Minorities internal migration in Italy: an analysis based on gravity models

Le migrazioni interne in Italia degli stranieri: un'analisi basata sul modello gravitazionale

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Abstract Italians and foreigners internal migration assume different behaviour in terms of intensity, geography, type. The levels of the mobility, the propensity to move in a short or in a long range, the propensity to cluster or to disseminate in the host country represent important differential characteristics between the two population. Actually the foreign population seems as a mosaic made up of minorities showing different propensities. This is the reason why an analysis considering foreign population as a whole could reach biased outcome. In the paper some gravity models applied to migratory movements among the 110 Italian provinces concerning the most consistent minorities groups are used. The Poissonian effects (regarding various typologies of masses and distance) show in a synthetic way the main differences among the minorities mobility. Moreover, the interpretation of these parameters allows an original interpretation of the minorities mobility structure inside Italy: the sign and level of the estimates derived from the gravity model can permit to better illustrate the residential model of the minorities reflecting how different theories in this domain act.

Abstract *Stranieri ed italiani si muovono all'interno dell'Italia con intensità, forme, percorsi spesso differenti. Livelli di mobilità, tendenza a preferire spostamenti di breve o di lungo raggio, propensione a raccogliersi in determinate aree o al contrario a diffondersi sul territorio sono elementi che agiscono in modo differente tra le due popolazioni. Inoltre, i gruppi che compongono il mosaico etnico nel nostro paese mostrano a loro volta tendenze differenti per cui un'analisi limitata a considerare la popolazione straniera nel suo insieme potrebbe ricostruire una realtà*

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media che non trova corrispondenza nel comportamento di nessun gruppo etnico. Nel lavoro si applica un modello gravitazionale ai movimenti migratori tra le province italiane di alcuni tra i più consistenti gruppi presenti nel Paese. La lettura dei parametri del modello ottenuti attraverso stime di tipo poissoniano consente non solo di acquisire solidi elementi esplorativi sul comportamento differenziale delle varie collettività, ma anche di interpretare la mobilità migratoria dei diversi gruppi alla luce delle teorie più convincenti che inquadrano il modello di insediamento residenziale delle minoranze all'interno del paese ospite.

Key-words: internal migration, gravity model, Poisson estimator, segregation theory

1 Introduction

Analysis of the mobility of the foreign population in Italy is important for at least three reasons. Firstly, the internal mobility of foreigners have had a strong impact on the observed mobility in Italy for their greater propensity to move within the country as well as for structural factors such as their greater incidence within the younger age groups (De Filippo and Strozza, 2011). Secondly, previous studies (Lamonica and Zagaglia, 2011; Casacchia et al., 2010) show the differences between the internal mobility by citizenship with different characteristics and demographic implications on the areas of the country. Finally, the analysis of internal migration of foreigners sheds light on the issue of integration/segregation of the foreign and Italian population. Generally speaking, the studies on the mobility by citizenship have basically followed two main directions, at least as regards the quantitative approaches: behavioral models (with regression analysis, mainly in the rare cases in which microdata was available) and macro models (often with gravitational approaches). In any case, due to the strong heterogeneity of the foreign presence in Italy, the need to better analyze the internal mobility of the single communities (instead of just considering the foreign population as an unique group of interest) has clearly emerged. In this paper a macro approach and a gravity model have been used with the aim of reducing to few crucial elements, basically origin and destination populations and distance, the information included in the origin-destination matrix and also to test the theories on spatial adaptation for the most numerous foreign communities in Italy. The resulting signs and levels of the coefficients will subsequently be read in the light of these abovementioned theories.

2 The gravity model: a theoretical framework

The empirically evident interrelationship between internal migration and residential patterns of immigrants is the basis of the spatial assimilation theory (SAT). The early settlement of immigrants from abroad is generally concentrated in large urban cities or regions and in areas of receiving countries where their national or ethnic groups are more concentrated (ethnic concentration). This solution enables immigrants to accumulate social capital through migration or ethnic networks that facilitate the acquisition of information, assistance, availability of ethnic goods and services, reducing costs of migration and the risk of discrimination in labour and housing markets. According to the SAT with time immigrants tend to take a settlement pattern which is more similar to that of the natives, dispersing their presence in the host country through internal migration from areas of first arrival to subsequent locations.

