



Revista de Economía y Estadística - Vol. XLVI - N° 1 - (2008) - pp 7- 29.
Instituto de Economía y Finanzas - Facultad de Ciencias Económicas
Universidad Nacional de Córdoba - Argentina

What Sways the Decision to Migrate? An Empirical Analysis of the Argentinean Case

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Abstract

Labour mobility among different regions within a country is known as one of the mechanisms that can contribute to the adjustment of regional labour markets. This will only occur on the condition that the individual's responses to labour earnings differentials are sensitive enough. This paper provides with empirical evidence for Argentina concerning the analysis of the individual's decision to migrate, and in particular, the response of the individuals to regional wage differentials, based on individual data. A random effects logit for panel data models the migration decision. The real expected income was found to significantly influence the probability of migrating.

Keywords: Migration Decision, Income, Random Effects Logit, Argentina.

JEL Classification: J6; J3.

Resumen

La movilidad laboral entre regiones de un país es uno de los mecanismos que contribuyen al ajuste de los mercados laborales regionales. Sin embargo, esto ocurrirá con la condición que la respuesta de los individuos a los diferenciales laborales sea lo suficientemente sensible a dichos

* I'm grateful to Walter Nonneman, Liesbet Okkerse and Mariana Delgado Cordomí for helpful comments for the improvement of this study. I also acknowledge financial support from ALFA II Program, Project AML/B7-311-97/0666/II-0058 FA of the European Union. The usual disclaimer applies.

diferenciales. El trabajo provee evidencia empírica de Argentina con respecto a la decisión de las personas de migrar, y en particular, se focaliza en la respuesta de las personas a los diferenciales salariales. La decisión de migración se modela mediante un logit de efectos aleatorios. El trabajo encuentra que el ingreso real esperado influencia la probabilidad de migrar.

Palabras clave: Decisión de Migración, Ingresos, Logit de Efectos Aleatorios, Argentina.

Clasificación JEL: J6; J3.

I. THEORIES AND PREVIOUS STUDIES

Migrants move for many different motives. A well established notion in the economic literature is that migrants move to gain access to a higher income stream. Sjaastad (1962) introduced into the migration literature the idea that migration is an investment in human capital. That is, an individual's choice of moving is influenced by the present value of the difference in income streams between all possible locations minus any financial or psychological cost of moving. Migration occurs if the returns in a potential destination net of the discounted costs of moving are larger than the returns obtained in the origin. Therefore, the human capital approach considers migration as an investment increasing the productivity of human resources.

The model of Todaro (1969) eliminates the neoclassical assumption of full employment when analysing rural-urban migration and is the first model that incorporates urban unemployment, explaining both why people migrate to the cities and why urban unemployment exists in developing countries. The Todaro model points out that it is the relative rather than the absolute cost-benefit analysis the one that determines migration, and that it is the expected income differential (rather than actual urban-rural real wage differential), which acts as a determinant of the migration decision.

This expected income differential takes into account the job opportunities by considering the probability of obtaining an urban job that incorporates in the analysis the unemployment rates. Therefore, a migrant will decide to move provided that the expected real income in the urban area exceeds the expected real income in the rural area.

This individual's cost-benefit calculations are not only determined by the labour market. As Massey et al. (1993) discusses, it is usually observed that once the number of migrants has reached a certain threshold in the

destination area, the expansion of the social network reduces the costs and risks of moving, and migration may become self-perpetuating: the existence of ties of kin and friendship (social networks) both in the sending and in the receiving communities, increase the likelihood of moving. This occurs since, by decreasing the costs and risks of migration, the social network increases the expected (net) return from moving. The declination of risks is a crucial point in easing migration: a migrant can easily find a job for a member of the sending society, and in this way, she makes the migration decision for the person that takes the job virtually risk free.

The observed regularity that migrants from the same origin tend to choose the same destination places can also be explained by the presence of informational cascades (Epstein, 2002). That is, when an individual considers migrating she must take into account not only his own incomplete private information, but also the observed previous emigrants' decisions. As a consequence, the migrants "...discount private information and duplicate a location that previous emigrants have been observed to choose" (Epstein (2002), p. 2), with a consequent clustering in destination areas.

Family features can also be important in the migration decision. Da Vanzo (1977) incorporates the role that factors such as the spouse's labour status play when analysing migration. This can be modelled in various ways; one of them is to introduce the total income of the family in the analysis. Married people are then expected to be less mobile than single workers, given that the migration decision involves two persons rather than only one.

The individual's decision to migrate is not purely determined by economic factors. In the equilibrium perspective (Greenwood, 1997), migration is ultimately conditional on amenities, such as language, climatologic amenities (average temperature during the year, average humidity), topological amenities (the presence or absence of a sea coast, variety of terrain, among others).

There are many empirical studies concerning the causes of migration. However, studies dealing with individual data on this topic are less frequent, mainly due to the scarcity of this kind of data, and they tend to focus on internal migration.

Bartel (1979)'s article on the US internal migration was one of the first to study the migration decision with individual data. The author focuses on the relationship between job mobility and migration, showing that the real effects of human capital variables, job characteristics and family variables on the decision to migrate are best measured when accounting for the relationship between migration and mobility.

Decressin (1994) analyses migration in West Germany, finding that both unemployment and wages are important determinants of migration, while Daveri and Faini (1996), in their study of Italy, find that the expected income differential (which considers both the wage rate and the probability of employment) is a crucial determinant when analysing internal migration within the country.

