The Regional Dimension of Migration in Greece: Spatial Patterns and Causal Factors

45th Congress of the European Regional Science Association
23-27 August 2005, Vrije Universiteit Amsterdam
"Land Use and Water Management in a Sustainable Network Society"

By ANTONIS ROVOLIS* and ALEXANDRA TRAGAKI**

* *Department of Geography, Harokopeion University, 70 El. Venizelou Str., 176 71 Athens, Greece. Email: rovolis@hua.gr*
** *Department of Geography, Harokopeion University, 70 El. Venizelou Str., 176 71 Athens, Greece. Email: a.tragaki@hua.gr*

ABSTRACT

Since the nineties, Greece, like other Southern European countries, has changed from being a country of migratory origin to a destination country for migrants. This, in itself, has been the result of fundamental political and economic reforms across Eastern Europe, as well as of demographic and economic developments within Greece. The first officially available data on migrants in Greece – country of origin, employment, education level or marital status- had been extracted from the 2001 population census. There are interesting points to be made regarding their spatial distribution. Migrants of Albanian origin, the most heavily represented migrant ethnic group, have a more or less even distribution across Greek regions. However, migrants of other ethnic origin seem to cluster in different regions. The first part of this paper offers a panorama of how migrants are dispersed across Greece in respect with their country of origin. This is followed by an attempt to identify the causal economic, social, and demographic factors of the spatial distribution of migration using various econometric tools, including spatial regression.

Key words: International Migration, Spatial Econometric Models, Regional Migration; Regional Labor Markets; Population

JEL: F22, R15, R23

1. Introduction

International migration is an issue of increasing importance to a continually growing number of countries. Recent political and economic changes have radically affected population movement leading to the redrawing of the European migration map. New countries of origin have emerged and flows have been diverted towards new directions. Greece is among the countries that have been affected the most by this new migration scene: during the last decades a traditionally emigration country has turned into a new destination area where foreigners represent a relatively high share of the total population.

This paper focuses on the sub-national distribution of immigrant workers in Greece and analyses differences in patterns of settlement of various nationalities. Which regions appear to be more attractive, to which nationalities and why?

The text is organized as follows: Section 2 offers a brief overview of the recent migration experience in Greece and describes the main characteristics of non-nationals. Section 3 presents the regional distribution of immigrants in total, while Section 4 examines and discusses the settlement patterns of 15 major nationalities currently installed in Greece. Section 5 offers an econometric investigation of the causal factors of the regional distribution of immigrant workers. The last section summarizes the main concluding remarks.

2. The recent migration experience in Greece

Since the 80s, Southern European countries form a new destination region for migratory flows mainly originating from North Africa, Asia and Eastern Europe. Portugal, Spain, Italy and Greece, after having sent thousands of workers for decades to North America and Western Europe, have now been transformed into receivers of increasing inflows of immigrants. The restrictive migratory policies, followed by almost all traditional immigration countries, made this part of Europe an appealing destination for flows originating from new emigration countries.

This sudden and almost simultaneous reverse of migratory balance offered the framework for the development of the so-called Southern European model of migration (King, 2000). A large agriculture and tourist sector, a great proportion of small (mostly family) enterprises and a high share of informal economy are some of the common characteristics used as explanatory factors of this phenomenon.

The traditionally evoked "pull-factors" in migration theory are strengthened by major developments in the economic and social background. Economic and structural reforms improved infrastructures and narrowed discrepancies in living standards between North and South Europe, further increasing the attractiveness of the latter. Meanwhile, profound social changes have created a new context: higher education levels led to the natives' aversion towards low-skilled and ill-paid jobs while female participation in the labor market increased the demand for domestic workers. This demand for low-status jobs was easily satisfied by immigrant labor offer.

Geography hereby plays a pivotal role: long coastlines, many islands and mountainous regions, with little -if any- board control, look like a semi-open door to thousands of illegal migrants, originating from the North, East or South, turning away from their homeland for various reasons.

The picture of immigrant population in Greece can be placed within various frames, depending on the definition- it may comprise, for example, all people of a foreign citizenship, including "repatriates", "skilled foreigners", "refugees and asylum seekers" and "economic immigrants"[1]. The first category (repatriates) refers mostly to retired or voluntarily inactive Greeks returning from the US, Canada, Australia, Germany and Turkey. The second typology (skilled foreigners) refers to professionals, technicians or management staff mainly coming from the USA or EU15 countries. The third and fourth categories compose the corps of the "immigrant population", usually under an illegal status, and account for the majority of foreigners residing in Greece.

In this paper, the total number of foreigners provided by the 2001 population census is used, though the analysis is focused on the third and fourth typology. The above description of different groups of immigrants allows the distinction between non-EU and

[1] The same categories are used to classify immigrants in most South-European countries (see also Gozalvez Perez, 1996; Rodriguez Rodriguez, 1995)

EU-15 citizens, due to the free movement and residence rights of the latter. Foreigners from the USA, Canada, Australia and Cyprus are also excluded from the sub-national analysis due to their specific characteristics and social status which is different to those of "economic immigrants".

a. Foreign population in Greece

Migration is a phenomenon hard to be seized in all its dimensions and – no matter how reliable statistics may be- only a proxy of immigrant population can be provided. According to the latest official data coming from the population census, the total number of non-nationals living in Greece in 2001 was 762,191, the equivalent of 7.3% of the total population[2]. This percentage is among the highest in the EU15, where the non-nationals count for about 5% of the total population on average.

