

UNIVERSITY OF THESSALY
DEPARTMENT OF PLANNING AND REGIONAL
DEVELOPMENT

Graduate program in
EUROPEAN REGIONAL DEVELOPMENT STUDIES

Dissertation

Immigrants' Residential Segregation in Greek Cities: The Case of Lamia

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Volos, June 2012

ABSTRACT

This study investigates the residential segregation of immigrants in the small-sized Greek city of Lamia. The increasing number of immigrants in the country over the years (and in the city of Lamia) and the possible implications of their locational/residential choices (in terms of creation of specific ethnic enclaves within the urban frame) provide the impetus for this study. Previous work on residential segregation of minority populations concluded that immigrants tend to find residence primarily in the city centres, where low-cost housing is available and where their co-ethnics reside. As the time goes by and their income rises, immigrants may move to other areas, depending on the attitudes of the native population (and the degree of discrimination the immigrants face) and their own preferences for mixing up with the locals. Findings from the case of Lamia indicate that segregation levels of the city remain extremely low throughout the examined time period. Immigrants can be found in all neighbourhoods of the urban area and are distributed in a relatively even way. Therefore no ethnic enclave is materialised. However, areas near the city centre or in the south part of the city seem to attract a relatively larger percentage of foreign population compared to the northern neighbourhoods.

Keywords: Residential segregation, immigrants, locational preferences, Lamia

ACKNOWLEDGMENTS

I would firstly like to express my thanksgivings to my supervisor Dr. Paschalis Arvanitidis for all his advice, guidance and support throughout the preparation of this study. I would also like to thank all the academic staff of the department of planning and regional development of University of Thessaly for all the interesting courses and shared experiences we had during this graduate program. Moreover, I would like to thank the Directors of all the primary schools of Lamia, who decisively helped me in the collection of the required data for this study. Needless to say, all mistakes and deficiencies are my responsibility.

It would be my omission if I do not thank my parents, brother and sister for their support and encouragement. This work is especially dedicated to my sister Sophia who had a difficult year in the last class of her high school and I would like to wish her constructive and enjoyable academic years.

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CHAPTER 1: Introduction

1.1 Aim and objectives of the study

The purpose of this research is to study the residential location patterns of immigrants in a small-sized Greek city. This is Lamia, which is the capital of the region of Central Greece, one of the thirteen regions of the country. The review of the relevant literature made clear that there is a limited number of studies exploring immigrants' intra-urban location patterns in Greece. The vast majority of them focus their analysis on the metropolitan centres of Athens and Thessaloniki, where none, according to our knowledge, have attempt to shed light on the patterns of ethnic segregation experienced by the small-sized cities of the country. However, immigrants are spread all over Greece, making it essential to study their locational behaviour and residential choices in smaller cities as well as in metropolitan centres.

This becomes even more important due to the fact that the number of immigrants that the country has received has substantially increased over the last twenty years. This gave rise to many discussions (in the politics and the society) concerning the intra-urban spatial effects immigration has for the country and the possible creation of ethnic enclaves within the cities. However few studies have explored in depth the issue and as a result we still know very little of the process and spatial outcomes of immigrants' residential choices.

The current study comes in response to this need, attempting to shed light on the residential pattern of immigrants within the city of Lamia and the possible emergence of apparent ethnic enclaves. Such a study should be useful to local authorities (at regional and urban level) and policy makers. It will enable them to assess the degree of segregation and, on this basis, to consider appropriate policies on the matter. In addition to this, the study will provide a clearer depiction to researchers and to the public, with regard to the locational preferences of immigrants.

This aim of the study will be accomplished through the following objectives:

1. To set up an appropriate conceptual and analytical framework (including a suitable methodology and methods) to study residential segregation at an intra-urban level.

2. To explore the experience of other countries (at the intra-urban level) with regard to the locational choices of immigrants and the emergence of ethnic enclaves (or even ghettos).
3. To examine the patterns of residential segregation of immigrants in Lamia and their evolution over the last ten years.

The originality of the study is, as it has been mentioned before, that it focuses on a small-sized city of Greece. Lamia, despite its small size and population¹, attracts a large number of immigrants for a number of reasons. The central position of the city on the Greek territory and its high accessibility is one of them. Furthermore, the generally rural character of the whole area (prefecture of Fthiotida) attracts many immigrants who seek employment in the agricultural sector.

1.2 Structure of the study

The study is comprised of six parts, excluding the first introductory chapter. The second chapter provides some general facts and trends about the phenomenon of migration, both at an international and national level. In the third chapter we focus on the theoretical framework concerning ethnic residential preferences and segregation. The fourth chapter includes some important case studies, which have been made for other countries or cities around the globe and have examined the spatial segregation of minority groups within them. The methodology of the study, including the data and the segregation indices employed, is developed in the fifth chapter. The sixth chapter provides the data analysis and the results on the issue of segregation of immigrants within the urban area of Lamia. Finally, the conclusions and remarks of the study are discussed in the seventh chapter.

¹ According to the latest available official data from the 2001 national census Lamia's urban population is about 51,000 people.

CHAPTER 2: Migration

2.1 Introduction

This chapter discusses the worldwide issue of the constantly increasing migration and provides some general facts about it, starting from the international level and continuing with the national and local level. It both covers the theoretical context of migration and gives numerical data which account for global migration, migration in Greece and finally migration in the region of Central Greece and the city of Lamia.

2.2 International migration

According to the International Organization for Migration (IOM, 2012) the estimated number of immigrants worldwide is about 214 million for the year 2010. This constitutes a substantial increase of about 42 percent, compared to the number of immigrants observed ten years ago. Moreover, the percentage of the total world's population who are immigrants is about 3.1 percent, while the total number of immigrants would theoretically constitute the fifth most populous country of the world.

Whilst the total number of immigrants tends to increase globally, this is distributed unevenly between the host countries, as Table 2.1 and Table 2.2 show.

Table 2.1 Indicative countries with a high percentage of immigrants (2010).

Country	Immigrants as percentage of national population (%)
Qatar	87.0
United Arab Emirates	70.0
Jordan	46.0
Singapore	41.0
Saudi Arabia	28.0

Source: International Organization for Migration, 2010

Table 2.2 Indicative countries with a low percentage of immigrants (2010).

Country	Immigrants as percentage of national population (%)
Indonesia	0.1
India	0.4
Romania	0.6
Nigeria	0.7
Japan	1.7

Source: International Organization for Migration, 2010

In order to give the appropriate definition of migration we have to focus on the social, economic and political factors which influence this phenomenon. Except from the simple definition that human migration is the physical movement from one place to another for the personal improvement of the socio-economic status of the immigrant (Polyzos, 2011), a further exploration and study of the phenomenon is essential.

As Polyzos (2011) mentions, we can detect a number of different types of migration. The most notable of them are migration for employment, migration for educational reasons, migration for professional training, seasonal and not long-lasting migration, settlement migration and migration of special categories of people, such as refugees or political asylum seekers. Each of the above forms of migration has its relative theories and can be examined by different perspectives. What can securely be argued is that immigration has substantial implication for both the sending and the receiving country or city. This applies, especially during last decades, to the most of the European countries which have been transformed into a principal destination of immigrants, mainly coming from the less-developed countries.

From the beginning of the second half of the 20th century, the majority of developed and economically strong countries of Europe started to attract a large number of newcomers from many countries, from both inside or outside the continent. Over the years the phenomenon spread to other European countries. More lately, it was the European Union itself who facilitate this human mobility within its area, by granting EU citizens and residents fundamental rights to move and settle in every EU country (Penninx et al., 2008). The result is that many cities have become multi-ethnic and the composition of their population has changed over the years.

The causes of these increased migration flows can be attributed to a number of factors (Boswell, 2005). Policy changes in the European countries can be considered as an important one. Many European countries have opened up possibilities for high-skilled labour movements. This was a result of the labour shortages which were observed in many countries during the last decades. Moreover, the changed relationship between the European Union and its East and South neighbours influenced migration flows and increased the number of in-comers in the EU. With fewer restrictions on travel for the nationals of the ex-communist countries, many of them could enter the EU more easily. Furthermore, factors such as the establishment of migration networks in many

destination countries or the change of the economic and political conditions in many sending countries have also influenced and increased the migration flows in Europe over the last years.

The vast majority of immigrants can be considered as economic immigrants. They are mainly people who migrate from the less-developed to economically stronger countries, where they can find employment easier, at higher wages and better conditions and live in a “better” life way. An also important number of immigrants are those who change residence for educational reasons or for reasons relative to professional training and spend a number of years in their host country. Another category are those who migrate for a short period of time, in order to be employed in seasonal jobs, such as in tourism or in agriculture, and then return back to their native land. This type of migration is more difficult to be recorded, due to its temporary character. Additionally, there is the type of settlement migration, according to which people voluntarily migrate to another country for ideological, religious or other personal reasons. In this case, employment is not the primal incentive of this movement (Polyzos, 2011). Finally, migration of refugees or asylum seekers refers to cases of involuntary migration, caused for example by national disasters or war conflicts. All the above cases of migration can lead to increased migratory flows and can change the composition of nationalities in both sending and receiving countries and cities.

But who can really be reported as an immigrant? Baldwin-Edwards (2005) states that the distinction whether a person can be considered as an immigrant or not, remains confused. For example, many of them, after a number of years, possess the nationality of the host country, so national statistics do not record them as immigrants. This causes problems and gives an uncertain picture of the real number of immigrants in the examined area. For this reason, we come-across to a usual distinction in the relevant literature between foreign-born and foreign populations. In addition to this, there are differences on the number of years which are required for the acquisition of the nationality of the host country. This makes complex any comparison between different countries on migration issues.

Nevertheless, the globally increasing tendency for migration has attracted the interest of the researchers, giving rise to a growing number of studies investigating the process, outcomes and dimensions of the phenomenon. The majority of these studies look into

the implications of immigration on the labour market and the host society, but several also examine the spatial effects under the rubric of residential or spatial or ethnic or simply segregation. The objective of the latter is to acquire a clear picture of the patterns of locational behaviour of immigrants. But before we start the examination of this dimension of migration, and focus on the case of a specific small-sized city of Lamia, it is necessary to give a brief presentation of the Greek experience about migration during the last years.

2.3 Migration of Greece

Greece's experience on migration since 1950 can be separated into three different periods (Lianos, 2004). From the mid 1950's to 1974, Greece was a major migrant-sending country. It was after the end of the Second World War when a large number of Greeks started to migrate to specific countries, mostly motivated by economic factors. From the 1950's countries like the United States, Canada and Australia became important destinations for Greeks, while during the period 1960-1980 European countries, mainly Germany and countries of Western Europe, started also to attract a large number of Greek emigrants. The estimated number of Greek emigrants for this period was over 1 million people, the majority of which migrated to Germany (over 800,000).

The second important period of migration flows was this between 1975 and 1990. International events, such as the oil crisis of 1973, and domestic ones, such as the restoration of democracy after seven years of dictatorship (1967-1974), mitigated emigration flows and made Greece a prospective destination country. During these years, Greeks continued to migrate, mainly to Germany, but to a lesser extent. Moreover, a significant number of previous emigrants started to return to Greece after spending a long period abroad. At the same time limited numbers of immigrants, mainly, from African and Asian countries begun to enter Greece. That was the period in which Greece started to being transformed into a host country, like many other Mediterranean countries². The total number of in-comers who entered Greece during these years remains unknown due to the mainly illegal character of migration and, as a result, national statistics recorded only a percentage of the real number of immigrants. It has been argued, however, that during this period Greece had received a large number

² Spain, Italy and Portugal also started to attract immigrants due to the economic growth that was taking place at that time.

of immigrants most of which were illegal, whereas those who entered the country legally were much lower as compared to those received by the other European Union countries (Lalenis and Beriatos, 2008).

The number of immigrants who entered Greece was significantly increased from the beginning of 1990's, which constitutes the third migration period. Large inflows of foreigners from the Central and Eastern Europe migrated to Greece, as a consequence of the collapse of the communist regimes in their countries, the opening of the borders and the enlargement of the EU. The main sending countries were Albania, Bulgaria, Georgia and Romania. According to the 2001 national census, Albanian immigrants were 438,000 (57.5%) Bulgarians were 35,000 (4.6%), Georgians were 23,000 (3%) and Romanians were 22,000 (2.9%) (see table 2.3).

The recorded total number of immigrants was 761,813 persons, who constitute the 6.97% of the total population of Greece. More recent statistics from Eurostat indicate that in 2006 a number of 884,000 immigrants were settled in Greece.

Table 2.3 Groups of immigrants in Greece by nationality, with a population over 10,000 persons (2001).

Country	Number of immigrants	Percentage of the total number of immigrants
Albania	438036	57.50
Bulgaria	35104	4.61
Georgia	22875	3.00
Romania	21994	2.89
USA	18140	2.38
Russia	17535	2.30
Cyprus	17426	2.29
Ukraine	13616	1.79
United Kingdom	13196	1.73
Poland	12831	1.68
Germany	11806	1.55
Pakistan	11130	1.46
Total	761813	100.00

Source: Hellenic Statistical Authority, Population Census 2001

It becomes clear that from the beginning of the 1990's, when Greece starts to attract larger number of immigrants, the Balkans has constituted the main source of migration flows to the country. A persuasive explanation of this can be the fact that Greece, unlike the other southern European countries in which migration flows have also been increased, shares common borders with its major source countries (Cavounidis, 2004).

But which are the reasons for Greece to be considered as an attractive destination for large number of immigrants? Its geographic position is, with no doubt, one of them. Greece is the meeting point of three continents and many immigrants consider the country as an entry point to the more developed countries of Western Europe. Furthermore, the large length of Greek borders and the country's long coastline, which is about 15,000 kilometres, make easier the entrance of many illegal foreigners, due to the difficulty in guarding all possible entry points. The spatial proximity of the country with former socialistic and communistic countries of East Europe plays an important role too, taking also into consideration the political and economic instability of those countries (Polyzos, 2011).

The nature of Greek economy also influences the migration flows of the country. With a large informal economy and with many small family businesses, the country attracted a large number of unskilled or semi-skilled immigrants who were able to provide cheap labour. Moreover, the seasonal character of basic industries of Greece, such as tourism or agriculture, increased the cases of seasonal and short-term migration and augmented the number of immigrants who entered the country during specific months of the year.

2.4 Migration of Central Greece and Lamia

The examined area of the study is the urban area of Lamia. Lamia is the capital city of the region of Central Greece, which is one of the thirteen regions of the country.

The region of Central Greece is the second largest region of Greece, with a total area of 15,549 km² which constitutes the 11.8% of the total Greek area. Moreover, the latest official data from the 2001 national census show that the region has a permanent population of 558,144 people, who constitute the 5.1% of the total population of the country. The number of immigrants in the region was 39,393, representing the 7% of total population, a figure which was similar to the percentage of the percentage of immigrants in the total Greek territory (about 6.9%).

Lamia is also the capital of the Fthiotida prefecture, which is an area of about 170,000 inhabitants and almost 13,000 immigrants (7.6% of the population). The following table shows the total population and the number of Greek and immigrants in the region of Central Greece, the Fthiotida prefecture, the municipality of Lamia and the urban area of Lamia, which is the examined area of the study.

Table 2.4 Population and number of immigrants in the urban area of Lamia and its above administrative levels (2001).

Area	Total	Greeks	Immigrants	Immigrants (%)
Central Greece Region	558144	518751	39393	7.06
Fthiotida Prefecture	169542	156588	12954	7.64
Lamia Municipality	62452	59431	3021	4.84
Lamia Urban Area	50551	48024	2527	4.99

Source: Hellenic Statistical Authority, Population Census 2001

The urban area of Lamia attracts a significant number of immigrants from a number of different countries. The central position of the city on the Greek territory and its consequent close proximity to the metropolitan area of Athens increases the attractiveness of the city. In addition to this, the generally rural character of the local economy appeals to many unskilled or low-skilled foreigners who settle and work in the area.

The overriding majority of immigrants within the city, over 80%, are coming from Albania. For this reason the study does not deal with each one of the separate ethnic group, but considers immigrants as an aggregate number of people and explore the issue on the whole. Table 2.5 shows the number of immigrants by nationality within the municipality of Lamia in 2001.

Table 2.5 Number of immigrants in Lamia, by nationality (2001).

Country	Number of immigrants	Percentage of the total number of immigrants
Albania	2439	80.73
Romania	161	5.33
Bulgaria	117	3.87
Cyprus	47	1.55
USA	43	1.42
Poland	28	0.92
Ukraine	24	0.79
Rest countries	162	5.36
Total	3021	100.00

Source: Hellenic Statistical Authority, Population Census 2001

2.5 Conclusions

In this chapter the increasing trend of global migration has been highlighted. This explains the growing interest of researchers and their focus on exploring and studying the phenomenon of migration. We highlighted the significant number of immigrants at a global level and we briefly presented both the different types of migration and the different categories of immigrants. Moreover, we discussed the evolution of migration in Greece, where the country has been transformed from a country of emigration into one of immigration. Data from the 2001 national census helped us to indicate some useful statistics. Finally, we dealt with migration at a more local level since the aim of this study is the examination of residential patterns of immigrants within the urban area of Lamia.

CHAPTER 3: Methodological framework

3.1 Introduction

The interest on the spatial pattern of immigrants' settlement has been increased over the years and many studies have focused their analysis on identifying, assessing and explaining this pattern. In this chapter we review the relevant literature in an attempt to provide a coherent conceptual and analytical framework which would enable us to study the phenomenon of segregation in its proper depth. Furthermore, we present empirical evidence from important case studies which tried to examine the residential segregation of immigrants, both from around the globe and within Greece.

3.2 Defining residential segregation

Residential segregation is a multi-dimensional phenomenon and concerns the physical separation of two or more groups of people within a specific area or spatial unit. As Massey and Denton (1988) elegantly put it, it is the degree to which two or more groups live separately from one another, in different parts of an urban environment, or as Reardon and O'Sullivan (2004) identify it, it is the extent to which individuals of different groups occupy and experience different social environments. From a slightly different point of view, others (such as Feitosa et al., 2004) place emphasis on the links within a group to define residential segregation as the degree of spatial proximity between families belonging to the same community.

By assessing the degree of residential segregation within an examined area, we can acquire a clear picture of the patterns of locational behaviour of the immigrants. Through this way, questions about the parts of a spatial unit in which immigrants choose to locate, or the reasons of their decisions, can be explored. Moreover, conclusions about the point to which different groups of people choose or not to live near each other can be reached. Finally, the degree of the nationality's affect on the residential preferences of the different minorities groups can be examined.

3.3 A methodology to assess immigrant segregation

There are various reasons which can cause residential segregation in cities and areas which attract a large number of immigrants. On the first hand, this ethnic segregation can emerge from voluntary decisions of the new-comers, who may have the opportunity to choose their residential location in the new environment. On the other hand, social

restrictions, such as discrimination or prejudice against foreigners, can play the most important role in the formation of the residential pattern of the receiving areas. Usually, both aspects are present and can be met in the examined areas (Anas, 2006). Furthermore, residential segregation should not be considered as “good” or “bad” in itself. It could “produce” advantages or “cause” disadvantages, and this can be clearly concluded with the examination of the urban environment (White, 1986; Peach, 1996; Almirall et al., 2009).