Empirical applications for LDCs are less common. Whereas aggregate analyses are relatively more frequent (see e.g. Navarro de Gimbatti and Mendez (2002 and 2003), Kallai (2003), and Cattaneo (2003)), studies focusing on individual data for less developed countries are rather scarce. Hazans (2003) undertakes an analysis for the case of the Baltic Countries, finding evidence which supports the predictions of the human capital model, and the importance of both family determinants and labour market-related incentives for inter-regional mobility.

In this paper, the hypothesis that will be contrasted is that for the Argentinean case, the human capital approach to migration is adequate to explain the individual's migration decision. It must be stressed that the role of amenities in the migration decision may also be of importance.

The remainder of this study is structured as follows: Section 2 discusses the methodological aspects of the random effects estimation with panel data; Section 3 defines the data and describes it; Section 4 presents the model that has been used to analyse the data and its main findings. The study concludes in Section 5 with a discussion of its findings and limitations.

II. METHODOLOGICAL ISSUES

Statistical methods to analyse data with continuous response variables are quite established. For discrete responses, however, one faces a greater mathematical complexity and statistical analysis is not any longer straightforward.

II.1 The logit specification

A linear response latent variable y^* can be defined, depending on a vector of independent variables X . These variables determine whether an individual decides to migrate or not:

$$y^* = \beta' X + \nu$$

For the usual models, the dependent variable is not guaranteed to lie in the unit interval. The standard solution has been to use the logistic cumulative distribution function that constrains F to lie between zero and one¹.

The observed y is related to the response variable y^* as follows:

$$y = 1 \text{ if } y_i^* > 0$$

$$y = 0 \text{ if } y_i^* \leq 0$$

The dependent variable can only assume two values, 1 if the person is a migrant and 0 if the person is a native.

Let the probability of the dependent variable $y = 0$ be $(1 - p)$. The expected value of y is given by the probability that the person will be a migrant:

$$E(y) = (1 - p) \cdot 0 + p \cdot 1$$

This probability is a function of a vector of independent variables X . The probability of being a migrant is then:

$$Prob(y = 1 | X) = P(\beta'X + v > 0) = P(v_i > -\beta'X) = F(\beta'X)$$

where the last equality holds given that the logistic density function is symmetric around zero. Then, the general binary model can be specified as:

$$F(\beta'X) = \frac{1}{1 + e^{-\beta'X}}$$

The formulation of the logit model that was presented above assumes that the error term is independently identically distributed, and that is distributed independently of X .

II. 2 Panel data and the logit model

The effect of omitted variables, v usually can be attributed to three types of effects:

1. Therefore, it is assumed that the density of v is logistic. However, if one assumes that the distribution of the error is normal, the correct specification is a probit model. From a theoretical point of view, it is difficult to justify the preference of a logit model rather than a probit model (Greene, 2003). Amemiya (1981) also analyses different aspects related to this issue. In most of the cases, though, the use of a probit or a logit model gives very similar predictions of the probability of $y = 1$. The only exception is when one is analysing the regions where the probability of $y = 1$ is either very near to zero or very high (Hsiao, 1996).

- individual – specific, time- invariant effects μ_i : which are the same for a given cross-section. μ_i represent the effect on the endogenous variable y of all the time-invariant non-observable characteristics of the individual, and the impact of pre-sample behaviour. Hence, this effect implies that the specification of the model is not complete.

- time - specific; individual invariant effects λ_t , that are the same for all cross sections at a given point in time but vary with time- this implies that each time-period has a specific non-observable characteristic.

- individual-time varying effects ε_{it} , that vary across cross-sections and through time -i.e. vary with both i and t .

II.2.1 Random effects estimation

Following Hsiao (1996), if one assumes that the individual effects μ_i are unknown parameters that assume fixed values for the dataset, and that the residuals are uncorrelated with the explanatory variables, centered and spherical, the model to be estimated is:

$$y_{it}^* = \beta' x_{it} + \mu_i + \varepsilon_{it}$$

The probability of $y_{it} = 1$ is then given by:

$$P(\varepsilon_{it} > -\beta' x_{it} - \mu_i) = \int_{-\beta' x_{it} - \mu_i}^{\infty} f(\varepsilon_{it}) d\varepsilon_{it} = 1 - F(-\beta' x_{it} - \mu_i) \quad (1)$$

Equation (1) indicates that both μ_i and β are unknown parameters for the $P(y_{it} = 1 | x_i)$; only when $t \rightarrow \infty$ the maximum likelihood estimator is consistent. If one considers that the individual effects are latent, random, normally distributed variables, and introduces these effects in the model as error terms, the heterogeneity will not be incorporated in the expected value of the error term, but via its variance (non-observable heterogeneity).

If the random effects (μ_i) are independent of x_i , the log-likelihood becomes:

$$\log L = \sum_{i=1}^N \log \int \prod_{t=1}^T F(\beta' x_{it} + \mu) y_{it} [1 - F(\beta' x_{it} + \mu)]^{1-y_{it}} dG(\mu_i | \delta) \quad (2)$$

Maximisation of (2) provides a consistent efficient estimator for β .

The random effects estimation is an adequate method for this research and it will be used in the estimation hereafter.