Geographical mobility is achieved as a result of the socio-economic upward mobility of immigrants who, through the progress of the assimilation/integration process, acquire more knowledge and ties with the host country and the native population, so reducing the link with the community of origin. At a spatial level, the result is a lower separation/segregation of immigrants and the convergence of their settlement model to that of natives. This theory, however, was criticized by supporters of both the segmented assimilation theory (Portes, Zhou, 1993) and of the ethnic disadvantage model (Aguirre et al., 1989). The former argues that the process of assimilation/integration takes place at different levels of the social and professional scale of the host country and that immigrants who experience socio-economic improvements may prefer to remain at or to move to areas with higher concentration of persons of their own ethnic group to benefit from the social network. The latter argues that the prejudice attitudes and discriminatory behavior of the natives against immigrants, especially in the labour and housing markets, may limit the process of spatial dispersion (assimilation) and instead push immigrants to find protection in ethnic enclaves. It can therefore be concluded that the alternative to the ethnic and migratory networks (EMN) that provide information, support and reduced costs to the people involved in the movement and could therefore guide the immigrants internal migration in the years immediately following their arrival from abroad and less significantly with the passage of time (Finney and Simpson, 2008). The populations of origin and destination have been studied as explanatory variables of nationals and non-nationals migration flows: they have a positive effect because of "… the presence of already existing communities, lessen the costs associated with the migration process" (Recaño-Valverde and de Miguel Luken, 2012).

In summary, the estimated coefficients of the gravity model can be seen in the light of the two theories discussed above, according to the hypotheses shown in Prospect 1.

Foreigners' mobility level is always higher than nationals are (Finney and Catney, 2012; Silvestre and Reher, 2014). Moreover, it has been noted that the negative effect of distance on internal migration is relevant. With regard to migration distance, the results are controversial: in some countries, for instance

Germany, foreigners tend to move less than nationals in long distances (Şaka, 2012; Vidal and Windzio, 2012); in other countries, such as Sweden, foreigners have always a higher propensity to move regardless the distance (Andersson, 2012). In Anglo-Saxon countries, studies prove that distance has a different effect according to the considered community (Gurak and Kritz, 2000; Finney and Simpson, 2008; Belanger and Rogers, 2009; Lichter and Johnson, 2009).

Prospect 1. Sign and importance of the coefficients by variables of the gravitational model and theories on spatial adaptation.

Gravity model variables	Foreigners	
	SAT (Spatial assimilation theory)	EMN (Ethnic and migration network)
Native population in the origin place	+	-/+
Native population in the destination place	-	+
Origin Foreign Population: $B2^{fr}$	+	-
Destination Foreign Population: $B4^{fr}$	-	+
$B2^{fr}$ - $B4^{fr}$	> 0	< 0
Distance	no hypotheses	no hypotheses

With reference to the Italian case, according to international literature, the studies show that foreigners reveal a higher mobility than nationals. This is due to factors such as different social and demographic features, i.e., foreign populations are more concentrated in the younger working ages, when people are more likely to move (de Filippo and Strozza, 2011; Recaño-Valverde and de Miguel - Luken, 2012; Bonifazi et al., 2014). Moreover, foreign citizens have already experienced a migration and therefore it may be easier for them to migrate again (de Filippo and Strozza, 2011). Furthermore, the mobility levels of foreigners are higher, even taking into account the different age structure by using age-standardized measures as total migration rate (de Filippo and Strozza, 2011).

As far as the gravity model as concern, in Italy this type of tool has been applied using different approaches and territorial units, making it difficult to compare the results obtained. Applications proved that the effect of distance on mobility is negative and stronger for foreigners than Italians (Casacchia et al., 2010b; Lamonica and Zagaglia, 2011). At first glance, this result may seem surprising, given that an individual who already undertook an international migration may likely be less limited to move within the country than a national because of the absence of bonds to the family or place of residence in the destination country.

We therefore think that the model can well represent also the Italian case and highlight, especially during the period of strong immigration flows, the changing pattern of Italians' and foreigners' internal mobility. In this paper we analyze simultaneously the Italians' and foreigners' internal mobility by considering as explanatory variables not only the total population in the place of origin and destination but also the masses divided by citizenship (Italian and foreign

populations). This allows to consider the cross effect of the foreign population on the Italians' migratory flows and vice versa by using a unique model.