Massey and Denton (1988)³ have provided a solid methodological framework to analyse residential segregation on the basis of five spatial dimensions. These are *evenness*, *exposure*, *concentration*, *centralisation* and *clustering*. By measuring the above dimensions, the degree of the spatial segregation of immigrants can be assessed and the characteristic of their spatial pattern can be identified. For each of the five dimensions of spatial segregation there are a number of different indices, which can be used for the measurement of these dimensions.

3.3.1 Evenness

According to Massey and Denton’s formulation, *evenness* refers to the “differential distribution of two social groups among areal units in the city” (p. 283). In other words, evenness varies from one area to another due to the fact that minority groups may be overrepresented in some areas and underrepresented in others. When evenness is maximized, segregation is getting minimised and vice versa. As a result, in the case that all units of the examined area have the same relative number of majority and minority groups, evenness is maximized. In contrast, in the case where minority groups are unevenly distributed over the examined area, evenness is minimized and segregation is maximized.

Massey and Denton propose the *Dissimilarity Index*⁴ (*D*) for the measurement of residential evenness. This index varies from 0 (maximum evenness, no residential segregation) to 1 (minimum evenness, complete residential segregation). It shows how much even or uneven the composition of the population of each area is.

The formula of the dissimilarity index is:

³ Their paper “The Dimensions of Residential Segregation” is considered to be one of the most important attempts on the analysis of residential segregation and has been used in the majority of relevant studies and literature.

⁴ The Index of Dissimilarity is the most widely used measure of residential segregation.

$$D = \frac{1}{2} \sum_{i=1}^n \left| \frac{x_i}{X} - \frac{y_i}{Y} \right|$$

where:

x_i is the majority population of neighbourhood i,

X is the total majority population in the whole city

y_i is the minority population of neighbourhood i,

Y is the total minority population in the whole city.

3.3.2 Exposure

Residential exposure shows the degree (and existence) of interaction and contact between majority and minority groups within the different parts of the examined area. This contact or the possibility of interaction between different populations, determines the degree of exposure of the minority group. Massey and Denton argue that, by measuring the degree of exposure, we can actually measure the *experience* of segregation, as felt by the average minority or majority member.

The dimension of exposure will be measured by the use of the widely-used Lieberson's (1981) *Isolation Index of Segregation*⁵ (IIS). This index measures the degree to which immigrants live apart from natives within a specific area. It varies from 0 (no residential segregation) to 1 (complete residential segregation) and, in fact, finds the extent to which members of a minority group are exposed to members of the majority group.

The formula of the isolation index is:

$$IIS = \sum_{i=1}^n \frac{x_i}{X} \cdot \frac{x_i}{t_i}$$

where:

x_i is the number of immigrants of areal unit i,

t_i is the total population of areal unit i,

⁵ Lieberson (1981) compares the usage of the Index of Dissimilarity and the Isolation Index (IIS) and argues that the latter is a more complete and adequate measure of residential segregation. This is because the IIS describes the "actual isolation of a group from either all others or from a specific group in a manner which takes into consideration the joint influence of population composition and spatial distribution" (p. 25).

X is the total population of immigrants in the whole city

3.3.3 Concentration

The dimension of concentration refers to the case in which the members of the minority groups occupy a small or a large area in the total urban environment. In other words, in the case where immigrants occupy a small area of the city, we assume high residential concentration. In contrast, we assume the existence of a low degree of residential concentration if immigrants occupy a large area within the urban environment.

The most appropriate index for measuring the spatial concentration, as proposed by Massey and Denton, is the *Delta Index (DEL)*.

The formula of the delta index is:

$$DEL = \frac{1}{2} \sum_{i=1}^n \left| \left[\frac{x_i}{X} - \frac{a_i}{A} \right] \right|$$

where:

x_i is the number of immigrants of areal unit i ,

X is the total population of immigrants in the whole city,

a_i is the land area of unit i ,

A is the total land area of the whole city.

3.3.4 Centralisation

The dimension of centralisation is relevant to the one of concentration, but it measures the degree of the residential concentration of the minority groups in areas which are characterised as city centres. It refers to the extent to which immigrants are spatially located and settled around the centre of the examined urban area. In many cases, minority groups which choose to locate near the city centre have also a higher degree in the dimension of concentration⁶.

The degree of centralisation can be measured by using a simple index of the number of immigrants who live in the centre of the examined city as a proportion of the total number of immigrants who live in the total city area. The index can be measured for

⁶ There is no need for the opposite situation to be occurred because immigrants' concentration in out-of-centre- areas means lower degree of centralisation.

each sub-area and then conclusions can be reached by comparing the results of sub-areas with the one of the city centre.

The formula of this index is:

$$P_{CC} = \frac{X_{CC}}{X}$$

where:

X_{CC} is the number of immigrants who live near the city centre,

X is the total number of immigrants.

3.3.5 Clustering

The last dimension of segregation is clustering and refers to the degree of the immigrants' concentration in specific areas of the city (and the potential to generate solid ethnic enclaves or ghettos). What makes this dimension different from the previous ones is that it refers to the distribution of minority areas with respect to each other. In contrast, the previous four dimensions of residential segregation refer to the distribution of minority and majority groups within spatial units.

High degree of clustering means that immigrants create minority enclaves which are contiguous and neighbouring, while low degree of clustering shows that minority areas are more widely dispersed in the total urban frame.

The calculation of the dimension of clustering will be made by using a *Spatial Proximity Index (SP)* (developed by White, 1986). The first step is to estimate the average proximities between majority groups (natives), between minority groups (immigrants) and among all members of the population. The formulas of this index are the following:

$$P_{xx} = \frac{\sum_{i=1}^n \sum_{j=1}^n x_i x_j c_{ij}}{x^2} \quad P_{yy} = \frac{\sum_{i=1}^n \sum_{j=1}^n y_i y_j c_{ij}}{y^2} \quad P_{tt} = \frac{\sum_{i=1}^n \sum_{j=1}^n t_i t_j c_{ij}}{t^2}$$

where:

x_i, y_i and t_i are the numbers of natives, immigrants and total residents in area i ,

x_j, y_j and t_j are the numbers of natives, immigrants and total residents in area j ,

c_{ij} is the negative exponential of the distance between areas i and j

($c_{ij} = e^{-d_{ij}}$, where d_{ij} is the distance between the centroids of areas i and j),

X , Y and T are the total number of natives, immigrants and residents of the city.

The final step is to estimate the spatial proximity index (SP) of the whole urban area, which is the average of intra-group proximities, weighted by the fraction of each group in the total population. The formula of the SP index is the following:

$$SP = \frac{XP_{xx} + YP_{yy}}{TP_{tt}}$$

3.4 Towards more “spatial” measures of segregation

An equally interesting attempt to assess residential segregation and the patterns developed has been made by Reardon and O’Sullivan (2004). They assert that the most commonly used measures of residential segregation are “aspatial” and, as a consequence, they do not take into account the spatial patterning of population distributions.

Therefore, the measurement of segregation must be based on appropriate measures which can define the social environment of each resident and, at the same time, estimate the extent to which these social environments differ across residents. The authors also indicate that the most appropriate measures of residential segregation are those which take into account the exact locations of residents and their proximities to one another in the examined urban space.

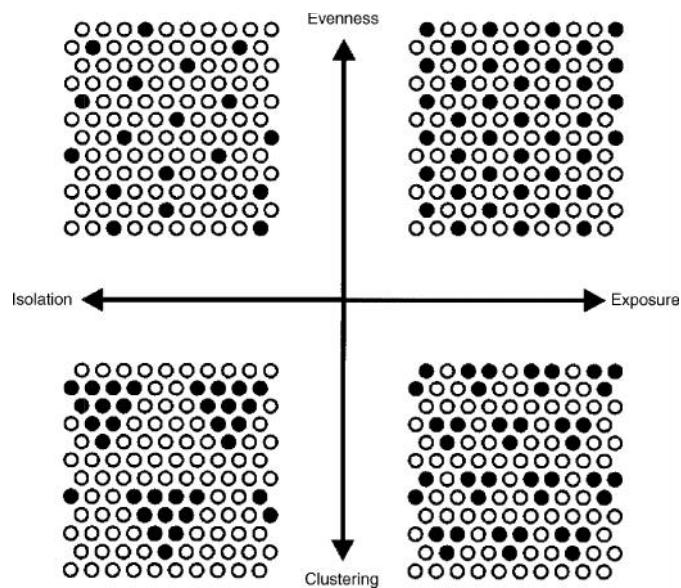
This argumentation stems from two major weaknesses that “aspatial” measures suffer from. These are the “checkerboard problem”⁷ and the “modifiable areal unit problem”⁸, which make aspatial measures less accurate. This has been argued, among others, by Cohn and Jackman (2011) who calculated both aspatial and spatial measures of income segregation for the San Mateo County, California and, indeed, they confirmed that they were different.

⁷ This problem occurs due to fact that aspatial measures of segregation take into account only the racial composition of neighbourhoods. Reardon and O’Sullivan argue that the spatial proximity of neighbourhoods must also be taken into consideration.

⁸ This problem occurs due to the arbitrary division of spatial units within an examined area. The authors argue that the use of a definition of neighbourhoods that is based on administrative units and the consequent absence of a reliable correlation between spatial and social boundaries can guide to ambiguous results.

On these grounds Reardon and O’Sullivan proposed a methodology which replaces the less-spatial measures of Massey and Denton and integrates their five dimensions of segregation into two⁹. The first is *spatial exposure (or spatial isolation)* and the second is *spatial evenness (or spatial clustering)*. The former measures the degree to which residents of one group are mixed and live together with residents of another group or live spatially isolated. The latter measures the extent to which the examined population groups are regularly or irregularly distributed in the local spatial environment. The visualisation of the combination of the above two dimensions is given in Figure 3.1.

Figure 3.1 Dimensions of Spatial Segregation



Source: Reardon and O’Sullivan (2004, page 126)

This gives rise to four different patterns of residential segregation. The upper half of the figure shows high levels of evenness and low levels of clustering in the population distribution. The right one differs from the left in the degree of spatial exposure/isolation. The former shows high levels of exposure, which means that members of one group encounter members of the other one. In contrast, the latter shows high levels of isolation, which means that the populations of the two groups remain isolated in the spatial environment.

The bottom half of the diagram, shows two patterns which represent high degree of clustering. The members of the minority group (“black dots”) create clusters in order to live near co-ethnics. The bottom-left quadrant indicates that the populations of the two

⁹ In fact, Reardon and O’Sullivan enhance the measures of evenness and exposure with a spatial component using the SP function

groups remain isolated with each other, whereas the bottom-right quadrant shows higher degree of exposure between the two groups.

The methodology of Reardon and O’Sullivan is certainly more advanced than that of Massey and Denton but the measures the former propose demand high amount of information and are hard in their calculation (require use of a GIS). As such a limited number of studies have used them (in contrast to those proposed by Massey and Denton which are now “classics”) making comparisons with other cases (in time or in space) impossible.

3.5 Conclusions

This chapter introduced the notion of segregation and identified an appropriate methodological framework for its exploration with specific reference to the immigrant population. Segregation is defined as multi-dimensional phenomenon which concerns the physical separation of two or more groups of people within a specific area or spatial unit. Our methodological framework was based on the work of Massey and Denton (1988), who identified five different dimensions of segregation (evenness, exposure, concentration, centralisation and clustering) and provided simple but appropriate measures for their evaluation. A more refined framework was also developed by Reardon and O’Sullivan (2004), but certain difficulties in the calculation of the concepts proposed made it less appropriate for the current study.

CHAPTER 4: Empirical evidence

4.1 Introduction

There is a variety of studies on residential segregation around the globe. Many researchers have examined the issue with focus on the minority populations (immigrants) trying to identify their locational patterns and trends. This chapter eclectically discusses some of these studies to delineate the experience on the issue in America and Europe.

4.2 America

Starting with Canada, Bauder and Sharpe (2002) examined and compared the residential patterns of visible minority groups in Canada's three major gateway cities, which are Montreal, Toronto and Vancouver. Their analysis indicated that minorities in these three cities are not ghettoised and that even the most concentrated groups remain in contact with each other (that means low levels of isolation). This situation, according to their view, should be seen as most desirable because each ethnic group has spatial access to the economic and social institutions of the host society (no complete isolation) while at the same time it enjoys a high degree of social coherence and cultural independence and pride.

Qadeer (2003), on the other hand, took a step forward by trying to outline the process of formation of segregated neighbourhoods in Toronto, Canada. He argues that immigrants create ethnic areas by choice and that discrimination is not considered to be the major reason for immigrants' isolation. Their residential settlement is affected by the location of their employment and by their own need for socialization with their co-ethnics, which give rise to rather homogenous communities.

Iceland (2002) examined the issue of segregation in the multi-ethnic USA for the period 1980-2000. Using a number of conventional measures (such as the Dissimilarity index) the study found that overall segregation has been decreasing, during the examined period of time. Segregation of Black people and segregation of White ones declined clearly, while there has been observed a slight increase in Asian and Pacific Islander segregation. At the same time, a little change in Hispanic segregation has been noted. The researcher also examined the association between racial diversity and ethnic

segregation in the USA. He concluded that, while diversity increased rapidly over the examined period, multi-group segregation declined moderately.

In a study that explored the main causal factors of residential segregation, Clark and Blue (2004) concluded that increases in the socio-economic status of immigrants can result to a decline in ethnic separation within the main immigrant cities of the USA. Their analysis indicated that income and education may be the most important variables in creating higher levels of social integration between the natives and the in-comers. Yoon (2007) came to the same conclusions when he examined the Asian residential segregation in Houston, Texas. His study showed that segregation of Asian groups, who migrated to the area of Houston, is mainly affected by two factors; education and income. As a result, higher socio-economic status means lower degree of segregation and higher degree of social integration between immigrants and natives. The results of these studies are opposite to the ones of Tienda (1999), who predicted greater racial and ethnic segregation, on the basis of unequal opportunities in the labour market between different ethnic groups.

Another significant study is this of Iceland and Lake (2004), who analysed patterns of residential segregation in 2000 for various immigrants groups in all the US metropolitan areas. They concluded that almost all groups of foreign-born people were more segregated than native-born ones. Furthermore, they highlighted that the most recent arrivals of immigrants had the tendency to be more segregated than foreigners who were living in the US for a longer period of time. This applied more to the non-Hispanic Whites and Asian populations and to a lesser extent to the Hispanic ones. Nevertheless it provided evidence in accordance to the spatial assimilation theory¹⁰, despite its uneven process. Similar arguments were raised by Cutler et al. (2008) after examining trends in immigrants' segregation in the United States between 1910 and 2000. Levels of segregation seemed to increase in the second half of the century and this was attributed to several factors, and particularly to the linguistic differences between

¹⁰ The spatial assimilation model is one of the three models which have been developed in order to analyse the processes of immigrants' residential settlement in their new environment. The rest are the spatial stratification model and the residential preference model. According to the spatial assimilation model, cultural and economic reasons motivate immigrants in order to choose their residential location. At the initial stages of immigration, the new-comers prefer to settle in areas where co-ethnics also reside. This helps them to take advantages from the social networks of their new residence and to settle more easily at the area. After a period of time and while the foreigners' contact and interaction with the natives is getting stronger, immigrants choose to relocate in other areas, and so to be more integrated with the native population (Freeman, 2000; Arvanitidis et al., 2008).

immigrants and natives which found to cause higher degree of separation and isolation and the creation of small ethnic or racial enclaves.

Studying the residential segregation of immigrants, Dick (2008) focused on the separation of the Mexican population on St. Paul's West Side, Minnesota. She highlighted the importance of the difference between immigrants who live in an ethnic area as a result of discrimination or due to their own choice. In her research, she finds evidence of Mexicans' voluntary choices about their residential location and argues that the majority of them choose to settle in the West Side in order to live near co-ethnics. By this way, the in-comers have the opportunity to take advantage of the social networks of co-ethnics and live more comfortably and safely.

4.3 Europe

Across the Atlantic, Blom (1999) examined patterns of residential segregation among immigrants in the capital city of Norway, Oslo, from the early 1970s until 1996. The results showed that immigrants start to conform to Norwegian residential patterns after a certain length of stay in the country. For this reason, immigrants with greater cultural distance from the Norwegian population seemed to be more residentially concentrated than immigrants from countries neighbouring to Norway. Moreover, Blom argued that differences in economic resources are an important factor in creating and maintaining residential segregation of immigrants. Interestingly he also identified a cyclical pattern of segregation, where, during the examined period, an early phase of immigrant concentration in the inner city was interrupted by a phase of dispersion and suburbanisation, to be followed by a new phase of concentration and clustering.

A particularly interesting study was the one of Musterd and Fullaondo (2008) who tried to make a comparison of ethnic segregation, and its effect on the housing market, between two cities in northern and southern Europe: Amsterdam and Barcelona. They concluded that the segregation levels between the two cities were not very different, despite the fact that, as they argue, other studies indicate the existence of differences between southern and northern European cities. Their analysis also revealed that, although the tendency of immigrants to cluster was present in both cities, stronger concentrations of ethnic groups emerged in Amsterdam than in Barcelona.

In a more recent study, Almirall et al. (2009) tried to approximate the residential characteristics of the immigrant population in the metropolitan areas of Madrid and

Barcelona, Spain. They focused on these areas because of the large number of immigrants they attract and host¹¹. The authors argue that the synergies, which are created by the interaction between the residential patterns of immigrants and some structural aspects of the host environment, gave rise to a “new city”. In particular, both metropolitan areas experience decentralisation, with immigrants moving out to the periphery. In addition to this, the study noted the significance of the social networks for the in-comers. Immigrants with access to social networks of co-ethnics could be more easily adjusted in their new environment, as compared to those with no such access. Finally, evidence of better residential insertion for immigrants with greater cultural affinity with the host society was found.

From another perspective and making an attempt to study residential segregation in eight cities of northern Italy¹² with reference to the labour market, Boeri et al. (2010) came to some interesting conclusions. By using data that cover both legal and illegal immigrants, they observe that immigrants who reside in areas with a high concentration of foreigners are less likely to be employed, than immigrants who reside in more integrated areas. According to this, isolation can create more unemployment within immigrant groups. Interestingly, and despite this negative correlation between residential segregation and employment probability of immigrants, the researchers found evidence of a positive sorting of foreigners in the most segregated areas of the examined cities.

4.4 Rest of the world

Turning our attention to case studies outside Europe and America, Khairkar (2008) tried to study the linguistic segregation of immigrants groups in Pune city, India. Immigrants from different states of the Indian Union migrate to Pune city. The study indicated that the in-comers prefer to stay and live together in order to be more secured and retain their national identity. The author also highlighted the greater significance of linguistic segregation of immigrants in Pune, as compared to racial or ethnic segregation.

Focusing on the residential preferences of Taiwanese immigrants in three cities of Australia, Sydney, Brisbane and Melbourne, Lan-Hung and Jung-Chung (2005)

¹¹ According to the latest official data available, in 200, Madrid and Barcelona hosted the 31.78% of the total immigrant population of Spain.

¹² The chosen cities were Milan (the largest city of the sample), Bologna, Brescia, Verona (medium-sized cities) and Alessandria, Lucca, Prato, Rimini (small cities).

conclude that the choice of residence is mainly based on in-comers' needs and their financial resources. They clearly prefer to locate in close proximity to their family and friends and create Taiwanese communities. This leads to higher concentrations of them in the suburbs, where earlier immigrants have established strong ethnic networks.

4.5 Greece

Few studies have explored residential segregation of immigrants in Greece. Despite the fact that immigrants can be met in any region or city within the Greek territory, the metropolitan areas of Athens and Thessaloniki are the most examined cases due to the larger number of foreigners they receive, as compared to other smaller cities¹³.