Table 1: Foreign population in Greece, 2001

Country of origin	Foreign Population	as % of non-nationals	Sex ratio
Albania	438,036	57.5%	142.2
Bulgaria	35,104	4.6%	65.5
Georgia	22,875	3.0%	75.5
Romania	21,994	2.9%	130.4
Russia	17,535	2.3%	59.6
Ukraine	13,616	1.8%	32.5
Poland	12,831	1.7%	84.5
Pakistan	11,130	1.5%	2238.2
Turkey	7,881	1.0%	103.0
Armenia	7,742	1.0%	87.6
Egypt	7,448	1.0%	324.4
India	7,216	0.9%	1360.7
Iraq	6,936	0.9%	231.1
Philippines	6,478	0.8%	30.9
Other Countries	76,034	0.1%	101.0
TOTAL	762,191	100.0%	119.9

[2] Many analysts believe that the real number of immigrants easily reaches as much as 10% of the total population (Lianos, 2001; Fakiolas, 2002).

Note: The sex ratio refers to the number of males corresponding to 100 females.

Source: 2001 Population Census

Nationality composition is often described as a particularity of the Greek migration experience (Lianos, 2001; Cavounidis 2002). The 762,191 non-nationals come from more than 195 different countries of origin. However, dispersion in nationalitiy is considerably less significant than the above figures imply. Contrary to the experience of other Southern European countries, the mass of non-nationals comes from neighboring or proximate countries. The major migrant inflows come from ex-communist countries, mainly the Balkans, whereas one country, Albania, accounts for 57% of all foreigners (Table 1). The second most important country of origin is Bulgaria followed by Georgia and Romania, with 4.6%, 3.0% and 2.9% respectively. The share of EU-15 citizens in Greece is limited to less than 5% of all non-nationals, significantly lower than that of the EU as a whole, where about one third of non-national are citizens from another EU member state (European Commission, 2003).

Gender asymmetry is another point of interest. Overall, there is a male surplus of about 120 men to 100 women. This ratio becomes even higher for specific nationalities, as in the case of Pakistanis (2238:100), Indians (1361:100) and Egyptians (324:100), mainly due to cultural and societal characteristics in those countries. On the other hand, these ratios are particularly low for other nationalities: inflows from the Philippines, Ukraine, the Russian Federation and Bulgaria are practically comprised exclusively of women, most of them employed as domestic workers.

The foreign population is characterized by a young age structure (Table 2). Half of the non-nationals are between 20 and 40 years of age, while approximately 64% are younger than 35 years. It is interesting to mention that the share of children up to 15 years of age is about 17%- far from negligible. The median age is 28.8 years, but males are generally about 1.5 years younger than women (29.7 against 31.2 years). Differences also exist between urban and rural areas, as the median age for the latter is about one year less than in the rural areas.

Table 2: Median and mean age of foreign population, 2001

	Greece	*Urban Areas*	*Rural Areas*

	Total	Male	Female	Total	Male	Female	Total	Male	Female
Median age	30.4	29.7	31.2	30.6	29.9	31.4	29.6	29.2	30.2
Mean age	28.8	28.2	30.5	29.0	28.4	30.7	28.0	27.6	29.8

Source: 2001 Population Census and own calculations

b. Immigrant workers in Greece

Focusing on foreign workers, their number comes up to approximately 392,000 persons, which corresponds to nothing less than 8.5% of the domestic labour force. Albanians outnumber all other nationalities representing approximately 60% of migrant workers, followed by Bulgarians (about 6%), and Romanians (about 4%). The following table presents the top-10 nationalities of working immigrants in Greece.

Table 3: Top-10 nationalities of immigrant workers in Greece, 2001

Country of origin	Number of foreign workers	as % of total foreign workers
Albania	226,301	57.78
Bulgaria	23,147	5.91
Romania	14,808	3.78
Georgia	11,181	2.85
Pakistan	9,238	2.36
Ukraine	8,356	2.13
Russian Federation	7,855	2.01
Poland	7,333	1.87
India	6,062	1.55
Philippines	4,948	1.26
All other countries	72,445	18.49
TOTAL	391,674	100

Source: 2001 Population Census

Data on foreign levels of education reveal a number of interesting points about their instruction. About 60% of all foreigners have at least attained a secondary level of education, while 7.6% have a university diploma. The share of illiteracy is somewhat higher than 9%. Both gender and national differences are significant. Women are generally better educated than men at all levels: considerably higher levels of tertiary (29.6% against 16%) and secondary (52.4% against 49.9%) attainment. Albanians and

Egyptians are the exception to the above statement, with significantly lower education levels for their female population.

Significant differences are detected along the lines of ethnicities. Of all immigrants those coming from the former Soviet Union are by far better educated: 26.3% of immigrants from Ukraine and 19.7% of Russians are university graduates. Albanians, Indians and Pakistanis appear to be the least educated: about half of them have only attained primary education while illiteracy levels are steadily higher than 10%.