In synthesis, two aspects should be considered as separated when analyzing the result of the gravity model. First of all, as far as the masses (i.e., the parameters of the origin and destination population coefficients), the interpretation of these parameters obtained through the application of the gravity model allow to acquire some elements about the process of the foreigner's spatial assimilation in Italy. The estimation of these parameters of our modified gravity model allows us to respond to our two main theoretical research questions: Does foreign interprovincial migration follow a process of spatial assimilation (SAT) of immigrants or is it driven by the attractiveness of the ethnic and migration networks (EMN)? The reading of the sign and the importance of the Poisson estimated coefficients of the masses of the modified gravity model will answer our research questions, assuming that foreigners are concentrated in the provinces of major demographic size.

Secondly, regarding the effect of distance, we have tried to answer the following questions:

a) are there significant differences in the estimates of β coefficients that express the effect of the distance when applying the gravity model on the internal mobility of the different communities?

b) is there a link between the settlement pattern of a community and β coefficients? In other words, are individuals belonging to collectivity with a low distance traveled characterized by high levels of β or is rather the combined effect of the spatial distribution of the source / target populations to produce differences between collectivities?

c) Finally, the settlement pattern of a community, which affects this parameter? Is there a connection between the average distance observed between individuals belonging to different communities and distance? In other words, increasing the spatial distribution of the members of the community, is the distance traveled decreasing?

The average distance traveled may depend not only on the type of movement but also on the type of spatial distribution on the Italian territory by the different foreign nationalities. The average distance of the distribution is shorter for those national groups who prefer to move between contiguous provinces and longest for the groups characterized by a broader range of mobility. However, a primary role should be played by the settlement pattern on the Italian territory.

3 Sources and Methodology

An important decision is choosing the geographical scale to be considered in the analysis. Italy is now divided into 5 geographical divisions (NUTS level 1), 20 regions (NUTS level 2), 110 provinces (NUTS level 3) and a little less than 8,100 municipalities. We choose the provinces and we consider in this paper the

changes of residence among Italian provinces, namely inter-provincial migration.

In order to select the communities to be included in the model, three steps were planned. First, by mean of factor analysis applied to a set of indicators, we have identified six different groups of citizenships characterized by a similar settlement behavior. Two communities were then selected for each group;

It was first identified an index capable of measuring the distance related to a specific settlement pattern. To this end the average distance of the movements between provinces has been applied:

$$ {}^{c}\overline{D} = \frac{\sum_{ij}^{110} D_{ij} \ {}^{c}M_{ij}}{2 \sum_{ij}^{110} {}^{c}M_{ij}} $$

where D_{ij} representing the distance between the provinces (i and j) and the ${}_{c}M_{ij}$ the number of people of nationality c who have moved between them. Moreover, other 7 indexes have been computed: the percentage of residents in the North West; the percentage of residents in the Centre; the percentage of residents in the South; the percentage of residents in the Islands; the provincial concentration index; the dissimilarity index in the provincial distribution than Italians; the percentage of residents in the two "global" provinces Rome and Milan. Three main factors were extracted. Later a cluster analysis has been conducted and some groups were identified. Within each group were selected the two more numerous communities.

Secondly, an application of the gravity model on the 12 selected communities were made. A gravity model, derived from Isaac Newton's law of gravity, is used. It is widely applied in the empirical analyses of goods and services flows, particularly within the field of international trade (Fotheringham and O'Kelly, 1989; Sargento Marto, 2007). It is one of the first formal model of migration (Lowry, 1966; Etzo, 2008; Kim and Cohen, 2010) and the most common theoretical framework in empirical migration analysis (Greenwood and Hunt, 2003). It also provides satisfying results in Italian studies on internal migration flows to describe and predict the degree of interaction between geographical areas (Casacchia and Tagliarini, 2000; Lamonica and Zagaglia, 2008; 2013; Casacchia et al., 2010b).

The model considers the migratory flows, as directly proportional to the product of the masses (measured in terms of origin and destination resident population) and inversely proportional to the distance (or to a function of the distance) between the place of origin and the place of destination.