In a notable study about the residential patterns of immigrants in Athens, Arapoglou (2006) indicated that immigrants from central and eastern European countries tend to be concentrated in small communities and show signs of higher degree of isolation. The same applied to population groups originating from less developed Asian and African countries. However, immigrants from Albania, who constitute the vast majority of immigrants in the country, tend to be more integrated with the natives and more dispersed within the urban environment.

In another study, Maloutas (2007) described the paradoxical and contradictory phenomenon that, while segregation of immigrants in Athens tends to be decreased during the 1990's, social polarization and income inequalities tend to be increased at the same time. Evidence of immigrants' desegregation in Athens was also found by Arvanitidis and Skouras (2008) in their study on residential patterns within the Greek capital city. This makes sense after taking into consideration the tendency of relocation which was observed for all the minority groups. The authors argued that immigrants have the trend to change residence after a period of time and move outside the city centre. Moreover, they underlined that the residential patterns of immigrants depend on both economic and cultural reasons.

Similar evidence of desegregation was also found by Hatziprokopiou (2006) in his study about the processes of socio-spatial integration of immigrants in Thessaloniki, Greece. He concluded to the nonexistence of "clusters of poverty" within the city area even though immigrants tend to settle in "cheap" districts.

¹³ According to data from the 2001 census, metropolitan areas of Athens and Thessaloniki hosted almost the 45% of the total number of immigrants in Greece.

Finally, in a study about residential characteristics of immigrants in the medium-sized Greek city of Volos, Arvanitidis et al. (2008) confirmed the locational patterns observed in Athens and Thessaloniki. Minority groups seemed to be dispersed in almost all urban neighbourhoods of the city and no significant level of segregation was noted. What made this attempt different from previous ones was the use of an alternative source of data. This was school enrolments for native and immigrants students in primary schools of Volos, which were available on a year-to-year basis.

Although this approach suffers from the fact that childless immigrants cannot be taken into account, it, in sharp contrast to official statistics, does not exclude illegal immigrants (since all children are obliged by law to enrol primary schools independently of their legal status) and provide evidence on a yearly basis.

4.6 Conclusions

This chapter presented a number of studies from around the globe which examined the phenomenon of ethnic segregation. A number of conclusions can be drawn. In all examined cities a decreasing process of segregation levels was observed. Only the most recent arrivals of immigrants seemed to experience relatively higher levels of segregation. In such cases the in-comers tried to benefit from the social networks that their co-ethnics had established within the host city. Furthermore, in the majority of cases income and education seemed to be the most important factors that could cause an increase on segregation levels. Finally, in almost all studies the decrease on segregation levels was followed by a relocation of immigrants into more upgraded city areas, outside the city centres.

CHAPTER 5: Methodology

5.1 Introduction

An objective of this study is to explore immigrant residential segregation in a small-sized Greek city, this of Lamia. This chapter delineates the specific methodology employed, after having discussed and explained the data that were used to achieve this objective.

5.2 Data

The usual data set that studies of this sort employ is the one available from the national censuses, conducted every year by the Hellenic Statistical Authority (ELSTAT).

For a number of reasons this approach was not followed here. The main reason was the fact that the most recent census data available was the one of the 2001. Although a new census was conducted in May of 2011, its final outcome and datasets were not yet available¹⁴. In addition to this, another crucial element for our decision was the non-availability of official statistics on a year-to-year basis. This could make impossible to properly examine the dynamics of the phenomenon and to make comparisons between different periods of time, which is the essence in our case due to the highly evolving character of the phenomenon under study.

Instead we set forth the approach followed by Arvanitidis and Skouras (2008), who consider the intra-urban location of immigrants through the primary school enrolments of their children. The use of these data relies on the fact that every family of foreigners is obliged to enrol its children into a school located in the vicinity of the family's residence. This criterion of proximity between house and school plays the most important role in the choice of school. As a result, in the vast majority of cases, immigrants' residence and their children' school belong to the same neighbourhood. By using this kind of data, and by considering the proportion of foreigner school students as an indicative sample of the proportion of immigrants in every subarea, we can consequently conclude for the pattern of spatial distribution and the degree of residential segregation of immigrants in every neighbourhood of the examined urban area.

¹⁴ In personal communication with the ELSTAT we were told that such data would be available at the end of 2012, at best.

A number of advantages can be cited in order to enhance the use of school enrolments data, comparing to those of population census. They are available on a year-to-year basis and this enables us to get a more reliable picture of the evolution of residential segregation of immigrants within the urban area of Lamia. In our study we estimate the degree of segregation in each year of the period 2001-2011. This helps us to make comparisons between the different periods of time and conclude for the issue in a more reliable manner. Furthermore, this set of data includes both legal and illegal families of immigrants, as they all compulsorily enrol their children into a primary school, whereas census data include only legal and officially listed immigrants. Finally, it should be mentioned that primary schools of Lamia are equally dispersed within the total urban environment and its neighbourhoods, so this ensures the high trustworthiness of the results for the spatial distribution of immigrants.

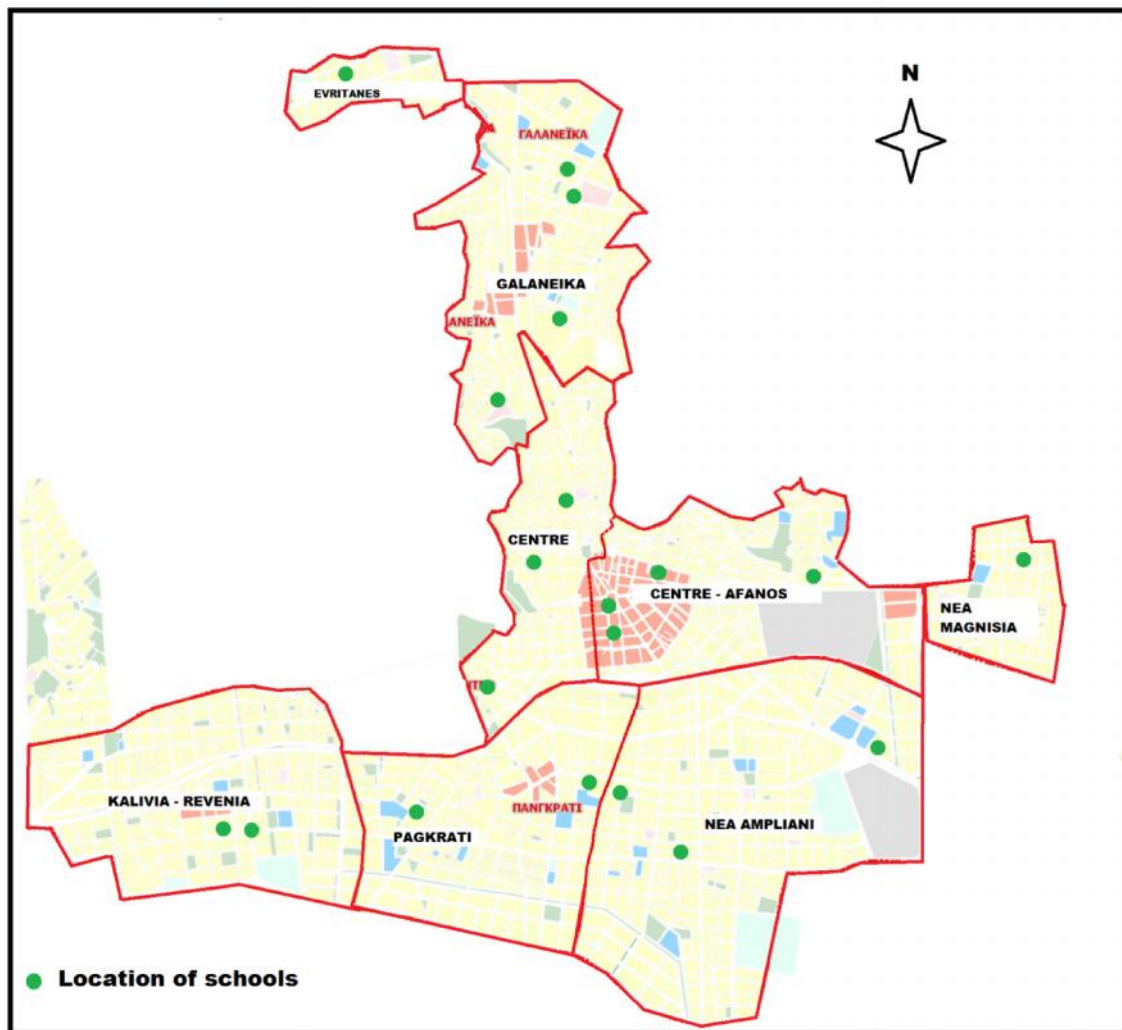
5.2.1 The examined areal units

The aforementioned data of the total school enrolments were not available in the local Directorate of Primary Education of Fthiotida. For this reason, we appealed to the Directors of each one of the 20 primary schools which are operating in the urban area of Lamia. After personal interviews with them, we managed to collect the required data for the period 2001-2011. We used the total number of Greek and the total number of non-Greek students for each one of the 20 primary schools, which are operating within the urban area of Lamia, for the period 2001-2011.

Each school belongs to one of the 8 neighbourhoods of Lamia, which are the Centre, Centre-Afanos, Galaneika, Evritanes, Nea Ampliani, Pagkrati, Kalivia-Revenia and Nea Magnisia. Obviously, areas include more than one school. For each neighbourhood we use the total numbers of Greek and non-Greek students regardless of the number of schools it houses.

The neighbourhoods of the urban area and the locations of the primary schools are shown in the Figure 5.1.

Figure 5.1 The 8 neighbourhoods of Lamia and the location of the 20 primary schools



Source: www.lamia-city.gr, own construction

5.3 Indices

As it has been mentioned, this study uses the methodological framework of Massey and Denton (1988), in which segregation is analysed in five dimensions. For each dimension we employ and calculate the appropriate index specified. This is discussed next.

Residential evenness refers to the differential distributions of two social groups among areal units in an examined city, while exposure shows the existence, and its degree, of interaction and contact between majority and minority groups within the different areas of the examined city. The first dimension is measured by the use of the Dissimilarity Index, while the second by the use of the Isolation Index of Segregation.

The formulas of the first two indices are the following:

- Dissimilarity Index (D)

$$D = \frac{1}{2} \sum_{i=1}^n \left| \frac{x_i}{X} - \frac{y_i}{Y} \right|$$

where:

x_i is the majority population of neighbourhood i,

X is the total majority population in the whole city

y_i is the minority population of neighbourhood i,

Y is the total minority population in the whole city.

- Isolation Index of Segregation (IIS)

$$IIS = \sum_{i=1}^n \frac{x_i}{X} \cdot \frac{x_i}{t_i}$$

where:

x_i is the number of immigrants of areal unit i,

t_i is the total population of areal unit i,

X is the total population of immigrants in the whole city.

Except from the dimensions of evenness and exposure, which are the two most widely studied dimensions of segregation, the rest three dimensions of Massey and Denton's formulation will be also examined in this study. Concentration refers to the case in which the members of the minority groups occupy a small or a large area in the total urban environment. Centralisation, in turn, measures the degree of the residential concentration of the minority groups in the city centre. Finally, the dimension of clustering refers to the degree of the immigrants' concentration in specific areas of the city, in which they create ghettos. The following three indices will be used in order to measure the dimension of concentration, centralisation and clustering respectively.

- Delta Index (DEL)

$$DEL = \frac{1}{2} \sum_{i=1}^n \left| \left[\frac{x_i}{X} - \frac{a_i}{A} \right] \right|$$

where:

x_i is the number of immigrants of areal unit i ,

X is the total population of immigrants in the whole city,

a_i is the land area of unit i ,

A is the total land area of the whole city.

- Centralisation Index (P_{CC})

$$P_{CC} = \frac{X_{CC}}{X}$$

where:

X_{CC} is the number of immigrants who live near the city centre,

X is the total number of immigrants.

- Spatial Proximity Index (SP)

The first step is to estimate the average proximities between majority groups (Greeks), between minority groups (immigrants) and among all members of the population. The formulas of this index are the following:

$$P_{xx} = \frac{\sum_{i=1}^n \sum_{j=1}^n x_i x_j c_{ij}}{X^2} \quad P_{yy} = \frac{\sum_{i=1}^n \sum_{j=1}^n y_i y_j c_{ij}}{Y^2} \quad P_{tt} = \frac{\sum_{i=1}^n \sum_{j=1}^n t_i t_j c_{ij}}{T^2}$$

where:

x_i, y_i and t_i are the numbers of Greeks, immigrants and total residents in area i ,

x_j, y_j and t_j are the numbers of Greeks, immigrants and total residents in area j ,

c_{ij} is the negative exponential of the distance between areas i and j

($c_{ij} = e^{-d_{ij}}$, where d_{ij} is the distance between the centroids of areas i and j),

X, Y and T are the total number of Greeks, immigrants and residents of the city.

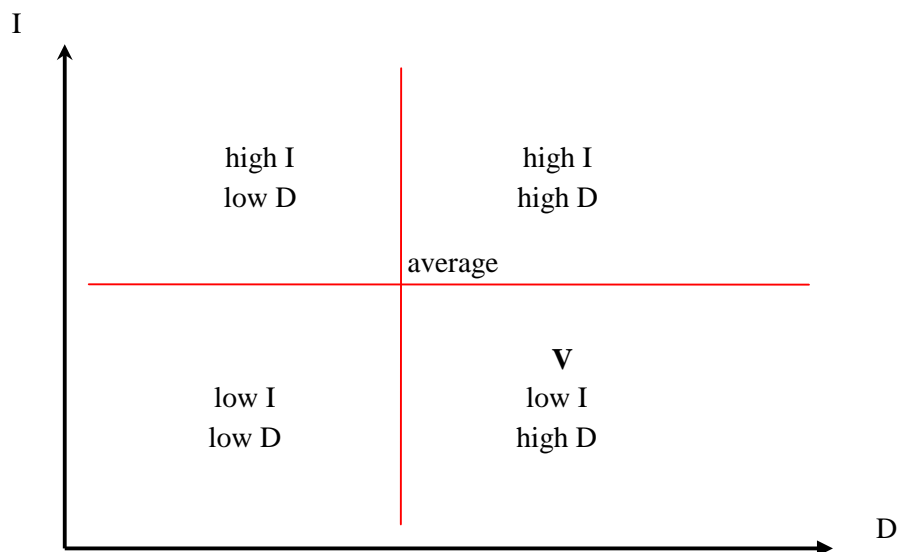
The final step is to estimate the spatial proximity index (SP) of the whole urban area, which is the average of intra-group proximities, weighted by the fraction of each group in the total population. The formula of the SP index is the following:

$$SP = \frac{XP_{xx} + YP_{yy}}{TP_{tt}}$$

We will calculate the above five indices for each neighbourhood and each year, for the period 2001-2011.

In addition to the above we also used the two-dimensional system of Arvanitidis and Skouras (2011) in order to explore the combined effect of evenness and exposure (see Figure 5.2). The horizontal axis records the degree of Dissimilarity a neighbourhood exhibits while the vertical one the degree of its Isolation. Setting as “zero point” the average figures of Dissimilarity and Isolation we get a four quadrant area which enables us to easily identify neighbourhoods characterised by relatively higher or lower degrees in the aforementioned indices. More specifically, quadrant I indicates areas of higher (in comparison to the average) isolation and dissimilarity, quadrant II areas of higher isolation but lower dissimilarity, quadrant III areas of lower both isolation and dissimilarity, and finally quadrant IV areas of higher dissimilarity but lower isolation.

Figure 5.2 The two-dimensional system of Dissimilarity (D) and Isolation (I)



Source: based on Arvanitidis and Skouras (2011)

5.4 Conclusions

In this chapter, the two available and possible to be used data sets were discussed. There are the national censuses and data concerning the school enrolment of natives and immigrants. The second data set was deemed preferable mainly due to its availability on a year-to-year basis. In contrast, official statistics from the national censuses were only available for an exact year and, moreover, data from the most recent nation census of the 2011 were not available during the preparation of this study. Furthermore, data from the school enrolment of immigrant students involves both legal and illegal immigrants and for this reason it can be considered as a reliable source of data.

The examined areal units were the eight neighbourhoods of Lamia's urban area. The methodological framework that the study used was the one which Massey and Denton (1988) proposed by analysing segregation into five residential dimensions (evenness, exposure, concentration, centralisation and clustering). Appropriate indices were employed and calculated for the measurement of each dimension.

CHAPTER 6: Immigrant segregation in Lamia

6.1 Introduction

This is the empirical part of the study which explores the pattern of immigrant segregation in the city of Lamia. Seven sections comprise this chapter. The first presents a general overview of immigrant locational pattern (without use of any index), while the next five sections present the evaluation of the five dimensions of segregation, i.e. evenness, exposure, concentration, centralisation and clustering. The seventh section provides an evaluation of the combined degree of evenness and exposure, based on the two-dimensional diagram explained in the previous chapter.

6.2 General evidence

Some initial interesting trends can be extracted from following Table 6.1, which shows the total number of students and the number of foreign students in the whole urban area of Lamia for the period 2001-2011.

Table 6.1 Number of non-Greek students in the public primary schools of the urban area of Lamia, by year (2001-2011).

Year	Total number of students	Number of immigrant students	Percentage of immigrant students (%)
2011	3784	417	11.02
2010	3741	366	9.78
2009	3668	328	8.94
2008	3654	320	8.76
2007	3564	285	8.00
2006	3585	278	7.75
2005	3535	257	7.27
2004	3617	247	6.83
2003	3647	233	6.39
2002	3660	222	6.07
2001	3624	240	6.62

Source: Directorate of Primary Education of Fthiotida

While the total number of students during this period remains almost stable, with a slight increase of 4.42%, the number of foreign students records an impressive increase of 73.75%. As a result, the percentage of foreign students in all public primary schools of the area has risen from 6.62% in 2001 to 11.02% in 2011 and has been almost doubled during this decade. A reasonable explanation of this tendency can be sought to

the increased migration inflows which took place from the beginning of the 1990's. Many young immigrants settled in Greece during that period, and as a consequence their new-born children reached the age of primary school's participation during the 2000's and mainly during the last years of the decade.

Table 6.2 shows the percentage of foreign students for each neighbourhood, on a yearly basis. As it can be seen, they are dispersed in all neighbourhoods of the city, with the exception of the neighbourhood of Evritanes, in which the percentage of foreign students remains low. This provides a primary indication of low degree of segregation of immigrants within the whole urban area of Lamia.

Table 6.2 Percentage of immigrant students in the urban area of Lamia, by neighbourhood and year.

Area	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Average
Centre	6.24	5.24	5.22	6.92	9.67	9.00	9.05	11.27	7.41	7.57	9.15	7.89
Centre-Afanos	7.36	7.66	9.29	9.06	8.28	10.37	10.37	9.82	12.21	13.51	15.15	10.28
Galaneika	8.57	8.08	7.93	7.29	7.96	8.35	8.95	9.85	9.73	10.04	10.20	8.81
Evritanes	1.96	1.61	1.54	1.28	2.38	2.02	0.98	0.83	0.87	1.75	1.80	1.55
Nea Magnisia	5.21	5.05	8.65	11.22	9.28	11.21	12.82	10.87	9.16	8.27	6.08	8.89
Nea Ampliani	5.53	4.33	4.05	5.65	6.05	6.23	4.49	5.55	5.87	7.42	9.84	5.91
Pagkrati	5.86	5.13	5.33	5.36	5.12	6.12	9.42	9.57	13.40	14.06	16.47	8.71
Kalivia-Revenia	5.51	6.02	6.25	5.97	4.17	3.96	3.92	7.01	6.51	7.89	6.90	5.83

Source: Own construction

Higher average percentage of immigrant students can be seen in the neighbourhood of Centre-Afanos. Neighbourhoods with an average higher than the city average, which is 7.23%, are Nea Magnisia, Galaneika, Pagkrati and Centre. Nea Ampliani and Kalivia-Revenia have an average percentage lower than the city average, whereas Evritanes seems to be an area with the lowest presence of immigrant students during the examined period.