Table 4: Immigrant workers by level of education, 2001

	Tertiary Level	*Secondary Level*	*Primary Level*	*Primary students*	*Can read and write*	*Illiterates*
TOTAL	7.58%	51.10%	21.90%	7.44%	2.76%	9.21%
Males	6.2%	49.9%	24.3%	7.2%	3.0%	9.2%
Females	9.2%	52.4%	18.9%	7.7%	2.4%	9.2%
Ukraine	26,3%	42,9%	22,1%	4,5%	1,0%	3,2%
Russia	19,7%	34,9%	29,4%	6,8%	2,6%	6,4%
Egypt	19,1%	35,9%	25,4%	2,7%	4,3%	12,5%
Georgia	17,0%	31,7%	33,7%	7,7%	3,2%	6,6%
Philippines	10,9%	52,8%	24,2%	3,1%	1,9%	7,1%
Bulgaria	10,4%	34,6%	42,0%	4,2%	3,4%	5,4%
Poland	10,2%	53,4%	22,6%	5,1%	0,8%	8,0%
Romania	6,9%	52,9%	30,5%	2,5%	1,9%	5,3%
Albania	5,0%	27,0%	44,5%	9,6%	2,6%	11,2%
Pakistan	1,9%	23,5%	52,2%	0,6%	8,0%	13,8%
India	1,9%	24,1%	57,0%	0,6%	5,7%	10,7%

Source: 2001 Population Census and own calculations

Immigrants are mainly employed in the construction sector (24.51%), "other services" (20.5%), agriculture (17.5%) and "commerce-hotels and services" (15.7%). Gender differences are evident: more than half of all males are occupied in the construction and agriculture sector, while half of all females (51.8%) are found in only one sector -"other services", i.e. domestic work.

3. Regional concentration of immigrant workers

Immigrants are found in every county; yet (and that is far from being surprising) they are not evenly dispersed across the country. This statement, common to all host countries, breeds the literature on factors determining the immigrants' choice of destination (Faasmann 1994; van der Gaag & van Wissen 2000; Rephan 2004). Relevant literature suggests that urban areas as well as land border regions are mostly affected by migratory inflows. Migration patterns seem to follow some general rules more or less valid for all countries.

Before addressing this issue, it is important to examine whether there are systematic differences between the spatial distribution of national and immigrant populations. The most important findings of this analysis can be summarized in the following.

- A relatively high proportion of foreigners is found in the capital region[3].
- The three most populous prefectures, Attica, Thessaloniki and Achaia, where the three major cities are found, attract the higher proportions of immigrants.
- There are regions attracting disproportionately high shares of foreigners, mainly the tourist areas of Zakynthos, Kephallinia, Lassithi, Rethymno, Chalkidiki and the rural areas of Argolida, Viotia and Lakonia.
- The share of immigrants is significantly lower than expected at the border regions of Evros, Rodopi, Serres and Kozani.
- The five prefectures with the largest immigrant population account for more than 60% of all foreigners, but contain less than half of the total population. Seven prefectures count for hardly 1.4% of foreigners when their population concentration is about 5%.

Concluding we may say that differences in settlement patterns between nationals and non-nationals are substantial (Table 5), and provide for further research in the area of sub-national distribution along with the investigation of determinant factors influencing immigrant choice of destination.

[3] This is a quite common finding for most countries. International experience shows that the share of foreign population in urban regions is much higher than their share in the total population (van der Gaag & van Wissen 2000).

Table 5. Spatial distribution of nationals and non-nationals

	NON-NATIONALS (1)	NATIONALS (2)	(2)-(1)
ATHENS MAJOR AREA	1	1	0
THESSALONIKI	2	2	0
REST OF ATTICA	3	3	0
ACHAIA	4	4	0
DODEKANISSOS	5	12	7
IRAKLIO	6	5	-1
LARISSA	7	6	-1
KORINTHIA	8	17	9
MESSINIA	9	14	5
MAGNISSIA	10	9	-1
FTHIOTIDA	11	13	2
CHANIA	12	18	6
VIOTIA	13	24	11
ILIA	14	11	-3
EVIA	15	8	-7
KYKLADES	16	27	11
KERKYRA	17	28	11
ARGOLIDA	18	31	13
CHALKIDIKI	19	32	13
KAVALA	20	21	1
IOANNINA	21	15	-6
LAKONIA	22	36	14
ETOLIA & AKARNANIA	23	7	-16
RETHYMNO	24	38	14
LASSITHI	25	40	15
PELLA	26	20	-6
PIERIA	27	25	-2
LESVOS	28	30	2
ZAKYNTHOS	29	49	20
IMATHIA	30	22	-8
SERRES	31	10	-21
ARKADIA	32	34	2
KEFALLINIA	33	48	15
KOZANI	34	16	-18
PREVEZA	35	41	6
KILKIS	36	37	1
TRIKALA	37	23	-14
FOKIDA	38	45	7
DRAMA	39	33	-6
THESPROTIA	40	46	6
KARDITSA	41	26	-15
CHIOS	42	44	2
FLORINA	43	42	-1
SAMOS	44	47	3

KASTORIA	45	43	-2
ARTA	46	39	-7
EVROS	47	19	-28
XANTHI	48	35	-13
RODOPI	49	29	-20
LEFKADA	50	52	2
GREVENA	51	50	-1
EVRITANIA	52	51	-1

4. Settlement patterns of different nationalities

The geographic distribution of total immigrant flows, described above, reveals that different nationalities have different preferences, various professional skills and/or job opportunities, and have therefore different destination criteria.

a. Methodology

This section analyses data on regional distribution of immigrant workers so as to illustrate the settlement patterns of different nationalities in Greece. The analysis highlights 15 major - and non-EU15 countries - of origin, namely Albania, Bulgaria, Romania, Georgia, Pakistan, Ukraine, Russian Federation, Poland, India, Philippines, Bangladesh, Moldavia, Egypt, Armenia and Syria.