The classical formulation of the gravity model is the following:

$$ F_{ij} = \alpha \frac{P_i^{\beta_1} \cdot P_j^{\beta_2}}{d_{ij}^{\beta_3}} $$

where α is a proportionality constant, i is the area of origin and j is the area of destination, Fij is the migratory flow between i and j, Pi e Pj are the respective population masses, and dij is a measure of the distance between i and j. We assume that the dependent variable is treated as the outcome of a discrete probability process. This treatment seems appropriate when the dependents variables represents a count of a number of items, such as people who moving from one place to another

(Flowerdew and Aitkin, 1982; Burger et al., 2009). We applied a Poisson regression analysis and we state that the volume of flows between provinces i and j (F_{ij}) has a Poisson distribution with a conditional mean (f_{ij}) that is a function of the independent variables. So, considering ln α equal to β_0, the linear predictor is:

$$\ln f_{ij} = \ln \alpha + \beta_1 \ln P_i + \beta_2 \ln P_j - \beta_3 \ln D_{ij}$$

We consider the flows between different provinces by citizenship. Furthermore, we want include both Italian populations (P^{IT}) and populations of each citizenship (P^Z) in the model as explanatory variables. The idea is that the Italian populations has a stronger effect on migratory flows, but also populations of the own citizenship. We introduce dummy variable (λ) for each citizenship that we consider. The dummy variables λk, set at 1 when z is equal to the citizenship considered (k) and set at 0 when citizenship (z) is different.

$$ln f^{z}_{ij} = \beta^{Z}_{0} + \beta^{Z}_{1}\, ln P^{IT}_{i} + \beta^{Z}_{2}\, ln P^{Z}_{i} + \beta^{Z}_{3}\, ln P^{IT}_{j} + \beta^{Z}_{4}\, ln P^{Z}_{j} - \beta^{Z}_{5}\, ln D_{ij} + \lambda_k (\beta^{Z}_{0} + \beta^{Z}_{1}\, ln P^{IT}_{i} + \beta^{Z}_{2}\, ln P^{Z}_{i} + \beta^{Z}_{3}\, ln P^{IT}_{j} + \beta^{z}_{4}\, ln P^{Z}_{j} - \beta^{Z}_{5}\, ln D_{ij})$$

Lastly, a study of the link between the average distance traveled by a person belonging to a given community and its settlement model through a multiple regression model was made. A regression model has been used to estimate the effect of some variables that express the settlement pattern: among them the level of territorial concentration and the distance between people of the same nationality were selected.

4 The internal mobility of some foreign citizens in Italy: some empirical results

1.1 The settlement patterns of the main foreign communities in Italy

The descriptive analysis of inter-provincial mobility of foreigners in Italy is carried out by mean of indicators. The average distance of the movements is on average equal to 266 km for the 32 nationalities considered (with a standard deviation of less than 60 km). This is considerably less than the average distance between people of the same nationality (552 Km is the mean of the mean distances between people of the same community, with a standard deviation of only 20 km). This obviously depends on the fact that travel between neighboring provinces are more frequent than those between distant provinces. The propensity to move varies according to the distance between the province of origin and destination, being greater when the distance between the two territories is shorter. It should however be noticed the existence of a significant linear correlation between the two measures (0.631).

Factor analysis in principal components (with varimax rotation) was conducted on the 32 nationalities of greatest demographic dimension and on 8 elementary indicators already mentioned. Three orthogonal factors were extracted explaining more than 81% of the total variability. The first factor summarizes the spatial concentration of immigrants. The second factor expresses the distance between people of the same nationality. The third factor expresses the pull capacity of the global provinces (Tab. 1).