III. THE DATA

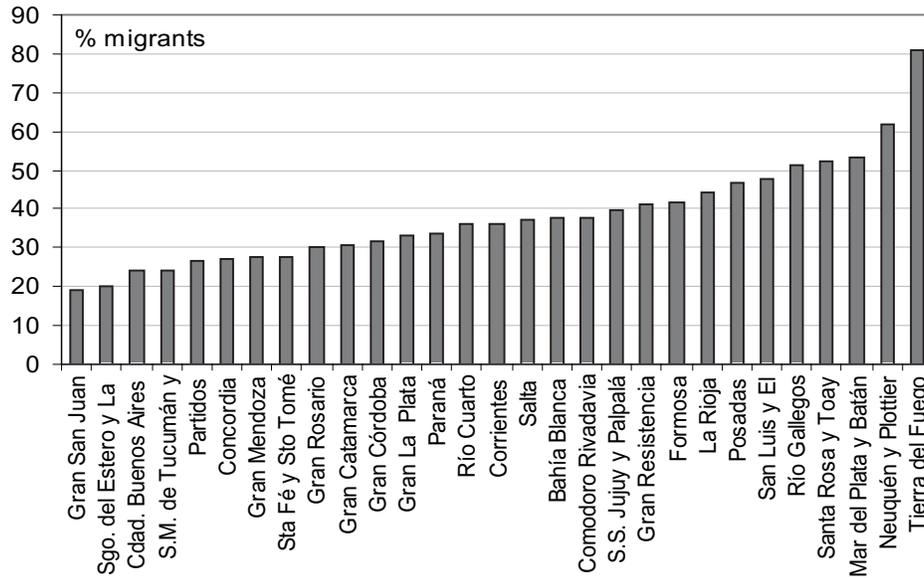
The analyses are based on official biannual statistical data (waves May and October) for the period 1998-2003 from the Argentinean Permanent Household Survey (EPH) that is carried out by the National Bureau of Statistics and Censuses (INDEC). The redesign of the survey after wave May 2003 imposes a constraint on the availability of fresh data on migration variables. The year 1998 was chosen as a starting point for this study since it is a year of economic growth and relative stability, which contrasts sharply with the following years, marked by economic and political instability and recession. Besides, beginning with the year 1998 provides a time-span of ten waves of surveys for the research, with the country in different economic scenarios which provides with variability in the sample.

As its name implies, the EPH is primarily a survey of households and was usually carried out twice a year. The EPH is an excellent data source for this research since it contains detailed information on migration, economic activity, labour force position and status, and household composition.

The areas of reference for the study are the 28 metropolitan areas the survey covers: Gran La Plata, Bahía Blanca, Gran Rosario, Santa Fé and Santo Tomé, Paraná, Posadas, Gran Resistencia, Comodoro Rivadavia, Gran Mendoza, Corrientes, Gran Córdoba, Concordia, Formosa, Neuquén and Plottier, San Salvador de Jujuy and Palpalá, Santiago del Estero and La Banda, Río Gallegos, Gran Catamarca, Salta, La Rioja, San Luis and El Chorrillo, Gran San Juan, San Miguel de Tucumán and Tafi Viejo, Santa Rosa and Toay, Tierra del Fuego, Ciudad de Buenos Aires and counties, Mar del Plata and Batán, and Río Cuarto.

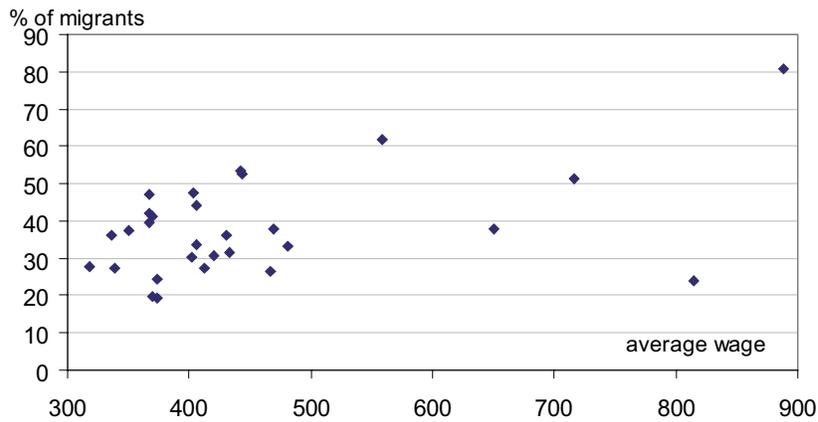
The dataset includes active people, i.e. aged 15-64 years old, from the above-mentioned 28 metropolitan areas. Each one of these metropolitan areas has a specific proportion of migrants. As shown in Figure 1, the percentages of migrants vary in a wide range, from a 19 per cent in the case of the metropolitan area of Gran San Juan, to an 81 per cent in the case of the metropolitan area of Tierra del Fuego. This diversity in the percentages of migrants of the metropolitan areas may be an indication of the existence of regional disparities that would be inducing these flows.

