“Are Informal Workers Refugees?”

Ricardo Freguglia

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Marcelo Arbex
Department of Economics
University of Windsor
Windsor, ON
N9B 3P4, Canada.

Ricardo Freguglia
Department of Economics
Federal University of Juiz de Fora
Juiz de Fora, MG
36036-330, Brazil.

Flávia Chein
CEDEPLAR
Federal University of Minas Gerais
Belo Horizonte, MG
31270-901, Brazil.

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Abstract

Informal worker migrants behave as refugees and migration is their alternative of last resort. We present a simple model to analyze the impact of education on agents' decision to migrate. When the learning technology exhibits decreasing returns to scale, the probability of migration is higher for less educated people and decreases as education increases. The empirical study shows that there is a negative and significant effect of education on the Brazilian informal worker's migration. Wage differentials and wealth are not relevant to explain the migration flow of these workers. We also provide evidence on the (ability) positive selection of migrants.

1 - INTRODUCTION

The migration of workers and people in developing countries has been intensively studied, and in recent years the results of these studies have been thoroughly reviewed.[1] Many factors influence the decision to migrate: income differentials, amenities, new job opportunities and others. According to the seminal study of Raveinstein (1985), the most prominent incentive to migration is the economic motivation. Sjaastad (1962) formalized this idea establishing the hypothesis that the individual decision to move is a form of investment in human capital. As migrants are not a random sample of the population, much of the research effort in the migration literature has been devoted to understand the factors that determine the relative skills of the migration flow and to evaluate how skill differentials affect economic outcomes.[2]

Education plays an important role on an agent's decision to migration and one of the most well-known result of the migration literature is that the propensity to migrate increases with education, as discussed by Blanchard and Katz (1992), Docquier and Marfouk (2006), Greenwood (1993), Mauro and Spilimbergo (1999) and Ritsilä and Ovaskainen (2001). It is often argued that openness to migration and labor mobility can cause high-skilled and most talent workers to migrate. More educated workers tend to have more access to information about the labor

[1] See Borjas (1994, 1995), Cushing and Poot (2004) and Greenwood (1975, 1985, 1997) for reviews of the economics of migration

[2] Chiswick (1978, 1999); Borjas (1987, 1999); Borjas, Bronars, and Trejo (1992); Bound and Holzer (2000); Borjas and Bratsberg (1996); Chen (2009); LaLonde and Topel (1996)

market than their unskilled counterparts, which can increase their probability of migration, as documented by Kanbur and Rapoport (2005), Chiquiar and Hanson (2005) and Schwartz (1973).

In contrast with this large empirical literature which emphasizes that migrants are positively self-selected, Borjas (1987) shows that migrants can be positively or negatively selected in terms of one characteristics depending on the differential between the rate of return to this characteristics in the source and destination economy. In the case of education, for instance, migrants would be negatively self-selected if the rate of return to education is higher in the source economy.

Borjas (1987) characterizes the selection mechanism of migration and present systematic analyses of types of selection biases on the decision to migrate. The underlying assumption is that individuals compare the potential incomes in the destination with the incomes in the home region and take migration decision based on these income differentials (net of mobility costs). The author identifies three possibility of selection bias on migration decision: positive selection (migrants are drawn from the upper tail of the income distribution in the source economy and they outperform in the destination); negative selection (migrants are drawn from the lower tail of the income distribution in the source economy and they do not perform well in the destination) and "refugee sorting" (destination region draws below average immigrants, but they outperform in the destination). A necessary condition for the last case to occur is that the correlation between earnings in the two regions (source and destination) is sufficiently low or even negative. This might occur, for example, for a minority group whose opportunities in the source economy are depressed by prejudice.

In this paper, we investigate the selection bias on agent's migration decision in terms of education and unobserved ability for a particular set of workers, the informal workers. This set of workers is often characterized by low skill and low average wages. The lack of (formal) employment opportunities and unemployment force workers to join the informal sector to earn a living. Moreover, the precarious conditions of the informal labor market lead workers to migrate in an attempt to to improve their wellbeing.

We present a model to study migration and education decisions, where agents live two periods. There are two regions in this economy and agents can migrate from home to another (host) region. In the first period, an agent spends part of the endowment towards leisure and the rest towards education (human capital accumulation). Workers differ in their unobserved ability, so that certain amount of education is more difficult to acquire for some agents than for others. In the second period of their lives, agents supply labor hours inelastically. Individuals also differ in their endowed wealth, belonging to one of two types: rich or poor. Migrant workers have perfect foresight of wages, which are assumed to be higher at the destination region. If there are locational factors which produce externalities complementary to consumption, the migrant's gains from the same flow of consumption is higher in the home than in the host country. An agent's human capital when s/he is old depends on time spent on education and initial wealth. Earnings are concave in human capital and exhibit decreasing returns to scale, a common feature in the informal labor literature.

Our model, although simple, has a number of interesting implications for empirical work. The migration probability, depending on agent's learning technology and the elasticity of substitution between consumption and leisure, presents a convex pattern (U shape) with respect to education. In particular, for decreasing returns to scale and risk-neutral agents, the migration probability is decreasing in education. That is, less educated workers are more likely to migrate, a result in contrast to the migration literature as a whole. We use data from the ECINF survey (Informal Urban Economy Survey), conducted by the Brazilian Statistics Bureau (IBGE), collected in October of 2003 and covering all twenty-six Brazilian states and the Distrito Federal (Brazilian capital). The ECINF survey follows the International Labour Organization (ILO) definition of informal sector and focus on self-employed and firms with up to five employees, regardless the number of owners or non-paid workers, and not on firms status with the Brazilian tax authorities.

Although there is now a large literature on informal activities, as a result of the difficulties faced by researchers in terms of data collection regarding informal activities and informal workers, interesting and relevant questions remain to be studied.[3]

In particular, questions related to the migration of workers engaged in informal activities. This paper intends to contribute to fill this gap by studying the migration flow of workers engaged in informal activities in Brazil. According to the ECINF survey, there were 13,860,868 people employed at 10,335,962 small informal businesses (with five or less employees) in Brazil in 2003. Overall, interstate migration in the country rose from twenty percent in 1980 (Martine, 1990) to forty percent of the population in 1999 (Fiess and Verner, 2003). In the informal sector, over twenty two percent of the workers moved between states in 2003.

There are several reasons for studying migration in this particular economic sector. First, a significant part of economic activity in developing countries and developed countries is conducted in the informal sector (Schneider and Enste, 2000). Second, as for instance, Thomas (1992), Maloney (1999), Amaral and Quintin (2006) and Paula and Scheinkman (2007) argue informal activities emphasize self-financing, small scale of production, labor-intensive and low-skilled workers . In our dataset, informal high skilled workers (with high education level) are less likely to migrate than low skilled workers (less educated). Third, the average profile of informal worker migrants reveals that migrants are older at their destination, have more experience as business owners, higher wages, and higher wealth than non-migrants. Migrants are less educated than their counterparts and the probability of migration to another state to engage in informal activities decreases with education. These characteristics of informal workers can possibly be associated with the huge internal heterogeneity of the Brazilian urban informal sector and suggest that the decision to migrate to another region is their last resort alternative.

Empirically, we estimate the migration probability of an informal sector worker using a binary choice (probit) model with particular attention to the self-selection problem of migrants (Chiswick 1999; Borjas 1999). We estimate the effects of wage differentials, education and other personal and workplace controls on the probability of migration. Using the Rivers and Vuong (1988) approach, we pay special attention to the endogeneity problem caused by the correlation between education and workers' non-observable ability. We study three different types of migrant: interstate, intermunicipal and short-run intermunicipal (less than ten years). Our empirical analysis supports that there is a negative relationship between education and the probability of migration for this group of workers, regardless the definition of migration and even after a valid instrument for non-observable heterogeneity is used. This is consistent with the idea that education and workers' non-observable ability are important factors to explain the migration of Brazilian informal workers. Moreover, the probability of migration is increasing in the ability bias and wage differentials and wealth are not relevant to explain an informal worker's decision to migrate.

To the best of our knowledge, this is the first paper to study the migration of workers engaged in informal activities. We consider the possibility and present evidence that less educated workers are more likely to migrate. Moreover, our results bring new evidence on the possibility of a negative selection of migrants considering their observable characteristics, while it corroborates a positive selection of ability or unobservable characteristics of informal worker migrants. To this extend, we can compare informal workers to refugees in the spirit of Borjas (1987)'s findings on the international migration flow of workers.

The paper proceeds as follows. We present a simple model of education and migration decision in section II. In section III, we describe our dataset and the empirical strategy. Our empirical results are also presented in this section. Section IV concludes.

2 - A MODEL OF MIGRATION AND EDUCATION DECISION

[3] See Choi and Thum (2005), Chong and Gradstein (2007), Friedman et al. (2000) and Fugazza and Jacques (2003).

2.1 The Economy

We present a simple model to study migration and human capital acumulation decisions. Agents only live two periods, the first period as children and the second period as adults. There are regions in this economy and in the second period of their lives, agents can migrate from home to another (host) region. For simplicity, there is no discounting in our model. Every period, a cohort of measure 1 of two-period-lived agents is born. They decide about their education, consumption and migration. There is no population growth.

