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Dissertation

The Immigrant Residential location in medium-sized Greek cities: the
Case of Larisa

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Abstract

The phenomenon of immigration has significant consequences in the countries, provoking the interest of the literature and raising the number of studies exploring all the effects of immigrants, including their spatial implications. The purpose of this particular study is to explore the residential patterns of immigrants in a medium-sized city, the city of Larissa, and try to justify them. In order to achieve this, the analysis concerns the calculation of six measures of segregation, so the attitude of the five dimensions of residential segregation (evenness, exposure, concentration, centralization and clustering) is examined. The data used for the calculations are from the number of both natives and immigrants of the 39 Primary schools of Larissa located in the urban area. The main findings of this analysis is that there is a cluster of a specific minority group, which are not considered as immigrants, and after their installation there, they have become the majority population of this area. Apart from the existence of this cluster, immigrants can be found in almost all areas of Larissa, with special preferences on city-centre locations.

Keywords: Immigration, Residential Segregation, Spatial preferences, Measures of Segregation, Larissa

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Introduction

It is commonly accepted that international migration is a prominent feature of globalization and one of the defining issues of this century. As a matter of fact, migration can affect both sending and receiving societies on economic, social, demographic, cultural, security and environmental matters. For this reason, many researchers in their studies have wanted to explore these consequences involving also the spatial changes caused by the arrival of immigrants.

Firstly, most studies about immigration discuss the social, economic and spatial implications for the country as a whole rather than specifically for the cities. Secondly, although a few studies have explored the issue in the metropolitan areas of Athens and Thessaloniki, much less work has been done for the other major cities of Greece. Therefore the main question which this research will attempt to answer is how the immigrants are located in the city of Larissa and try to find some reasons for their residential preferences.

In the first chapter, there is a description of migration in Greece and of the residential segregation. In the second chapter, there is a description on how the residential patterns are shaped in the two largest cities of Greece, Athens and Thessaloniki. In the third chapter, some empirical evidence related to migration and residential segregation in United States of America, Germany, Italy, New Zealand, Britain and Spain are presented. In Chapter 4, the methodology is analysed and in Chapter 5 the calculated values of the measures are presented and analyzed in order to correlate the final observations.

As a conclusion, this thesis will hopefully become an instrument of policy making that will be able to predict the behavior that governs the residential segregation of immigrants in smaller cities where the native population must live in harmony with them. If decision makers were able to know where these populations reside and the reasons behind those choices, they could afterwards plan and implement certain policies that would benefit both the immigrants and the natives, even resulting in a possible economic growth of their cities.

Chapter 1. Migration

1.1 History of Migration in Greece

Until the 1980's, Greece was an emigration country. The most recent outflows took place after the Second World War, due to economic and political reasons. The main countries that the Greek immigrants preferred were the United States, Canada, Australia, and the industrialized countries of Northern and Western Europe. From 1952 to 1984, Greeks emigrated under the auspices of the International Committee for European Migration (ICEM), later known as IOM, to Australia, South Africa, the United States, and Canada, while from 1955-1973, Germany received approximately 600,000 Greek immigrants; Australia, 170,000, the United States, 124,000; and Canada, 80,000.

Because of the oil crisis of 1973 and the following restrictive immigration policies which were adopted by the receiving countries, not only the population who could emigrate decreased, but also the flow of immigration reversed towards Greece. Another significant reason why the reverse migration begun in the 1980s was the fall of the junta, the restoration of democracy in Greece in 1974, the improvement of the economic aspects and, finally, the accession of Greece to the European Economic Community (EEC) in 1982.

After the 1980s, Greece started to accept immigrants. Although the main continents from where immigrants originated were Africa and Asia, there were not any large inflows, even though these immigrants were mostly illegal. But, in the 1990s, just after the collapse of the communist regimes, a great number of immigrants from Central and Eastern Europe started to flow to Greece. Specifically, the first wave of immigrants originated from Poland, Bulgaria, and Romania with large numbers of Albanians following soon. The amount of immigrants Greece received during this decade was the highest in proportion to its labour force in the European Union (EU). The most important factors why the country attracted a large amount of immigrants was its geographical location, a semi-developed level of economy with a large portion of it being black, and the possibility of working in seasonal industries like tourism, construction, and agriculture (Chindea A. et al, 2008; Kasimis C. and Kassimi, C., 2004).

In the last 15 years, the number of immigrants quadrupled, making Greece the country with the highest proportional increase in immigration in the EU over that time (Chindea A. et al, 2008).

Indicatively, as the census of 2001 indicated, while the total population was under eleven million, the non-Greek citizens were 762.191, of which 483.036 were Albanians (57,4 % of the total foreign population), 35104 were Bulgarians (4,6 % of the total foreign population). The third nationality with the highest percentage was Georgians with 3 % (Cavounidis J., 2004). Five years later, statistics from Eurostat indicate that about 884,000 immigrants were present in the country. Currently, the main countries of origin are Albania, Bulgaria, Ukraine, Romania, and Georgia, with Albania constituting a large proportion (62%) of immigrants. Majority of immigrants come to Greece for work and are mainly employed in construction, domestic care, and manufacturing. Of the migrant population covered by the census, 45 per cent were women. However, there were considerable differences within specific nationalities, with men accounting for 93 per cent of the Indians, 79 per cent of the Syrians, and 76 per cent of the Egyptian men, and women making up 76 per cent of the Filipinos, 75 per cent of the Ukrainians, and 70 per cent of the Moldovans (Chindea A. et al ,2008).

In 2007, Greece was the 5th country in the global class of countries, following USA, Sweden, France and England. In 2008, according to data published by the Ministry of Interior, there was a significant increase of immigrants entering Greece: the increase amounts to 75,4 % in relation to 2007 and the newcomers amounted to 150.000 (Antoniou T. et al, 2009).

Greece remains a country which receives a large amount of immigrants, mainly from Romania, Bulgaria, Ukraine and Albania.

1.2 Residential Segregation

An important issue connected to migration is residential segregation, the degree to which some groups, especially minority groups, are segregated or in other words, how different groups are separated in an urban environment (Feitosa et al, 2006). The significance of this issue emerges strong after its consequences on different sectors of countries and cities attracting the attention of many researchers and the development of indices measuring it intensively (Johnston R. et al, 2009). Thus, residential segregation, because of its consequences, should not be used solely as a percentage of the racial and ethnic populations across an urban area, but also as

the possibility of development and improvement of the areas, where these groups reside, through their different social characteristics like religion, family structure, language (White M. and Kim A., 2005).