Figure 1
Percentage of migrants by metropolitan areas



Source: Permanent Household Survey, average 1998-2003

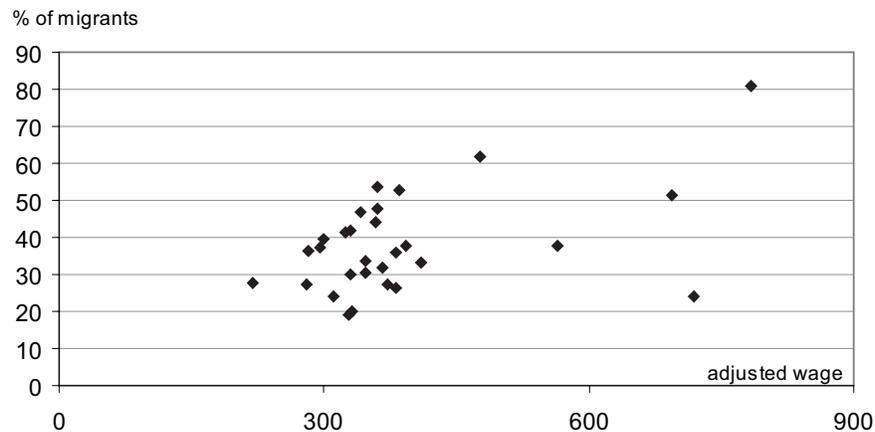
Figure 2
Wages and percentage of migrants in the 28 metropolitan areas



Source: Permanent Household Survey, average 1998-2003

The economic theory asserts that one of the factors that may be inducing these migration flows is the disparity in wages among metropolitan areas. Figure 2 depicts the average wage in each one of the 28 metropolitan areas and the percentage of migrants living in every one of them. As can be observed in the graph, there is a noticeable disparity in wages between these metropolitan areas; and even when eliminating the outliers, there is a positive association between the percentage of migrants and the wages². This may be calling for an application of the human capital theory: migrants move to the regions where wages are higher in order to increase their income.

Figure 3
Expected wage and percentage of migrants in the 28 metropolitan areas



Source: Permanent Household Survey, average 1998-2003

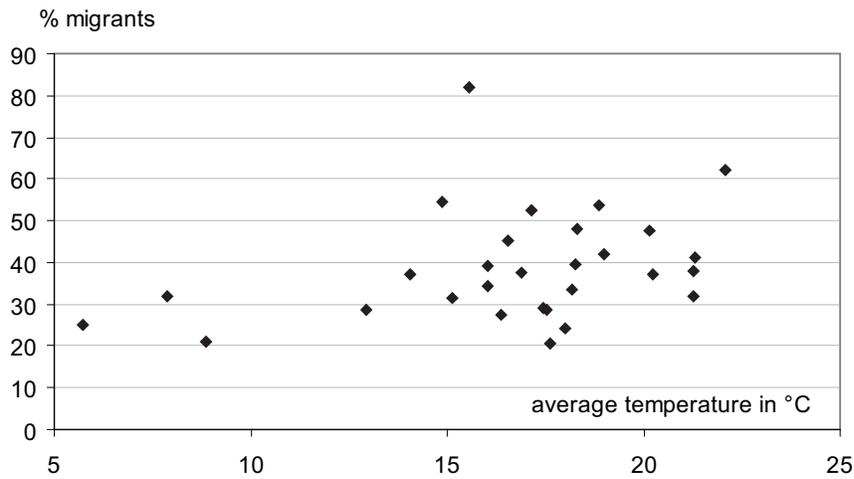
However, wages are not the only factors affecting the potential income a person can earn in a given destination area. When analysing whether to migrate or not, a rational individual, besides considering the wage she would earn in each possible destination, would also analyse the possibilities of employment. Therefore, a person considering migrating takes into account the expected income differential and not the wage differential.

Figure 3 plots the average wage in each one of the metropolitan areas adjusted by probability of employment (i.e. the expected income the migrant would obtain in the metropolitan area) and the percentage of migrants living there. This relationship is, as in the previous case, positive:

2. The correlation of 0.475 is significant at the 1 per cent level.

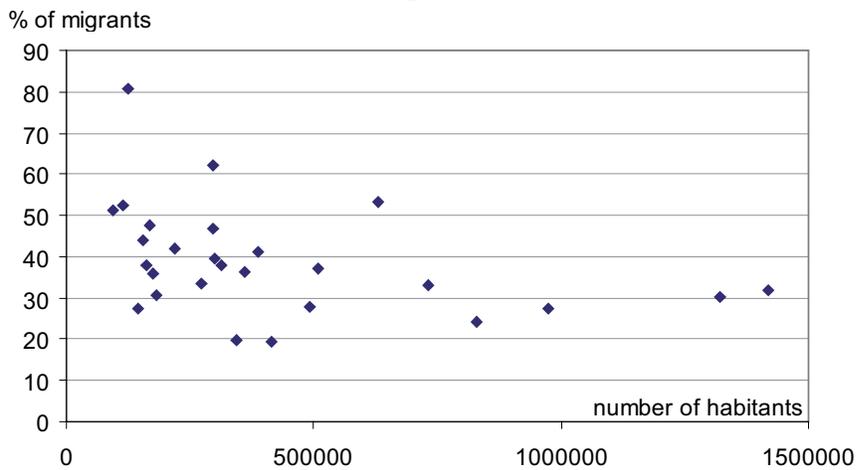
the higher the expected wages in the metropolitan area, the higher the percentage of migrants³. This positive association may be indicating that a potential migrant analyses the expected income in each destiny in order to decide whether to move or not.

Figure 4
Temperature and percentage of migrants in the 28 metropolitan



Source: Permanent Household Survey, 1998-2003 and Yahoo weather

Figure 5:
City size and percentage of migrants in the 28 metropolitan areas



Source: Permanent Household survey, 1998-2003

3. The correlation is 0.484, significant at the 1 per cent level. Note that this correlation is slightly higher than the correlation of wages and the percentage of migrants (0.475).