In each period, agents are endowed with one unit of time. In the first period, s/he spends part of the endowment towards leisure and the rest towards education (human capital accumulation). Education here refers to formal education - elementary, middle, high-school, college. Workers differ in their ability, so that certain amount of education is more difficult to acquire for some agents than for others (Di Maria and Stryszowski, 2009). We will assume that less talented agents spend more time on schooling-related activities than more talented agents (for instance, to complete an assignment or to finish reading a book). This implies a "cost" q in terms of leisure. For simplicity, an individual belongs to one of two types: more talented or less talented. This cost is zero for talented people and $\overline{q}$ for less talented people. That is, in the first period of his life, an agent allocates her/his time between education (e_t) and leisure (l_t), which is equal to ($1- e_t -q$).

In the second period of their lives, agents supply labor hours inelastically (normalized to one) and don't experience leisure. Individuals differ in their endowed wealth h. We can interpret this wealth as an initial endowment or the stock of human capital of an individual's parents. We assume a simple kind of heterogeneity: an individual belongs to one of two types: rich or poor. The poor type individual is endowed with $\underline{h}$, while the rich type is endowed with $\overline{h}$ (Glomm and Ravikumar, 1998).

Agents have identical preferences over leisure when young and consumption when old. The utility function is given by

$$[(1-e_t-q)^{1-\sigma}+c_{t+1}{}^{1-\sigma}]/(1-\sigma) \tag{1}$$

where $\sigma>0$ and $1/\sigma$ is the elasticity of substitution between consumption and leisure. When $\sigma=1$, we have a logarithmic utility.

In the second period of their lives, agents can live in one of two regions - home (A) and host (B) region. Agents can migrate from his home region to another region with probability $m_{t+1} \in [0,1]$, or remain in their home region with probability $(1-m_{t+1})$. During this second period, agents spend all their time working to earn income for consumption. Migrants have perfect foresight of wages in the home and host region, w_A and w_B respectively. We assume that wages are constant and $w_B > w_A$ throughout the analysis (Dustmann and Kirchkamp, 2002).

The agent's earnings y_{it+1} in region *i* are equal to their level of human capital (h_{t+1}) multiplied by the wage rate of the region where they live. For instance, in region A agents earn $y_{At+1} = w_A h_{t+1}$, where w_A is the wage rate in period t+1 and region A. An agent's human capital when s/he is old depends on time spent on education, e_t, and her/his initial wealth $P(M_i) = \Phi(\alpha + \beta X_i + \gamma_j z_{ij})$, i.e.,

$$h_{t+1} = \theta h_t^{\delta} e_t^{\beta} \tag{2}$$

where $\theta > 0$, $\delta \in (0,1)$ and $\beta \in (0,1)$. When $\delta + \beta > 1$, the learning technology exhibits increasing returns. Since time devoted to education is bounded above in the first period by one, we can think of the case $\delta + \beta > 1$ as one of short-run increasing returns. Moreover, $\beta < 1$ implies that earnings are concave in human capital and $\delta + \beta < 1$ agent's earnings exhibit decreasing returns to scale, a common assumption in the informal labor literature, as in Lemieux et al. (1994), for instance.

Notice that the time allocation decision in the first period - between education and leisure - affects the agent's earnings in the second period. That is, the agent can invest in education in the first period and earn more in the labor market in the second period. Our treatment of schooling and earnings reflects the Mincerian human capital literature in which education yields higher earnings. The Mincerian approach assumes that human capital accumulation is possible by combining inputs such as time spent in school, time spent in the labor market, and ability (Mincer, 1974).

Each individual chooses l_t and c_{t+1} to solve the problem

$$U(l_t, c_{t+1}) = [(1 - e_t - q)^{1-\sigma}[\rho_B mc_{Bt+1}{}^{1-\sigma} + \rho_A(1 - m_{t+1})c_{At+1}{}^{1-\sigma}]]/(1-\sigma) \tag{3}$$

$$^{s.t.} c_{At+1} = w_A \theta h_t^{\delta} e_t^{\beta} \tag{4}$$

$$c_{Bt+1} = W_{\mathbf{B}} \theta h_t^{\delta} e_t^{\beta} \tag{5}$$

where ρ_A and ρ_B represent preferences parameters. If there are locational factors which produce externalities complementary to consumption, for instance, culture, mentality, climate, etc., we assume that $\rho_A > \rho_B$, meaning that the utility a migrant gains from the same flow of consumption is higher at home than in the host region (Djajic and Milbourne, 1988; Dustmann and Kirchkamp, 2002).

The agents' problem is then to choose how much time they devote to education in the first period in order to maximize their expected utility. The unique interior solution to the agent's optimization problem is given by:

$$(1 - e_t - q)^{-\sigma} = [(\rho_B m_{t+1}(w_B)^{1-\sigma} + (\rho_A(1 - m_{t+1})(w_A)^{1-\sigma}]\beta(\theta h_t^{\delta})^{1-\sigma} e_t^{\beta(1-\sigma)-1} \tag{6}$$

Observe that the time allocation to education e_t is independent of the initial wealth when σ=1 and it is a decreasing (increasing) function of the wealth h_t when $\sigma > 1$ ($0 < \sigma < 1$). In this model, an increase in wealth raises the relative price of leisure (Glomm and Ravikumar, 1998). For instance, the higher initial wealth increases the time devoted to human capital accumulation when $0 < \sigma < 1$ (substitution effect dominates income effect). Facing a probability of migration, the agent gives up leisure (and increases time allocated to education) in the first period in order to consume more in the second period, which can occur in one of the two (home or host) regions. In this case, wage rates in regions A and B also affect agents's decision through their earnings function. When $\sigma > 1$, the time allocation to education is a decreasing function of the the wage rate, which is exogenously given in our economy. A higher wage in the second period increases the opportunity cost of leisure and decreases the time allocated to human capital accumulation e_t in the first period. In the case of $\sigma = 1$, the agent's optimal decision regarding education is independent of the wage rate either at home or at the host region.

2.2 Probability of Migration and Education

Since we observe that workers of different education levels - from no education to university degree - migrate, a natural question to ask is what is the effect of education on agent's decision to migrate. We concentrate our discussion on the determinants of migration and the role of education in the migration decision, reflected in the probability of migration m_{t+1} . Chen (2008, 2009) argues that the probability of migration is dependent upon average human capital. In our model, the average human capital is equivalent to the individual's human capital in each period and the probability of migration exhibits threshold effects, as follows:

$$m_{t+1}(h_t) = m_{t+1}(e_t) = \begin{cases} m_1, & if\ e_t < e^* \\ m_2, & if\ e_t \geq e^* \end{cases} \tag{7}$$

where e^* represents the average human capital threshold. Rearranging equation (3) for the probability of migration m_{t+1}, we obtain the following expression:

$$m_{t+1} = [(1-e_t-q)^{-\sigma} - \beta\rho_A e_t^{\beta(1-\sigma)-1}(w_A\theta h_t^{\delta})^{1-\sigma}]/[\beta e_t^{\beta(1-\sigma)-1}(\theta h_t^{\delta})^{1-\sigma}(\rho_B w_B^{\ 1-\sigma} - \rho_A w_A^{\ 1-\sigma})] \tag{8}$$

Notice that (7) is not an explicit expression for the probability of migration, since it depends on endogenous variables. The nonlinearity of this expression makes it less straightforward the effect of the time allocated to education on the probability of migration. However, we can use this expression to explore the role of some parameters in the relationship between education and the migration probability. Differentiating (7) with respect to the variable education (e_t) we obtain a negative relationship between a worker's education and her/his migration probability for an education level e_t lower than *[(1-β(1-σ))(1-q)]/(1+β(1-σ))*, and a positive relationship otherwise. Note that this threshold e^* depends on the learning technology parameter β and on the elasticity of substitution between consumption and leisure σ. The lower β, or equivalently, in the decreasing returns to scale learning technology case, the lower the education level for which migration is decreasing in education. That is, when β is small, returns to human capital investment are decreasing and the probability of migration is higher.

The elasticity of substitution between consumption and leisure plays an interesting role in this discussion. Micro and macro estimates of the elasticity of labor supply do not refer to the same variable. Typically, micro estimates deal with individual hours of work per unit of time (intensive margin), while macro estimates deal with total hours of work, i.e. the product of the intensive margin and the employment rate (extensive margin). Given the considerable controversy over the appropriate value of σ, we will not try to ascertain what the definitive value of σ is for the representative agent model under consideration. Instead, we explore the implications for our analysis of different values of σ.

The case of σ =1 is of particular interest because it allows us to solve for the probability of migration analytically. In this case, the equation (7) simplifies to

$$m_{t+1} = [e_t(1+\beta\rho_A) - \beta\rho_A(1-q)]/[\beta(1-e_t-q)(\rho_B-\rho_A)] \tag{9}$$

Notice that when the elasticity of substitution between consumption and leisure is equal to one (σ =1), wage rates in both regions and an agent's initial wealth are not relevant. In this case, what is important for a worker in his decision to migrate is his talent (measured in terms of leisure cost), his education level (e_t) and his locational preferences (ρ_A , ρ_B). Equation (9) says that the probability of migration varies negatively with the leisure cost q, i.e., $\partial m / \partial q = e_t / [\beta(1-e_t-q)^2(\rho_B-\rho_A)]$, and that there is a negative relationship between a worker's education level and her/his migration probability, i.e., $\partial m / \partial e = 1-q / [\beta(1-e_t-q)^2(\rho_B-\rho_A)]$, since $\rho_A > \rho_B$. Talented people are more likely to migrate and the probability of migration is higher for this type of worker. This probability is higher for less educated people and decreases as education increases ($\partial^2 m/\partial e^2>0$). When σ =1, the education threshold e^* is determined by the leisure cost q. This education level is lower for less talented (high q) workers.