In order to explain the reasons why immigrants prefer some areas to locate and how their integration and, even assimilation, is achieved, three basic explanatory models have been developed: the spatial assimilation model, the ethnic disadvantage or spatial stratification model and the segmented assimilation (Arvanitidis P. and Skouras, 2008; Bean F.D and Stevens G., 2003; Iceland J. and Scopiliti M., 2008).

The first model implies that the options of immigrants where to locate are motivated by cultural and economic reasons. Cultural reasons are due to the existence of co-ethnics in the area. Moreover, when the immigrants arrive in a place, they prefer to locate in areas where co-ethnics also reside, because they feel more secure, comfortable and free to live and move. In addition, many of the immigrants are not attracted to the idea of living in the same area, where the majority of another group resides. As far as economic reasons are concerned, settling in an area, where co-ethnics reside, offers them the opportunity to take advantage of the social networks and find more easily work. After a period of time, when immigrants manage to achieve certain gains from their settlement there, such as increases in income, and they have a satisfied level of communication, they begun to assimilate with the natives leading to the dispersion of immigrant and minority-group members and desegregation over time (Alba R. and Nee V. ,2003; Iceland J. and Scopiliti M., 2008).

The second model supports that the development of communication and knowledge of the country or city does not mean that its result will be the increasing assimilation. There is always the fear of natives for the newcomers and, especially the foreigners, resulting in categorizing them even for a large period of time as 'strangers'. The phenomenon of prejudice and discrimination by the dominant group hamper the majority groups to come closer to the immigrants. For these reasons, immigrants decide to remain in the same area, although they could move to other better areas. So, it can be said that, according to that model, the discrimination plays an important role in shaping the residential patterns of immigrants (Iceland J. and Scopiliti M., 2008). It was observed that white people were trying to avoid neighbourhoods with more than a few Black residents, both by exiting and by not moving into neighbourhoods with more than a few Blacks (Quillian L., 2002)

Thirdly, the segmented assimilation model focuses on divergent patterns of incorporation among contemporary immigrants. Individual level factors as education, career aspiration, place of birth, age at the time of arrival and structural-level factors affect the incorporation process, and there is an important interaction between the two levels. The host society can offer uneven possibilities to different immigrant groups, and segmented assimilation theory supports that recent immigrants are being absorbed by different segments of society (Iceland J. and Scopillity M., 2008).

Chapter 2. Immigration and segregation of the Greek Metropolitan Areas

It is evident that Athens and Thessaloniki constitute the principals destinations of immigrants. According the census of 2001, the number of immigrants residing in Athens was 132.000 (17 % of total population), while the number of immigrants in Thessaloniki was 27.000 (7 % of total population) (Baldwin-Edwards M. et al, 2004).

2.1 Immigration and Segregation in Athens

Athens, as the capital of Greece, attracts a large percentage of immigrants. By calculating the location quotient in respect to total active population 2001, the residential location of the economically active immigrants in municipalities of Attica indicates that there is a significant spatial variation within Attica. Specifically, there is uneven distribution of the total active immigrants population within the municipalities of the centre (Kandylis G. et al, 2008). Nevertheless, immigrants seem to be unevenly distributed across space and the pattern of Athens does not indicate an intense ethnic segregation (Arapoglou V., 2006).

The studies related to metropolitan areas concluded that while high concentrations are shown in the metropolitan city of Athens and its immediate neighbouring municipalities, low concentrations appear on a first inner suburban circle, and then high concentrations appear again on peri-urban areas. This pattern is more clearly evident for Albanians, who comprise the majority of the immigrant population (Arapoglou V., 2006)

According to a survey of Public Issue for the year 2009, the centre of Athens, western districts and Thriasio Pedio are the areas of Attica, where the biggest concentration of immigrants is presented. In capital, the area ‘down the Omonoia’

bears the palm, while high concentrations are observed in 'Eksarxeia'. In these areas, immigrants as permanent residents exceed 10% of all the residents and, in certain cases, they exceed 30% of total residency. For 2010, the survey of Public Issue, showed that although the economic crisis and especially the crisis in the sector of construction (where the economic immigrants are mainly occupied), many of them left, the general pattern does not appear to have changed radically (Public Issue, 2010).

2.1 Immigration and Segregation in Thessaloniki

For Thessaloniki, the second largest Greek city, it is reasonable to expect it to attract large numbers of migrants. The main nationalities, which Thessaloniki attracts, are Albanians and Bulgarians. Albanian immigrants appear to be spatially dispersed all over the city, though more than half (60,2 percent) are in the central part (municipality), mostly in areas just outside the city centre, and neighbourhoods to its north and east, while the percentage of Bulgarians in the municipality is lower (38,5 percent). The largest percentages of Albanians and Bulgarians are observed in North-Western districts, mainly motivated by the cheap rents. In addition to, no "enclaves" or Albanian neighbourhoods have been generated in Thessaloniki (Hatziprokopiou P., 2005; Kokkali I.E., 2005).

So the general pattern is that the inner-city remains popular for diverse classes of population and immigrants. The main reason of the inner-city preference is the price of rent, which means bad-quality and old housing. Moreover, the presence of immigrants in 'good' areas (South-East) indicates the existence of social networks (Hatziprokopiou P., 2005; Hatziprokopiou P., 2006; Arvanitidis P. and Skouras D., 2008,)

Chapter 3. Experience of Immigration and Segregation in other Countries

3.1 Immigration and Segregation in Italy

Rome is considered to be an immigrant city, attracting north-bound migration flows from southern Italy. In 2003, it was estimated that about 10% of all the foreign residents in Italy lived in Rome (Mudu P., 2006). The presence of foreigners in Rome is more visible due to their high concentrations in some areas of the city-centre. This concentration of ethnic minorities does not seem to generate tensions as seen in other

capital cities, but the types of labour in which migrants engage has an impact on the settlement pattern of some neighbourhoods (Cristaldi F., 2002). As it seems, the spatial distribution of immigrants within the city has been strongly influenced by factors such as family ties and common ethnic origins, the local labour and housing markets, the attitudes of residents, and support offered by government and religious bodies (Mudu P., 2006).