In order to assess the importance of amenities in migration decisions, Figure 4 presents the average temperature and the percentage of migrants in each metropolitan area. As can be observed in the figure, the higher the temperature in the metropolitan area, the higher the percentage of migrants⁴. This may be an indication of the fact that migrants also include in their considerations the temperature of the metropolitan area where they are considering to move. Finally, Figure 5 depicts another amenity: the size of the city and the percentage of migrants living in each one of the metropolitan area under consideration. As it can be observed, the smaller cities concentrate a high number of migrants, whereas the larger cities tend to have a lower proportion of migrants. Therefore, it seems that large cities are unattractive to migrants.

A simple regression analysis can help to identify the importance these variables have on the migration decision. The percentage of migrants in each metropolitan area will be explained by means of the expected wage (average wage in the metropolitan area multiplied by one minus the unemployment rate) in that city, the temperature and the city size.

As it can be observed in Table 1, all the proposed indicators are significative in explaining the concentration of migrants in the metropolitan areas. This analysis indicates that both the adjusted wage and the amenities play an important role in explaining the concentration of migrants.

Table 1
A simple regression

VARIABLE	COEFFICIENT	STD. ERR
ADJ_WAGE	0.05995(***)	0.0140
TEMPERAT	1.47169(***)	0.4940
CITY_SIZE	-0.000001(*)	0.0000
INTERCEPT	-8.382	11.217

Statistical significance:(***) $p < 0.01$, (*) $p < 0.10$.

4. Correlation of 0.338 is significant at the 0.05 level.

IV. EMPIRICAL ANALYSIS

In order to understand why people move, and in particular, the individual's decision to migrate, it is important to keep in mind that the reasons for moving may respond both to individual characteristics-that may also influence the wage rate the person can earn-, and to regional characteristics. While personal characteristics influence the migration decision affecting the subjective cost of movement, the regional ones -i.e. wage and unemployment differentials among the cities- affect the returns to migration.

Recalling that in the human capital approach, a person will decide to migrate provided that the net returns of moving exceed the costs of the movement; therefore, migration occurs only if the returns in a potential destination net of the discounted costs of moving are larger than the returns in the origin. Here, it will be considered the possibility that migration may not only respond simply to wage differentials, but to expected wage differentials, taking into account both the wage rate the person can earn and the possibilities of employment in each region. This implies that the probability that an individual will migrate from a given location to another increases as the earnings differential increases, as the observed unemployment differential decreases, and as distance decreases.

The random effects logit model for panel data presented in Section 2 has been applied to explain the migration decision. This decision can be thought of as depending on two sets of variables: personal variables and regional characteristics, as follows:

$$\text{migration_dummy} = f(\text{personal, regional characteristics}).$$

IV. 1 VARIABLES INCLUDED IN THE ANALYSIS

The dependent variable (*dep*) was constructed considering the place of birth of the person. The dummy equals one if the person was born in a different city from the one where she currently lives. It must be pointed out that the definition of the variable does not allow for a separation of the adults that have migrated as a result of their own decision, from those who migrated as children; in this latter case this variable would indicate the result of the parent's decision.

Personal characteristics

men : dummy variable that equals one if the respondent is a man.

married : dummy variable that assumes a value equal to one if the respondent is living with another person, or is married.

tfi : total income earned in the household minus the income earned by the individual. It's used as an indicator of the family's wealth.

exp : maximum possible years of experience at work, measured as the difference between the years of formal education of the person and the age of the person minus six, the schooling starting age.

exp_sq : experience squared.

edu : dummies indicating the maximum level of education the person has reached (*primary*, *secondary* for secondary and *univ* for further education: tertiary or university). The basic or primary level of education was used as comparison group.

age : dummies indicating the age group the person belongs to (*age15-24*, *age25-34*, *age35-44*, *age 45-64*). The age group 15-24 years of was used as comparison group.

mobility : variable that measures the relative mobility of the person. It equals one if the person has lived in another metropolitan area besides the one of birth and the one she is currently living.

Regional characteristics

wr - p/100 : difference between the real average wage in the metropolitan area where the person is currently living and the real average wage in the province of birth of the person; in both cases according to gender, age group, and educational level of the individual.

ureg - prov : difference between the unemployment rate in the metropolitan area where the person is living and the unemployment rate in the province of birth of the person, in both cases corresponding to the gender, age group, and educational level of the person.

ratio_w : This variable was used as an alternative to *wr - p/100* and *ureg - prov*. The *ratio_w* variable is defined as the ratio of the real wage of the metropolitan area the person is living in at present, corrected by the employment probability in the metropolitan area; divided by the real wage in the province the person comes from, multiplied by the employment probability in that province.

dgp : regional GDP in pesos measured as added value in the production of the province of reference.

size : number of habitants in the metropolitan area that is being considered.

temperat : average temperature in the metropolitan area of reference.

The descriptive statistics of these variables are presented in Table 2.

Table 2
Descriptive Statistics

	MEAN	STD. DEVIATION
<i>dep</i>	0.3481	0.47638
<i>men</i>	0.5885	0.49210
<i>married</i>	0.5912	0.49161
<i>tfi</i>	554.3757	969.56675
<i>exp</i>	22.3073	13.62653
<i>expsq</i>	683.2979	692.26465
<i>secondary</i>	0.4006	0.49001
<i>univ</i>	0.2821	0.45002
<i>age25-34</i>	0.2635	0.44054
<i>age35-44</i>	0.2332	0.42285
<i>age45-64</i>	0.3087	0.46195
<i>wr-p/100</i>	-0.8157	1.45823
<i>ureg-prov</i>	2.4074	8.37115
<i>ratio_wr</i>	0.8616	0.36450
<i>migrants</i>	29.5847	8.52383
<i>gdp</i>	45737403	28868720
<i>size</i>	4812129	4242556
<i>temperat</i>	15.8869	2.01618

The ways in which some of these variables are constructed deserve some consideration.