To illustrate the effect of different values for on the model's implications regarding the probability of migration, we use numerical simulations and display results in Figure 1 and 2. Common parameter values for these figures are: β =0.7, ρ_B =1, ρ_A =3, Θ=1, δ=0.1, σ =3, w_A =1 and w_B =4.[4] Here, we focus on the decreasing returns to scale case, i.e. δ+β<1. Figure 1 shows the probability of migration as a function of the individual's education level for σ =3 and σ =5, assuming q=0.01. The left (right) panel of Figure 1 shows the probability of migration for a rich (poor) individual with high (low) initial wealth (h). The right panel illustrates the case for a poor individual. We observe that the lower the elasticity of substitution between consumption and leisure (high σ), the lower is the probability of migration for a given level of education. Notice that as h (initial wealth) reduces from h=10 to h=1, the probability of migration increases. That is, less wealthy people will have a relative higher probability of migration than more wealthy people. Rich people have a tendency to stay in their home region.

[4] Similar parameter values are used in Dustmann and Kirchkamp (2002).

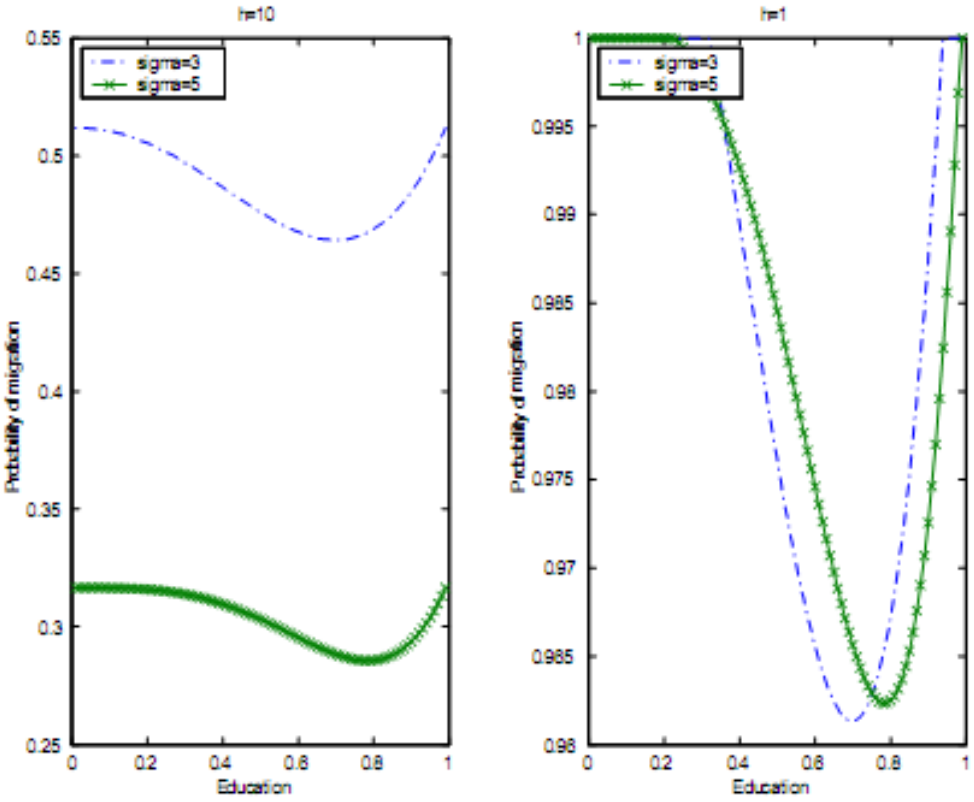

Figure 1 - Education and Probability of Migration

2.3 Elasticity of substitution between consumption and leisure σ

We also observe that more talented workers are more likely to migrate. Recall that here we assume that less talented agents spend more time on schooling-related activities than more talented agents, which implies a higher "cost" q in terms of leisure. In Figure 2, we present the probability of migration for both types of agents: more talented (q=0.01) and less talented (q=0.20) workers, assuming h=5. For any given level of education, the probability of migration is higher for more talented workers.

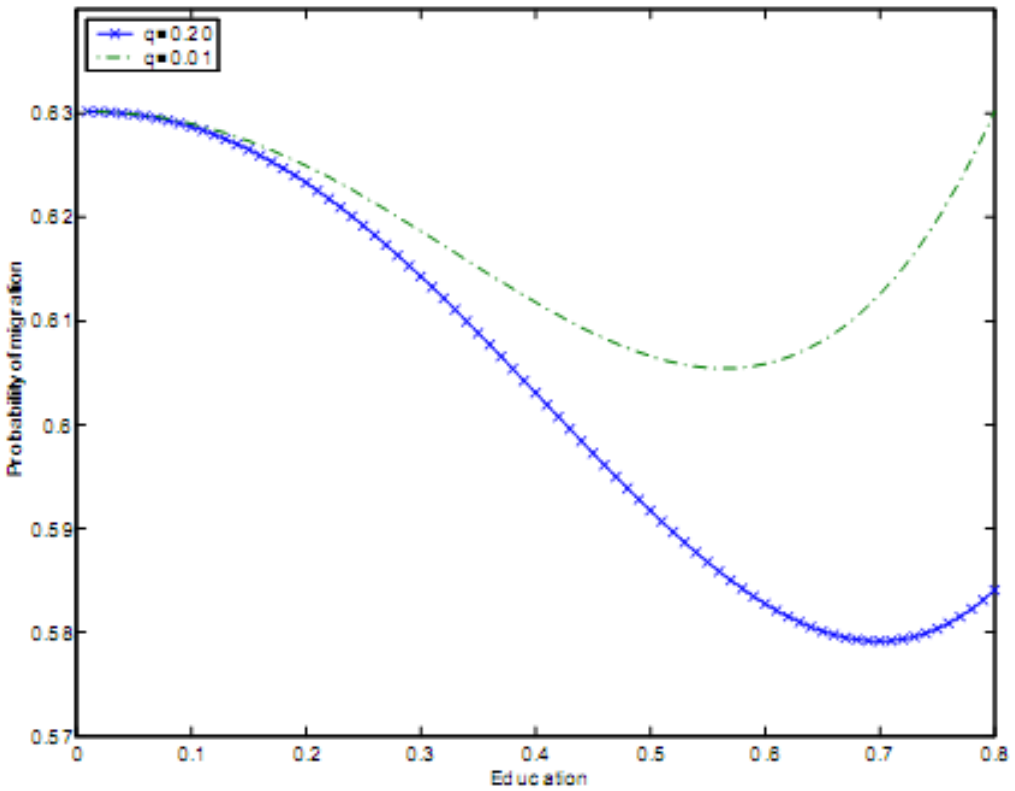

Figure 2 - Education and Probability of Migration - Leisure cost q

When wage rates at home (w_A) and host (w_B) regions are the same or the wage at home is higher ($w_A \geq w_B$), more people will stay at their home region (m_{t+1}=0), when compared to the case when $w_A < w_B$. In the $w_A \geq w_B$ case, the probability of migration is different than zero only for the those with very low education or very educated. The human capital accumulation technology also has an interesting effect on the agent's probability of migration. As long as the learning technology exhibits decreasing returns (δ+β <1), the probability of migration curve has a U shape with respect to education. That is, the probability of migration is high for less educated people and decreases with education. Once it reaches a threshold (which clearly depends on β), migration is increasing in the agent's education level.[5]

3 - EMPIRICAL APPLICATION

3.1 Data and Description of Variables

Our data were obtained from the ECINF survey (Informal Urban Economy Survey), conducted by the Brazilian Statistics Bureau (IBGE) and collected in October of 2003. The ECINF survey considers all twenty-six Brazilian states and the Distrito Federal (Brazilian capital). Brazil is currently divided into five regions composed of states

[5] In essence, our model is very similar to the Glomm and Ravikumar (1998).s analysis of increasing returns to scale and we would also obtain a Kuznets (inverted U) curve. Here we decided to focus on the decreasing returns to scale case in studying the migration of informal workers.

with similar cultural, historical, social and economic aspects as follows: North Region (Acre, Amapá, Amazonas, Pará, Rondônia, Roraima and Tocantins); Northeast Region (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte and Sergipe); Central-West Region (Goiás, Mato Grosso, Mato Grosso do Sul and Distrito Federal); Southeast Region (Espírito Santo, Minas Gerais, Rio de Janeiro and São Paulo) and South Region (Paraná, Rio Grande do Sul and Santa Catarina).

The ECINF survey follows the International Labour Organization (ILO) definition of informal sector as enterprises with all or most characteristics in a list that includes family ownership, small scale of operations and labor-intensive methods. The survey focus on self-employed and firms with up to five employees, regardless the number of owners or non-paid workers, and not on firms status with the Brazilian tax authorities. Sampling strategy used the demographic census as a frame and the survey is limited to urban areas. Preliminary interviews were conducted to screen households for the presence of at least one entrepreneur with a business employing five or less people. Interviews were made aware that information collected for the survey was confidential and would be used for statistical purposes only[6].

Information regarding workers' migration is obtained from ECINF answers to the question "Were you born in this state?". By comparing a worker's answer and where s/he lived in October of 2003, we define origin (place where s/he was born) and destination (place where s/he lives). More specifically, we consider three types of migrant. First, we define that a worker migrated if her/his origin state is different than her/his destination state. In this case, all migrants are interstate migrants. Second, we look into the data at the municipality level and migrants are not necessarily interstate migrants. A worker is considered migrant if the municipality where s/he lives in October 2003 is different than her/his municipality of birth. And, finally, we restrict our definition of migration to consider only workers that are twenty five years old or older and who have been living in the destination municipality for less than ten years.