3.2 Immigration and Segregation in Germany

A research of Johannes Michael Nebe(1988) indicated that regional concentrations of immigrants were observed in southern metropolitan areas (Stuttgart and Munich), the Rhine-Main area (Frankfurt and Offenbach) and the metropolitan area from Duisburg to Cologne in the western part of the country (Nebe J. M., 1988)

According to a recent analysis of European Foundation for the Improvement of Living and Working Conditions (2009) for the city of Stuttgart (one of the strongest industrial regions in Germany), the non-German population is spread across Stuttgart's entire urban area. The specific districts, where foreigners reside, are Zuffenhausen and Feuerbach in the north and Bad Cannstatt in the northeast, Wangen and Untertürkheim in the eastern part of the city and the central districts of Mitte, Nord, Süd and Ost. Looking at segregation at scale of districts, the non-German population lives more often in areas with a higher density of social welfare recipients, but that the foreign nationals do not necessarily receive social benefits themselves. This might be because the local economy in these areas acts as a stabilising element by offering formal and informal employment opportunities for low-qualified people. Looking, though, at segregation at a scale of city blocks, another pattern is shaped. In city blocks of Zuffenhausen and Feuerbach (north) and Bad Cannstatt (northeast), and also in other parts of the city, foreign population is sometimes even higher than 50 % of the total. In general, there is not concentration of a single ethnic group in Stuttgart, but there is a concentration of migrants in general. All of the foreign nationalities are similarly distributed throughout the city quarters.

The development of integration policy interventions is the main reason of the socio-spatial concentration of social and ethnic population groups in certain areas. Another reason is that German families with higher income left particular areas for better housing within Stuttgart or in the suburbs, motivated by the lack of affordable real estate in Stuttgart and by the fear that their children will come in contact mainly

in school with a high proportion of foreigners (European Foundation for the Improvement of Living and Working Conditions, 2009).

3.3 Immigration and Segregation in United States of America

Immigration has become a phenomenon of critical importance for American Society, because levels of immigration are high (Bean F. and Stevens G., 2003). Residential segregation is connected to immigration, having important social implications. In the case of urban ghettos, where segregation is extreme, because of the poverty, adverse neighbourhood spillovers and isolation from mainstream society, individuals may confront difficulties in their daily life. So, the interventions of policy makers must be made (Bayer P. et al, 2001).

In an analysis of John Iceland (2004), he examined the racial and ethnic residential segregation in the United States over the 1980–2000 period. The results showed that multi-group segregation, White segregation and Black segregation declined; Hispanic segregation change a little; Asian and Pacific Islander segregation increased. He also examined the relation between increasing diversity and segregation. Increasing diversity has as a result of increasing segregation for White, Hispanic and Asian, while increasing diversity was associated with declining segregation among African Americans (Iceland J., 2004). In addition, during the period 1990-2000, the calculation of dissimilarity by race and Hispanic origin indicated, in general, that levels of segregation are much higher for black immigrants than for Asian, Hispanic and White immigrants (Iceland J. and Scopiliti M., 2008).

As far as California is concerned, the city of Los Angeles is characterised by a very diverse overall population, but also by a high degree of neighbourhood segregation. The phenomenon of a high degree of segregation in Latino majority neighbourhoods is more intense than elsewhere in the state. As far as the number of African American majority segregated neighbourhoods, it is observed that they have declined not only in the state, but also in Los Angeles, yet substantial African American segregation still exists in Los Angeles County. In fact, in 2000, all of the segregated neighbourhoods with an African American majority in California were in Los Angeles County. The fact that Newport Beach still ranks as one of the most segregated cities in California, and that wealthy primarily white neighbourhoods remain among the most segregated areas in the state, shows that the not-existence of

diversity in these neighbourhoods are due to existing economic and social forces (Sandoval J. et al, 2002).

However, the residential patterns of these neighbourhoods indicate that the increases in residential mixing is a phenomenon which started in earlier decades, as a result of civil rights initiatives and changing attitudes, continued in California in the 1990s. Moreover, the analysis of forthcoming economic data will be helpful in elucidating the role that economic considerations play in the maintenance of segregation in these areas (Sandoval J. et al, 2002).

The comparison of the residential patterns of minority population of the three largest cities of Canada (Toronto, Montreal and Vancouver) indicated that visible minorities in these three cities are not ghettoised, and even the most concentrated groups are not isolated among each other (Bauder H. and Sharpe B., 2002).

3.4 Immigration and Segregation in New Zealand

The survey conducted by Grbic, Ishizawa and Crothers (2010) examined the patterns of residential segregation, calculating the indices of dissimilarity and exposure, for the three ethnic minority groups, Asian, Maori, and Pacific people, from the majority European ethnic group for the period 1991-2006. The results indicated that, in the central Auckland region, the highest levels of segregation from Europeans among the three ethnic groups were that of Pacific people. In addition to, Asians and Maori experienced lower levels of segregation over time. Moreover, the level of segregation decreased only slightly for Maori and Pacific people, but has gradually increased for the Asian population. The gradual increase of the national average dissimilarity score and decrease of the national average exposure score for the Asian population were especially attributable to an increase in the levels of segregation in the more populated territorial authorities, such as Auckland city (Grbic D. et al, 2010)

3.5 Immigration and Segregation in Britain

A study published by the Royal Geographical Society indicated that ethnic 'enclaves' are growing in the UK's cities. Particularly, in major cities, groups are isolated by ethnicity and it is observed that nationalities with the highest separation are Pakistani and Bangladeshi (Casciani D., 2005)

The degree of ethnic group social integration is a major issue in Britain. Burgess and Wilson, in their paper, make a try to examine the patterns of ethnic

segregation in English schools in 2001, by using the indices of dissimilarity and isolation. Their main findings were that the levels of ethnic segregation in England's schools are high. Specially, it is showed that segregation is higher for pupils of Indian, Pakistani or Bangladeshi origin than for pupils with black Caribbean or African heritage. Moreover, it was observed that the relation of segregation for Indian, Pakistani or Bangladeshi to their proportion in the local population was positive; something did not happen for the Black group (Burgess S. and Wilson D., 2004).

3.6 Migration and Segregation in Spain

According to the analysis of Martori et al (2005), the comparison of the percentage of immigrants between the municipalities in the metropolitan area of Barcelona showed that the highest values were found in Barcelona centre and in some municipalities in the northern and southern coast like Pineda, Sitges. Examining Barcelona municipality, the central part of the town was the only one characterized by the highest percentages of immigrants (31% to 81%). So, the central part of the town can be defined as a multi ethnic neighbourhood. The analysis of the four dimensions of segregation in Barcelona municipality and its region showed that the most segregated groups were Pakistanis and Philippines with relative high level of segregation. At the same time, these groups exhibit the highest values for Moran's I (Martori J. et al, 2005).

Chapter 4. Methodology

Residential segregation is considered to be a complex meaning, because social groups can be segregated in many ways and , for this reason, its description should be made by its five dimensions: evenness, exposure, concentration, centralization and clustering. So, in this study, each dimension is analyzed by the calculation of six indices of segregation according the formulas, which Massey and Denton introduced in their article (Massey D. and Denton N., 1988).