Geographic concentration indicates the extent to which a small area of the national territory accounts for a large proportion of a certain economic phenomenon. This paper examines the presence of immigrant workers (*economic phenomenon*) in the 52 prefectures (*areas*) of Greece.

The most commonly used measures of dispersion and concentration are the coefficient of variation (*CV*), the Herfindahl-Hirschman index (*H*) and the location quotient (*QL*). With the exception of CV which is widely used, the rest of the above mentioned measures are normally applied by regional economists either to estimate concentration of an economic activity or to indicate its share to the market. In this paper, these measures will be used in a different way so as to estimate the concentration of workers of particular nationalities in a region. The formulas being used are shown below:

- The *CV* provides a relative measure of data dispersion compared to the mean, that is:

$$C.V. = \frac{s}{\bar{x}} = \frac{\sqrt{\frac{\sum_{i=1}^{N}(x_i - \bar{x})^2}{N}}}{\bar{x}}$$

where, x_i is the number of immigrant workers in county i, $\bar{x}$ and s are respectively the mean and the standard deviation of immigrant workers and N is the number of prefectures.

- *H* is the sum of squares of the percentages of immigrant workers in a county.

$$H = \sum_{i=1}^{n}\left(x_i \Big/ \sum_i x_i \right)^2$$

The index *H* varies from 1, in case of perfect concentration of all immigrants in one county, to $1/N$ when immigrants are equally distributed to all 52 regions.

The above measures of concentration are calculated for each one of the 13 selected nationalities.

- *QL* compares the local presence of immigrant workers to the national level as indicated by the following formula:

$$QL = \frac{A_{ni} / A_i}{A_{nT} / A_T}$$

where A_{ni} is the number of immigrants of nationality *n* in the region i, A_i the total number of immigrant workers in region *i*, A_{nT} the total number of immigrant of nationality *n* in the country and A_T the total number of immigrants in the country.

If *QL* >1, this indicates a relative concentration of immigrant workers of nationality *n* in the region i, compared to the country as a whole.

If *QL*=1, the region has a share of immigrant workers of nationality *n* in accordance with national standards

If *QL*<1, this reveals a lower share of immigrant workers of nationality *n* than generally found.

b. Ethnicity concentration

Immigrant settlement patterns and spatial dispersion vary significantly among different nationalities. The *CV* and *H* indexes indicate significant differences in the dispersion and concentration of nationalities across the country. All 15 nationalities demonstrate high diversity in their distribution across the different regions and prefectures, as depicted by the high levels of *CV*, with values consistently greater than 200. Moreover, all nationalities are characterized by high values of *H*, compared to 0.019 ($=\frac{1}{52}$) referring to the level of *H* index that indicates equal distribution of a nationality across prefectures. High *H* values indicate high levels of concentration. As shown on Table 6, all ethnic minorities are far from being equally distributed across the country. Geographical, social and economic characteristics can be easily detected behind this regional concentration. However, concentration is especially high for immigrants coming from particular countries, such as the Philippines (0.7234), Poland (0.5547), Syria (0.4604), Egypt (0.4105) and Pakistan (0.3952). Workers from those countries are gathered in a limited number of prefectures unlike immigrants from the Balkans who are more or less scattered all over Greece.

Table 6: Coefficient Variation and Herfindahl-Hirschman Index

	CV	*H*
BANGLADESH	425.7	0.7356
PHILIPPINES	485,8	0,7234
POLAND	527,7	0,5547
SYRIA	428,2	0,4604
EGYPT	403,0	0,4105
PAKISTAN	347,0	0,3952
MOLDAVIA	391.3	0.3199
UKRAINE	398,7	0,3189

GEORGIA	336,9	0,2375
ARMENIA	304,3	0,2280
INDIA	246,3	0,1963
RUSSIAN FED.	269,4	0,1558
ROMANIA	250,1	0,1369
ALBANIA	244,9	0,1320
BULGARIA	212,1	0,1038
All other countries	362.3	0.27

Source: 2001 Population Census (own calculations)

The above results are confirmed by the *QL*, which identifies prefectures with high and low ethnicity concentration. The following analysis provides for a better comparison between different ethnicities.

Albanians, the overwhelming majority of immigrants in Greece, are found in every single county. Thirty-three out of 52 prefectures have a location quotient for Albanians greater than 1.00. The higher levels are clustered in regions in the North-West, with the county of Arta recording the greatest value, 1.60. At the other end of the list, the lower values are met in Thrace: Evros (0.22), Rodopi (0.34) and Xanthi (0.45).