Migration is a very intensive phenomenon among workers engaged in informal activities, and it varies considerably across geographical regions (Table 1). Our database has a total of 48,813 workers. Since our focus is to analyze informality in a context of internal migration, missing values for this variable and foreigners (220 individuals) were dropped out. We analyze a sample of 45,151 informal workers in urban regions from all Brazilian states and the Distrito Federal. There are 9,915 migrants in the ECINF survey, corresponding to twenty two percent of the population of informal workers in Brazil (after expanding our sample by the appropriate weights). The proportion of migrants in our sample is similar to the one observed in studies of inter-state migration for the whole population, regardless whether the worker is engaged in formal or informal activities. The net migration (inflow minus outflow) of workers engaged in the informal sector is positive for fifteen states, in particular, São Paulo, Rio de Janeiro, Pará, Mato Grosso, and Distrito Federal. On the other hand, states like Paraná have a net migration close to zero, but the in- and out-migrant flows are quite expressive.

[6] A disclaimer appears on top of the questionnaire stating that such information is confidential and protected by Law 5534 of November 11, 1968. For more details, see Almeida and Bianchini (1998), Jorge and Valadao (2003).

Table 1: Migration flows - Brazilian states

State	In-migrants		Out-migrants		Net migrants
	N	%	N	%	N
RO	279	2.81	10	0.10	269
AC	27	0.27	19	0.20	7
AM	120	1.21	48	0.48	72
RR	47	0.47	3	0.03	44
PA	482	4.87	162	1.63	321
AP	70	0.71	14	0.15	56
TO	172	1.74	56	0.57	116
MA	183	1.84	469	4.73	-287
PI	93	0.94	331	3.34	-238
CE	110	1.11	741	7.47	-631
RN	81	0.82	204	2.06	-123
PB	90	0.91	548	5.53	-458
PE	205	2.07	887	8.95	-682
AL	104	1.05	256	2.58	-152
SE	88	0.88	0	0.00	88
BA	262	2.65	1169	11.79	-907
MG	433	4.37	1682	16.97	-1250
ES	235	2.37	216	2.18	19
RJ	832	8.39	300	3.02	532
SP	3396	34.25	808	8.15	2588
PR	752	7.58	735	7.41	17
SC	244	2.46	294	2.97	-51
RS	116	1.17	435	4.38	-319
MS	240	2.42	87	0.87	154
MT	394	3.97	71	0.71	323
GO	509	5.14	287	2.89	223
DF	350	3.53	82	0.83	268
Total	9,915	100.00	9,915	100.00	-

Table 2 shows the transition matrix of migration flows for each Brazilian state. The analysis of the transition rates reveals some interesting patterns. On one hand, states with more in-migrants, i.e. number of migrants above the Brazilian average of 367 individuals, are from the South West (São Paulo, Rio de Janeiro, and Minas Gerais) and the Middle West (Mato Grosso and Goiás) regions, and from Paraná (South) and Pará (North) states. On the other hand, states with more out-migrants are Minas Gerais and São Paulo (South East), large part of Northeast (BA, PE, CE, PB, MA) and South (Paraná and Rio Grande do Sul) regions.

Table 2: Raw transition matrix of inter-state migration

Origin \ Destination	RO	AC	AM	RR	PA	AP	TO	MA	PI	CE	RN	PB	PE	AL	SE	BA	MG	ES	RJ	SP	PR	SC	RS	MS	MT	GO	DF
RO	70	1	1	1	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	3	0	0	
AC	6	92	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1	4	0	0	0	0	0	2	0
AM	15	11	359	5	5	0	0	0	0	0	0	1	2	0	0	0	2	0	5	0	0	0	0	0	0	1	1
RR	0	0	1	16	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PA	6	0	48	4	1,086	49	7	11	0	6	0	0	0	1	0	0	0	1	14	6	1	0	1	1	2	0	3
AP	0	0	0	0	12	83	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
TO	0	0	0	1	37	0	115	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	7	5
MA	8	1	19	22	179	11	53	897	46	14	0	1	4	0	0	2	2	1	23	19	0	0	0	0	7	26	28
PI	5	0	5	3	18	2	21	70	357	13	0	0	4	2	0	6	0	1	8	84	0	1	3	1	4	39	40
CE	18	5	18	5	56	2	12	55	27	1,627	8	12	25	4	1	20	7	7	86	267	12	4	2	8	10	28	44
RN	1	0	1	1	13	1	1	3	1	14	351	20	15	1	1	6	8	1	26	62	4	0	1	1	2	12	8
PB	4	1	5	1	3	0	3	6	4	14	38	768	63	8	2	24	2	3	132	166	4	1	1	1	4	37	23
PE	3	0	3	0	25	1	2	9	6	14	10	31	2,188	60	10	77	14	6	78	478	10	4	4	8	4	11	16
AL	3	0	0	0	0	0	2	1	0	1	2	1	30	358	32	8	0	3	21	122	6	0	0	5	4	10	1
SE	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
BA	12	0	1	0	26	0	8	7	1	3	2	5	23	7	26	2,965	56	39	68	707	20	2	3	8	22	85	36
MG	24	2	2	1	25	0	12	2	2	3	4	1	4	3	1	31	4,353	116	214	883	85	10	3	11	46	127	69
ES	29	0	1	0	7	0	1	0	0	0	0	0	0	0	0	18	45	651	852	19	0	0	0	0	6	2	1
RJ	1	0	1	0	3	0	1	1	1	6	6	9	14	4	4	19	78	39	2,923	64	16	5	7	1	5	4	11
SP	21	1	1	0	7	0	4	2	2	11	6	4	15	11	7	37	140	8	38	7,809	286	18	7	92	66	23	13
PR	79	2	5	1	9	0	3	1	0	0	1	1	3	2	1	1	26	4	10	356	1,900	67	15	53	80	10	1
SC	7	0	0	0	4	0	0	0	0	0	0	1	0	0	0	0	1	0	3	24	160	993	693	8	16	1	1
RS	8	0	1	0	2	0	3	2	1	0	1	0	0	0	0	2	1	1	10	51	150	129	3,121	21	31	16	2
MS	8	0	0	0	2	0	1	0	0	0	0	0	0	0	0	1	1	0	0	20	6	0	1	335	38	3	1
MT	12	0	2	0	5	0	2	1	0	2	0	0	2	0	0	0	2	1	0	7	5	0	1	9	222	18	1
GO	7	1	1	1	42	0	34	3	0	3	0	2	1	0	0	7	36	1	0	47	5	0	0	7	42	795	46
DF	1	0	2	0	1	0	1	2	1	1	3	1	0	0	0	1	10	1	8	2	0	1	0	1	1	46	95
Total	348	119	713	63	1,549	153	323	1,080	666	1,806	609	884	2,499	722	473	3,377	4,980	774	3,938	11,741	2,732	1,273	3,330	597	634	1,345	461

Source: ECINF (2003)

We summarize the variables considered in this study on Table 3. The first variable is a dummy variable equal to one if the worker was born in a different state than its current state of residence. Individual characteristics are described by education, experience, age, and gender. Education is a continuous variable with eight levels. Experience is measured by the number of years as a business owner. Age of the worker is in years and gender equals 1 for female. Job features are described by a dummy variable which indicates if the owner has another job, and by other dummies which are used to identify the economic sector where the individual works. Economic sectors in our sample are classified according to the aggregate sectorial characterization of the ECINF survey. Additional variables available in our survey are also important to be considered, such as wage differential, wealth, metropolitan area, and business motivation dummies. The variable wage differential denotes the wage differences expressed in R$ (Brazilian Reais) of October of 2003. The wealth represents the individual's assets, while the metropolitan area is a dummy to identify metropolitan regions. The last variable are the business motivation dummies, which identifies the main causes workers have to start up an informal business.