6.3 Degree of residential evenness

In this section we evaluate the degree of residential evenness in Lamia. We search for evidence of even or uneven distribution of immigrants within the various neighbourhoods and the whole urban area.

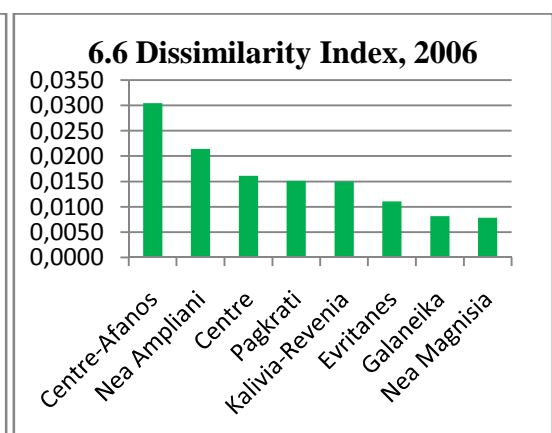
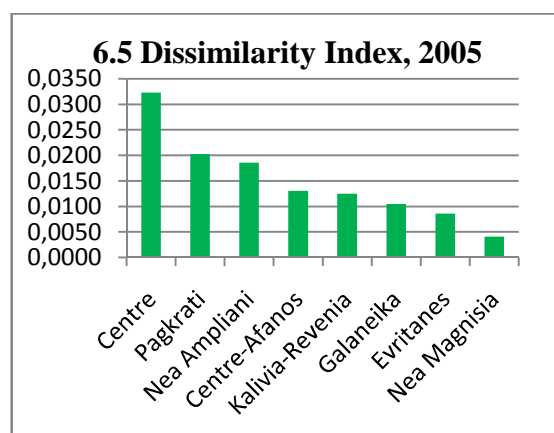
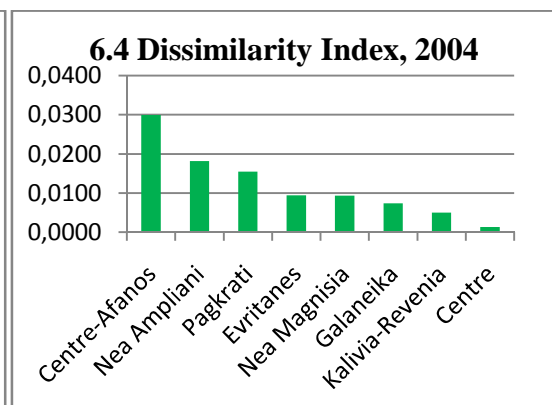
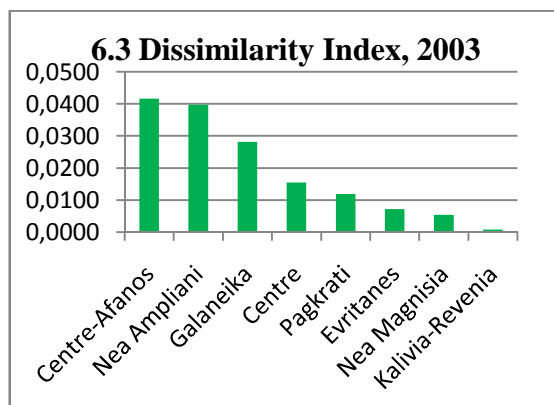
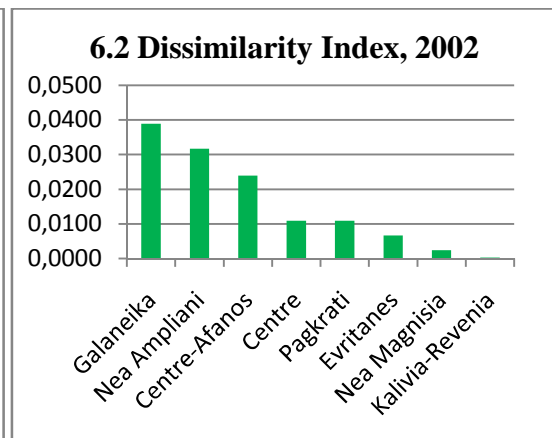
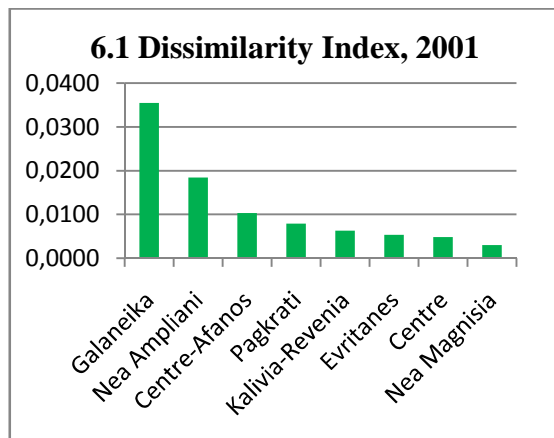
The next table 6.3 shows the scores of Dissimilarity Index by neighbourhood and year, for the period 2001-2011. Taking into consideration that this index can vary from 0 (maximised evenness, no residential segregation) to 1 (minimised evenness, complete residential segregation), it can be concluded that, even in areas with a relative high degree of Dissimilarity Index, majority and minority groups are evenly distributed across space. In other words, there is no significant evidence of uneven distribution of immigrants within the urban area, as the level of D remains low for every neighbourhood and year. There is no area with an extremely high score of the index, so in none neighbourhood high levels of immigrants' segregation are encountered.

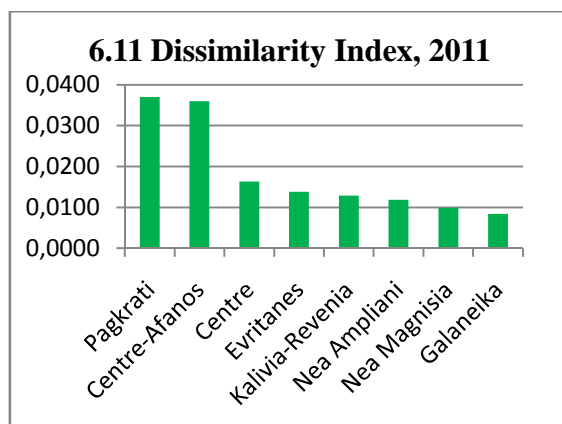
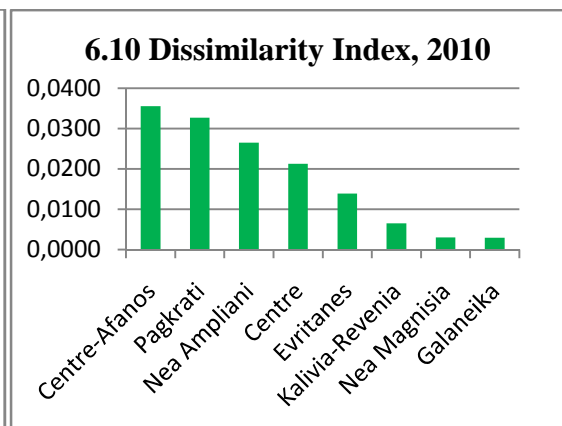
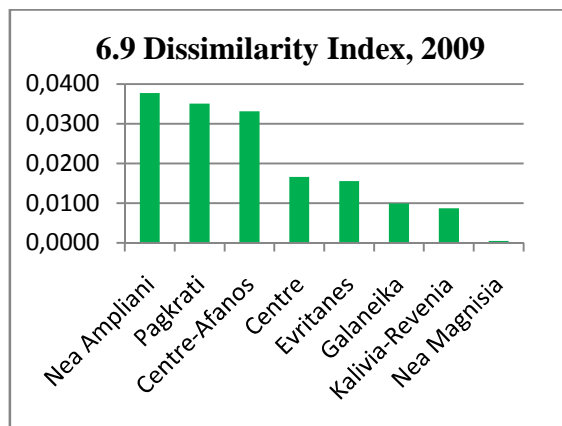
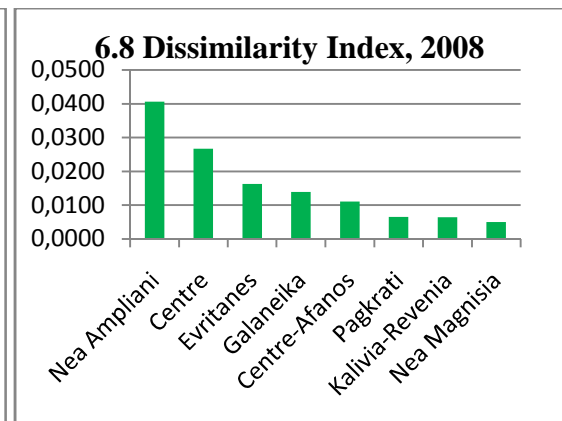
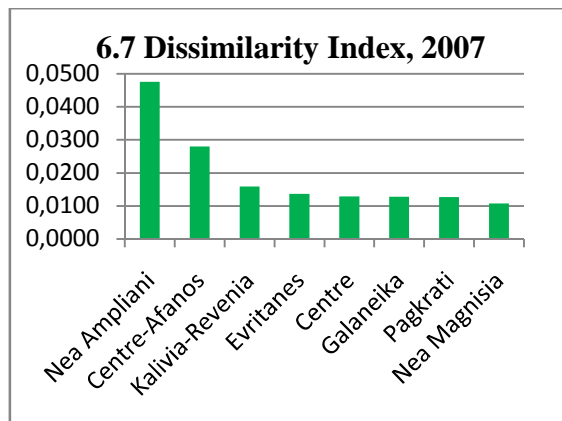
More specifically, it can be mentioned that Pagkrati and Centre-Afanos areas record the highest degree of D in 2011, which means that within these areas immigrants are more segregated, as compared to all other neighbourhoods. But, in fact, their scores, which are 0.0370 and 0.0360, indicate that even these two areas appear to experience low levels of unevenness in immigrants' distribution. The highest score of D during the whole examined period can be met in the neighbourhood of Nea Ampliani in 2007, something which indicates a possible relocation of immigrants in the southeast area of the city during the middle of the decade.

Table 6.3 Dissimilarity Index (D) by neighbourhood and year.

Area	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Centre	0.0048	0.0109	0.0154	0.0013	0.0323	0.0161	0.0129	0.0267	0.0166	0.0212	0.0163
Centre-Afanos	0.0103	0.0239	0.0416	0.0300	0.0130	0.0305	0.0280	0.0111	0.0332	0.0355	0.0360
Galaneika	0.0355	0.0389	0.0281	0.0074	0.0105	0.0081	0.0128	0.0139	0.0099	0.0029	0.0084
Evritanes	0.0053	0.0066	0.0072	0.0094	0.0086	0.0111	0.0136	0.0163	0.0155	0.0139	0.0138
Nea Magnisia	0.0030	0.0024	0.0054	0.0094	0.0041	0.0078	0.0108	0.0050	0.0005	0.0030	0.0099
Nea Ampliani	0.0184	0.0317	0.0398	0.0181	0.0186	0.0214	0.0475	0.0406	0.0377	0.0265	0.0118
Pagkrati	0.0079	0.0109	0.0119	0.0155	0.0202	0.0151	0.0127	0.0066	0.0351	0.0327	0.0370
Kalivia-Revenia	0.0063	0.0003	0.0008	0.0050	0.0125	0.0149	0.0159	0.0064	0.0087	0.0065	0.0129

Source: Own construction



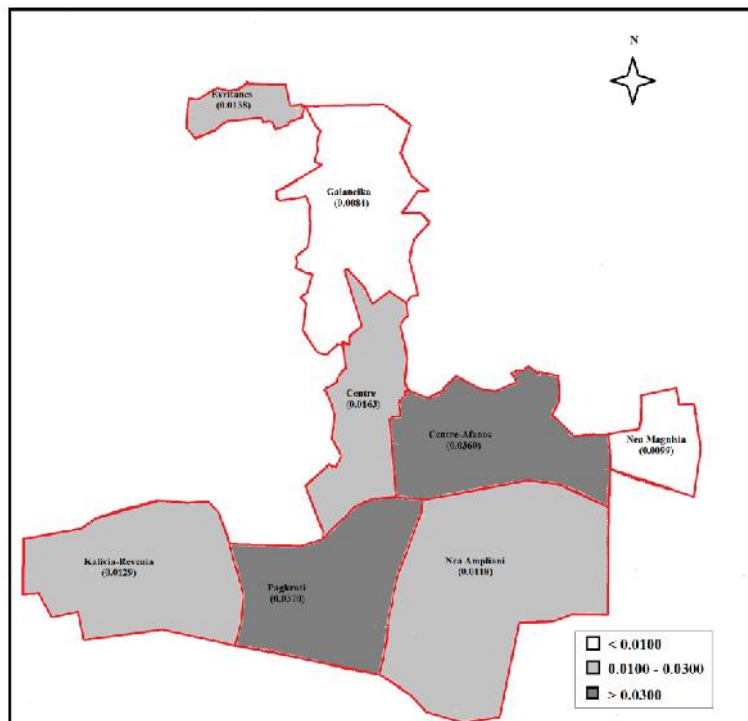


homogenization process of the population took place in this area during this decade. A number of immigrants who were settled in Galaneika at the beginning of the decade moved to other areas of Lamia and, as a result, the area became more even in regard with the composition of population, as compared to the other neighbourhoods.

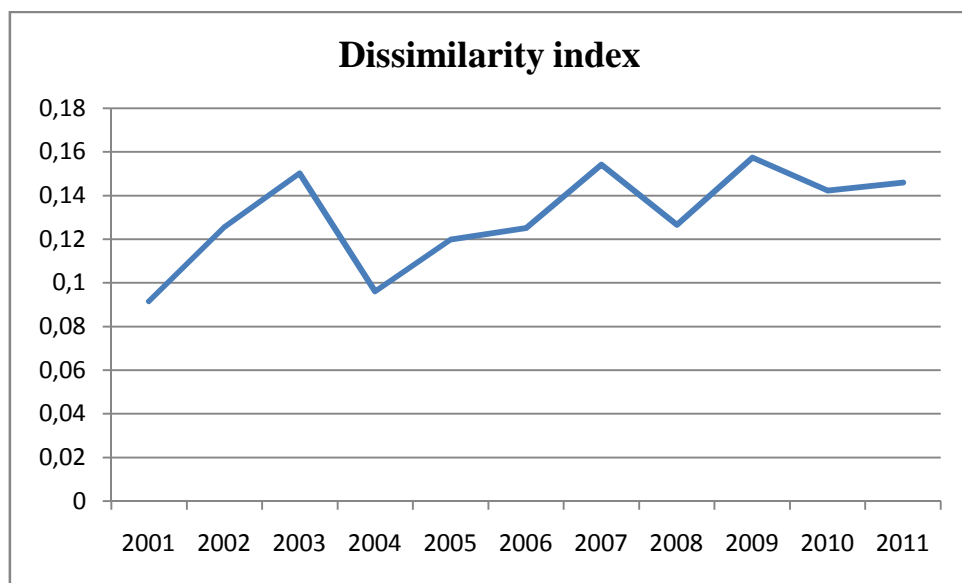
The opposite process took place in the neighbourhood of Centre. This area starts with a low D value in 2001 and, progressively, ends up with a relative high D score in 2011. During this last year, the area of Centre has the third position in the relevant rank. This means that the majority of the more recently arrived immigrants tend to settle in the Centre of the urban area, probably attracted from the low-cost housing which this area provides.

The highest value of D index in 2011 can be seen in Pagkrati. Interestingly this is an area with a large number of Roma residents, which is in close proximity with the Centre and suffers from low quality of housing and of urban amenities. Figure 6.12 plots the most recent results of Dissimilarity index which are those of 2011. Neighbourhoods are painted according to their score for this particular year.

Figure 6.12 Dissimilarity Index (D) for each neighbourhood of Lamia in 2011.



Source: Own construction



6.4 Degree of residential exposure

In this section we evaluate the degree of residential isolation or exposure of immigrants. High degree of isolation means that immigrants tend to have low levels of interaction with the majority group, while low degree of isolation shows more contact between Greeks and foreigners. Moreover, high levels of exposure mean that residential space and individual neighbourhoods are better shared by the total of residents.

The next Table 6.4 shows the scores of Isolation index of segregation (I) by neighbourhood and year, for the period 2001-2011. As it can be seen from the table, the highest value of I, during all the examined years, is recorded by the area of Centre-Afanos and its value is 0.0356 for 2011. This indicates that immigrant isolation in Lamia is at low level, or that there is a high degree of immigrant exposure and interaction between majority and minority groups. This applies to all neighbourhoods and years. There is no neighbourhood with extreme values of I and it can be concluded that immigrants are not residentially isolated from the natives. On the contrary, residential space in Lamia seems to be shared between Greeks and foreigners.

The neighbourhood of Evritanes experiences the highest levels of immigrants' exposure within its area. The value of I for the northern area of Lamia is extremely low for all the examined period. The same applies to areas like Kalivia-Revenia and Nea Magnisia which also have low I scores for all the decade. Taking into consideration that the above three areas are the most remote ones from the city centre, it can be concluded that natives and immigrants who live outside the inner urban area are more integrated with each other.

In contrast, areas like Centre-Afanos and Galaneika seem to have I values that are higher to the city average and therefore they exhibit the highest isolation of immigrants.