These indices were calculated for the 23 neighborhoods of Larissa and for the last decade. Granted that the most recent data which I could use for these calculations was the official statistics of the 2001 census, I preferred to use the number of the immigrants and natives from the 39 Primary Schools of the urban area of Larissa. In addition, because these data were not available in the Directorate of Primary

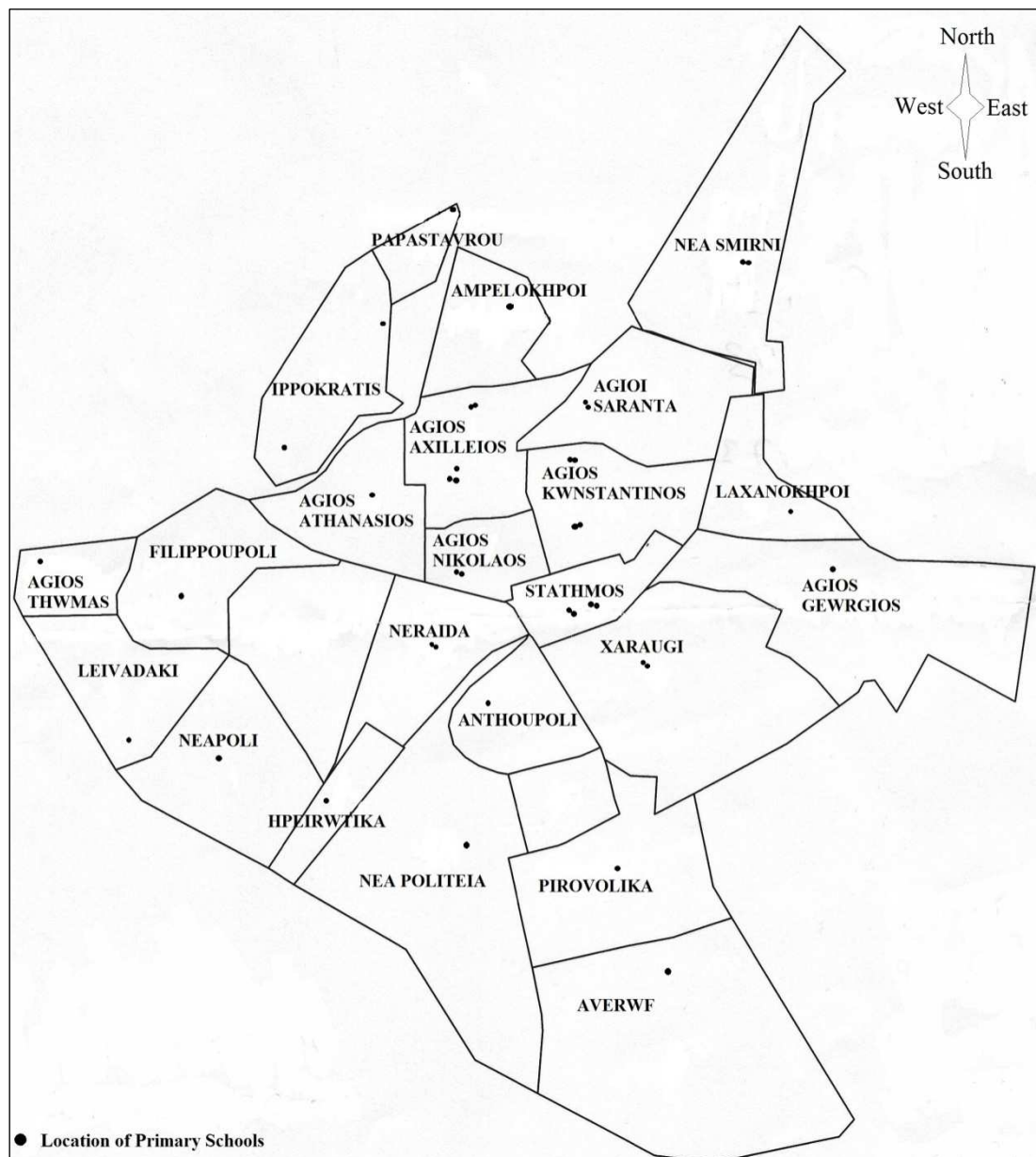
Education of Thessaly, they were collected by interviewing the Directors of Primary Schools.

The basic steps followed are presented:

1. Collection of data of the 39 Primary Schools of the urban area of Larissa
2. The number of immigrants and natives for each neighbourhood was estimated according to the location of each Primary School.
3. The six indices of segregation, presented below, were calculated for each neighbourhood and for the last decade.

A map of the 23 neighbourhoods of Larissa and the location of the 39 Primary Schools is presented in the Map 4.1. As far as the neighbourhoods is concerned, it should be mentioned that Agios Achilleios is the centre of the city, where five Primary Schools are located, because of the high density of population. Agios Nikolaos, Agios Konstantinos and Stathmos are also areas close to the centre, where the number of Primary Schools is more than one. Filippoupoli, Leivadaki, Hpeirwtika, Nea Politeia are the Southern areas, which are under growth. Ampelokhpoi, Ippokratis, Papastavrou and Nea Smyrni are the Northern areas, which are considered to be degraded. Especially, although Nea Smyrni is resided by a large amount of Romas, the number of Romas is included in the number of immigrants of the two schools located there.

Map 4.1 The 23 neighborhoods of Larissa and the location of 39 Primary Schools



4.1 Evenness

The first dimension of residential segregation is evenness. It concerns the differential distribution of population groups among the units in a city. In my analysis, the distribution of immigrants among the 23 neighbourhoods of Larissa is studied. Immigrants are said to be segregated if they are unevenly distributed over the 23 neighbourhoods.

In this analysis, the Index of Dissimilarity is employed in order to explore the dimension of evenness. The Dissimilarity Index varies between 0 (there is no residential segregation) and 1 (there is complete residential segregation). It represents the number of immigrants, who would have to change their area of residence to achieve an even distribution in all 23 neighbourhoods.

The formula used is:

$$D = \frac{\sum_{i=1}^{23} \left| \frac{\text{total population of neighborhood } i}{\text{total population of city}} - \frac{\text{immigrants of neighborhood } i}{\text{immigrants of city}} \right|}{2}$$

¹ ABS = Absolute value of number: measures its distance to the origin on the real number line.

4.2 Exposure

The second dimension of segregation is exposure, which indicates the degree of possible contact or interaction between the immigrants and natives within the 23 neighbourhoods of Larissa.

The indice used is that of Isolation Index, which measures the extent to which immigrants are exposed only to one other, rather than to natives.