Table 3: Summary statistics

Variable	Description	Total	Migrants	Non-migrants
Migration	(1,0) if migrant	0.22	-	-
		(0.41)	-	-
Education level		4.31	4.01	4.40
		(1.83)	(1.78)	(1.83)
Wage Differential		525.65	518.76	527.58
		(437.71)	(426.27)	(440.87)
Wealth		8624.22	7630.49	8903.86
		(41351.97)	(28943.72)	(44216.63)
Age	Age	41.75	44.20	41.06
		(12.59)	(12.14)	(12.62)
Experience	Number of years as owner	9.24	9.70	9.11
		(9.28)	(9.46)	(9.23)
Gender	(1,0) if female	0.33	0.34	0.33
		(0.47)	(0.47)	(0.47)
Other Job	(1,0) if the owner has other job(s)	0.10	0.08	0.10
		(0.30)	(0.28)	(0.31)
Metropolitan Area	(1,0) if in a metropolitan area	0.36	0.39	0.35
		(0.48)	(0.49)	(0.48)
Business Motivation				
Motivation1	(1,0) if Unemployment	0.30	0.30	0.30
		(0.46)	(0.46)	(0.46)
Motivation2	(1,0) if Opportunity of a partnership/Flexibility	0.02	0.02	0.02
		(0.13)	(0.12)	(0.14)
Motivation3	(1,0) if Flexibility	0.02	0.01	0.02
		(0.13)	(0.11)	(0.14)
Motivation4	(1,0) if Independence	0.17	0.17	0.17
		(0.37)	(0.38)	(0.37)
Motivation5	(1,0) if Family Tradition	0.09	0.06	0.09
		(0.28)	(0.24)	(0.29)
Motivation6	(1,0) if Improve income	0.17	0.18	0.16
		(0.37)	(0.38)	(0.37)
Motivation7	(1,0) if Previous experience	0.09	0.10	0.08
		(0.28)	(0.31)	(0.27)
Motivation8	(1,0) if Business attractiveness	0.08	0.08	0.07
		(0.26)	(0.27)	(0.26)
Motivation9	(1,0) if Second Job (became principal)	0.02	0.02	0.02
		(0.15)	(0.15)	(0.15)
Motivation10	(1,0) if Other	0.06	0.05	0.06
		(0.23)	(0.22)	(0.23)
Economic Sector				
Sector1	(1,0) if Transformation & Mineral Extraction Industry	0.11	0.11	0.11
		(0.31)	(0.32)	(0.31)
Sector2	(1,0) if Construction	0.19	0.20	0.18
		(0.39)	(0.40)	(0.39)
Sector3	(1,0) if Retail and Repair Services	0.37	0.38	0.36
		(0.48)	(0.48)	(0.45)
Sector4	(1,0) if Lodging and Food Services	0.06	0.06	0.06
		(0.24)	(0.24)	(0.23)
Sector5	(1,0) if Transportation and Communications	0.08	0.07	0.08
		(0.27)	(0.26)	(0.28)
Sector6	(1,0) if Real Estate and Services	0.05	0.05	0.05
		(0.23)	(0.22)	(0.23)
Sector7	(1,0) if education, health, and social services	0.03	0.03	0.03
		(0.18)	(0.18)	(0.18)
Sector8	(1,0) if other collective, social, and personal services	0.08	0.07	0.08
		(0.28)	(0.26)	(0.28)
Sector9	(1,0) if other activities	0.02	0.02	0.02
		(0.15)	(0.14)	(0.16)

Source: ECINF-IBGE (2003)
Notes: Means are reported in lines, and standard deviation between brackets.

It is worth mentioning that our data set comprises mainly low-skilled workers with low average wages, common characteristics of informal sector workers (Figures 3 and 4). Sixty percent of the informal workers in our sample receives less than 500 Brazilian Reais per month, when the average wage is around 650 Brazilian Reais.

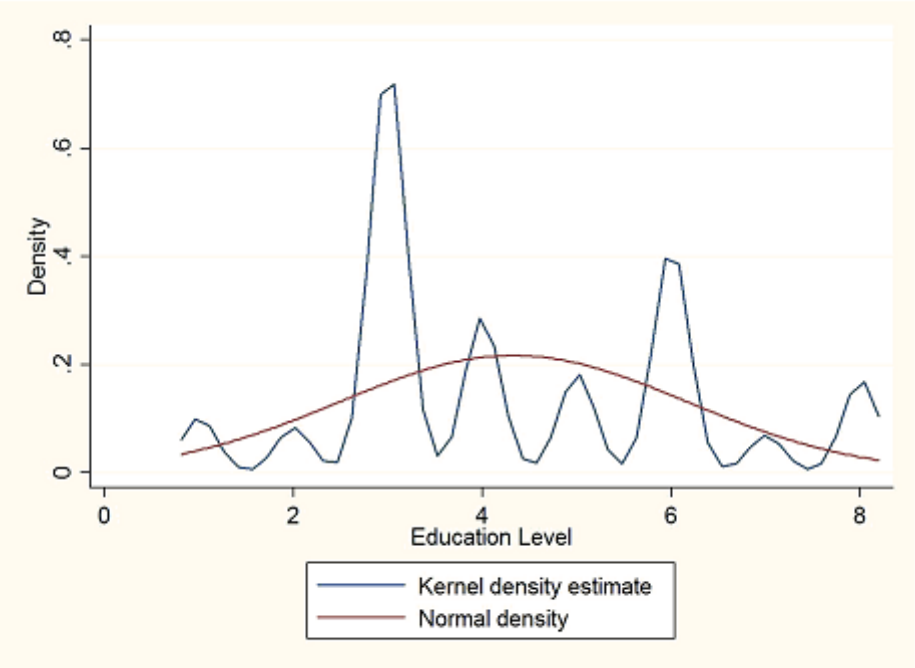

Figure 3 - Education Distribution

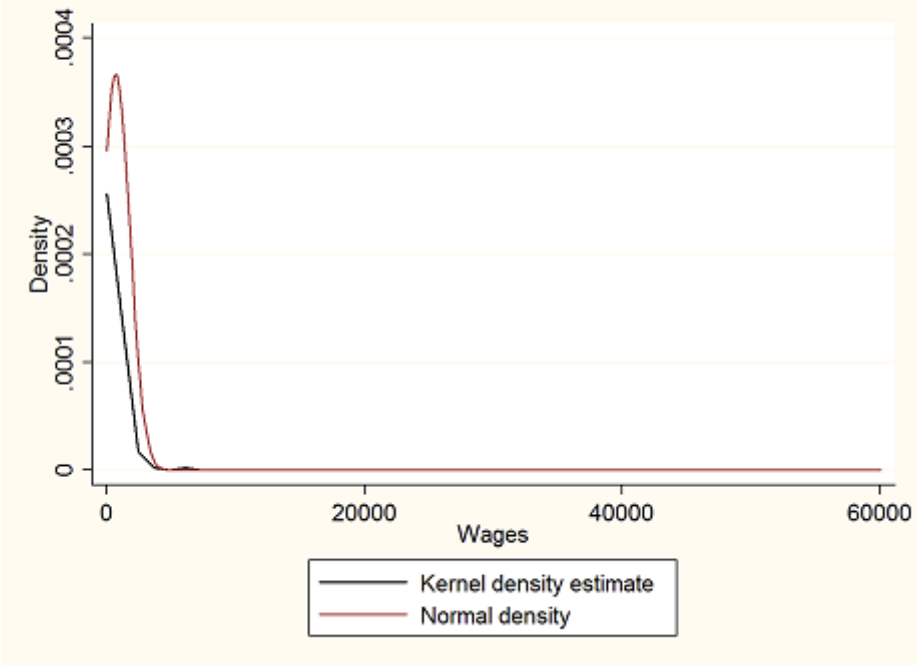

Figure 4 - Wage Distribution

The average profile of migrants reveals some interesting results in comparison to non-migrants. The main differences between the two groups are the following: (i) migrants are older at their destination, have more experience as business owners, and are more concentrated in metropolitan areas than non-migrants; (ii) migrants wages are higher than those of non-migrants, which is in accordance with the migrant self-selection literature; (iii) non-migrant's wealth, defined here as individual's assets, such as properties, labor tools, equipment, motor vehicle and others, is higher than migrant's wealth; (iv) non-migrants are more likely to have a second job than migrant workers.

In our sample, migrants are, on average, less educated than non-migrants and migration to another state decreases monotonically with education (Figure 5). This observation goes in contrast with the existing migration literature that suggests a positive relationship between education and migration, establishing that the propensity to migrate increases with education (Greenwood 1975 and 1993, Blanchard and Katz, 1992; Mauro and Spilimbergo, 1999; Ritsilä and Ovaskainen, 2001; Basker, 2002, Docquier and Marfouk, 2006). The fact that, in our dataset, high skilled workers (with high education level) are less likely to migrate than low skilled workers (less educated) can be in part be associated with the informal activities are often carried out by less qualified workers (Thomas, 1992; Maloney, 1999; Paula and Scheinkman, 2007).

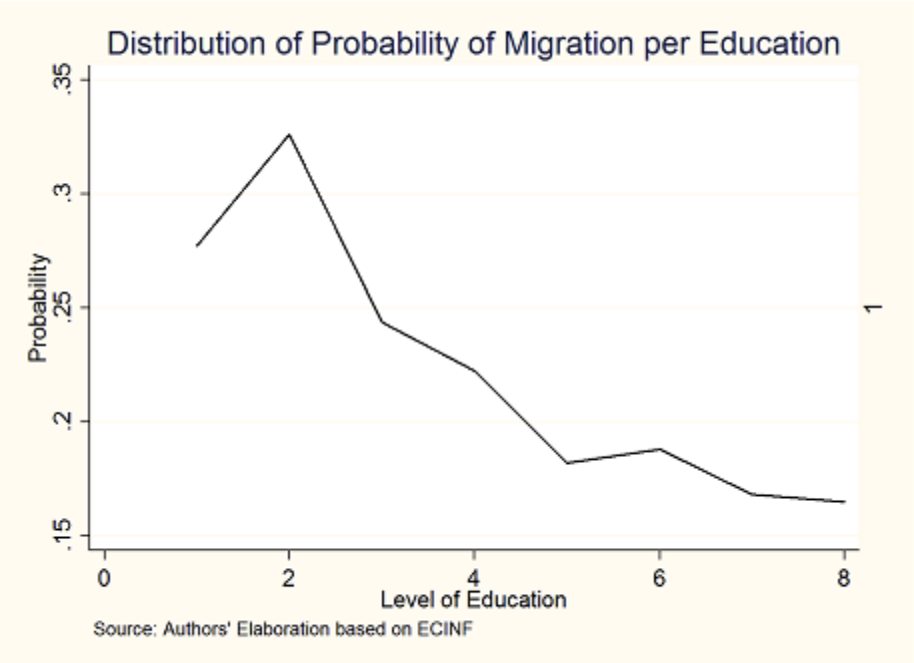

Figure 5 - Education and Probability of Migration

Additionally, we observe that probability of migrate is higher for those with smaller wages in the source region (Figure 6).[7]

Migrants are draw from the lower tail of income distribution of source economy. Thus, it seems that migration appears to be an outside option for those who already have rather precarious labor market conditions.