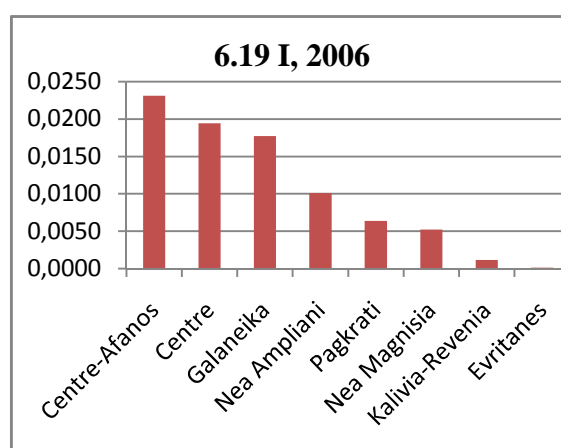
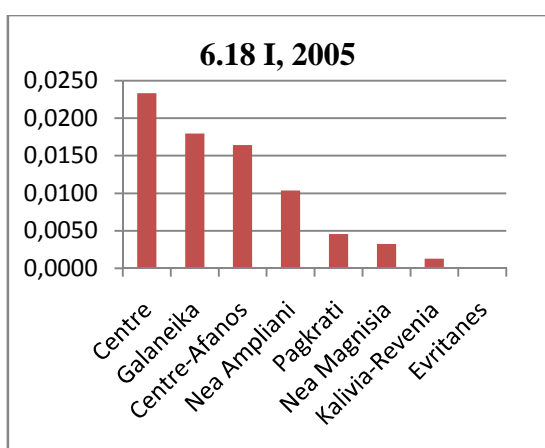
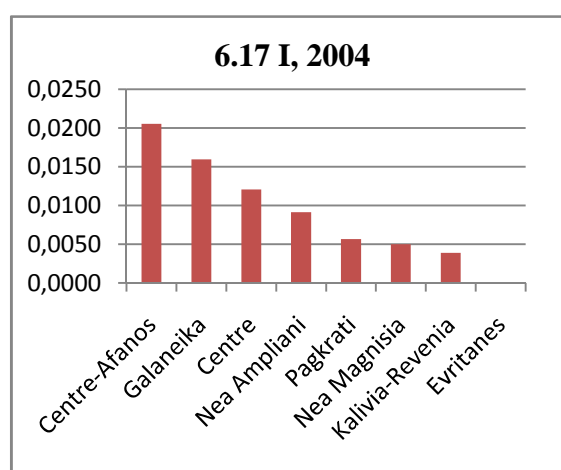
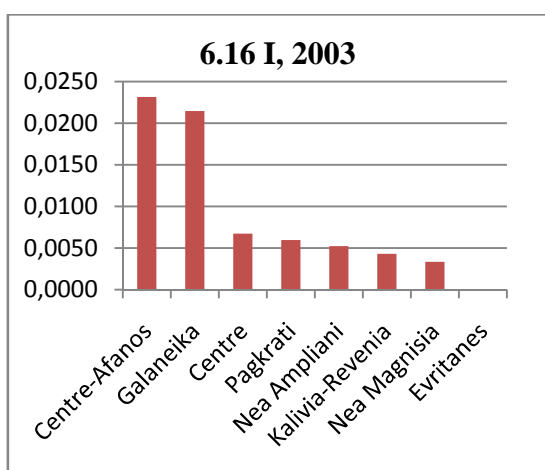
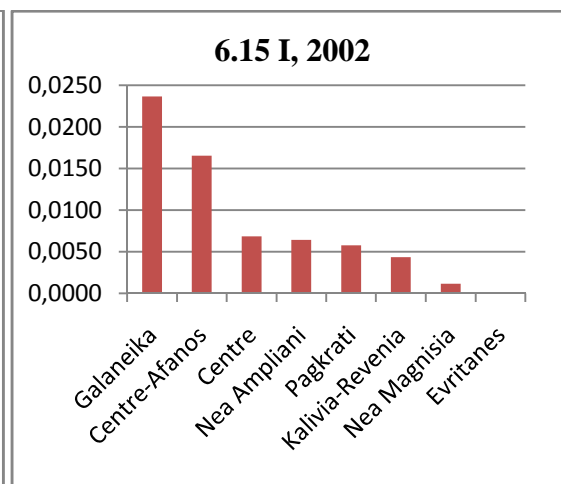
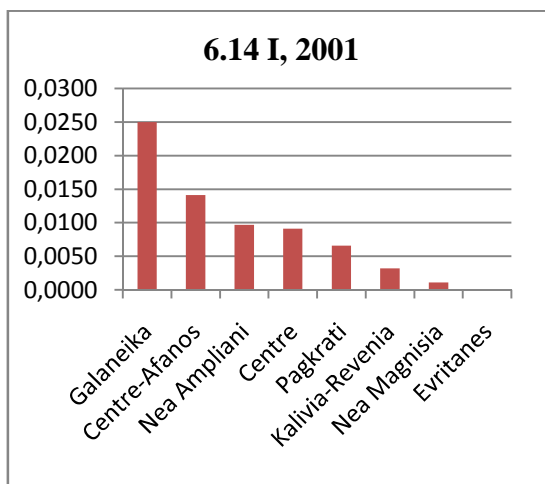
Table 6.4 Isolation index of segregation (I) by neighbourhood and year

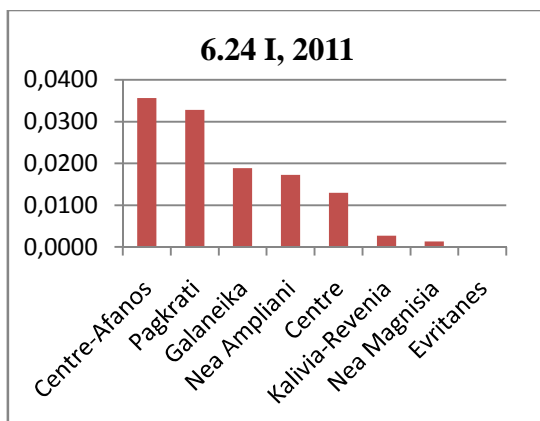
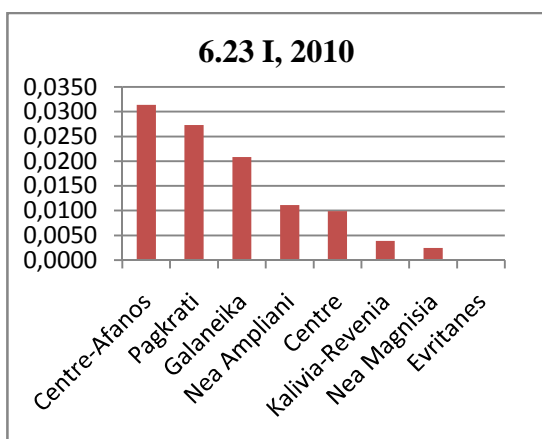
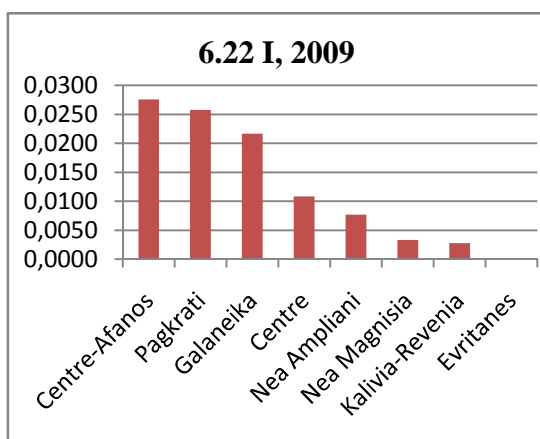
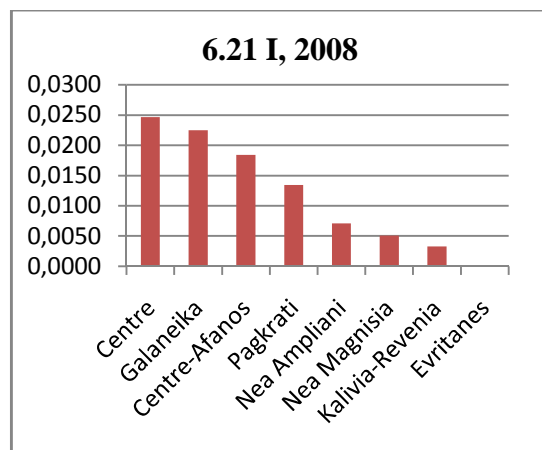
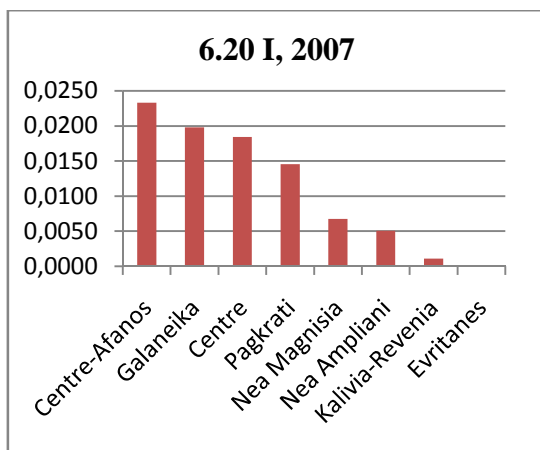
Area	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Centre	0.0091	0.0069	0.0067	0.0121	0.0233	0.0194	0.0184	0.0247	0.0108	0.0099	0.0129
Centre-Afanos	0.0141	0.0166	0.0231	0.0205	0.0164	0.0231	0.0233	0.0184	0.0275	0.0314	0.0356
Galaneika	0.0250	0.0237	0.0215	0.0159	0.0180	0.0177	0.0198	0.0225	0.0217	0.0208	0.0188
Evritanes	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0000	0.0000	0.0000	0.0001	0.0001
Nea Magnisia	0.0011	0.0011	0.0033	0.0050	0.0032	0.0052	0.0067	0.0051	0.0034	0.0025	0.0013
Nea Ampliani	0.0097	0.0064	0.0052	0.0091	0.0104	0.0101	0.0050	0.0071	0.0077	0.0112	0.0172
Pagkrati	0.0066	0.0058	0.0059	0.0056	0.0046	0.0064	0.0145	0.0135	0.0257	0.0273	0.0328
Kalivia-Revenia	0.0032	0.0043	0.0043	0.0039	0.0013	0.0011	0.0011	0.0033	0.0028	0.0039	0.0026

Source: Own construction

Figures 6.14 to 6.24 present the rank of all neighbourhoods according to the Isolation index for each year. At the beginning of the decade, Galaneika is, by far, the area with the highest value of I. Centre-Afanos and Nea Ampliani are following. These are the three areas in which, during that period, immigrants are more isolated and less integrated with the majority group (Greeks). As we reach the end of the period examined, a little differentiation seems to take place. Centre-Afanos and Galaneika remain at the top of I scores, but Pagkrati takes the second place. In this area a big change seems to have occurred from 2007 onwards, whereas its I score progressively increases to end up in 2011 in the second highest place.

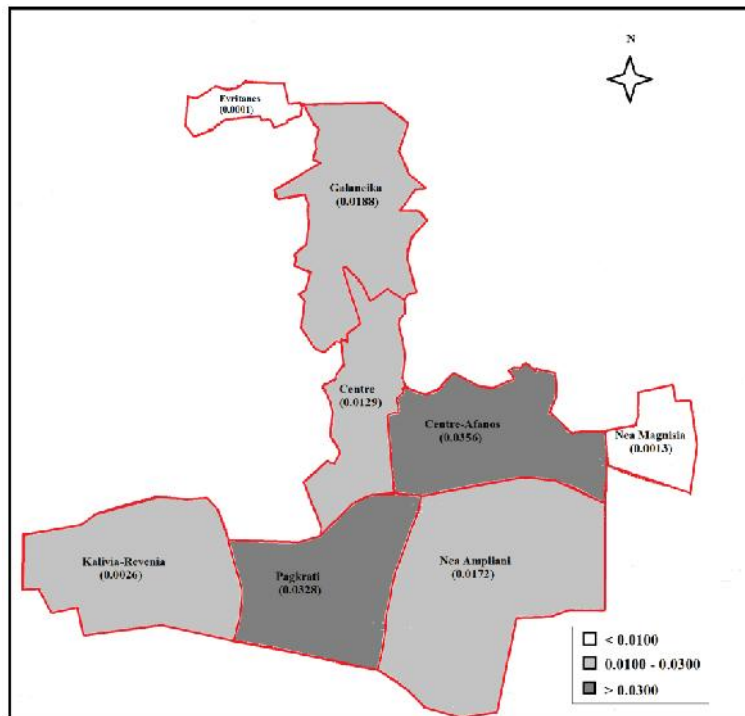
Although there are some variations on rankings between the different neighbourhoods throughout the years, it becomes clear that even the areas with the highest I values do not experience extreme immigrant isolation. Immigrant populations are located in all areas of Lamia and there is no evidence of the formation of ethnic enclaves.





neighbourhoods experience an intermediate situation regarding the residential exposure of immigrants.

Figure 6.25 Isolation index of segregation (I) for each neighbourhood of Lamia in 2011.



Source: Own construction

Finally, Figure 6.26 depicts the evolution of exposure/isolation (as measured by the Isolation index) for the whole urban area of Lamia. As can be observed, an increase of the index takes place throughout the years; actually it doubles from about 0.06 in 2002 to 0.12 in 2011. However, overall, the value of I remains low in all the examined period. This means that Lamia experiences low levels of immigrants' isolation despite the fact that residential segregation (as assessed by the Isolation index) seems to increase over the years.

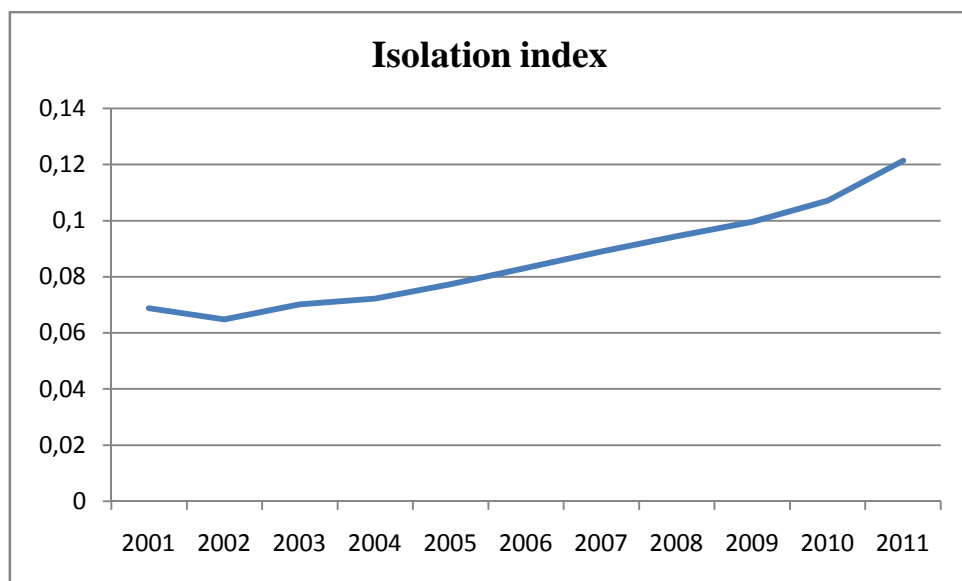


Table 6.5 Delta Index (DEL) by neighbourhood and year.

Area	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Centre	0.0266	0.0190	0.0181	0.0407	0.0743	0.0616	0.0555	0.0631	0.0269	0.0193	0.0244
Centre-Afanos	0.0280	0.0403	0.0566	0.0455	0.0314	0.0437	0.0444	0.0259	0.0450	0.0483	0.0497
Galaneika	0.0711	0.0717	0.0605	0.0346	0.0381	0.0314	0.0358	0.0393	0.0366	0.0291	0.0176
Evritanes	0.0108	0.0107	0.0108	0.0109	0.0090	0.0093	0.0112	0.0114	0.0114	0.0102	0.0105
Nea Magnisia	0.0114	0.0105	0.0025	0.0005	0.0043	0.0016	0.0045	0.0016	0.0035	0.0068	0.0110
Nea Ampliani	0.0369	0.0501	0.0600	0.0434	0.0388	0.0434	0.0682	0.0603	0.0588	0.0492	0.0368
Pagkrati	0.0162	0.0161	0.0166	0.0198	0.0277	0.0202	0.0048	0.0021	0.0236	0.0246	0.0271
Kalivia-Revenia	0.0505	0.0436	0.0453	0.0472	0.0641	0.0652	0.0656	0.0562	0.0583	0.0550	0.0605

Source: Own construction

An initial observation from the above table is that the highest concentration value is recorder by the area of Centre for the year 2005. Since then this neighbourhood tend to decrease its Delta scores. Kalivia-Revenia, Centre-Afanos and Nea Ampliani are areas with constantly high levels of concentration, while the area of Nea Magnisia seems to experience to lowest levels of the index during the whole period examined.

Next, Figures 6.27 to 6.29 show the rank of all neighbourhoods according to the Delta index. Three figures are created, one in every five years, in order to present the evolution of the neighbourhoods' rank.

At the beginning of the decade Galaneika, Kalivia-Revenia and Nea Ampliani are the areas where immigrants tend to be more concentrated than the other neighbourhoods. This situation changes at the middle of the examined period. Kalivia-Revenia exhibits now the highest concentration of immigrants and next come the areas of Centre and Centre-Afanos, the two most central areas of the city. Finally, in 2011 Kalivia-Revenia remain at the top of the rankings, while Centre-Afanos is second and Nea-Ampliani third.

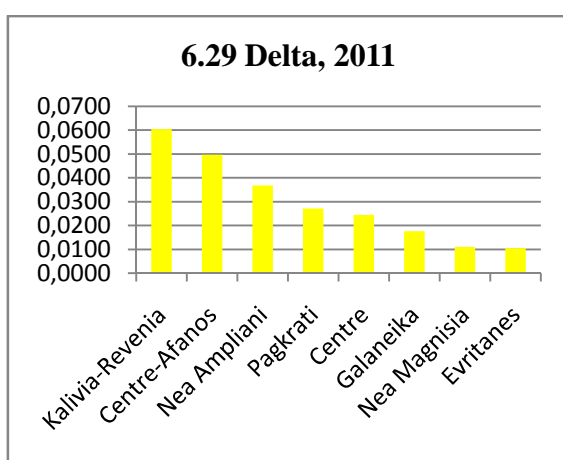
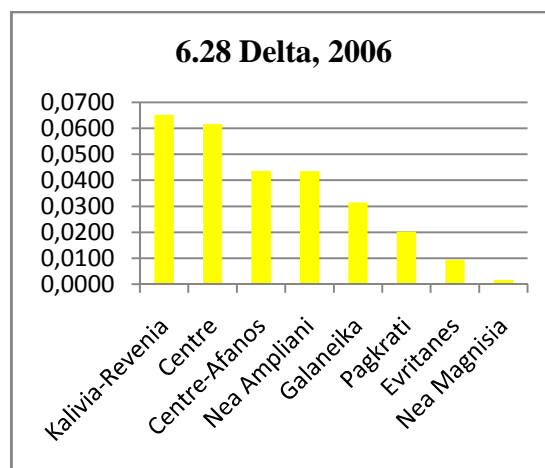
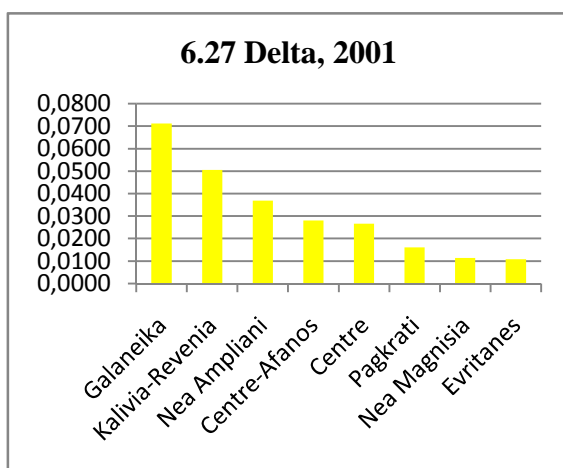
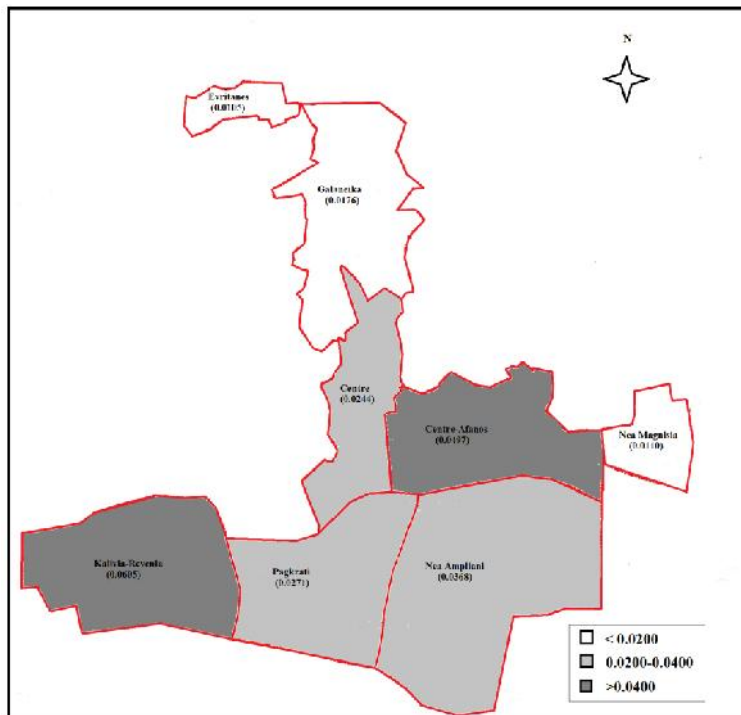


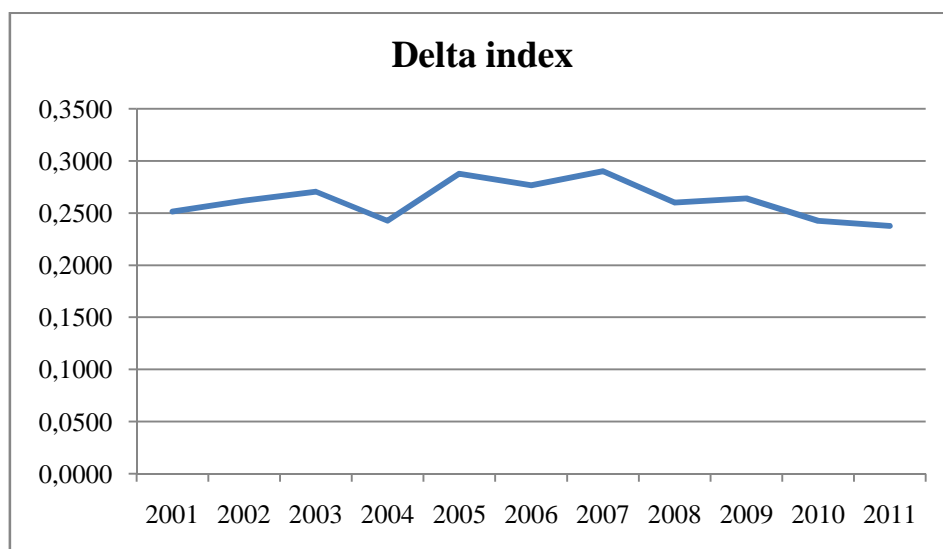
Figure 6.30 Delta index (DEL) for each neighbourhood of Lamia in 2011.