Its formula is:

$$I_x = \sum_{i=1}^{23} \frac{\text{immigrants of neighborhood } i}{\text{immigrants of city}} * \frac{\text{immigrants of neighborhood } i}{\text{total population of neighborhood } i}$$

It varies between 0 (there is no residential segregation) and 1 (there is complete residential segregation) and it indicates the probability that an immigrant encounters another immigrant in random.

4.3 Concentration

The third dimension of segregation is concentration. It refers to the relative amount space occupied by immigrants in the urban environment. If immigrants occupy a small share of the total area of a city, they are said to be residentially concentrated.

The indice used to describe the dimension of concentration is Delta. It computes the proportion of immigrants residing in neighborhoods with above average density of immigrants.

Its formula is:

$$\Delta = \frac{1}{2} * \frac{\text{immigrants of neighborhood } i}{\text{immigrants of city}} * \frac{\text{land area of neighborhood } i}{\text{total land area of city}}$$

It is interpreted as the number of immigrants that would have to change neighbourhood to achieve a uniform density of immigrants over all units.

4.4 Centralization

The fourth dimension of segregation is centralization and it concerns the degree to which immigrants are spatially located near the centre of urban area.

Two indices of segregation are employed in order to describe the dimension of centralization: the Pcc and the Absolute Centralization Index.

Using the formula of $P_{cc} = X_{cc} / X$, the ratio $P_{cc\ 1}$ =immigrants living in neighbourhood i/immigrants of the city, the ratio $P_{cc\ 2}$ =natives living in neighbourhood i/natives of the city, and the ratio $P_{cc\ 3}$ =immigrants of the city centre (Ag. Achilleios) / immigrants of city.

The second indice calculated is ACE, which measures the immigrant's spatial distribution compares to the distribution of land area around the city centre. In addition, this index gives the proportion of immigrants required to change area of residence to achieve a uniform distribution of population around the central business district (Agios Achilleios).

Its formula is:

$$ACE = (\sum^{23} X_{i-1} * A_i) - (\sum^{23} X_i * A_{i-1})$$

where X_i is the cumulative proportion of immigrants in neighbourhood i

A_i is the cumulative proportion of land area through neighbourhood i.

Moreover, the neighbourhoods are ordered by increasing distance from the central business district (Agios Achilleios).

ACE varies between -1 and 1. Positive values indicate a tendency for immigrants to reside close to city centre (Agios Achilleios), while negative values indicate a tendency to live in outlying areas. A score of 0 indicates that immigrants have a uniform distribution throughout the city.

4.5 Clustering

The last dimension of residential segregation is the extent to which the neighbourhoods inhabited by immigrants adjoin one another, or cluster, in space. Clustering is the only dimension, which refers to the distribution of immigrants and natives among the neighbourhoods with respect to each other, while the previous four dimensions concern the distribution of immigrants and natives among the neighbourhoods, or the distribution of immigrants relative to central area. A high degree of clustering indicates a residential pattern, where immigrant's districts are continuous in such a way that they create a large ethnic or racial enclave. In the opposite, a low level of clustering implies that immigrants' districts are widely scattered around the urban environment.

The index used to measure the clustering is Proximity between the groups of immigrants (P_{xx}), which indicates the average proximity between immigrants.

Its formula is: $P_{xx} = \frac{\sum_{i=1}^n \sum_{j=1}^n x_i x_j c_{ij}}{X^2}$

where x_i is the immigrants of one neighbourhood

x_j is immigrants of the next neighbourhood

c_{ij} the distance between the areas i and j

X^2 is the sum of immigrants of city.

Chapter 5. Evaluation on Immigrants' Residential Patterns in

Larissa

To begin with, the sum of students and the percentages of immigrants in the last decade are presented in the Table 5.1. A steady increase of immigrants is observed, while the total number of students is characterized by some fluctuations.

Table 5.1: Students and Immigrants from 2000-2001 to 2009-2010

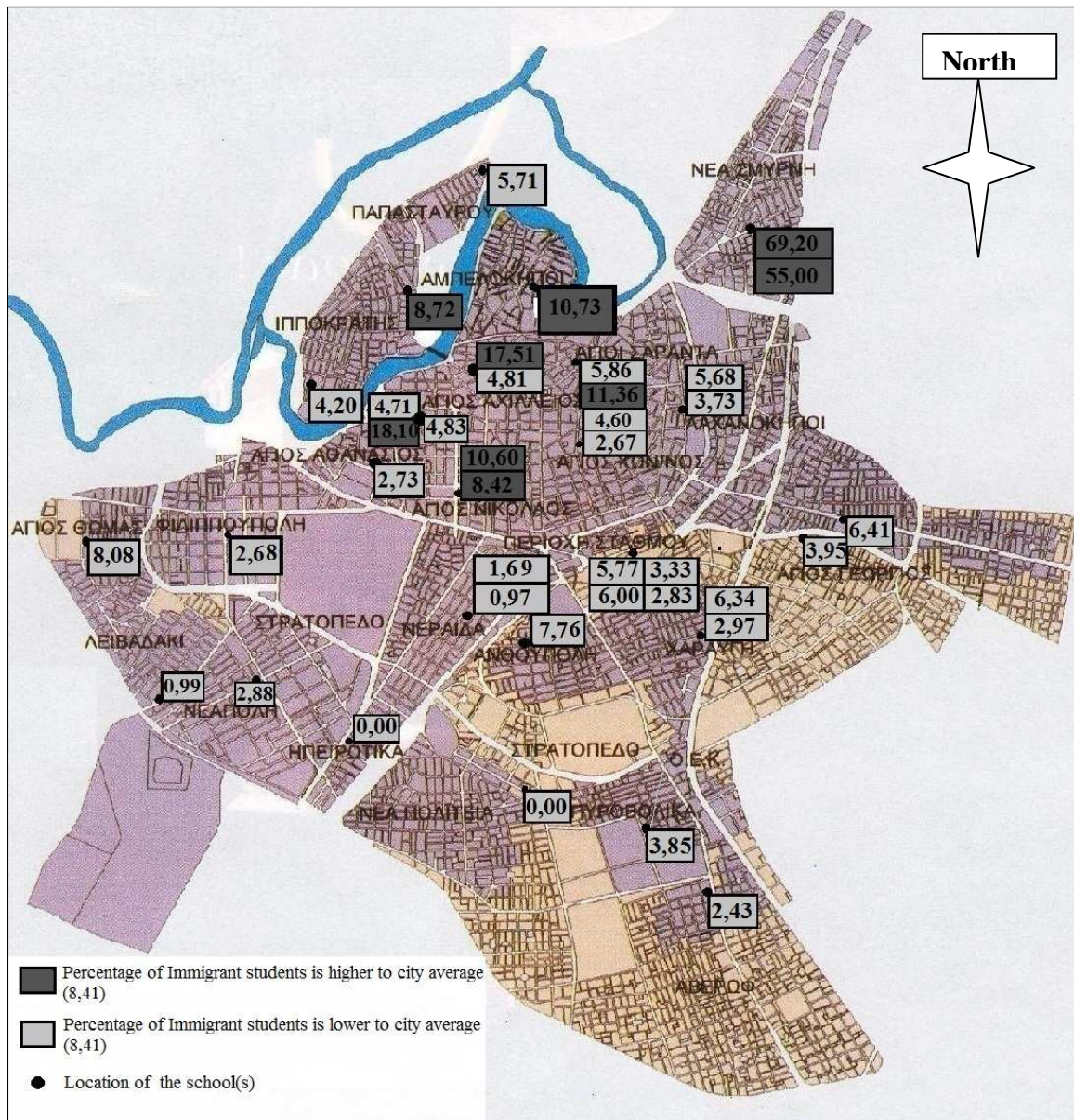
| Year | Students | Immigrants |
|-----------|----------|------------|
| 2000-2001 | 8417 | 765 |
| 2001-2002 | 8508 | 814 |
| 2002-2003 | 8616 | 854 |
| 2003-2004 | 8695 | 914 |
| 2004-2005 | 8902 | 980 |
| 2005-2006 | 8784 | 996 |
| 2006-2007 | 8733 | 1003 |
| 2007-2008 | 8637 | 1046 |
| 2008-2009 | 8678 | 1100 |
| 2009-2010 | 8823 | 1144 |