[7] See Borjas (1994, 1995), Cushing and Poot (2004) and Greenwood (1975, 1985, 1997) for reviews of the economics of migration.

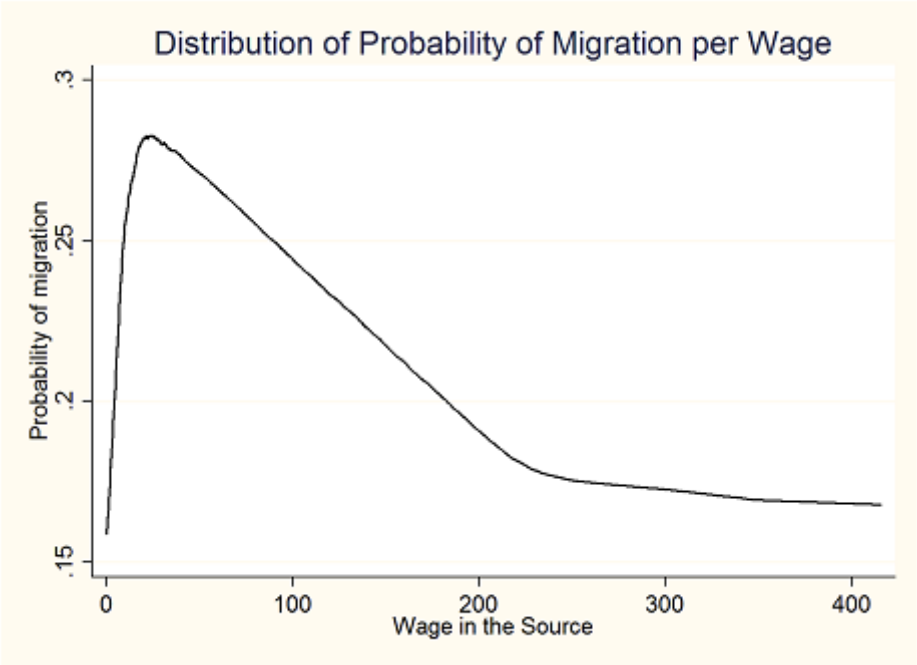

Figure 6 - Wages in the Origin Region and Probability of Migration

The ENCIF allows us to identify the main motivations workers have to start an informal business. Although unemployment is the main reason for a worker to engage in informal activities, answers such as "improve income", "previous experience" and "business attractiveness" are more frequently observed among migrant workers. The pairwise correlation matrix for the main variables used in this study is presented in Table 4.

Table 4: Correlation matrix

	diff	age	age2	expcp	expcp2	fem	educa	cmjob	cmcar1	cmcar2	cmcar3	cmcar4	cmcar5	cmcar6	cmcar7	cmcar8	cmcar9	armstra	cmsiv1	cmsiv2	cmsiv3	cmsiv4	cmsiv5	cmsiv6	cmsiv7	cmsiv8	cmsiv9	cmsiv10	wealth
diff	1																												
age	-0.0372*	1																											
age2	-0.0704*	0.9851*	1																										
expcp	0.1338*	0.4307*	0.4208*	1																									
expcp2	0.0569*	0.3969*	0.4093*	0.9177*	1																								
fem	-0.0376*	-0.0021*	-0.0079*	-0.1383*	-0.0952*	1																							
educa	0.6532*	-0.0317*	-0.0358*	-0.1006*	-0.1035*	0.1050*	1																						
cmjob	0.0482*	-0.0580*	-0.0612*	-0.0327*	-0.0177	0.0411*	0.0609*	1																					
cmcar1	-0.1192*	0.0396*	0.0327*	0.0469*	0.0554*	0.1494*	-0.013	0.0196*	1																				
cmcar2	-0.1463*	-0.0038	-0.0048	0.1339*	0.1213*	-0.3192*	-0.0112*	-0.0191*	-0.1770*	1																			
cmcar3	-0.0774*	0.0113	0.0072	-0.1164*	-0.1120*	0.0487*	-0.0413*	-0.0377*	-0.0778*	-0.3850*	1																		
cmcar4	-0.0490*	0.0071*	0.0054*	-0.0634*	-0.0447*	0.0492*	-0.0030*	0.0135	-0.0498*	-0.1297*	-0.0533*	1																	
cmcar5	0.0469*	-0.0027	-0.0044	-0.0337*	-0.0335*	-0.0442*	-0.0067	-0.0171	-0.0498*	-0.1263*	-0.0187*	-0.0750*	1																
cmcar6	0.0341*	-0.0399*	-0.0313*	-0.0164	-0.0215*	-0.0211*	0.0126*	0.0336*	-0.0537*	-0.1162*	-0.1621*	-0.0914*	-0.0654*	1															
cmcar7	0.0632*	-0.0216*	-0.0316*	0.0337*	0.0332*	0.0563*	0.0656*	0.1183*	-0.0635*	-0.0606*	-0.1419*	-0.0479*	-0.0810*	-0.0458*	1														
cmcar8	-0.0113	-0.0566*	-0.0555*	0.0161*	0.0161	0.0632*	0.0750*	0.0191*	-0.1033*	-0.1391*	-0.2160*	-0.0750*	-0.0793*	-0.0554*	-0.0813*	1													
cmcar9	-0.0071	0.0001	0.0043	-0.0179*	-0.0035	0.0005	0.0303*	-0.0039	-0.0535*	-0.0701*	-0.1069*	-0.0370*	-0.0392*	-0.0282*	-0.0395*	-0.0287*	1												
armstra	0.0194*	0.0172	0.009	0.001	0.0031	0.0333*	0.0279*	-0.0760*	-0.0330*	0.0569*	-0.0310*	0.017	-0.0433*	0.0210*	0.0007	0.0331*	-0.0003	1											
cmsiv1	-0.1418*	-0.0644*	-0.0677*	-0.1537*	-0.1368*	-0.1219*	-0.1150*	-0.0949*	-0.0648*	0.1100*	-0.0117	0.0562*	0.0046	-0.0459*	-0.0765*	-0.0311*	-0.0097	0.1196*	1										
cmsiv2	0.0386*	-0.0333*	-0.0332*	-0.0375*	-0.0291*	0.0031	0.0911*	0.0018	-0.0353	-0.0503*	-0.0043	0.0332*	-0.003	0.0413*	0.0187	0.0253*	0.0041	-0.0036	-0.3510*	1									
cmsiv3	0.0311*	-0.0423*	-0.0418*	-0.0338*	-0.0291*	0.1046*	0.0621*	-0.0031	0.0061	-0.0585*	-0.0146	-0.0333	0.0085	0.0176	0.0532*	0.0195*	0.0004	0.0334*	-0.0738*	-0.0141	1								
cmsiv4	0.0615*	-0.0193*	-0.0271*	0.0662*	0.0707*	-0.0377*	0.0373*	-0.0190*	-0.0332*	-0.0614*	0.0334*	-0.0214*	0.0093	0.0350*	0.0141	0.0190*	0.0144	-0.0432*	-0.3970*	-0.0569*	-0.0316*	1							
cmsiv5	0.0299*	-0.0175	-0.0242	0.1356*	0.1358*	-0.0711*	0.013	-0.0016	0.0164	0.0436*	-0.0069	-0.0216*	-0.0041	-0.0224*	-0.0194*	-0.0035	-0.0122	-0.0445*	-0.1702*	-0.0220*	-0.0397*	-0.1160*	1						
cmsiv6	-0.1364*	0.1371*	0.1477*	-0.0662*	-0.0514*	0.3037*	-0.0853*	0.1126*	0.0641*	-0.0817*	0.0276*	0.0173	-0.0360*	-0.0362*	-0.0248*	0.0017	-0.0263	-0.0458*	-0.3012*	-0.0777*	-0.0556*	-0.2115*	-0.1212*	1					
cmsiv7	0.1019*	0.0091	-0.0006	0.0618*	0.0684*	-0.1331*	0.0531*	-0.0503*	0.0182*	0.0054	0.0033	-0.0350*	-0.0246	0.0273*	-0.0109	-0.0471*	0.0187	-0.0458*	-0.3333*	-0.0439*	-0.0389*	-0.1563*	-0.0990*	-0.1556*	1				
cmsiv8	0.0466*	-0.0379*	-0.0366*	0.0072	-0.0035	-0.0346*	0.0539*	0.0358*	-0.0338*	-0.0549*	0.006	0.0263	0.0284*	0.0178	0.0290*	0.0154	-0.0116	-0.013	-0.1630*	-0.0371**	-0.0338*	-0.1329*	-0.0779*	-0.1378*	-0.1018*	1			
cmsiv9	0.0372*	0.0361*	0.0383*	0.0432*	0.0382*	-0.0164*	0.0273*	0.0035	-0.0199*	0.0360*	-0.0187*	-0.0263*	-0.0139	0.0368*	0.0191*	0.0014	0.0151	0.0176	-0.3564*	-0.0190*	-0.0173	-0.0699*	-0.0460*	-0.0758*	-0.0532*	-0.0455*	1		
cmsiv10	0.0797*	0.0502*	0.0535*	0.0533*	0.0532*	0.0469*	0.0554*	0.0319*	0.0039	-0.0345*	-0.0434*	0.0239	0.0033	0.0063	0.0999*	0.0351*	-0.0021	0.0263	-0.1631*	-0.0393*	-0.0367*	-0.1075*	-0.0616*	-0.1091*	-0.0536*	-0.0701*	-0.0360*	1	
wealth	0.0597*	0.0469*	0.0512*	0.0096	0.0058	-0.0510*	0.0451*	0.0063	-0.0239*	-0.0560*	0.0330*	0.001	0.0797*	0.0556*	0.0542*	-0.0350*	-0.0113	-0.0376*	-0.0491*	0.0422*	0.0231	0.0126	-0.0147	0.0033	0.0164*	0.0059	-0.0105	0.0199*	1

Note: *relers to the 5% significance level.