Source: Own construction

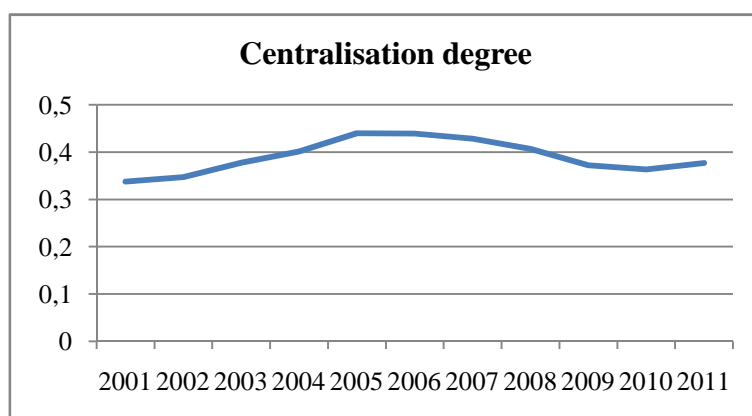
Finally, the evolution of the Delta index in the whole urban area is presented in the Figure 6.31. As it can be observed, slight variations take place throughout the years but at the end of the examined period concentration levels remain almost stable, as compared with the first years of the study.

Figure 6.31 Delta index of Lamia for the period 2001-2011.



Source: Own construction

Year	Immigrant students of the two central areas	Total number of immigrant students	Pcc
2001	81	240	0.3375
2002	77	222	0.3468
2003	88	233	0.3777
2004	99	247	0.4008
2005	113	257	0.4397
2006	122	278	0.4388
2007	122	285	0.4281
2008	130	320	0.4063
2009	122	328	0.3720
2010	133	366	0.3634
2011	157	417	0.3765



It can be concluded that, according to Figure 6.32, centralisation levels within Lamia are characterised by some variation during the examined period. A slight increase is noted until the middle of the decade, then centralisation drops. This means that immigrant population tend to concentrate in the city centre during the first years, but, as time goes by, centralisation levels decrease and in 2011 are almost the same was in 2001. This decentralisation process, in which immigrants leave the city centre (especially the specific neighbourhood of Centre and not so much the area of Centre-Afanos) and relocate to other areas and neighbourhoods, has already been noted earlier, when we discussed the previous dimensions of segregation within Lamia.

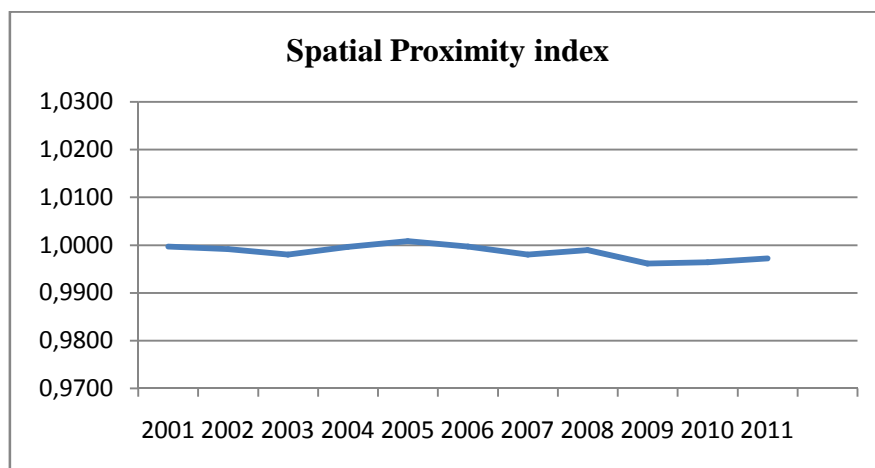
6.7 Degree of residential clustering

In this section we evaluate the degree of residential clustering within the whole urban area of Lamia. High levels of clustering indicate that neighbourhoods where immigrants reside are close to each other (have common borders), making wider clusters of immigrant-areas and possibly larger ethnic enclaves. In contrast, levels of residential clustering remain low if minority areas are dispersed within the whole city.

The index of spatial proximity is used to measure the degree of residential clustering within the whole city. We find the values of the index for each year of the period 2001-2011. The first step is to estimate the average proximity (P_t) among all members of the population and then we estimate the average proximities (P_{xx} and P_{yy}) between members of the majority group (Greeks) and between members of the minority group (immigrants). Finally, the spatial proximity index (SP) is calculated for the whole urban area. In case that the SP equals 1.0 we conclude for the absence of residential clustering within the examined area, while if the index value is greater than 1.0 we conclude for the existence of ethnic enclaves.

These estimations require the use of the distances between the different neighbourhoods of the city. We use the distances between the centroids of all possible pairs of areas. Tables with the estimated results can be found in the appendix. In these tables the neighbourhoods' names are abbreviated as follows: PA is an abbreviation for Pagkrati, GA for Galaneika, CE for Centre, CA for Centre-Afanos, KR for Kalivia-Revenia, NM for Nea Magnisia, NA for Nea Ampliani and EV for Evritanes.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
SP value	0,9997	0,9991	0,9980	0,9996	1,0008	0,9997	0,9980	0,9989	0,9961	0,9964	0,9972



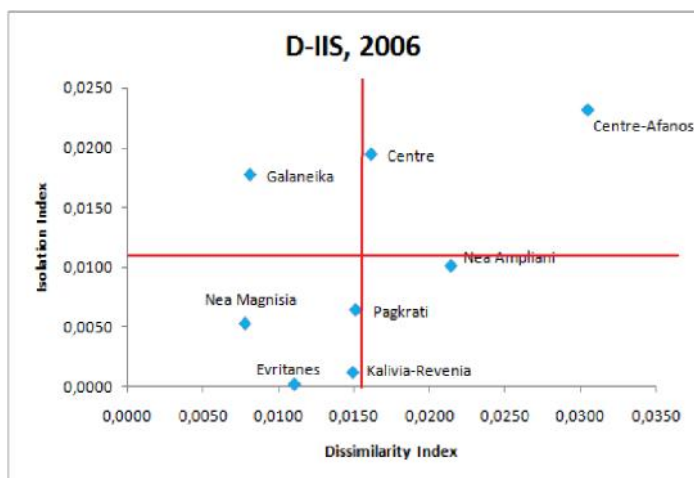
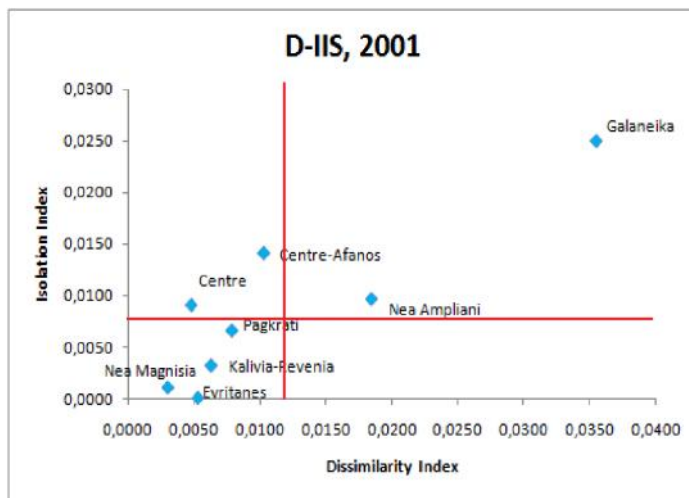
The different neighbourhoods of the urban area of Lamia are placed into three different figures, according to their value on both previously calculated Dissimilarity index (D) and Isolation index (I). Moreover, the average value of each index is plotted (red cross), which helps us to identify where each neighbourhood stands with regards to the four quadrants. The position of each neighbourhood within these quadrants gives us more solid evidence on their degree of residential segregation.

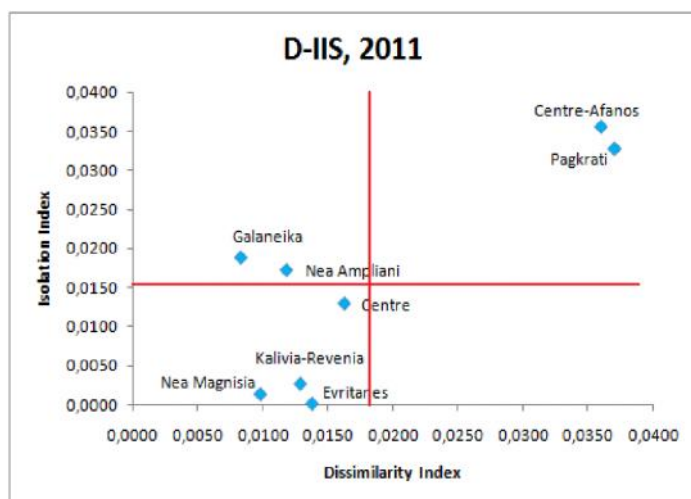
As discussed, areas which are placed in the upper right quadrant are those which experience higher levels of segregation. Their scores on both combined indices of segregation are higher than the city average and, as a result, immigrants who live in these areas tend to be more segregated than in other neighbourhoods. The exactly opposite quadrant, which is the bottom left one, includes areas with lower scores on both indices than the city average. This means that these areas experience less segregation of immigrants who tend to be more integrated with the natives.

The rest two quadrants include areas which are in a more intermediate situation. Areas of the upper left quadrant record higher levels of isolation but, at the same time, take lower values on dissimilarity. On the contrary, areas of the bottom right quadrant have more unevenly distributed but, simultaneously, less isolated immigrant populations.

The first figure concerns the year of 2001, the second the year of 2006 and the third the most recent year of 2011. By comparing these three different figures, one in every five years, the evolution of the position of each neighbourhood on the figures can be assessed. Moreover, a combined and more reliable degree of segregation for each area can be extracted.

In Figure 6.34, it can be seen that Galaneika is, by far, the most segregated neighbourhood of the urban area. Both indices record much higher values than the city average. In the same quadrant, Nea Ampliani is the second more segregated neighbourhood of Lamia for 2001. An intermediate situation is experienced by the areas of Centre and Centre-Afanos in which immigrants tend to be more isolated than the city average but, at the same time their population is more evenly distributed. The rest neighbourhoods are placed in the bottom left quadrant and experience low levels of residential segregation.





neighbourhoods remain almost stable during all the period, other areas record more significant increases or decreases of their segregation levels. This is more than expected due to the probable immigrants' relocation within the urban environment after a period of time.

6.9 Conclusions

This chapter was the empirical part of the study which explored the pattern of immigrant segregation in the city of Lamia. Five indices were calculated and helped us to conclude for the overall segregation level of the city. It became evident that the whole urban area of Lamia experiences low level of residential segregation and immigrants are dispersed within all neighbourhoods.

According to Dissimilarity index there was no significant evidence of residential uneven distribution of immigrants. Even the areas with the highest values of Dissimilarity index experience relatively even distribution of their population and there are no signs of high levels of immigrants' segregation in any neighbourhood. Isolation level, despite its increase throughout the years, remained also low, while the lowest levels of isolation were exhibited by the most peripheral neighbourhoods. Another interesting finding was that centralisation levels within Lamia were characterised by some variation during the examined period. A slight increase was noted until the middle of the decade and then centralisation dropped again into initial levels. Moreover, there was no evidence of the existence of contiguous and neighbouring minority areas, as the SP value remained close to 1.0 during the examined period. As a consequence, there were no ethnic enclaves within the urban area of Lamia.

Finally, according to the combined index of dissimilarity and isolation we can conclude that there were some changes and variations on some neighbourhoods' position in the four created quadrants. This can be explained by taking into consideration that immigrants choose to change residence and relocate into other areas after a period of time.

CHAPTER 7: Conclusions

The aim of this study was to explore the residential patterns of immigrants in a small-size Greek city and to identify their evolutionary trends. The urban area of Lamia, which is the capital of the region of Central Greece, was chosen as a case study. The impetus for this study was the fact that previous researches have focused exclusively on the metropolitan areas of Athens and Thessaloniki, and as a result nothing is known about the locational behaviour of immigrants which find residence in the small cities of the country.

In achieving its aim the study set forth three objectives: to identify an appropriate methodological framework for analysing ethnic segregation at the intra-urban level, to review the relevant literature in order to pinpoint the experience of other countries on the issue, and to employ the aforementioned methodology in a specific case, the city of Lamia, in order to empirically examine the patterns of ethnic segregation and the emergence of ethnic enclaves.

The methodological framework employed was this developed by Massey and Denton (1988), who assess spatial segregation on the basis of five different dimensions: evenness, exposure, concentration, centralisation and clustering. This also provided some simple but effective measures for the evaluation of the aforementioned dimensions.

Moving to the review of the experience of the other countries, it was made clear that segregation is certainly a complex phenomenon. In the vast majority of previous studies segregation levels tend to decrease throughout the years. In many examined areas immigrants seem to choose more central neighbourhoods for their first period of residence in their new environment. Lower housing costs, and strong and well-established social networks of co-ethnics seems to be the most important factors driving their choice. However, after some years of residence in the inner cities, immigrants tend to fly out and to relocate in other areas outside the degraded city centres. As they become more assimilated with the natives and the whole local environment they start to search for better living conditions, hence they settle into more upgraded neighbourhoods.

Our third objective was to employ the developed methodological framework in order to examine the spatial pattern of immigrants and its dynamics in the specific case of Lamia, a small-sized city which houses a large number of foreign population. Since long runs of official data on immigration are not available, the study employed the approach proposed by Arvanitidis and Skouras (2008) to use primary school enrolments as a proxy. The availability of such data on a yearly basis, the relatively even distribution of primary schools within the city and the compulsory character of primary education for all population (natives and immigrants independently of their legal status), constitute the advantages of the approach, as compared to the conventional use of datasets compiled from the national censuses once in a decade. On these grounds, data through personal visits in all primary schools of Lamia city were collected for each year of the period 2001-2011.

The analysis was based on the evaluation of the five spatial dimensions of residential segregation. The measurement of the degree of each dimension, and consequently the estimation of the degree of segregation, was made by using appropriate indices. Regardless of which the estimated index was, the general conclusion of the analysis was that segregation level within the urban area of Lamia remains extremely low during the whole period examined. Values of all the calculated indices remained constantly low throughout the years. This means that immigrant population can be found in all neighbourhoods of the urban environment, and as such no ethnic enclaves seems to exist.

Concerning the dimension of evenness, there was no significant evidence of uneven distribution of immigrants within the urban area of Lamia. This was the case for all neighbourhoods, even for those exhibited relatively higher values of dissimilarity. The neighbourhood with the most uneven distribution of immigrants in 2011 was Pagkrati, followed by Centre-Afanos. In contrast, Galaneika was the area with the most evenly distributed population in the same year.

As concerns the dimension of exposure, there was no evidence of high isolation levels in Lamia. Immigrants were dispersed all over the urban frame and there were no neighbourhoods with a particularly high isolation score. In fact, the peripheral neighbourhoods presented the lowest isolation degree. An interesting point to note, however, was the fact that isolation was showing an increasing trend all over the period

examined. Concerning 2011 the areas of Centre-Afanos and Pagkrati were again those with the highest degrees of immigrant isolation, whereas immigrants in Evritanes seemed to be the least isolated.

Similar evidence was found from the examination of the rest dimensions of segregation. Concerning concentration, results showed that immigrants were most concentrated in the areas of Kalivia-Revenia and Centre-Afanos, and least concentrated in Evritanes, for the last year examined. Generally, all values of the Delta index remained relatively low during the whole period examined.

With respect to centralisation an increase of the percentage of immigrants living in the city centre was noted until the middle of the decade. Since then centralisation levels were decreased and, finally, reached the levels of 2001 by the end of the examined period.

Finally, as regards to dimension of clustering, there were no signs of the existence of contiguous minority areas, as the value of the Spatial Proximity index remained close to 1.0 at the beginning, at the middle and at the end of the examined period. As a consequence, the formation of ethnic enclaves was not perceived.

Analysis was completed with the examination of the joint effect of evenness and exposure for all areas of the city over the examined period. Throughout these years a number of neighbourhoods remained stable with regard to the degree of segregation they experienced, while a few others recorded some significant changes. Overall it was made evident that a number of immigrants changed their area of residence and relocated into other neighbourhoods of the city after a period of time.

Concluding this study we should highlight the need for further research on the issue before firm conclusions to be drawn. The study could be repeated when data from the most recent national census of 2011 become available. It would be interesting to examine residential segregation in Lamia by using this data set to see whether results match those of the current research.

Moreover, additional research is needed to see whether other cities (and especially small ones) exhibit similar to Lamia spatial patterns of immigrant location. Through this process researchers and scholars would become able to record and highlight any similarities or dissimilarities of the immigrants' residential behaviour and choices.

