7	43,7	0,0	**8278,6**
	189,0	**274,9**	**199,8**	**589,9**	**1479,2**	**892,2**	**5961,8**	**742,2**	**1235,2**	**242,5**	**734,7**	**696,1**	**2548,8**	**671,7**	**639,9**	**3249,7**	**1143,9**	**143,2**	**6503,5**	**460,8**	**1268,6**	**676,0**	**221,7**	**1972,6**	**7868,4**	**356,1**	**127,0**	**41089,7**

Table 2A – Shares in total migration, 2000

	AC	AL	AP	AM	BA	CE	DF	ES	GO	MA	MT	MS	MG	PA	PB	PR	PE	PI	RJ	RN	RS	RD	RO	SC	SP	SE	TO
AC	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,04%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,06%	0,03%	0,00%	0,00%	0,00%	0,05%	0,00%	0,00%	0,02%	0,00%	0,00%	0,00%	0,00%	0,00%
AL	0,00%	0,00%	0,00%	0,00%	0,07%	0,02%	0,15%	0,00%	0,03%	0,00%	0,00%	0,00%	0,03%	0,00%	0,00%	0,02%	0,09%	0,00%	0,22%	0,00%	0,05%	0,00%	0,00%	0,03%	0,15%	0,02%	0,00%
AP	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,05%	0,00%	0,00%	0,00%	0,00%	0,02%	0,00%	0,03%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
AM	0,03%	0,00%	0,00%	0,00%	0,00%	0,03%	0,16%	0,00%	0,01%	0,02%	0,00%	0,00%	0,00%	0,02%	0,01%	0,00%	0,05%	0,00%	0,18%	0,02%	0,00%	0,00%	0,01%	0,03%	0,10%	0,00%	0,00%
BA	0,00%	0,05%	0,00%	0,02%	0,00%	0,09%	0,43%	0,02%	0,02%	0,07%	0,05%	0,00%	0,12%	0,04%	0,10%	0,10%	0,16%	0,00%	0,52%	0,02%	0,12%	0,05%	0,00%	0,06%	0,46%	0,15%	0,02%
CE	0,03%	0,01%	0,02%	0,00%	0,16%	0,00%	0,56%	0,03%	0,13%	0,04%	0,07%	0,00%	0,09%	0,18%	0,10%	0,06%	0,24%	0,04%	0,39%	0,23%	0,03%	0,11%	0,06%	**0,03%**	0,35%	0,02%	0,02%
DF	0,00%	0,00%	0,00%	0,00%	0,00%	0,02%	0,00%	0,02%	0,11%	0,00%	0,00%	0,00%	0,03%	0,00%	0,00%	0,00%	0,00%	0,03%	0,10%	0,00%	0,00%	0,00%	0,02%	0,02%	0,02%	0,00%	0,00%
ES	0,00%	0,00%	0,00%	0,00%	0,05%	0,00%	0,24%	0,00%	0,00%	0,00%	0,00%	0,00%	0,20%	0,00%	0,00%	0,04%	0,00%	0,02%	0,54%	0,00%	0,08%	0,15%	0,00%	0,03%	0,23%	0,05%	0,00%
GO	0,02%	0,00%	0,02%	0,02%	0,02%	0,02%	0,40%	0,02%	0,00%	0,03%	0,09%	0,00%	0,12%	0,00%	0,00%	0,09%	0,00%	0,00%	0,19%	0,00%	0,00%	0,02%	0,01%	0,00%	0,25%	0,00%	0,00%
MA	0,00%	0,00%	0,02%	0,02%	0,00%	0,03%	0,29%	0,03%	0,05%	0,00%	0,00%	0,00%	0,02%	0,15%	0,00%	0,03%	0,03%	0,08%	0,17%	0,00%	0,00%	0,09%	0,02%	0,00%	0,16%	0,00%	0,03%
MT	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,10%	0,03%	0,02%	0,00%	0,00%	0,02%	0,00%	0,00%	0,00%	0,03%	0,03%	0,00%	0,16%	0,00%	0,08%	0,02%	0,00%	0,00%	0,10%	0,00%	0,00%
MS	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,11%	0,00%	0,03%	0,00%	0,12%	0,00%	0,06%	0,00%	0,00%	0,04%	0,02%	0,00%	0,08%	0,00%	0,00%	0,00%	0,00%	0,00%	0,14%	0,00%	0,00%
MG	0,02%	0,06%	0,03%	0,18%	0,54%	0,11%	**2,42%**	0,55%	0,75%	0,11%	0,17%	0,21%	0,00%	0,16%	0,07%	0,48%	0,21%	**0,00%**	**2,41%**	0,02%	0,13%	0,15%	0,03%	0,16%	**2,82%**	0,08%	0,11%