First, the variable denoting wage differentials was constructed as follows: in a first step, the average wage rates in the metropolitan area the person is living at present was computed. To do so, the individuals were separated into eighteen groups in order to reflect the different earning profiles of individuals, according to: gender of the person, the age group she belongs to (15-24 years old, 25-34 years old, and 35-64 years old), and the educational level of the individual (primary, secondary or high school, and further education level, which includes university and other non-university tertiary studies); and the average wage per group was finally assigned to

the individuals. These wages were deflated with a regional purchasing power indicator. The following step was to calculate the wages in the regions of origin of the migrants. The available data only informs about the province where the migrant comes from. Therefore, in order to reflect the variation of wages according to the different earning profiles above-mentioned, the data for the corresponding metropolitan area was used as proxy for the level of income it is possible to achieve in the whole province. To calculate average wages for the province, once again the sample was split considering eighteen different groups, according to gender, age group, and educational level. The average wages in this way obtained were deflated with the regional purchasing power indicator. Finally, the indicator of wage differentials is the difference between the real average wage in the metropolitan area the person is living and the real average wage in the province where the person was born.

Secondly, the variable reflecting unemployment rate differentials was constructed as follows. In a first step, average unemployment rates in the metropolitan area where the person is living were computed. Eighteen different calculations were carried out per metropolitan area taking into account gender, age group and educational attainment of the individuals. In this way, we computed first the unemployment rates corresponding to each category in each metropolitan area and these unemployment rates were imputed to the individuals with these characteristics living there. As a following step, the calculations were done for each province and imputed to the individuals with these characteristics that were born in each one of the provinces. Finally, the unemployment wage differentials were calculated.

As an alternative to the wage and employment differentials, the variable that was constructed is the ratio of the real average wage of the metropolitan area the person is living at present (adjusted by employment probability in the metropolitan area, which equals one minus the unemployment rate of the corresponding group); divided by the real average wage of the province the person comes from (adjusted by employment probability in that province). These wages were calculated considering the earning profile of the individual: the gender of the person, the age group she belongs to (15-24 years old, 25-34 years old, and 35-64 years old) and the educational level of the individual (primary, secondary or high school, and further education level, which includes university and other non-university tertiary studies).

According to the human capital theory, it is expected that migrants will move to gain access to a higher income stream, so that the higher the

income differential for each group of individuals, the higher the probability of migration for the person. Furthermore, a rational individual considers not only the level of wages in all possible destinations, but also the probabilities of employment in these destinations. It is therefore expected that the higher the unemployment differential, the lower the probability that the person will migrate to that destination.

Finally, as an alternative, it is expected that the individuals respond to the ratio of (adjusted) real expected wages of the metropolitan area where the person lives to the (adjusted) real wage in the province the person comes from: the higher the ratio of real expected wages, the higher the probability of migration.

With regard to the amenity variable, it is expected that the climate will exert a positive influence on the probability of migration: as the average temperature in the metropolitan area increases, the probability of migrating is also expected to increase.

The educational variable can also play a key role in the migration decision: the better educated can have better employment connections, access to better sources of information, and can also have greater efficiency in the search for jobs, which would make them more likely to migrate. A similar effect would imply that the more experienced people -those who have been working for a longer period- are those more likely to migrate given that they have better connections and possibilities of being promoted to another metropolitan area.

The percentage of migrants in each metropolitan area is intended to capture the existence of social networks -i.e. ties of kin and friendship- and the effect of informational cascades on the migration decision of the individuals. Thus, the logical relationship between the concentration of migrants in a metropolitan area and the probability of migration is that, the higher the concentration of migrants in a given destination area the higher the probability of other migrants going there.

The age of the person is expected to be negatively linked to the probability of migration: the younger the individual, the more likely she is to migrate. It is expected that as the person ages, there will be a declination in the probability of being a migrant.

Finally, the total family income -excluding that of the individual- is expected to negatively influence the probability of migration of the individual, since what the other members of the family earn is also considered as an opportunity cost of family migration.

How the other variables affect the probability of migration is more difficult to predict. It is not obvious how gender and the marital status affect the probability of migration. It is possible that since men are generally the primary worker of the family they are more likely to migrate. Conversely, it is also possible that if men who have a family migrate alone, after some years in which they have time to find a stable job, family reunification takes place. In this case, men will be more likely to migrate in the first years, while women, who will follow in the latter years, will be more likely to migrate afterwards. Therefore, the probability of migration would depend on which migratory phenomenon prevails at the moment of the study.

The GDP is expected to be positively related with migration: the richer the metropolitan area, it is more likely migrants wish to move there. Finally, the effect of city size on the probability of migration is a priori not so clear .