Further comparisons of the findings of this study with globally made similar studies, and especially with studies which refer to small-sized cities, could also be extremely interesting.

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Year	2000-2001				2001-2002				2002-2003				2003-2004				2004-2005				2005-2006			
School	Total	Greek	Immigrants	Immigrants percentage	Total	Greek	Immigrants	Immigrants percentage	Total	Greek	Immigrants	Immigrants percentage	Total	Greek	Immigrants	Immigrants percentage	Total	Greek	Immigrants	Immigrants percentage	Total	Greek	Immigrants	Immigrants percentage
1st	227	218	9	3.96	227	217	10	4.41	225	218	7	3.11	208	203	5	2.40	200	195	5	2.50	210	204	6	2.86
2nd	254	240	14	5.51	248	237	11	4.44	239	230	9	3.77	242	232	10	4.13	233	221	12	5.15	246	235	11	4.47
3rd	192	176	16	8.33	180	168	12	6.67	183	175	8	4.37	196	180	16	8.16	213	184	29	13.62	207	182	25	12.08
4th	100	91	9	9.00	104	93	11	10.58	101	91	10	9.90	102	91	11	10.78	102	92	10	9.80	103	91	12	11.65
5th	96	91	5	5.21	99	94	5	5.05	104	95	9	8.65	98	87	11	11.22	97	88	9	9.28	116	103	13	11.21
6th	309	292	17	5.50	312	292	20	6.41	305	287	18	5.90	322	294	28	8.70	326	301	25	7.67	321	299	22	6.85
7th	244	230	14	5.74	244	229	15	6.15	252	233	19	7.54	249	229	20	8.03	227	209	18	7.93	238	216	22	9.24
8th	174	167	7	4.02	185	177	8	4.32	173	166	7	4.05	188	179	9	4.79	95	91	4	4.21	102	99	3	2.94
9th	216	205	11	5.09	218	208	10	4.59	216	206	10	4.63	208	199	9	4.33	220	210	10	4.55	197	182	15	7.61
10th	207	184	23	11.11	205	181	24	11.71	203	170	33	16.26	203	171	32	15.76	190	164	26	13.68	184	154	30	16.30
11th	331	314	17	5.14	331	326	5	1.51	318	314	4	1.26	264	262	2	0.76	278	268	10	3.60	287	277	10	3.48
12th	115	110	5	4.35	125	119	6	4.80	153	140	13	8.50	183	166	17	9.29	195	174	21	10.77	214	190	24	11.21
13th	112	105	7	6.25	111	102	9	8.11	103	97	6	5.83	92	88	4	4.35	78	72	6	7.69	68	60	8	11.76
14th	217	204	13	5.99	243	233	10	4.12	236	229	7	2.97	236	230	6	2.54	222	217	5	2.25	236	229	7	2.97
15th	102	99	3	2.94	100	97	3	3.00	104	99	5	4.81	105	101	4	3.81	104	99	5	4.81	114	109	5	4.39
16th	244	205	39	15.98	232	202	30	12.93	236	200	36	15.25	230	193	37	16.09	248	208	40	16.13	215	180	35	16.28
17th	234	219	15	6.41	234	218	16	6.84	230	216	14	6.09	211	203	8	3.79	203	196	7	3.45	214	204	10	4.67
18th	80	73	7	8.75	81	73	8	9.88	83	74	9	10.84	80	73	7	8.75	97	93	4	4.12	100	95	5	5.00
19th	51	50	1	1.96	62	61	1	1.61	65	64	1	1.54	78	77	1	1.28	84	82	2	2.38	99	97	2	2.02
20th	119	111	8	6.72	119	111	8	6.72	118	110	8	6.78	122	112	10	8.20	123	114	9	7.32	114	101	13	11.40
Total	3624	3384	240	6.62	3660	3438	222	6.07	3647	3414	233	6.39	3617	3370	247	6.83	3535	3278	257	7.27	3585	3307	278	7.75

Year	2006-2007				2007-2008				2008-2009				2009-2010				2010-2011							
School	Total	Greek	Immigrants	Immigrants percentage	Total	Greek	Immigrants	Immigrants percentage	Total	Greek	Immigrants	Immigrants percentage	Total	Greek	Immigrants	Immigrants percentage	Total	Greek	Immigrants	Immigrants percentage				
1st	211	204	7	3.32	222	215	7	3.15	222	216	6	2.70	223	216	7	3.14	225	215	10	4.44				
2nd	242	234	8	3.31	234	221	13	5.56	237	226	11	4.64	231	221	10	4.33	242	225	17	7.02				
3rd	195	175	20	10.26	186	167	19	10.22	202	178	24	11.88	194	168	26	13.40	185	160	25	13.51				
4th	102	91	11	10.78	101	90	11	10.89	105	95	10	9.52	108	95	13	12.04	112	98	14	12.50				
5th	117	102	15	12.82	138	123	15	10.87	131	119	12	9.16	133	122	11	8.27	148	139	9	6.08				
6th	304	288	16	5.26	322	303	19	5.90	320	299	21	6.56	317	293	24	7.57	314	289	25	7.96				
7th	230	198	32	13.91	234	203	31	13.25	235	190	45	19.15	267	218	49	18.35	264	208	56	21.21				
8th	101	98	3	2.97	109	101	8	7.34	109	101	8	7.34	114	103	11	9.65	115	105	10	8.70				
9th	212	200	12	5.66	213	198	15	7.04	209	185	24	11.48	208	186	22	10.58	204	180	24	11.76				
10th	178	145	33	18.54	167	139	28	16.77	161	128	33	20.50	176	133	43	24.43	184	132	52	28.26				
11th	294	290	4	1.36	295	290	5	1.69	295	286	9	3.05	306	289	17	5.56	308	283	25	8.12				
12th	204	174	30	14.71	201	163	38	18.91	209	196	13	6.22	209	197	12	5.74	218	201	17	7.80				
13th	70	60	10	14.29	97	71	16	16.39	95	77	18	18.95	99	80	19	19.19	111	92	19	17.12				
14th	237	225	12	5.06	236	222	14	5.93	235	217	18	7.66	238	216	22	9.24	240	213	27	11.25				
15th	125	117	8	6.40	130	124	6	4.62	131	124	7	5.34	137	130	7	5.11	147	139	8	5.44				
16th	210	173	37	17.62	211	174	37	17.54	221	183	38	17.19	214	180	34	15.89	193	168	25	12.95				
17th	213	204	9	4.23	221	208	13	5.88	212	201	11	5.19	221	205	16	7.24	226	203	23	10.18				
18th	103	98	5	4.85	105	98	7	6.67	106	100	6	5.66	114	107	7	6.14	117	111	6	5.13				
19th	102	101	1	0.98	120	119	1	0.83	115	114	1	0.87	114	112	2	1.75	111	109	2	1.80				
20th	114	102	12	10.55	122	105	17	13.93	118	105	13	11.02	118	104	14	11.86	120	97	23	19.17				
Total	3564	3279	285	8.00	3654	3334	320	8.76	3668	3340	328	8.94	3741	3375	366	9.78	3784	3367	417	11.02				

	2001				2002				2003				2004			
	Total Number of Students	Number of Greek Students	Number of Immigrant Students	Percentage of Immigrant Students (%)	Total Number of Students	Number of Greek Students	Number of Immigrant Students	Percentage of Immigrant Students (%)	Total Number of Students	Number of Greek Students	Number of Immigrant Students	Percentage of Immigrant Students (%)	Total Number of Students	Number of Greek Students	Number of Immigrant Students	Percentage of Immigrant Students (%)
Centre	561	526	35	6,24	553	524	29	5,24	575	545	30	5,22	621	578	43	6,92
Centre-Afanos	625	579	46	7,36	627	579	48	7,66	624	566	58	9,29	618	562	56	9,06
Galaneika	817	747	70	8,57	804	739	65	8,08	794	731	63	7,93	741	687	54	7,29
Evritanes	51	50	1	1,96	62	61	1	1,61	65	64	1	1,54	78	77	1	1,28
Nea Magnisia	96	91	5	5,21	99	94	5	5,05	104	95	9	8,65	98	87	11	11,22
Nea Ampliani	759	717	42	5,53	762	729	33	4,33	741	711	30	4,05	708	668	40	5,65
Pagkrati	461	434	27	5,86	487	462	25	5,13	488	462	26	5,33	485	459	26	5,36
Kalivia-Revenia	254	240	14	5,51	266	250	16	6,02	256	240	16	6,25	268	252	16	5,97
	3624	3384	240	6,62	3660	3438	222	6,07	3647	3414	233	6,39	3617	3370	247	6,83
	2005				2006				2007				2008			
	Total Number of Students	Number of Greek Students	Number of Immigrant Students	Percentage of Immigrant Students (%)	Total Number of Students	Number of Greek Students	Number of Immigrant Students	Percentage of Immigrant Students (%)	Total Number of Students	Number of Greek Students	Number of Immigrant Students	Percentage of Immigrant Students (%)	Total Number of Students	Number of Greek Students	Number of Immigrant Students	Percentage of Immigrant Students (%)
Centre	641	579	62	9,67	667	607	60	9,00	641	583	58	9,05	621	551	70	11,27
Centre-Afanos	616	565	51	8,28	598	536	62	10,37	617	553	64	10,37	611	551	60	9,82
Galaneika	729	671	58	7,96	707	648	59	8,33	704	641	63	8,95	741	668	73	9,85
Evritanes	84	82	2	2,38	99	97	2	2,02	102	101	1	0,98	120	119	1	0,83
Nea Magnisia	97	88	9	9,28	116	103	13	11,21	117	102	15	12,82	138	123	15	10,87
Nea Ampliani	727	683	44	6,05	722	677	45	6,23	712	680	32	4,49	739	698	41	5,55
Pagkrati	449	426	23	5,12	474	445	29	6,12	467	423	44	9,42	470	425	45	9,57
Kalivia-Revenia	192	184	8	4,17	202	194	8	3,96	204	196	8	3,92	214	199	15	7,01
	3535	3278	257	7,27	3585	3307	278	7,75	3564	3279	285	8,00	3654	3334	320	8,76
	2009				2010				2011							
	Total Number of Students	Number of Greek Students	Number of Immigrant Students	Percentage of Immigrant Students (%)	Total Number of Students	Number of Greek Students	Number of Immigrant Students	Percentage of Immigrant Students (%)	Total Number of Students	Number of Greek Students	Number of Immigrant Students	Percentage of Immigrant Students (%)				
Centre	648	600	48	7,41	634	586	48	7,57	645	586	59	9,15				
Centre-Afanos	606	532	74	12,21	629	544	85	13,51	647	549	98	15,15				
Galaneika	750	677	73	9,73	757	681	76	10,04	755	678	77	10,20				
Evritanes	115	114	1	0,87	114	112	2	1,75	111	109	2	1,80				
Nea Magnisia	131	119	12	9,16	133	122	11	8,27	148	139	9	6,08				
Nea Ampliani	733	690	43	5,87	741	686	55	7,42	742	669	73	9,84				
Pagkrati	470	407	63	13,40	505	434	71	14,06	504	421	83	16,47				
Kalivia-Revenia	215	201	14	6,51	228	210	18	7,89	232	216	16	6,90				
	3668	3340	328	8,94	3741	3375	366	9,78	3784	3367	417	11,02				

	2001					2002					2003					2004			
Neighbourhood	xi/X	yi/Y	xi/X-yi/Y	D		xi/X	yi/Y	xi/X-yi/Y	D		xi/X	yi/Y	xi/X-yi/Y	D		xi/X	yi/Y	xi/X-yi/Y	D
Centre	0,1554	0,1458	0,0096	0,0048		0,1524	0,1306	0,0218	0,0109		0,1596	0,1288	0,0309	0,0154		0,1715	0,1741	0,0026	0,0013
Centre-Afanos	0,1711	0,1917	0,0206	0,0103		0,1684	0,2162	0,0478	0,0239		0,1658	0,2489	0,0831	0,0416		0,1668	0,2267	0,0600	0,0300
Galaneika	0,2207	0,2917	0,0709	0,0355		0,2150	0,2928	0,0778	0,0389		0,2141	0,2704	0,0563	0,0281		0,2039	0,2186	0,0148	0,0074
Evritanes	0,0148	0,0042	0,0106	0,0053		0,0177	0,0045	0,0132	0,0066		0,0187	0,0043	0,0145	0,0072		0,0228	0,0040	0,0188	0,0094
Nea Magnisia	0,0269	0,0208	0,0061	0,0030		0,0273	0,0225	0,0048	0,0024		0,0278	0,0386	0,0108	0,0054		0,0258	0,0445	0,0187	0,0094
Nea Ampliani	0,2119	0,1750	0,0369	0,0184		0,2120	0,1486	0,0634	0,0317		0,2083	0,1288	0,0795	0,0398		0,1982	0,1619	0,0363	0,0181
Pagkrati	0,1283	0,1125	0,0158	0,0079		0,1344	0,1126	0,0218	0,0109		0,1353	0,1116	0,0237	0,0119		0,1362	0,1053	0,0309	0,0155
Kalivia-Revenia	0,0709	0,0583	0,0126	0,0063		0,0727	0,0721	0,0006	0,0003		0,0703	0,0687	0,0016	0,0008		0,0748	0,0648	0,0100	0,0050
	2005					2006					2007					2008			
Neighbourhood	xi/X	yi/Y	xi/X-yi/Y	D		xi/X	yi/Y	xi/X-yi/Y	D		xi/X	yi/Y	xi/X-yi/Y	D		xi/X	yi/Y	xi/X-yi/Y	D
Centre	0,1766	0,2412	0,0646	0,0323		0,1836	0,2158	0,0323	0,0161		0,1778	0,2035	0,0257	0,0129		0,1653	0,2188	0,0535	0,0267
Centre-Afanos	0,1724	0,1984	0,0261	0,0130		0,1621	0,2230	0,0609	0,0305		0,1686	0,2246	0,0559	0,0280		0,1653	0,1875	0,0222	0,0111
Galaneika	0,2047	0,2257	0,0210	0,0105		0,1959	0,2122	0,0163	0,0081		0,1955	0,2211	0,0256	0,0128		0,2004	0,2281	0,0278	0,0139
Evritanes	0,0250	0,0078	0,0172	0,0086		0,0293	0,0072	0,0221	0,0111		0,0308	0,0035	0,0273	0,0136		0,0357	0,0031	0,0326	0,0163
Nea Magnisia	0,0268	0,0350	0,0082	0,0041		0,0311	0,0468	0,0156	0,0078		0,0311	0,0526	0,0215	0,0108		0,0369	0,0469	0,0100	0,0050
Nea Ampliani	0,2084	0,1712	0,0372	0,0186		0,2047	0,1619	0,0428	0,0214		0,2074	0,1123	0,0951	0,0475		0,2094	0,1281	0,0812	0,0406
Pagkrati	0,1300	0,0895	0,0405	0,0202		0,1346	0,1043	0,0302	0,0151		0,1290	0,1544	0,0254	0,0127		0,1275	0,1406	0,0132	0,0066
Kalivia-Revenia	0,0561	0,0311	0,0250	0,0125		0,0587	0,0288	0,0299	0,0149		0,0598	0,0281	0,0317	0,0159		0,0597	0,0469	0,0128	0,0064
	2009					2010					2011								
Neighbourhood	xi/X	yi/Y	xi/X-yi/Y	D		xi/X	yi/Y	xi/X-yi/Y	D		xi/X	yi/Y	xi/X-yi/Y	D					
Centre	0,1796	0,1463	0,0333	0,0166		0,1736	0,1311	0,0425	0,0212		0,1740	0,1415	0,0326	0,0163					
Centre-Afanos	0,1593	0,2256	0,0663	0,0332		0,1612	0,2322	0,0711	0,0355		0,1631	0,2350	0,0720	0,0360					
Galaneika	0,2027	0,2226	0,0199	0,0099		0,2018	0,2077	0,0059	0,0029		0,2014	0,1847	0,0167	0,0084					
Evritanes	0,0341	0,0030	0,0311	0,0155		0,0332	0,0055	0,0277	0,0139		0,0324	0,0048	0,0276	0,0138					
Nea Magnisia	0,0356	0,0366	0,0010	0,0005		0,0361	0,0301	0,0061	0,0030		0,0413	0,0216	0,0197	0,0099					
Nea Ampliani	0,2066	0,1311	0,0755	0,0377		0,2033	0,1503	0,0530	0,0265		0,1987	0,1751	0,0236	0,0118					
Pagkrati	0,1219	0,1921	0,0702	0,0351		0,1286	0,1940	0,0654	0,0327		0,1250	0,1990	0,0740	0,0370					
Kalivia-Revenia	0,0602	0,0427	0,0175	0,0087		0,0622	0,0492	0,0130	0,0065		0,0642	0,0384	0,0258	0,0129					

	2001			2002			2003			2004		
Neighbourhood	xi/X	xi/ti	IIS	xi/X	xi/ti	IIS	xi/X	xi/ti	IIS	xi/X	xi/ti	IIS
Centre	0,1458	0,0624	0,0091	0,1306	0,0524	0,0069	0,1288	0,0522	0,0067	0,1741	0,0692	0,0121
Centre-Afanos	0,1917	0,0736	0,0141	0,2162	0,0766	0,0166	0,2489	0,0929	0,0231	0,2267	0,0906	0,0205
Galaneika	0,2917	0,0857	0,0250	0,2928	0,0808	0,0237	0,2704	0,0793	0,0215	0,2186	0,0729	0,0159
Evritanes	0,0042	0,0196	0,0001	0,0045	0,0161	0,0001	0,0043	0,0154	0,0001	0,0040	0,0128	0,0001
Nea Magnisia	0,0208	0,0521	0,0011	0,0225	0,0505	0,0011	0,0386	0,0865	0,0033	0,0445	0,1122	0,0050
Nea Ampliani	0,1750	0,0553	0,0097	0,1486	0,0433	0,0064	0,1288	0,0405	0,0052	0,1619	0,0565	0,0091
Pagkrati	0,1125	0,0586	0,0066	0,1126	0,0513	0,0058	0,1116	0,0533	0,0059	0,1053	0,0536	0,0056
Kalivia-Revenia	0,0583	0,0551	0,0032	0,0721	0,0602	0,0043	0,0687	0,0625	0,0043	0,0648	0,0597	0,0039
	2005			2006			2007			2008		
Neighbourhood	xi/X	xi/ti	IIS	xi/X	xi/ti	IIS	xi/X	xi/ti	IIS	xi/X	xi/ti	IIS
Centre	0,2412	0,0967	0,0233	0,2158	0,0900	0,0194	0,2035	0,0905	0,0184	0,2188	0,1127	0,0247
Centre-Afanos	0,1984	0,0828	0,0164	0,2230	0,1037	0,0231	0,2246	0,1037	0,0233	0,1875	0,0982	0,0184
Galaneika	0,2257	0,0796	0,0180	0,2122	0,0835	0,0177	0,2211	0,0895	0,0198	0,2281	0,0985	0,0225
Evritanes	0,0078	0,0238	0,0002	0,0072	0,0202	0,0001	0,0035	0,0098	0,0000	0,0031	0,0083	0,0000
Nea Magnisia	0,0350	0,0928	0,0032	0,0468	0,1121	0,0052	0,0526	0,1282	0,0067	0,0469	0,1087	0,0051
Nea Ampliani	0,1712	0,0605	0,0104	0,1619	0,0623	0,0101	0,1123	0,0449	0,0050	0,1281	0,0555	0,0071
Pagkrati	0,0895	0,0512	0,0046	0,1043	0,0612	0,0064	0,1544	0,0942	0,0145	0,1406	0,0957	0,0135
Kalivia-Revenia	0,0311	0,0417	0,0013	0,0288	0,0396	0,0011	0,0281	0,0392	0,0011	0,0469	0,0701	0,0033
	2009			2010			2011					
Neighbourhood	xi/X	xi/ti	IIS	xi/X	xi/ti	IIS	xi/X	xi/ti	IIS			
Centre	0,1463	0,0741	0,0108	0,1311	0,0757	0,0099	0,1415	0,0915	0,0129			
Centre-Afanos	0,2256	0,1221	0,0275	0,2322	0,1351	0,0314	0,2350	0,1515	0,0356			
Galaneika	0,2226	0,0973	0,0217	0,2077	0,1004	0,0208	0,1847	0,1020	0,0188			
Evritanes	0,0030	0,0087	0,0000	0,0055	0,0175	0,0001	0,0048	0,0180	0,0001			
Nea Magnisia	0,0366	0,0916	0,0034	0,0301	0,0827	0,0025	0,0216	0,0608	0,0013			
Nea Ampliani	0,1311	0,0587	0,0077	0,1503	0,0742	0,0112	0,1751	0,0984	0,0172			
Pagkrati	0,1921	0,1340	0,0257	0,1940	0,1406	0,0273	0,1990	0,1647	0,0328			
Kalivia-Revenia	0,0427	0,0651	0,0028	0,0492	0,0789	0,0039	0,0384	0,0690	0,0026			