PA	0,00%	0,02%	0,24%	0,07%	0,02%	0,12%	0,26%	0,00%	0,12%	0,04%	0,00%	0,03%	0,14%	0,00%	0,00%	0,08%	0,06%	0,03%	0,51%	0,00%	0,06%	0,04%	0,00%	0,02%	0,32%	0,00%	0,01%
PB	0,01%	0,06%	0,00%	0,00%	0,19%	0,18%	0,42%	0,05%	0,00%	0,00%	0,08%	0,01%	0,05%	0,01%	0,00%	0,09%	0,37%	0,05%	0,37%	0,17%	0,00%	0,15%	0,07%	0,01%	0,27%	0,05%	0,00%
PR	0,04%	0,00%	0,00%	0,05%	0,04%	0,05%	0,50%	0,02%	0,02%	0,00%	0,12%	0,11%	0,13%	0,00%	0,03%	0,00%	0,03%	0,00%	0,35%	0,00%	0,21%	0,19%	0,03%	0,49%	**1,07%**	0,03%	0,00%
PE	0,00%	0,03%	0,00%	0,05%	0,25%	0,14%	0,64%	0,05%	0,05%	0,00%	0,00%	0,02%	0,14%	0,05%	0,45%	0,04%	0,00%	0,02%	**0,81%**	0,22%	0,02%	0,08%	0,00%	0,03%	0,42%	0,07%	0,05%
PI	0,00%	0,00%	0,02%	0,03%	0,09%	0,27%	0,22%	0,06%	0,02%	0,07%	0,00%	0,00%	0,10%	0,08%	0,02%	0,06%	0,02%	0,00%	0,13%	0,04%	0,04%	0,00%	0,00%	0,03%	0,18%	0,04%	0,02%
RJ	0,04%	0,18%	0,03%	0,14%	0,34%	0,19%	**2,62%**	0,40%	0,32%	0,03%	0,16%	0,16%	**1,28%**	0,14%	0,14%	**0,80%**	0,31%	0,00%	0,00%	0,17%	**0,42%**	0,07%	0,07%	0,66%	**3,16%**	0,12%	0,06%
RN	0,00%	0,04%	0,02%	0,04%	0,05%	0,11%	0,12%	0,00%	0,00%	0,00%	0,01%	0,00%	0,00%	0,00%	0,04%	0,00%	0,11%	0,03%	0,27%	0,00%	0,00%	0,00%	0,00%	0,00%	0,10%	0,00%	0,00%
RS	0,06%	0,03%	0,00%	0,11%	0,21%	0,11%	1,19%	0,05%	0,23%	0,00%	0,20%	0,27%	0,28%	0,10%	0,12%	1,22%	0,12%	0,00%	**1,70%**	0,00%	0,00%	0,11%	0,05%	**1,89%**	**1,42%**	0,02%	0,00%
RD	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,02%	0,00%	0,00%	0,00%	0,01%	0,00%	0,00%	0,03%	0,00%	0,00%	0,00%	0,00%	0,02%	0,00%	0,00%	0,00%	0,00%	0,00%	0,03%	0,00%	0,00%
RO	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,03%	0,00%	0,00%	0,00%	0,00%	0,00%	0,06%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
SC	0,00%	0,00%	0,00%	0,05%	0,06%	0,00%	0,25%	0,02%	0,05%	0,00%	0,08%	0,06%	0,05%	0,00%	0,00%	0,81%	0,06%	0,00%	0,25%	0,03%	0,24%	0,05%	0,00%	0,00%	0,56%	0,00%	0,00%
SP	0,11%	0,08%	0,02%	0,20%	**0,67%**	0,30%	**2,16%**	0,25%	**0,69%**	0,02%	0,34%	**0,67%**	**1,89%**	0,16%	0,13%	**2,32%**	0,28%	0,03%	**2,86%**	0,06%	**0,52%**	0,27%	0,10%	**0,78%**	0,00%	0,11%	0,00%
SE	0,00%	0,00%	0,00%	0,00%	0,13%	0,06%	0,10%	0,00%	0,00%	0,00%	0,00%	0,00%	0,05%	0,00%	0,02%	0,00%	0,02%	0,00%	0,18%	0,00%	0,00%	0,00%	0,00%	0,00%	0,11%	0,00%	0,00%
TO	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,02%	0,00%	0,08%	0,00%	0,01%	0,00%	0,03%	0,00%	0,00%	0,00%	0,00%	0,00%	0,02%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
EX	0,09%	0,12%	0,07%	**0,45%**	**0,70%**	0,34%	**1,07%**	0,21%	0,28%	0,16%	0,27%	0,13%	**1,33%**	0,40%	0,30%	**1,59%**	0,57%	0,04%	**3,31%**	0,13%	**1,07%**	0,07%	0,07%	0,53%	**6,74%**	0,11%	0,00%