Table 3
Estimation of the random effects logit model

VARIABLE	COEFFICIENT	(STD. ERR.)
<i>men</i>	-0.7464 (***)	(0.053)
<i>married</i>	-0.7464 (***)	(0.055)
<i>tfi</i>	-0.0001 (***)	(0.000)
<i>exp</i>	0.0490 (***)	(0.004)
<i>expsq</i>	0.0011 (***)	(0.000)
<i>secondary</i>	-1.3233 (***)	(0.051)
<i>univ</i>	0.5786 (***)	(0.074)
<i>age25-34</i>	1.4943 (***)	(0.087)
<i>age35-44</i>	1.6829 (***)	(0.116)
<i>age45-64</i>	1.3930 (***)	(0.154)
<i>ratio_wr</i>	5.2347 (***)	(0.073)
<i>migrants</i>	0.1876 (***)	(0.003)
<i>gdp</i>	-2.86e-09 (**)	(0.000)
<i>size</i>	4.91e-08 (***)	(0.000)
<i>temperat</i>	0.2951 (***)	(0.012)
<i>Intercept</i>	-21.2182 (***)	(0.350)

Statistical significance: (***) $p < 0.01$; (**) $p < 0.05$.

Table 3 shows the estimation results of the random effects logit model. The probability that an individual migrates depends on personal characteristics -being man, being married, income earned in the household, experience at work, educational level of the person, and the age- and on regional variables - the ratio of real wages multiplied by employment probabilities in the metropolitan area the person is living divided by the

real wage multiplied by employment probability in the province of origin of the person, and GDP, size, and temperature of the region where the person lives. All the variables of the model except the regional GDP are statistically significant.

In a first step, the variable that was used to explain migration is the real wage differential between the metropolitan area where the person is currently living in and the one where the person was born. The higher the differential between the average wage in the metropolitan area where the person is living and the wage in the province of birth corresponding to the earning profile of the individual, the higher the probability of migration. However, people do not seem to respond to unemployment differentials. Even though the variable had the expected sign -i.e. the higher the unemployment rate differential between the metropolitan area the person is living and the province of birth-, it is not statistically significant.

Consequently, an alternative approach was followed. Instead of using separately wage differentials and unemployment differentials, the ratio of real wages multiplied by the probability of employment in the region where the person lives to the real wages multiplied by the probability of employment in the province where the person was born was used. This expected income indicator takes into account both the regional real wages and the regional employment opportunities in the metropolitan areas. This indicator stresses the fact that migrants decide to move provided that the expected real income in the metropolitan area exceeds the expected real income in the place of birth.

The amenities also play an important role in the migration decision. In the case of Argentina, a country that has a considerable extension north - south, the role of temperature variations seems to be of importance: people migrate to areas where the average temperature is higher. The sign of the coefficient in the regression indicates that, indeed, in the Argentinean case, the higher the temperature, the higher the probability of migration⁵. However, as it's noticeable in Table 3 the other amenities (the size of the metropolitan area and the gdp of the region) have almost no influence on the probability of migration.

The educational variables are also of importance when deciding to migrate. This result highlights the importance of the employment connections that arise with a higher educational level: the ones that have a higher

5. In earlier instances of this research a quadratic term was included to check for a possible non-linear effect.

probability of migration compared to the people with primary education are the professionals, those individuals who have either achieved a university degree or who have followed other tertiary non university studies. The effect of the individual's working experience also indicates that it is more likely for the person to move the more time she has spent working, probably due to promotions to another metropolitan areas.

The effects of social networks and informational cascades have been introduced in the model by the *migrants* variable, which measures the percentage of migrants concentrated in the metropolitan area that is being analysed. The significance of the corresponding coefficient indicates that these ties of kin and friendship that decrease the costs and risks of migration do play an important role in the case of Argentina, increasing the person's probability of migration as the percentage of migrants living in a certain metropolitan area increases.

The effects of age have been introduced in the model by the *age 25_34*, *age 35_44* and *age 45_64*. All the coefficients associated with these variables are measured as deviations from the omitted category - the age group 15-24 years old. The probability of migration is thus a function of age (the younger the person, the higher the probability).

The variable that indicates the wealth of the family has almost no effect on the probability of migration. Finally, while being men decreases the probability of migration, being married increases it. This may be an indication of the existence of family reunification: women may be going to where their husbands live. The mobility indicator had to be omitted due to collinearity problems.

V. Concluding remarks

This study provides an analysis of the importance of wages and amenities in the individual's migration decision in Argentina. Besides, it presents the first research in the country which analyses the factors affecting the individuals' migration decision.

By means of a random effects logit model for panel data, it was found that both personal characteristics of the individuals and regional factors influence the probability of migration. The personal factors that increase the probability of migration are: being married, getting older, having more work experience and having a tertiary degree (university and

other further studies); while being a man and having a larger income from other members of the family decrease the probability of migration. With regards to regional characteristics, the percentage of migrants living in a metropolitan area and the climate- i.e. the average temperature in the metropolitan area- also exert a positive effect on the probability of migration. The city size and the regional GDP have a very small influence on this probability, the first having a positive effect on the probability of migration and the second one having the opposite effect.

The most important finding of this research is that in Argentina, when considering to migrate, people take into account the real expected income they would earn in a given destination and migrate if this income exceeds the expected income in their places of origin. This is in line with the Todaro (1969) model's predictions: it is the relative rather than the absolute cost-benefit analysis the one determining migration, and for the migration decision, it is indeed the expected income rather than the absolute income the one that acts as a determinant.

In addition, the importance of amenities on a potential mover should not be underestimated. This research shows that for the case of Argentina, the climatologic factor influences a person's migration probability: when individuals consider migrating they also take into account the average temperature in the place they would move to, being more probable to move the higher the average temperature in the metropolitan area of destiny.