At Map 5.1 and 5.2, below, the percentages of immigrant children of each school in Larissa for the year 2000-2001 and 2009-2010 are pinpointed.

As can be seen in Map 5.1(2000-2001), immigrants are dispersed all over the urban area, but there seems to be a high spatial clustering in Nea Smyrni. Although it does not consist the traditional central business district, it seems to attract the largest percentage of immigrants relative to other areas. Specially, the percentage of immigrants of the two schools located there is extremely high compared to the city average (69,20 and 55,00 to 8,41). Then, the inner-city schools seem to attract a

significant percentage of immigrants: Agios Achilleios (18,10% and 17,50%), Agioi Saranta (11,36), Agios Nikolaos (10,60% and 8,42).

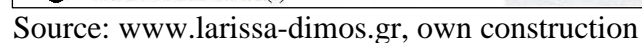
Map 5.1: Percentages of Immigrant Students for each Primary School (Year 2000- 2001)



Source: www.larissa-dimos.gr, own construction.

In the Map 5.2 (2009-2010), the highest residential concentration is also recorded in Schools of Nea Smyrni (69,93 and 63,49) like in the Map 5.1. The next area, where its schools have high percentages of immigrants are that of Agios Achilleios (17,51 % and 18,10 %). Percentage higher to the city average 12,69 is

Map 5.2: Percentages of Immigrant Students for each Primary School (Year 2009-2010)



24

5.1 Evaluation on Evenness

5.1.1 Dissimilarity Index

Using the formula of **Dissimilarity Index**, its value for each neighbourhood for the year 2000 to 2010 are calculated and presented in Table 5.2.

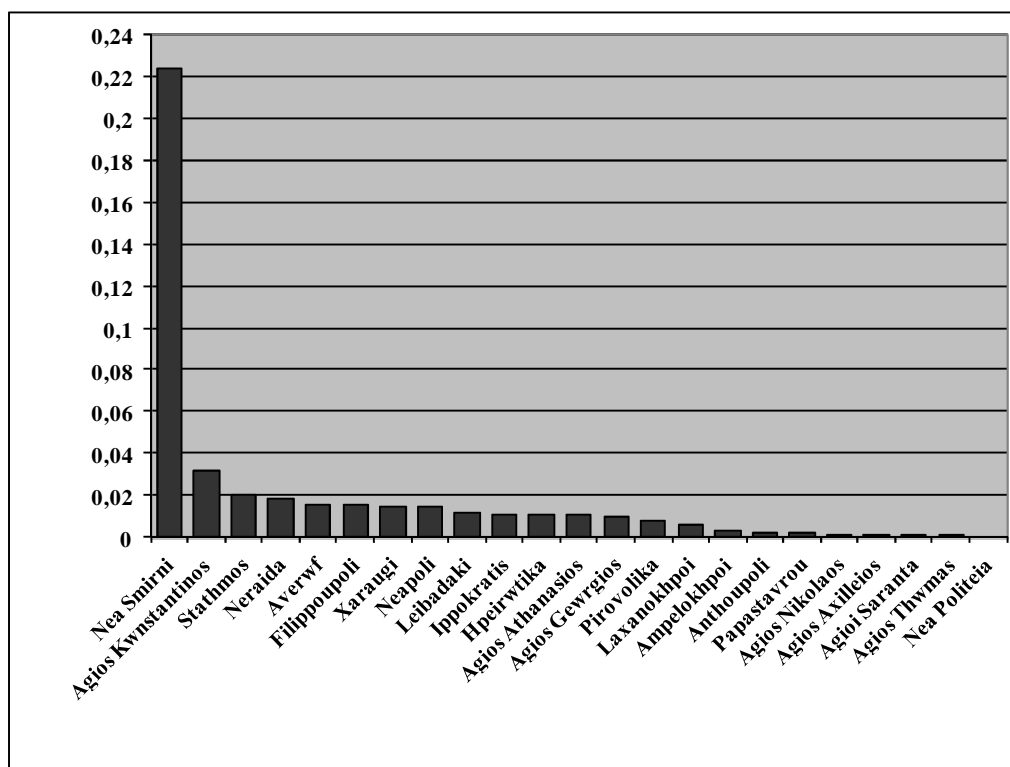
Table 5.2: The Dissimilarity Index for each Neighbourhood and Year