Bulgarians are also present in all prefectures but they are gathered in different regions. The prefectures with high *QL* values are scattered in the South (Lassithi, 4.89; Lakonia, 4.53 and Messinia, 3.34), the North (Evros, 2.81; Kavala, 2.51) East (Lesvos, 2.05) and West of Greece (Elia, 3.21). The lower values are clustered in the Northern-Western prefectures. Thus, it is worth mentioning that the settlement patterns of the two most important immigrant ethnicities are complementary.

Romanians are mostly clustered in the Central and Southern prefectures; the highest value is found in Lakonia, while the lower ones are found in the Northern and Northern-Western parts of the country. The county average for Romanian location quotient is 1.02, with just 15 prefectures above 1.00.

Immigrants from countries formed after the dissolution of the USSR, namely *Georgia, Ukraine* and *Russian Federation,* follow similar settlement patterns. They are mostly clustered in the North of the country, with slight differentiations across prefectures. Georgians and Russians are mostly gathered in Xanthi, Rodopi, Thessaloniki and Drama,

while, Ukrainians are clustered predominantly in Thrace, Attica and the islands. The lowest *QL* values for those three nationalities are gathered in Central Greece.

Most of the *Poles* live and work in the major area of Athens. Apart from Athens, there are only two other prefectures with a *QL* value higher than 1.00, Argolida (1.93) and Cyclades (1.30). The county average Polish location quotient is 0.35.

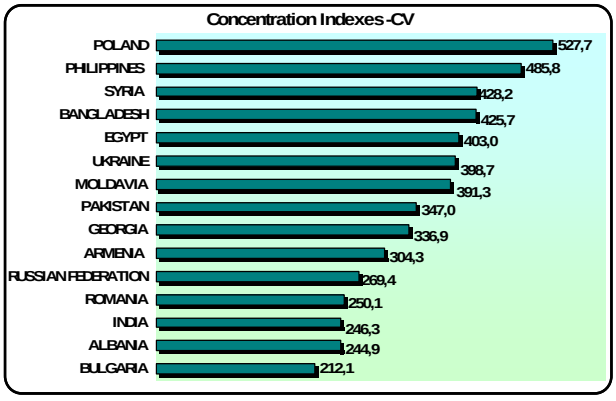
Indians and *Pakistanis* are almost exclusively settled in Central Greece, mainly Viotia, Attica (Athens major area + Rest of Attica) and Evia. Especially for Pakistanis, location quotients in all other prefectures are below 0.5. The average county quotient is 0.78 for Indians and 0.24 for Pakistanis.

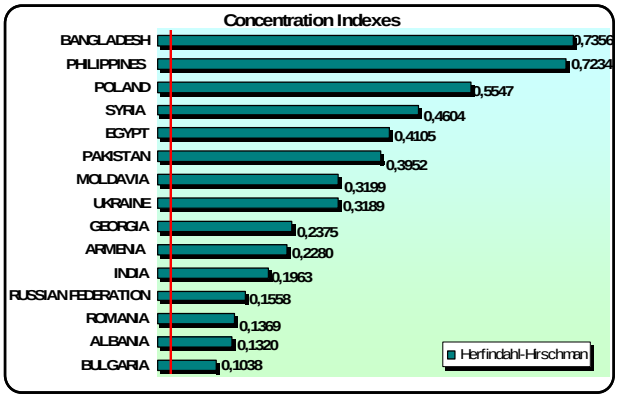
Only seven prefectures have *Egyptians* location quotients higher than 1.00, and they are scattered all over Greece. The higher value is met in Evros (5.92) and Drama (1.97). The *QL* is approximately equal to zero in more than 11 prefectures in the North-West.

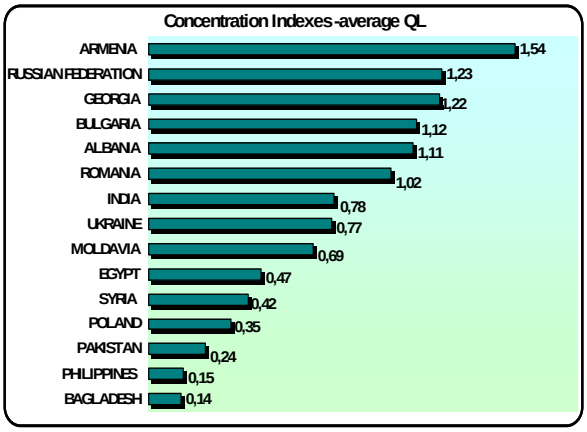
The quasi-totality of immigrants from the *Philippines* and *Bangladesh* are settled in Athens. All other prefectures have *QL* values significantly lower than 1.00.

Armenians and *Syrians*, though representing a small part of the foreign population in Greece, are included in this analysis for their particular settlement patterns. Armenians demonstrate high concentration in the prefectures of Trace, while Syrians are clustered mainly in Crete and Athens. Their presence in the rest of the country is very limited.