The effect of social networks and informational cascades indicates that, even given the somewhat crude proxy, these ties and these informational cascades have an effect on the probability of migration. This is a result that has been also pointed out in the literature (see e.g. Massey et al. (1993)). A more detailed research about how these networks work would be needed to uncover the complete effect of the social networks on the migration decision.

Finally, a gendered study of the migration decision may shed light on the exact nature of the effects of the civil status variable and the family reunification process that may be taking place in the case of Argentina.

References

- Amemiya, Takeshi (1981). Qualitative Response Models: A Survey. *Journal of Economic Literature*, 19:1483-1536.

- Baltagi, Badi H. (2002). *Econometric Analysis of Panel Data*. Wiley, England.
- Bartel, Ann P. (1979). The Migration Decision: What Role Does Job Mobility Play?. *American Economic Review*, 69:775-786.
- Borjas, George J. (1994). The economics of immigration. *Journal of Economic Literature*, 32:1667-1717.
- Burda, Michael C. and Jennifer Hunt (2001). From German Reunification to Economic Integration: Productivity and the Labor Market in East Germany. *Brooking Papers of Economic Activity*, 2:1-91.
- Cattaneo, Cristina (2003). The Determinants of Actual Migration and the Role of Wages and Unemployment in Albania: an Empirical Analysis. Presented at the 7th Annual Conference on Global Economic Analysis. Washington DC..
- Da Vanzo, J. (1977). Why Families Move: A Model of Geographic Mobility of Married Couples. R&D Monograph. U.S. Department of Labor. Washington D.C..
- Daveri, Francesco and Riccardo Faini (1996). Where Do Migrants Go? Risk-Aversion, Mobility Costs and the Location Choice of Migrants. *Center for European Policy Research Discussion paper*, 1540.
- Decressin, Jörg. (1994). Internal Migration in West Germany and Implications for East-West Salary Convergence. *Weltwirtschaftliches Archiv*, :231-257.
- Epstein, Gil S. (2002). Informational Cascades and Decision to Migrate. *IZA Discussion Paper*, 445.
- Greene, William H. (2003). *Econometric Analysis*. Prentice Hall, New York, 5th edition.
- Greenwood, Michael J. (1997). Internal Migration in Developed Countries. In Mark R. Rosenzweig and Oded Stark, editors, *Handbook of Population and Family Economics*, pages 47-720. Elsevier Science, The Netherlands.
- Hazans, Mihails (2003). Determinants of Inter-Regional Migration in the Baltic Countries. Technical report, European Regional Science Association.

- Hosmer, David W. and Stanley Lemeshow. (2001). *Applied Logistic Regression*. Wiley, New York, Second edition.
- Hsiao, Cheng (1986). *Analysis of Panel Data*. Cambridge University Press, New York.
- Hsiao, Cheng (1996). Logit and Probit Models. In László Mátyás and Patrick Sevestre, editors, *The Econometrics of Panel Data. A Handbook of the Theory with Applications*, chapter 16, pages 410-427. Kluwer Academic Publisher, The Netherlands, Second revised edition.
- Hunt, Jennifer (2000). Why do People Still Live in East Germany?. *IZA discussion paper*, 123.
- INDEC. Encuesta Permanente de Hogares. 1998-2003.
- Kaizen, Julie (2005). Les dynamiques de la migration contrainte: suivons le troupeau!. *Journal of International Migration and Integration*.
- Kallai, Ella (2003). Determinants of regional mobility in Romania. AccessLab, Report on Workpackage 3, Analysing and Modelling Inter-regional Migration. Austrian Institute for Economic Research, Vienna.
- Long, J. Scott (1997). *Regression Models for Categorical and Limited Dependent Variables* of Advanced Quantitative Techniques in the Social Sciences Series 7. Sage Publications, USA,.
- Lucas, Robert E.B. (1997). Internal Migration in Developing Countries. In Mark R. Rosenzweig and Oded Stark, editors, *Handbook of Population and Family Economics*, pages 721-798. Elsevier Science, The Netherlands.
- Maddala, G. S. (1990). *Limited Dependent and Qualitative Variables in Econometrics*. Cambridge University Press, Cambridge.
- Massey, Douglas S., Joaquin Arango, Graeme Hugo, Ali Kouaoci, Adela Pellegrino and J. Edward Taylor (1993). Theories of International Migration: A Review and Appraisal. *Population and Development Review*, 19(4):699-751.
- Navarro de Gimbatti, Ana Inés and Fernanda Méndez (2002). Mercados laborales y migraciones internas en Argentina. Un análisis descriptivo y probabilístico de las migraciones en los principales aglomerados del país. XXXVII annual meeting of Asociación Argentina de Economía Política.

- Navarro de Gimballi, Ana Inés and Fernanda Méndez (2003). Desigualdades Urbanas y Migraciones Internas en Argentina. XXXVIII annual meeting of Asociación Argentina de Economía Política.
- Pissarides, Christopher A. and Jonathan Wadsworth (1989). Unemployment and the inter-regional mobility of labour. *The Economic Journal*, 99:739-755.
- Plasmans, Joseph (2006). *Modern Linear and Nonlinear Econometrics*, volume 9 of Dynamic Modeling and Econometrics in Economics and Finance. Springer, The Netherlands.
- Sjaastad, Larry A. (1962). The Costs and Returns to Human Migration. *Journal of Political Economy*, 70(5, part 2):80-94.
- Todaro, Michael P. (1969). A Model for Labor Migration and Urban Unemployment in Less Developed Countries. *American Economic Review*, 59(1):138-148.