| Areas | 2000-2001 | 2001-2002 | 2002-2003 | 2003-2004 | 2004-2005 | 2005-2006 | 2006-2007 | 2007-2008 | 2008-2009 | 2009-2010 |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Neapoli | 0,0139 | 0,0137 | 0,0127 | 0,0126 | 0,0118 | 0,0119 | 0,0111 | 0,0109 | 0,0108 | 0,0101 |
| Leivadaki | 0,0118 | 0,0106 | 0,0096 | 0,0094 | 0,0091 | 0,0082 | 0,0093 | 0,0091 | 0,0085 | 0,0081 |
| Filippoupoli | 0,0155 | 0,0152 | 0,0154 | 0,0150 | 0,0148 | 0,0143 | 0,0139 | 0,0148 | 0,0141 | 0,0141 |
| Xaravgi | 0,0146 | 0,0133 | 0,0128 | 0,0114 | 0,0100 | 0,0085 | 0,0097 | 0,0090 | 0,0084 | 0,0085 |
| Anthoupoli | 0,0023 | 0,0025 | 0,0018 | 0,0015 | 0,0018 | 0,0013 | 0,0019 | 0,0018 | 0,0021 | 0,0033 |
| Pirovolika | 0,0078 | 0,0075 | 0,0063 | 0,0062 | 0,0055 | 0,0043 | 0,0057 | 0,0048 | 0,0041 | 0,0053 |
| Averwf | 0,0157 | 0,0153 | 0,0155 | 0,0142 | 0,0133 | 0,0128 | 0,0133 | 0,0128 | 0,0129 | 0,0125 |
| Laxanokhpoi | 0,0054 | 0,0062 | 0,0061 | 0,0057 | 0,0061 | 0,0060 | 0,0052 | 0,0050 | 0,0056 | 0,0055 |
| Nea Smirni | 0,2239 | 0,2127 | 0,2051 | 0,1928 | 0,1832 | 0,1807 | 0,1800 | 0,1738 | 0,1661 | 0,1675 |
| Ampelokhpoi | 0,0027 | 0,0023 | 0,0029 | 0,0024 | 0,0035 | 0,0020 | 0,0013 | 0,0023 | 0,0026 | 0,0021 |
| Ippokratis | 0,0106 | 0,0090 | 0,0077 | 0,0074 | 0,0076 | 0,0059 | 0,0046 | 0,0049 | 0,0058 | 0,0054 |
| Neraida | 0,0186 | 0,0169 | 0,0172 | 0,0166 | 0,0151 | 0,0149 | 0,0144 | 0,0133 | 0,0132 | 0,0123 |
| Hpeirwtika | 0,0102 | 0,0103 | 0,0102 | 0,0104 | 0,0107 | 0,0108 | 0,0102 | 0,0100 | 0,0098 | 0,0096 |
| Papastavrou | 0,0017 | 0,0012 | 0,0007 | 0,0004 | 0,0004 | 0,0013 | 0,0008 | 0,0013 | 0,0007 | 0,0011 |
| Agios Gewrgios | 0,0093 | 0,0091 | 0,0080 | 0,0080 | 0,0074 | 0,0066 | 0,0072 | 0,0068 | 0,0069 | 0,0067 |
| Agios Athanasios | 0,0101 | 0,0090 | 0,0086 | 0,0079 | 0,0078 | 0,0080 | 0,0073 | 0,0063 | 0,0065 | 0,0057 |
| Agios Nikolaos | 0,0012 | 0,0005 | 0,0000 | 0,0009 | 0,0021 | 0,0012 | 0,0024 | 0,0007 | 0,0009 | 0,0013 |
| Agios Kwnstantinos | 0,0317 | 0,0320 | 0,0350 | 0,0348 | 0,0335 | 0,0307 | 0,0283 | 0,0254 | 0,0240 | 0,0228 |
| Agioi Saranta | 0,0011 | 0,0001 | 0,0011 | 0,0018 | 0,0028 | 0,0012 | 0,0005 | 0,0018 | 0,0034 | 0,0022 |
| Agios Achilleios | 0,0012 | 0,0011 | 0,0036 | 0,0038 | 0,0043 | 0,0017 | 0,0002 | 0,0005 | 0,0035 | 0,0027 |
| Agios Thwmas | 0,0007 | 0,0003 | 0,0001 | 0,0000 | 0,0006 | 0,0017 | 0,0006 | 0,0005 | 0,0001 | 0,0056 |
| Stathmos | 0,0203 | 0,0178 | 0,0202 | 0,0151 | 0,0176 | 0,0202 | 0,0193 | 0,0169 | 0,0121 | 0,0120 |
| Nea Politeia | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0010 | 0,0011 | 0,0011 | 0,0010 |

As it can be seen in Table 5.2, each year from 2000 to 2010, the immigrants tend to gather in the area of Nea Smyrni, where they overrepresented proportionally in relation to the natives. The values of Dissimilarity Index for Nea Smyrni are characterized by a small decrease each year and a small increase for other areas, which maybe indicates a move of the immigrant of Nea Smyrni to other areas. Then, the area with the highest Dissimilarity Index for the year 2000-2001 is Agios Kwnstantinos and for 2009-2010 Nea Politeia. So, the dominant model of spatial behaviour of immigrants is supported and is characterized by the tendency of location in the centre of city. This is justified by the fact that almost the 2/3 of population who live in Nea Smyrni is Romas, but they are recorded as immigrants in the data of schools.

In Figure 5.1, the neighbourhoods are ranked according the Dissimilarity Index for the year 2000-2001, while in Figure 5.2, neighbourhoods are presented in the same order as the rank of Figure 5.1.

Figure 5.1: Rank of Neighbourhoods According to the Dissimilarity Index (Year 2000-2001)