Graphs 1: Concentration Indexes of 15 major ethnicities







5. Econometric analysis

One of the few pieces of empirical work regarding the geographical allocation of immigrants in Greek regions is that of Lianos (2001 and 2003). Lianos employed regression analysis in both his publications based on cross-sections of Greek prefectural data. The basic set of explanatory variables (all at prefectural level) were the per capita GDP, the unemployment rate, a measure of agriculture production, the degree of urbanization, and the distance (of the specific prefecture) from the Greek borders.

Lianos' basic (and very interesting) analytical framework is also used here, albeit with some significant differences. We have tried to replicate the exact calibration of his regressions (it has to be kept in mind that our set of data regarding the immigrants is different), but there were severe problems of multicollinearity . In order to circumvent this problem we transformed the variables in logarithmic form. However, and despite this transformation, Lianos' explanatory set of variables still presented multicolinearity. It has

to be mentioned that Lianos' did not deal with the potential presence of heteroscedasticity. In this paper, the OLS estimated coefficients and their relevant t-statistics, have been accompanied by a second line of t-statistics, marked as FE (HC). The latter t-statistics are corrected for heteroscedasticity using the White estimator, on the presumption that the variance of the error term differs across prefectures due to their difference in size (for this estimator see, for instance, Greene 2002).

The set of explanatory variables in our analysis (all at prefectural level) includes a proxy of tourism activity (TOURISM, which is the days spent in hotels by foreign tourists), a proxy of the economic activity at the agricultural sector (AGRIC., which is the cultivated area in hectares), a proxy of the economic activity at the construction sector (CONSTR., which is the volume in square meters of new constructed houses), and the population density (DENS.). The initial calibrations also included some other variables, namely the unemployment rate, and a proxy for industrial activity, but both were statistically insignificant (these results are available by request).

However, the biggest problem with Lianos' analysis (as it unfortunately is with most of regression analysis based on spatial data) is the fact that the geographical nature of the data has not been properly addressed; in fact it has not been addressed at all. One (major) potential problem that emanates from the spatial dimension of a cross-section dataset is the lack of independence among observations (for which are used the terms spatial dependence or spatial autocorrelation), in itself caused by the existence of spatial externalities and spill-over effects, by problems of spatial aggregation, by arbitrary delineation of the spatial units, etc. (for an extensive presentation of these problems, see for instance, Anselin 1988). Another, equally important problem, is the potential existence of spatial heterogeneity, that is "the lack of stability over space of the behavioral or other relationships under study" (Anselin 1988, p. 9).

There are several tests available by which the presence of spatial autocorrelation or spatial heterogeneity can been detected (see Anselin 1988, Anselin et al 1996, Anselin et al 1997). In the right part of tables 7 to 11, several of these diagnostic test are presented. Moran's I is the Moran's I test adapted to estimated residuals. LMERR is the Lagrange multiplier test for residual spatial autocorrelation, and R-LMERR is its robust version. Similarly, LMLAG

is the Lagrange multiplier test for spatially lagged endogenous variable, and R-LMLAG is its robust version. It has to be kept in mind that the probability levels presented in tables 7 to 11 of these Lagrange multiplier tests (all one-directional in this paper) are based on χ^2 statistics. In all regression tables, the Moran's I tests have shown that the spatial regression must be "preferred" in comparison to the OLS results.

There is a simple decision rule between the two spatial models, the spatial autocorrelation one (lines 4 and 5), and the one with the spatially lagged endogenous variable (lines 6 and 7), proposed by Anselin and Florax (1995). If the LMERR is more significant than LMLAG, and at the same time R-LMERR is significant, but R-LMLAG is not, then the preferred calibration is that with spatially dependent error terms (if the results of these Lagrange multiplier tests were reverse, then the preferred specification would be the spatial autoregressive model). This is the case in all but one regression in tables 7 to 11.

Thus, the basic organization of the following tables is: Line 1 in table 7 gives the estimated coefficients for the OLS (Ordinary Least Squares) regression. Line 2 presents the estimated t-ratios for these coefficients, whereas line 3 the (White) corrected for heteroscedasticity t-ratios. In line 4 are presented the EGLS (Estimated Generalized Least Squares) results for the model with spatially depended error terms; it has to be reminded that this is a Maximum Likelihood (ML) estimation. In line 5 are given the z-value statistics for the estimated coefficients of line 4. Finally, line 6 offers the estimations for the spatial lag model and (in line 7) the respective z-value statistics. The estimate for λ is a value that maximizes the concentrated likelihood (and achieves the desired convergence criterion; see Anselin 1988).

The results for the total of immigrants, presented in table 7, show that the most important explanatory variable is the volume of new house construction, with an estimated coefficient of 0,424 (it has to kept in mind that the estimated coefficients are the elasticities, as all variables are in logarithmic form). That means that most immigrants are attracted to a specific geographical area by the construction activity there. A similar impact, with estimated coefficients of 0.35 and 0.33 respectively, appear to have the variables for the agricultural activity and the population density. A smaller impact on the geographical distribution of immigrants seems to have the proxy for the regional tourism activity, that is

the number of foreign tourists. All these coefficients are statistically significant. A slightly different story is revealed by the regression with spatially dependent error terms (it has to be reminded that this is the preferred calibration). The coefficient for tourism is smaller and the impact of all other factors is now of, more or less, the same magnitude. To put it differently, this regression shows that immigrants are mainly attracted to prefectures with job opportunities in agriculture and housing construction sectors.