Table 1: Correlation variable/factor

Indicators	Principal Component		
	1	2	3
Gini Index	,928	,050	,099
Dissimilarity Index	,886	-,165	-,136
% Southern population	-,782	,213	,071
% Nord-West population	,645	-,170	,304
% Islands population	-,117	,954	,020
Average distance among popu-lation	-,162	,944	-,189
% in Milan and Rome	,424	-,005	,870
% in Center population	-,427	-,174	,756
% explained variance	38,43	24,19	18,63
% cumulated variance	38,43	62,62	81,25

The three factorial axes have been used to define homogeneous groups of countries based on the settlement pattern between the Italian provinces (using the hierarchical aggregation technique). Five distinct groups have been identifying. The first group (9 nationalities) is characterized by poor spatial concentration, a low distance between people and low pull capacity by the global provinces of Rome and Milan. Among the most numerous nationalities are those of the Albanians and Moroccans, Ukrainians, Moldavians and Indians. The second group (8 nationality) shows the lowest level of territorial concentration and, at the same time, an average pull attraction by the global provinces. Within this group, the most numerous nationalities are Romania and China. The third group (8 nationalities) consists of groups that are concentrated on the territory but not in the global provinces (Pakistan and Senegal are the main citizenships of this group). The fourth group is characterized by a strong concentration in the global cities (Philippines, Bangladesh, Peru, Egypt and Ecuador). The last group has a distinct settlement pattern as it is characterized by a strong presence in Sicily (Sri Lanka and Tunisia).

In light of this, the gravity model was applied to the nationalities covering different settlement models (for each group, on average two except in two cases where three communities were selected) identified listed below: Albania, Romania, Morocco, Sri Lanka, the Philippines, Egypt, Moldova, China, Pakistan, Tunisia, Peru, Ecuador.

1.2 The application of the gravity model to the twelve communities

The parameter's signs of the model concerning masses and distances are as expected: positive for the origin and destination population effect, negative for the distance. The level of the constant is linked to the size of the overall mobility of the minority considered, so not surprisingly the effect for Romanian and Moldovian is well above the Albanian one (the reference minority): the parameter ranges between four and five (Tab. 2).

As the distance effect as concern the gravity model clearly shows the existence of various pattern of mobility among the minorities observed. With respect to the Albanian distance effect, some minorities clearly show a more robust effect of the distance in shaping the interprovincial moves in Italy in 2014: people from Moldovia, Morocco and Romania are characterized in their internal movements inside Italy from a high inertia provoked from the distance between origin and destination places. In these three cases the parameter showed in Table 1 clearly illustrates an higher effect (for instance, the Morocco distance parameter is 0.358 less than Albanian one). At the same time the internal migration of people from India, China and overall Sri Lanka are less severely influenced by the distance, well below Albanians (Tab. 2).

Analyzing the interaction effect between masses and minority parameter, expressed by the dummies included in the enlarged model, it should be noted a series of not significant parameters, particularly by looking at the interaction between Italian origin population and minority effect (seven are not significant) and the interaction between foreign (expressed by a variables that should be declined by the various minorities observed) destination population and minority effect (six not significant parameters: see Table 2).

However, concerning the significant parameters by looking at the Italian mass effect it should be noted that with respect to Albanians all others minorities show a lower effect (the estimates range from 0.03 to 0.15 well below Albanians: 0.23). Compared to this last minority, no non-white effect emerges in this context.

On the opposite side, the parameters concerning the Italian destination population effect show clearly a more robust effect in shaping the minorities moves inside Italy confronted to Albanian people: excepted for Romanians where the parameter shows a fewer level of this effect (0.14 versus 0.28 of Albanians), the estimate are always - if significant - higher, particularly in the case of Ghana and Sri Lanka. So the higher is the Italian population in the province of destination, the higher are the flows of migration of people belonging to these two communities in these provinces (with respect to Albanians).

Lastly, with regard to the effect of the relative masses on the internal moves of the minorities observed, it is important to detect that by looking the destination population effect the (not many) significant parameters show a lower effect of the this mass: in the case of Romanians, Egyptians and overall Moroccan and Filipinos the parameters range from 0.34 to 0.49, well below the Albanians parameter (0.58). By looking at the origin places, some minorities show higher parameter (Romanians,

Tunisians and the Asian groups), others parameters below of the Albanian one (Moldova, Egyptians and Moroccans).

Tab. 2: Single and interaction effects considering only distance effect. Gravity model on interprovincial migration. Italy 2014 Reference community: **Albania** (bold).