	2001			2002			2003			2004		
Neighbourhood	xi/X	ai/A	DEL	xi/X	ai/A	DEL	xi/X	ai/A	DEL	xi/X	ai/A	DEL
Centre	0,1458	0,0926	0,0266	0,1306	0,0926	0,0190	0,1288	0,0926	0,0181	0,1741	0,0926	0,0407
Centre-Afanos	0,1917	0,1357	0,0280	0,2162	0,1357	0,0403	0,2489	0,1357	0,0566	0,2267	0,1357	0,0455
Galaneika	0,2917	0,1494	0,0711	0,2928	0,1494	0,0717	0,2704	0,1494	0,0605	0,2186	0,1494	0,0346
Evritanes	0,0042	0,0258	0,0108	0,0045	0,0258	0,0107	0,0043	0,0258	0,0108	0,0040	0,0258	0,0109
Nea Magnisia	0,0208	0,0436	0,0114	0,0225	0,0436	0,0105	0,0386	0,0436	0,0025	0,0445	0,0436	0,0005
Nea Ampliani	0,1750	0,2488	0,0369	0,1486	0,2488	0,0501	0,1288	0,2488	0,0600	0,1619	0,2488	0,0434
Pagkrati	0,1125	0,1448	0,0162	0,1126	0,1448	0,0161	0,1116	0,1448	0,0166	0,1053	0,1448	0,0198
Kalivia-Revenia	0,0583	0,1593	0,0505	0,0721	0,1593	0,0436	0,0687	0,1593	0,0453	0,0648	0,1593	0,0472
	2005			2006			2007			2008		
Neighbourhood	xi/X	ai/A	DEL	xi/X	ai/A	DEL	xi/X	ai/A	DEL	xi/X	ai/A	DEL
Centre	0,2412	0,0926	0,0743	0,2158	0,0926	0,0616	0,2035	0,0926	0,0555	0,2188	0,0926	0,0631
Centre-Afanos	0,1984	0,1357	0,0314	0,2230	0,1357	0,0437	0,2246	0,1357	0,0444	0,1875	0,1357	0,0259
Galaneika	0,2257	0,1494	0,0381	0,2122	0,1494	0,0314	0,2211	0,1494	0,0358	0,2281	0,1494	0,0393
Evritanes	0,0078	0,0258	0,0090	0,0072	0,0258	0,0093	0,0035	0,0258	0,0112	0,0031	0,0258	0,0114
Nea Magnisia	0,0350	0,0436	0,0043	0,0468	0,0436	0,0016	0,0526	0,0436	0,0045	0,0469	0,0436	0,0016
Nea Ampliani	0,1712	0,2488	0,0388	0,1619	0,2488	0,0434	0,1123	0,2488	0,0682	0,1281	0,2488	0,0603
Pagkrati	0,0895	0,1448	0,0277	0,1043	0,1448	0,0202	0,1544	0,1448	0,0048	0,1406	0,1448	0,0021
Kalivia-Revenia	0,0311	0,1593	0,0641	0,0288	0,1593	0,0652	0,0281	0,1593	0,0656	0,0469	0,1593	0,0562
	2009			2010			2011					
Neighbourhood	xi/X	ai/A	DEL	xi/X	ai/A	DEL	xi/X	ai/A	DEL			
Centre	0,1463	0,0926	0,0269	0,1311	0,0926	0,0193	0,1415	0,0926	0,0244			
Centre-Afanos	0,2256	0,1357	0,0450	0,2322	0,1357	0,0483	0,2350	0,1357	0,0497			
Galaneika	0,2226	0,1494	0,0366	0,2077	0,1494	0,0291	0,1847	0,1494	0,0176			
Evritanes	0,0030	0,0258	0,0114	0,0055	0,0258	0,0102	0,0048	0,0258	0,0105			
Nea Magnisia	0,0366	0,0436	0,0035	0,0301	0,0436	0,0068	0,0216	0,0436	0,0110			
Nea Ampliani	0,1311	0,2488	0,0588	0,1503	0,2488	0,0492	0,1751	0,2488	0,0368			
Pagkrati	0,1921	0,1448	0,0236	0,1940	0,1448	0,0246	0,1990	0,1448	0,0271			
Kalivia-Revenia	0,0427	0,1593	0,0583	0,0492	0,1593	0,0550	0,0384	0,1593	0,0605			

Areas	2001			2002			2003			2004		
	Ptt	Pxx	Pyy	Ptt	Pxx	Pyy	Ptt	Pxx	Pyy	Ptt	Pxx	Pyy
PA-GA	0,001830	0,001806	0,002093	0,001865	0,001843	0,002104	0,001859	0,001849	0,001925	0,001753	0,001771	0,001468
PA-CE	0,005156	0,005220	0,004296	0,005264	0,005363	0,003852	0,005524	0,005657	0,003762	0,006028	0,006117	0,004798
PA-CA	0,004184	0,004185	0,004112	0,004347	0,004316	0,004644	0,004366	0,004279	0,005297	0,004369	0,004332	0,004551
PA-KR	0,002129	0,002172	0,001567	0,002310	0,002334	0,001938	0,002243	0,002272	0,001830	0,002373	0,002432	0,001629
PA-NM	0,000161	0,000165	0,000112	0,000172	0,000175	0,000121	0,000182	0,000180	0,000206	0,000173	0,000168	0,000224
PA-NA	0,007850	0,008006	0,005801	0,008162	0,008396	0,004932	0,008010	0,008304	0,004233	0,007733	0,007955	0,005023
PA-EV	0,000034	0,000036	0,000009	0,000043	0,000045	0,000010	0,000045	0,000048	0,000009	0,000055	0,000059	0,000008
GA-CE	0,008318	0,008178	0,010138	0,007911	0,007809	0,009116	0,008182	0,008147	0,008298	0,008384	0,008334	0,009072
GA-CA	0,005466	0,005309	0,007859	0,005290	0,005089	0,008899	0,005237	0,004990	0,009462	0,004921	0,004779	0,006968
GA-KR	0,000708	0,000702	0,000763	0,000716	0,000701	0,000946	0,000685	0,000675	0,000832	0,000680	0,000683	0,000635
GA-NM	0,000302	0,000300	0,000307	0,000300	0,000297	0,000333	0,000314	0,000301	0,000528	0,000281	0,000266	0,000492
GA-NA	0,002489	0,002465	0,002690	0,002411	0,002402	0,002294	0,002332	0,002350	0,001835	0,002114	0,002130	0,001866
GA-EV	0,000490	0,000504	0,000188	0,000575	0,000589	0,000204	0,000599	0,000620	0,000179	0,000682	0,000719	0,000137
CE-CA	0,009821	0,009784	0,010283	0,009522	0,009443	0,010391	0,009924	0,009736	0,011791	0,010792	0,010522	0,014520
CE-KR	0,001353	0,001374	0,001061	0,001369	0,001382	0,001174	0,001380	0,001399	0,001102	0,001586	0,001599	0,001406
CE-NM	0,000334	0,000340	0,000247	0,000332	0,000339	0,000239	0,000366	0,000361	0,000405	0,000378	0,000360	0,000631
CE-NA	0,006308	0,006408	0,004965	0,006120	0,006288	0,003778	0,006233	0,006468	0,003225	0,006539	0,006615	0,005485
CE-EV	0,000117	0,000124	0,000033	0,000138	0,000146	0,000032	0,000151	0,000161	0,000030	0,000199	0,000211	0,000038
CA-KR	0,000706	0,000708	0,000653	0,000727	0,000715	0,000910	0,000701	0,000680	0,000998	0,000739	0,000728	0,000857
CA-NM	0,000979	0,000986	0,000856	0,000993	0,000987	0,001044	0,001046	0,000989	0,002061	0,000992	0,000923	0,002165
CA-NA	0,012059	0,012104	0,011199	0,011908	0,011923	0,010731	0,011607	0,011528	0,010701	0,011166	0,011037	0,012258
CA-EV	0,000059	0,000061	0,000019	0,000070	0,000072	0,000024	0,000074	0,000075	0,000026	0,000089	0,000092	0,000022
KR-NM	0,000024	0,000025	0,000016	0,000025	0,000026	0,000021	0,000026	0,000025	0,000034	0,000026	0,000025	0,000037
KR-NA	0,001035	0,001060	0,000720	0,001067	0,001087	0,000755	0,001006	0,001032	0,000623	0,001023	0,001045	0,000740
KR-EV	0,000027	0,000029	0,000007	0,000034	0,000035	0,000009	0,000034	0,000036	0,000008	0,000044	0,000047	0,000007
NM-NA	0,000753	0,000773	0,000495	0,000764	0,000787	0,000454	0,000786	0,000787	0,000675	0,000720	0,000695	0,000979
NM-EV	0,000003	0,000003	0,000001	0,000004	0,000004	0,000001	0,000004	0,000004	0,000001	0,000005	0,000005	0,000001
NA-EV	0,000031	0,000033	0,000008	0,000037	0,000040	0,000007	0,000038	0,000041	0,000006	0,000045	0,000048	0,000007
SUM	0,072725	0,072861	0,070496	0,072477	0,072632	0,068962	0,072954	0,072995	0,070083	0,073888	0,073696	0,076024
SP Index			0,9997			0,9991			0,9980			0,9996

Areas	2005			2006			2007			2008		
	Ptt	Pxx	Pyy	Ptt	Pxx	Pyy	Ptt	Pxx	Pyy	Ptt	Pxx	Pyy
PA-GA	0,001671	0,001706	0,001289	0,001664	0,001682	0,001412	0,001651	0,001609	0,002177	0,001664	0,001630	0,002047
PA-CE	0,006031	0,006042	0,005653	0,006441	0,006467	0,005895	0,006171	0,006006	0,008227	0,005724	0,005516	0,008055
PA-CA	0,004221	0,004294	0,003387	0,004206	0,004159	0,004437	0,004326	0,004149	0,006612	0,004102	0,004018	0,005028
PA-KR	0,001648	0,001751	0,000665	0,001779	0,001885	0,000717	0,001791	0,001842	0,001035	0,001799	0,001817	0,001574
PA-NM	0,000166	0,000167	0,000150	0,000204	0,000200	0,000233	0,000205	0,000192	0,000388	0,000232	0,000225	0,000315
PA-NA	0,007697	0,008020	0,004514	0,007846	0,008117	0,004975	0,007713	0,007882	0,005107	0,007665	0,007863	0,005309
PA-EV	0,000057	0,000062	0,000013	0,000069	0,000075	0,000014	0,000071	0,000076	0,000010	0,000080	0,000086	0,000008
GA-CE	0,008913	0,008602	0,012977	0,008746	0,008573	0,010918	0,008468	0,008284	0,010723	0,008215	0,007893	0,011894
GA-CA	0,005052	0,004951	0,006296	0,004624	0,004465	0,006654	0,004807	0,004635	0,006978	0,004767	0,004655	0,006013
GA-KR	0,000502	0,000514	0,000315	0,000498	0,000515	0,000274	0,000507	0,000524	0,000278	0,000532	0,000536	0,000479
GA-NM	0,000286	0,000277	0,000399	0,000323	0,000308	0,000502	0,000328	0,000307	0,000588	0,000387	0,000374	0,000540
GA-NA	0,002235	0,002244	0,002037	0,002093	0,002114	0,001811	0,002080	0,002137	0,001308	0,002162	0,002211	0,001541
GA-EV	0,000757	0,000789	0,000271	0,000841	0,000888	0,000236	0,000873	0,000930	0,000120	0,001028	0,001104	0,000110
CE-CA	0,011624	0,011179	0,017612	0,011417	0,010944	0,017708	0,011454	0,011031	0,016812	0,010454	0,010048	0,015089
CE-KR	0,001228	0,001234	0,000936	0,001307	0,001343	0,000774	0,001284	0,001325	0,000712	0,001241	0,001230	0,001278
CE-NM	0,000405	0,000385	0,000687	0,000490	0,000465	0,000821	0,000480	0,000450	0,000871	0,000522	0,000496	0,000834
CE-NA	0,007256	0,007147	0,008036	0,007290	0,007311	0,006797	0,006991	0,007174	0,004446	0,006687	0,006732	0,005453
CE-EV	0,000232	0,000238	0,000101	0,000277	0,000290	0,000084	0,000277	0,000295	0,000038	0,000301	0,000318	0,000037
CA-KR	0,000552	0,000564	0,000361	0,000549	0,000555	0,000375	0,000578	0,000588	0,000368	0,000572	0,000576	0,000513
CA-NM	0,001025	0,000990	0,001490	0,001157	0,001082	0,002236	0,001218	0,001125	0,002534	0,001354	0,001307	0,001884
CA-NA	0,011965	0,011968	0,011343	0,011216	0,011078	0,012053	0,011547	0,011677	0,008418	0,011291	0,011552	0,008021
CA-EV	0,000100	0,000104	0,000037	0,000111	0,000115	0,000039	0,000120	0,000126	0,000019	0,000133	0,000143	0,000014
KR-NM	0,000019	0,000019	0,000014	0,000024	0,000024	0,000017	0,000024	0,000024	0,000019	0,000029	0,000028	0,000028
KR-NA	0,000788	0,000823	0,000376	0,000800	0,000847	0,000328	0,000806	0,000874	0,000222	0,000835	0,000881	0,000423
KR-EV	0,000035	0,000038	0,000007	0,000043	0,000047	0,000006	0,000045	0,000051	0,000003	0,000053	0,000058	0,000004
NM-NA	0,000766	0,000758	0,000814	0,000885	0,000866	0,001027	0,000890	0,000876	0,000802	0,001037	0,001048	0,000815
NM-EV	0,000005	0,000005	0,000002	0,000007	0,000007	0,000003	0,000007	0,000007	0,000001	0,000010	0,000010	0,000001
NA-EV	0,000052	0,000055	0,000014	0,000059	0,000063	0,000012	0,000060	0,000068	0,000004	0,000070	0,000079	0,000004
SUM	0,075288	0,074929	0,079796	0,074965	0,074486	0,080357	0,074775	0,074262	0,078822	0,072945	0,072434	0,077314
SP Index			1,0008			0,9997			0,9980			0,9989

Areas	2009			2010			2011		
	Ptt	Pxx	Pyy	Ptt	Pxx	Pyy	Ptt	Pxx	Pyy
PA-GA	0,001672	0,001576	0,002727	0,001743	0,001655	0,002570	0,001695	0,001606	0,002345
PA-CE	0,005927	0,005732	0,007360	0,005990	0,005846	0,006662	0,005945	0,005698	0,007374
PA-CA	0,004037	0,003702	0,008264	0,004329	0,003953	0,008592	0,004343	0,003888	0,008921
PA-KR	0,001794	0,001751	0,001958	0,001965	0,001911	0,002279	0,001950	0,001916	0,001824
PA-NM	0,000218	0,000207	0,000335	0,000229	0,000222	0,000278	0,000249	0,000246	0,000205
PA-NA	0,007545	0,007417	0,007419	0,007878	0,007701	0,008589	0,007695	0,007320	0,010266
PA-EV	0,000076	0,000079	0,000011	0,000078	0,000081	0,000020	0,000074	0,000077	0,000018
GA-CE	0,008610	0,008679	0,007763	0,008174	0,008351	0,006491	0,008106	0,008353	0,006227
GA-CA	0,004749	0,004539	0,007059	0,004783	0,004572	0,006779	0,004796	0,004616	0,006100
GA-KR	0,000537	0,000547	0,000426	0,000553	0,000563	0,000458	0,000548	0,000579	0,000318
GA-NM	0,000369	0,000365	0,000412	0,000364	0,000369	0,000315	0,000394	0,000420	0,000201
GA-NA	0,002154	0,002207	0,001538	0,002113	0,002162	0,001645	0,002062	0,002109	0,001704
GA-EV	0,000990	0,001068	0,000105	0,000952	0,001034	0,000175	0,000904	0,001007	0,000137
CE-CA	0,010737	0,010526	0,012146	0,010483	0,010296	0,011205	0,010722	0,010440	0,012232
CE-KR	0,001291	0,001348	0,000779	0,001288	0,001347	0,000804	0,001303	0,001392	0,000677
CE-NM	0,000513	0,000521	0,000436	0,000490	0,000511	0,000321	0,000542	0,000584	0,000248
CE-NA	0,006869	0,007221	0,003733	0,006531	0,006866	0,003834	0,006503	0,006728	0,004819
CE-EV	0,000298	0,000330	0,000024	0,000278	0,000310	0,000039	0,000269	0,000304	0,000037
CA-KR	0,000565	0,000559	0,000562	0,000598	0,000585	0,000667	0,000612	0,000611	0,000526
CA-NM	0,001265	0,001217	0,001770	0,001281	0,001249	0,001496	0,001434	0,001443	0,001087
CA-NA	0,011023	0,010986	0,009875	0,011119	0,010938	0,011652	0,011194	0,010817	0,013736
CA-EV	0,000125	0,000131	0,000017	0,000124	0,000129	0,000031	0,000121	0,000128	0,000027
KR-NM	0,000027	0,000028	0,000020	0,000028	0,000029	0,000019	0,000031	0,000034	0,000011
KR-NA	0,000826	0,000877	0,000395	0,000851	0,000892	0,000521	0,000848	0,000899	0,000474
KR-EV	0,000050	0,000056	0,000004	0,000051	0,000057	0,000007	0,000049	0,000057	0,000005
NM-NA	0,000969	0,000999	0,000651	0,000956	0,000997	0,000613	0,001041	0,001113	0,000513
NM-EV	0,000009	0,000010	0,000001	0,000008	0,000009	0,000001	0,000009	0,000010	0,000001
NA-EV	0,000066	0,000075	0,000004	0,000064	0,000071	0,000009	0,000061	0,000068	0,000009
SUM	0,073312	0,072752	0,075791	0,073301	0,072708	0,076072	0,073502	0,072463	0,080043
SP Index			0,9961			0,9964			0,9972