The results in table 8, where the dependent variable is the number of the Albanian immigrant workers, are very similar to those of table 7. There are some differences when the dependent variable is the number of the non-Albanian immigrant workers, in table 9. Here the preferred specification is the spatial autoregressive model, and the variables with the higher elasticities are population density, and the proxy for agriculture activity.

The last two tables present the empirical findings for a breakdown of immigrant workers based on gender. Thus, in table 10 where the dependent variable is the Male immigrant workers, the most important factors appear to be the construction and agriculture sectors. For the Female immigrants the population density, and tourist sector have higher coefficients than those for Male immigrants (a possible explanation is that female immigrants are attracted by job opportunities in the service sector, either as ‘nannies’, or ‘maids’ in the tourist industry).

Table 7: Regression Results for Dependent Variable = *Total Number of Migrants* (MIGR_T)

		CONST.	TOURISM	AGRIC.	CONSTR.	DENS.	λ	W_MIGR_T	R^2	Moran's I	LME
(1)	Coeff.	-2.641	0.18	0.349	0.424	0.327			0.784	0.436	19.3
(2)	t-ratio	(-1.869)*	(4.274)***	(2.802)***	(2.528)**	(2.394)**				(0.000)	(0.00
(3)	t-ratio (HC)	(-2.185)**	(5.339)***	(3.112)***	(3.595)***	(3.489)***					
(4)	Coeff.	-2.595	0.159	0.378	0.391	0.325	0.496		0.850		
(5)	z-value	(-2.223)**	(4.083)***	(3.893)***	(3.206)***	(3.216)***	(3.625)***				
(6)	Coeff.	-3.802	0.137	0.320	0.387	0.390		0.256	0.820		
(7)	z-value	(-2.993)***	(3.464)***	(2.929)***	(2.651)***	(3.234)***		(2.756)***			

Table 8: Regression Results for Dependent Variable = *Number of Albanian Migrants* (ALBA)

		CONST.	TOURISM	AGRIC.	CONSTR.	DENS.	λ	W_ ALBA	R^2	Moran's I	LMER
(1)	Coeff.	-1.211	0.148	0.233	0.375	0.396			0.583	0.491	24.60
(2)	t-ratio	(-0.579)	(2.369)**	-1.264	-1.511	-1.961				(0.000)	(0.000
(3)	t-ratio (HC)	(-0.727)	(3.134)***	-1.522	(2.367)**	(3.615)***					
(4)	Coeff.	-2.546	0.158	0.342	0.357	0.354	0.545		0.739		
(5)	z-value	(-1.550)	(2.850)***	(2.519)**	(2.102)**	(2.511)**	(4.254)***				
(6)	Coeff.	-3.125	0.103	0.231	0.331	0.460		0.333	0.661		
(7)	z-value	(-1.706)*	(1.830)*	-1.453	-1.554	(2.622)***		(2.848)***			

Table 9: Regression Results for Dependent Variable = *Number of Non Albanian Migrants* (OTHERS)

		CONST.	TOURISM	AGRIC.	CONSTR.	DENS.	λ	W_OTHERS	R^2	Moran's I	LM
(1)	Coeff.	-7.421	0.293	0.537	0.420	0.280			0.777	0.342	11
(2)	t-ratio	(-4.197)***	(5.552)***	(3.448)***	(2.001)*	-1.639				(0.000)	(0.
(3)	t-ratio (HC)	(-4.053)***	(6.069)***	(3.518)***	(2.542)**	-1.862					
(4)	Coeff.	-4.427	0.219	0.402	0.310	0.357	0.548		0.850		
(5)	z-value	(-3.078)***	(4.528)***	(3.374)***	(2.087)**	(2.896)***	(4.302)***				
(6)	Coeff.	-7.303	0.195	0.421	0.325	0.425		0.384	0.865		
(7)	z-value	(-5.577)***	(4.547)***	(3.596)***	(2.087)**	(3.290)***		(4.884)***			

Table 10: Regression Results for Dependent Variable = *Number of Male Migrants* (MALE)

		CONST.	TOURISM	AGRIC.	CONSTR.	DENS.	λ	W_MALE	R^2	Moran's I	LME
(1)	Coeff.	-2.688	0.166	0.34	0.444	0.297			0.749	0.453	20.9
(2)	t-ratio	(-1.778)*	(3.688)***	(2.554)**	(2.471)**	(2.035)**				(0.005)	(0.00
(3)	t-ratio (HC)	(-2.057)**	(4.664)***	(2.809)***	(3.574)***	(3.040)***					
(4)	Coeff.	-2.748	0.148	0.376	0.407	0.293	0.504		0.830		
(5)	z-value	(-2.223)**	(3.595)***	(3.662)***	(3.156)***	(2.744)***	(3.721)***				
(6)	Coeff.	-3.899	0.123	0.313	0.402	0.361		0.273	0.793		
(7)	z-value	(-2.901)***	(2.951)***	(2.687)***	(2.589)**	(2.818)***		(2.797)***			

Table 11: Regression Results for Dependent Variable = *Total Number of Migrants* (FEMALE)