Citizenship	(intercept)		(Italian population in origin provinces)		(citizenship's population in origin provinces)		(Italian population in destination provinces)		(citizenship's population in destination provinces)		(distance)	
	β_0	Sig.	β_1	Sig.	β_2	Sig.	β_3	Sig.	β_4	Sig.	β_5	Sig.
Albania	**-4.503**	*******	**0.231**	*******	**0.564**	*******	**0,283**	*******	**0,580**	*******	**-0.975**	*******
Romania	6.837	***	-0.097	***	0.047	*	-0.142	***	0.017		-0.343	***
Moldova	6.895	***	0.039		-0.087	**	-0.002		-0.010	***	-0.461	***
Sri Lanka	-3.533	***	-0.169	***	0.158	***	0.179	***	0.038		0.242	***
China	2.450	***	-0.208	***	0.065	**	0.034		-0.010		0.080	***
India	0.088		-0.059	.	0.054	*	-0.061	*	-0.011		0.180	***
Pakistan	3.648	***	-0.088	*	-0.005		0.123	**	-0.229	***	-0.121	***
Philippines	1.433	.	0,064		-0.008		0.001		-0.009		-0.137	***
Egypt	1.115		0.044		-0.071	*	0.129	*	-0.129	***	-0.113	***
Ghana	-2.468	*	-0.053		0.035		0.201	***	-0.045		0.110	**
Morocco	6.135	***	-0.044		-0.102	***	0.143	***	-0.241	***	-0.358	***
Tunisia	1.640	.	-0.157	**	0.108	**	-0,051		0,055		0,021	

Signif. codes: 0 '***' 0,001 '**' 0,01 '*' 0,05 '.' 0,1 ' ' 1

Source: own elaboration ISTAT data

Finally, with reference to the theoretical framework (the SAT approach versus the EMN one) in which the analysis of the parameters masses could be situated, the following considerations could be made (see Prospect 2):

a) at least with respect to the Albanian effect, the effect of the origin or destination Italian population on the interprovincial mobility of each group is always positive. The level seems to be higher in the case of the native destination place effect rather than the origin one. So this result apparently seems to be a sign that the internal mobility is well fitted by the EMN theory (see Prospect 2);

b) looking at the origin and destination effects owned to each group, when significant both the levels are positive even if the second one is higher: in other words, the move inside Italy is clearly linked to the dimension of the mass of the population in the place of origin and in the place of destination (more in the last case). By looking at the difference between the two effects (last row in the Prospect 2), the parameters of the groups (but Albania), if significant, show the prevalence of the origin effect on the destination effect. In this case the results are quite contradictory, and no absolute outcome could be reached to overall explained the

prevalence of one theory above the other. So other advancements could be make and other refinements are needed in this difficult essay to adequate the results of an empirical model (the gravity model) to the theory.

Prospect 2. The gravity model application to support foreign population assimilation theories: the results of the gravity model on interprovincial migration. Italy, twelve selected communities, 2014.

Gravity model variables	Foreigners	
	SAT (Spatial assimilation theory)	EMN (Ethnic and migration network)
Native population in the origin place		*+ or nothing*
Native population in the destination place		*++ or nothing*
Origin Foreign Population: $B2^{fr}$	*+ or nothing*	
Destination Foreign Population: $B4^{fr}$		*++ or nothing*
$B2^{fr}$ - $B4^{fr}$	*> or = 0 or nothing*	*Albania ?*

1.3 The regression between distances: a tentative interpretation

The differences in the average distance of the inter-provincial movements are linearly dependent in a negative way by their level of territorial concentration and in a positive way by the distance between people of the same nationality (Tab. 3).

Tab. 3: The average distance of the foreigners interprovincial migration: a regression model

Variables	Coefficient		Standardized coefficient	t	Sig.
	B	Standard error	Beta		
Constant	266,1	7,22		36,9	,000
Gini Concentration Index	-19,7	7,33	-,333	-2,7	,012
Average distance among individuals	39,8	7,33	,674	5,4	,000
Global provinces attraction	-3,4	7,33	-,057	-,46	,650
Adjusted R^2	52,3%				

Source: own elaboration on Istat data

The latter factor shows that the presence, when it is spread in more distant territories, leads to a long-range mobility, probably supported by the migratory chains. The attraction of global provinces does not seem to play a crucial role probably for two main reasons: a) the capital being more or less in the center of the

country should cause medium-range mobility; b) Milan is collocated more or less at the center of Northern Italy where the majority of migrants are resident.

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