It is important to highlight that another important database with information about informal activities in Brazil is the PNAD - Pesquisa Nacional por Amostra de Domicilios (Brazilian Household Survey). A key distinction between the PNAD and ECINF datasets refers to the dimension of the occupied personnel in the informal sector in Brazil. According to Jorge and Valadao (2003), the estimates gathered from the PNAD indicate an occupied contingent in the informal sector beyond the estimates found out by the ECINF. This result is particularly affected by the total of employees and unpaid family workers. The estimates of the PNAD, considering only the urban areas in Brazil, indicate a total of 19 million people working in the informal sector, while the ECINF estimates a total of 13 million people engaged in informal activities. Hence, although the ECINF contains only information about informal workers, the advantage of this survey is that more precise information on informal labor characteristics can be obtained, information that is partially or not observed in other datasets. In addition, this dataset allows a more precise assessment of these activities in terms of job opportunities and earnings. The study of the ECINF dataset will allow a better understanding of migration and informal activities in Brazil.

3.2 Probability of Migration

Our theoretical model has a number of interesting implications for empirical work. In this section, we estimate the migration probability of a informal sector worker using a binary choice model, according to the following probit equation:

$$P(M_i) = \Phi(\alpha + \beta X_i + \gamma_j z_{ij}) \qquad (10)$$

where M_i is an indicator equal to 1 if individual *i* was born in a different region other than her/his region of residence (and 0 otherwise), Φ $(\cdot)$ is the standard normal CDF, z_{ij} is a continuous variable of worker's education, X_i is a vector of additional explanatory variables, and are the coefficients to be estimated. The vector X_i includes the wage differential, wealth, a set of individual characteristics (age, years of experience as owner, and gender), job characteristics (other job, and economic sector), spatial features (dummies of Brazilian origin states, and an indicator whether the worker lives in a metropolitan area) and dummies indicating the business motivation. The sign, magnitude, and statistical significance of the coefficient provides information about the relevance of worker's education in the migration decision.

We estimate the effects of wage differentials and education on the probability of migration of informal sector workers according to equation (10) and results are presented in Tables 5. In our database we do not observe the wage of a migrant worker in her/his origin region nor if s/he was already working in informal sector prior to her/his migration decision. The information available is restricted to workers at the destination state. Due to this data set limitation we impute wage differentials based on estimates of individual wages in the region of origin and destination following a Mincerian equation. More specifically, we estimate a Mincerian equation for each Brazilian state and take the estimated parameters to impute wages for those who were born there and have decided to migrate. All the regressions are estimated using the final ECINF weights.[8]

Table 5 reports the marginal effects of probit estimates for equation (10) where the dependent variable migrant is equal to 1 if the individual was born in a state different from her state of residence in October of 2003. The first column of Table 5 presents estimates when only wage differential and additional controls (wealth, age, squared

[8] In fact it is the simulated wage in the source taking into account the observed individual characteristics. Our database do not provide information about wages in the source region.

age, experience as owner, squared experience, female and state of origin) were included in the right-hand side of equation (10). In this case, wage differential and wealth have a significant effect on the probability of migration equal to zero, an implication of our model when the elasticity of substitution between consumption and leisure is equal to one (equation 6).

Table 5 Probability of Inter States Migration - Birth

	1	2	3	4	5
Education		-0.004*	-0.005**	-0.006***	-0.041**
		(0.002)	(0.002)	(0.002)	(0.018)
Wage Differential	0	0.000*	0.000***	0.000***	0.000**
	0.000	0.000	0.000	0.000	0.000
Wealth	0	0	0	0	0
	0.000	0.000	0.000	0.000	0.000
Age	-0.004**	-0.004**	-0.005***	-0.005***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Squared Age	0	0	0	0	0.000**
	0.000	0.000	0.000	0.000	0.000
Experience	-0.009***	-0.010***	-0.010***	-0.010***	-0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Squared Experience	0.000***	0.000***	0.000***	0.000***	0.000***
	0.000	0.000	0.000	0.000	0.000
Female	-0.008	-0.003	0.001	0.004	0.057**
	(0.006)	(0.007)	(0.007)	(0.007)	(0.028)
Other Job			-0.020**	-0.016	-0.045***
			(0.009)	(0.010)	(0.016)
Metropolitan Area			-0.018***	-0.018***	-0.015**
			(0.006)	(0.006)	(0.006)
Business Motivation					
Opportunity of a partnership				0.068**	0.089**
				(0.033)	(0.037)
Flexibility				0.027	0.037
				(0.023)	(0.025)
Independence				0.014*	0.023**
				(0.009)	(0.010)
Family Tradition				0.005	0.013
				(0.012)	(0.013)
Improve income				-0.011	-0.01
				(0.009)	(0.009)
Previous experience				0.018	0.027**
				(0.012)	(0.013)
Attractive business				0.013	0.023*
				(0.012)	(0.013)
Second Job (became principal)				0.005	0.019
				(0.019)	(0.022)
Other				0.024*	0.033**
				(0.014)	(0.016)
Residuals					0.036**
					(0.018)
Origin Dummies	sim	sim	sim	sim	sim
Sector Dummies			sim	sim	sim
Observations	41428	41428	41428	41428	41428

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Next, we introduce education as a determinant of a worker's migration decision and the probability of migration estimates are presented in the second column of Table 5. According to the gradual addition of observed controls, the marginal effect of education on the probability of migration ranges from -0.037 to -0.029 (columns 2 to 4). The results do not change significantly when we consider whether the worker has another job or s/he lives in a metropolitan area (column 4, Table 5). This empirical evidence indicates that the likelihood of migration decreases with a worker´s education level and it is consistent with our model when the learning technology exhibits decreasing returns to scale.

Besides education, we consider reasons that led a worker to engage in informal activities. We include a set of dummy variables which intends to capture the business motivation of informal workers (column 4, Table 5). The results suggest that those who have started up an informal business because its independency, the attractiveness of the investment or because they had some previous experience are more likely to migrate than those who have been unemployed before their decision to become an informal employer or a self-employed worker. The underlying assumption made here is that individuals were engaged in informal activities before their decision to migrate.

It is important to note that if education is positively correlated to individual's talent - an omitted variable in equation (7) - the marginal effects of education on the probability of migration depicted in columns 2 to 4 could be biased, because endogeneity issues are not taken into account. Since we emphasize in our theoretical model that talented people are more likely to migrate, we expected an upward bias in our estimates of the marginal effects of education on the probability of migration.

The fifth specification in Table 5 test for the endogeneity of education in equation (7).We adopt Rivers & Vuong (1988) approach, using the age at which an individual entered the labor market as the instrument variable for education. Specifically, we implement a two-step estimation. In the first stage, education level is regressed on the instrument and exogenous regressors. Then, the residuals from this first stage are included on the probit model, equation (7). The Rivers-Vuong approach requires that the errors in the education equation (first stage) and migration equation (second stage) must be independent of all exogenous variables and additional instrument. Our IV estimates rely on the assumptions that the age at which an individual entered the labor market (i) is strongly correlated with her/his education level (human capital investment) and (ii) affects the migration decision only through her/his education level. In this IV estimation, the negative marginal effect of education are stronger than the previous one (-0.166 against -0.037; both significant at 1%). This result corroborates our initial assumption of an upward bias on the estimates of marginal effects of education on probability of migration and, consequently, confirms that more talend agents are more likely to migrate.

A comparison between columns 4 and 5 (Table 5) shows that the positive marginal effects of having started an informal business motivated by the opportunity of partnerships and by a change in the job status (from a second job to a principal job) on the probability of migration are stronger. This implies that these business motivations, previous job experience and business attractiveness, together with independence plus opportunity of a partnership, significantly increases the probability of migration.

It is important to emphasizes that our estimates point to a special case of migration selectivity already identify by Borjas (1987) in the context of international migration. Migrants are negatively self-selected in terms of education level, but seems to be more talented when compared to non-migrants in the home economy. Then, we should expected that they outperfom in the destination economy like the case of "refugee sorting ". This outperfomance of informal worker migrants is depicted in Figure 7.