		CONST.	TOURISM	AGRIC.	CONSTR.	DENS.	λ	W_MALE	R^2	Moran's I	LME
(1)	Coeff.	-4.691	0.218	0.372	0.366	0.414			0.849	0.365	13.6
(2)	t-ratio	(-3.797)***	(5.914)***	(3.415)***	(2.496)**	(3.470)***				(0.000)	(0.00
(3)	t-ratio (HC)	(-4.889)***	(6.833)***	(4.221)***	(3.303)***	(4.479)***					
(4)	Coeff.	-4.404	0.191	0.384	0.343	0.413	0.47		0.888		
(5)	z-value	(-4.170)***	(5.457)***	(4.359)***	(3.089)***	(4.499)***	(3.323)***				
(6)	Coeff.	-5.295	0.173	0.34	0.336	0.477		0.226	0.874		
(7)	z-value	(-4.862)***	(4.898)***	(3.545)***	(2.630)***	(4.487)***		(2.777)***			

Note Tables 1 to 5: *t*-statistics (lines 2 and 3) and *z*-statistics (lines 5 and 7) in parentheses in the first nine columns *** Statistically significant at 1% level, ** Statistically significant at 5% level, * Statistically significant at 10% level; Moran's I is the Moran's I test adapted to estimated residuals; LMERR is the Lagrange multiplier test for residual spatial autocorrelation, and R-LMERR is its robust version; LMLAG is the Lagrange multiplier test for spatially lagged endogenous variable, and R-LMLAG is its robust version.

6. Concluding remarks

The basic conclusion of this analysis can be summarized as following. Firstly, more than half of the immigrant workers in Greece have come from Albania (58 percent). Secondly, the top four nationalities of immigrant workers, that is Albanians, Bulgarians, Romanians, and Georgians, account for more than 70 percent of the total number of foreign workers. Thirdly, there are significant differences regarding the educational level of immigrant workers. Immigrants coming from countries of the former USSR appear to have higher levels of education. In contrast, the major group of immigrant workers (Albanians) has significant lower level of education. Female immigrants are more educated in comparison to men. Fourthly, a high proportion of foreigners is found in Attica (that is in Athens area). Most of the immigrant workers are concentrated in urban regions, areas with significant activity of tourism sector, and some specific rural areas. There are differences regarding the geographical distribution of the various nationalities of immigrants. Lastly, as the regression analysis has shown, the most important factors for the spatial distribution of immigrant workers at prefectural level, are population density, the level of agricultural activity, the activity of the construction sector, and the activity of tourism.

References

Anselin, L. (1988) *Spatial Econometrics: Methods and Models*, Kluwer Academic Publishing, Dordrecht.

Anselin, L. and R. Florax (1995) "Small Sample Properties of Tests for Spatial Dependence in Regression Models", in L. Anselin and R. Florax (eds.) *New Directions in Spatial Econometrics*, Springer, Berlin.

Anselin, L., Bera, A.K., Florax, R. and M.J. Yoon (1996) "Simple Diagnostic Tests for Spatial Dependence", *Regional Science and Urban Economics*, 26, pp. 77-104.

Carella M. and R. Pace (2001) "Some Migration Dynamics Specific to Southern Europe: South-North and East-West Axis" *International Migration,* Vol. 39 (4), pp.63-99.

Castles S., M. Miller (2003) *The Age of Migration*, 3d edition, Palgrave Macmillan.

Cavounidis J. (2002) "Migration in Southern Europe and the Case of Greece" *International Migration*, Vol. 40 (1), pp.45-70.

Cliff, A.D. and J.K. Ord (1981) *Spatial Processes: Models and Applications*, Pion, London.

European Commission (2003) "The Social Situation in European Union -2003"

Gozalvez, Perez V. (1996) "L'immigration africaine en Espagne: l'entreé par la frontière méridionale", L. Di Comite and A.F. Cardamone (eds), *Crescita demografica e migrazioni internazionali nel bacino mediterraneo,* Quaderno no 11, Dipartimento per lo Studio delle Societa Mediterranee, Universita degli Studi di Bari, Cacucci.

Haug W., P. Compton and Y. Courbage eds (2002) *The demographic characteristics of immigrant populations*, Council of Europe Publishing.

King, R. (2000) Southern Europe in the Changing Global Map of Migration in King R, G. Lazaridis and C. Tsardanidis eds *Eldorado or Forteress? Migration in Southern Europe*, Macmillan, London.

King, R. (2002) "Towards a New Map of European Migration", *International Journal of Population Geography*, 8, pp. 89-106.

Malheiros, J. (2002) "Ethni-cities: Residential Patterns in the Northern European and Mediterranean Metropolises – Implications for Policy Design, *International Journal of Population Geography*, 8, pp. 107-134.

Rephann T (2004) "Economic-Demographic Effects of Migration: Results from a Dynamic Spatial Microsimulation Model" *International Regional Science Review*, 27, 4, pp.379-410.

Rodriguez, Rodriguez, V. (1995) "Skilled migration in Spain" *Studi Emigrazione*, 32 (117).

Van der Gaag N., L Van Wissen (2001) "Determinants of the Subnational Distribution of Immigration" *Tijdschrift voor Economische en Sociale Geografie*, Vol. 92, No 1, pp. 27-41.