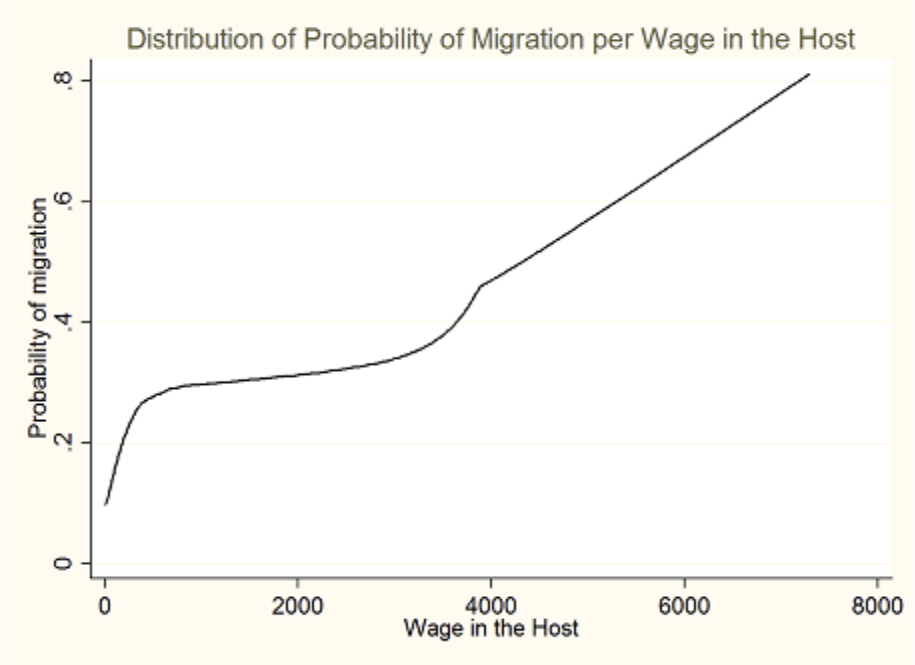

Figure 7 - Wages in the Host Region and Probability of Migration

In order to investigate the robustness of our results we explore two different definitions of migrant. First, we look into a more disaggregated data at the municipality level and migrants are not necessarily interstate migrants. A worker is considered a migrant if the municipality where s/he lives in October 2003 is different than her/his municipality of birth. The dependent variable on equation (7) is equal to one for a migrant worker. Next, we refine the migration definition to include only workers that are twenty five years old or older and who have been living in the destination municipality for less than ten years.

The results for the intermunicipal migration (Appendix, Table A.1) are very similar to those found in Table 5 when we considered interstate migration. When the migration concept refers to intermunicipal migration (less than ten years), the marginal effects estimates are smaller and less significant. But, once again, less educated individuals are more likely to migrate. The marginal effect of education on probability of migration ranges from -0.004 to -0.041 and it is significant at 5% (Appendix, Table A.2).

It is important to note that migration might not necessarily be an individual's own decision. For instance, children are forced to migrate when their parents decide to do so. In the first two definitions of migration - interstate (Table 5) and intermunicipal migration (Table A.2) - it is possible that a worker is classified as migrant as a consequence of her/his parents' decision to migrate. This can, in part, explain why the results are slightly different when we consider the intermunicipal (less than ten years) migration. Since we impose this time constraint, weaker results can potentially rely on the difference between short-term and long-term migration. In this case, the results suggest that education is relatively less important to the migration decision of short-term migrants.

Finally, we recognize that our results rely on two strong assumption, which are mainly due to limitations of our dataset. First, we have assumed the exogeneity of wage differentials and wealth. Second, we consider that all possible endogeneity between education and migration comes from the omission of the ability variable when we estimate equation (7). Our approach does not take into account the possibility of endogeneity due to simultaneity or reversal causality. Human capital investment is assumed to be made in the origin region, and thus the education decision cannot be reviewed once a worker decides whether to migrate or not to another region. Nevertheless, our empirical analysis supports that there is a negative relationship between education and the probability of migration

in this group of Brazilian informal workers, regardless the definition of migration. Moreover, wage differentials and wealth turned out to have no relevance in explaining a worker's decision to migrate.

4 - CONCLUSION

This paper analyzes the migration decision of workers engaged in informal activities in Brazil and investigates the effects of education, ability, wage differentials and wealth on their decision to migrate. We observe that there is a negative and significant effect of education on informal worker's decision to migrate. Wage differentials and wealth are not relevant to explain the migration flow of these workers, which is consistent with a unitary elasticity of substitution between consumption and leisure. A worker's talent, education level and locational preferences are key to her/his decision. This set of workers is traditionally characterized by low skill, low average wages and, due to a lack of employment opportunities in the formal sector and long unemployment periods, many people are forced to join the informal sector to earn a living. Moreover, we argue that the often precarious conditions of the informal labor market force workers to migrate as their last opportunity to try to improve their wellbeing. In this case, informal workers can be interpreted as the refugees of the international migration literature.

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NOTES

[1] See Borjas (1994, 1995), Cushing and Poot (2004) and Greenwood (1975, 1985, 1997) for reviews of the economics of migration.

[2] Chiswick (1978, 1999); Borjas (1987, 1999); Borjas, Bronars, and Trejo (1992); Bound and Holzer (2000); Borjas and Bratsberg (1996); Chen (2009); LaLonde and Topel (1996)

[3] See Choi and Thum (2005), Chong and Gradstein (2007), Friedman et al. (2000) and Fugazza and Jacques (2003).

[4] Similar parameter values are used in Dustmann and Kirchkamp (2002).

[5] In essence, our model is very similar to the Glomm and Ravikumar (1998)'s analysis of increasing returns to scale and we would also obtain a Kuznets (inverted U) curve. Here we decided to focus on the decreasing returns to scale case in studying the migration of informal workers.

[6] A disclaimer appears on top of the questionnaire stating that such information is confidential and protected by Law 5534 of November 11, 1968. For more details, see Almeida and Bianchini (1998), Jorge and Valadao (2003).

[7] In fact it is the simulated wage in the source taking into account the observed individual characteristics. Our database do not provide information about wages in the source region.

[8] See ECINF documentation at www.ibge.gov.br.

APPENDIX

Table A.1 Probability of Intermunicipal Migration - Birth

	1	2	3	4	5
Education		-0.025***	-0.033***	-0.034***	-0.187***
		(0.003)	(0.004)	(0.004)	(0.029)
Wage Differential	0	0.000***	0.000***	0.000***	0.001***
	0.000	0.000	0.000	0.000	0.000
Wealth	0	0	0	0	0
	0.000	0.000	0.000	0.000	0.000
Age	0.023***	0.020***	0.018***	0.018***	0
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
Squared Age	-0.000***	-0.000***	-0.000***	-0.000***	0.000*
	0.000	0.000	0.000	0.000	0.000
Experience	-0.004***	-0.005***	-0.007***	-0.007***	-0.017***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Squared Experience	0	0	0.000**	0.000**	0.000***
	0.000	0.000	0.000	0.000	0.000
Female	0.022**	0.054***	0.074***	0.074***	0.276***
	(0.010)	(0.011)	(0.012)	(0.012)	(0.037)
Other Job			-0.086***	-0.086***	-0.224***
			(0.016)	(0.016)	(0.030)
Metropolitan Area			0.064***	0.066***	0.077***
			(0.009)	(0.009)	(0.010)
Business Motivation					
Opportunity of a partnership				0.066*	0.128***
				(0.037)	(0.037)
Flexibility				0.039	0.081***
				(0.031)	(0.031)
Independence				0.042***	0.077***
				(0.013)	(0.015)
Family Tradition				-0.031*	0.005
				(0.018)	(0.019)
Improve income				0.013	0.014
				(0.014)	(0.015)
Previous experience				0.043**	0.081***
				(0.018)	(0.018)
Attractive business				0.018	0.057***
				(0.018)	(0.019)
Second Job (became principal)				0.04	0.095***
				(0.030)	(0.031)
Other				0.024	0.060***
				(0.021)	(0.022)
Residuals					0.156***
					(0.029)
Origin Dummies	sim	sim	sim	sim	sim
Sector Dummies			sim	sim	sim
Observations	45147	45147	45147	45147	45147

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A.2 Probability of Migration Inter Municipal Migration (less than 10 years) - Birth

	1	2	3	4	5
Education		-0.025***	-0.033***	-0.034***	-0.187***
		(0.003)	(0.004)	(0.004)	(0.029)
Wage Differential	0	0.000***	0.000***	0.000***	0.001***
	0.000	0.000	0.000	0.000	0.000
Wealth	0	0	0	0	0
	0.000	0.000	0.000	0.000	0.000
Age	0.023***	0.020***	0.018***	0.018***	0
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
Squared Age	-0.000***	-0.000***	-0.000***	-0.000***	0.000*
	0.000	0.000	0.000	0.000	0.000
Experience	-0.004***	-0.005***	-0.007***	-0.007***	-0.017***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Squared Experience	0	0	0.000**	0.000**	0.000***
	0.000	0.000	0.000	0.000	0.000
Female	0.022**	0.054***	0.074***	0.074***	0.276***
	(0.010)	(0.011)	(0.012)	(0.012)	(0.037)
Other Job			-0.086***	-0.086***	-0.224***
			(0.016)	(0.016)	(0.030)
Metropolitan Area			0.064***	0.066***	0.077***
			(0.009)	(0.009)	(0.010)
Business Motivation					
Opportunity of a partnership				0.066*	0.128***
				(0.037)	(0.037)
Flexibility				0.039	0.081***
				(0.031)	(0.031)
Independence				0.042***	0.077***
				(0.013)	(0.015)
Family Tradition				-0.031*	0.005
				(0.018)	(0.019)
Improve income				0.013	0.014
				(0.014)	(0.015)
Previous experience				0.043**	0.081***
				(0.018)	(0.018)
Attractive business				0.018	0.057***
				(0.018)	(0.019)
Second Job (became principal)				0.04	0.095***
				(0.030)	(0.031)
Other				0.024	0.060***
				(0.021)	(0.022)
Residuals					0.156***
					(0.029)
Origin Dummies	sim	sim	sim	sim	sim
Sector Dummies			sim	sim	sim
Observations	45147	45147	45147	45147	45147

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%