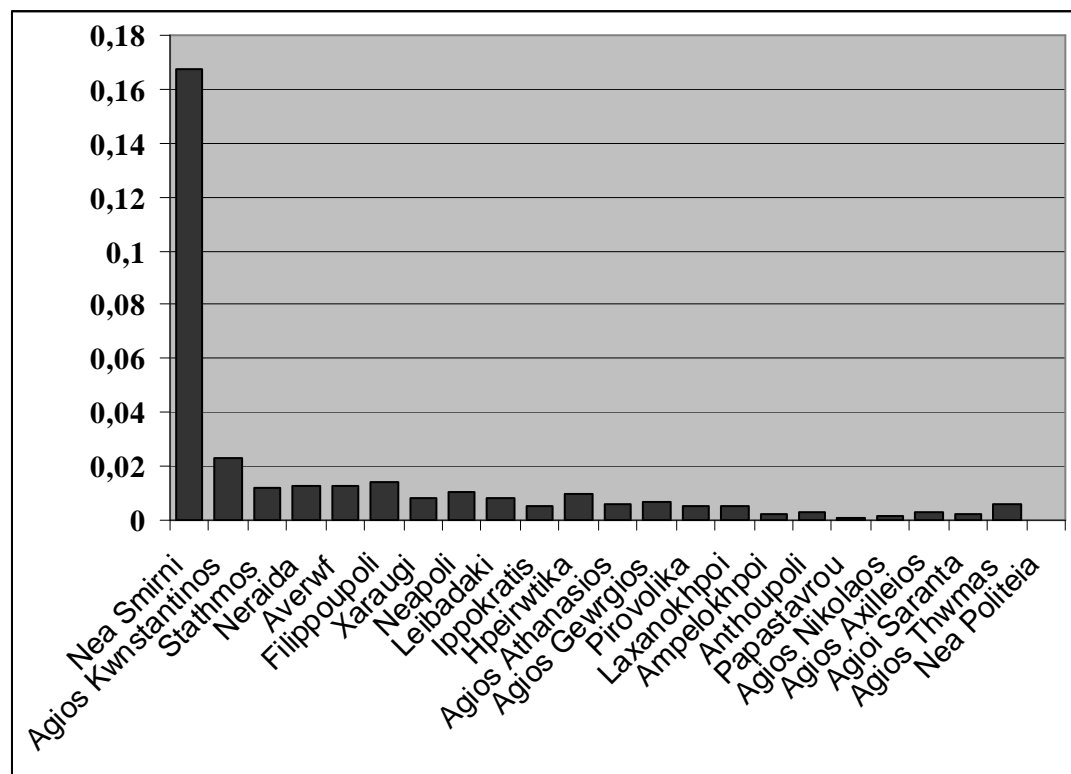


Source: own construction

In Figure 5.1, as can be seen, Nea Smyrni exhibits the highest degree of residential segregation, having the highest Dissimilarity Index (0,2239). The second highest value is that of Agios Kwnstantinos (0,0317) and Stathmos follows in the 3rd rank (0,0203). The district with the lowest Dissimilarity Index is Nea Politeia (0,0000), indicating no residential segregation.

In Figure 5.2, the order in which neighborhoods are presented is the same as in the Figure 5.1. The area with the highest segregation is Nea Smyrni (0,1675). Comparing the two Figures, it is observed that the areas, whose Dissimilarity Value increased in the last decade are Anthoupoli, Agioi Saranta, Agios Achilleios, Agios Thwmas indicating that the degree of residential segregation between natives and immigrants has increased. In the opposite, the Dissimilarity values of Neapoli, Leivadaki, Filippoupoli, Xaraugi, Pirovolika, Averwf, Ippokratis, Agios Athanasios, Stathmos were decreased, indicating that the degree of residential segregation has decreased. The Dissimilarity Index for the areas Laxanokhpoi, Ampelokhpoi, Neraida, Hpeirwtika, Papastavrou, Agios Nikolaos, Nea Politeia remained in the same levels.

Figure 5.2: .Neighbourhoods' Dissimilarity Index (Year 2009-2010)²



Source: Own Construction

² The order of Neighborhoods is the same as in Figure 5.1.

5.2 Evaluation on Exposure

5.2.1 Isolation Index

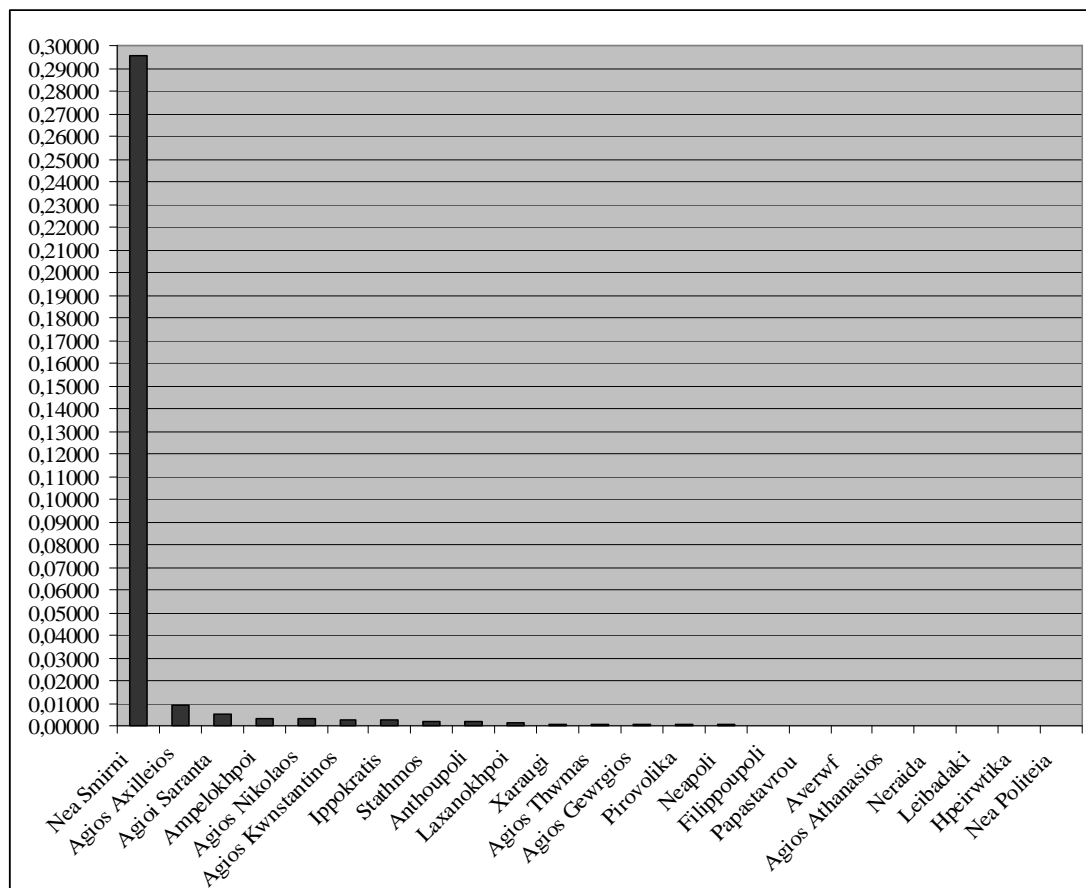
Using the formula of **Isolation index**, its values for each neighbourhood are calculated and presented in the following Table 5.3 (page 30).

In Figure 5.3, the areas are ranked according the values of Isolation Index of 2000-2001, while, in Figure 5.4, the values of Isolation Index are presented for the year 2009-2010 and areas have the same order as in Figure 5.4.

Table 5.3: The Isolation Index for each Neighbourhood and Year

| Areas | 2000-2001 | 2001-2002 | 2002-2003 | 2003-2004 | 2004-2005 | 2005-2006 | 2006-2007 | 2007-2008 | 2008-2009 | 2009-2010 |
|----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Neapoli | 0,00034 | 0,00039 | 0,00053 | 0,00058 | 0,00071 | 0,00079 | 0,00098 | 0,00116 | 0,00121 | 0,00139 |
| Leibadaki | 0,00003 | 0,00010 | 0,00020 | 0,00025 | 0,00082 | 0,00031 | 0,00030 | 0,00037 | 0,00051 | 0,00058 |
| Filippoupoli | 0,00032 | 0,00036 | 0,00034 | 0,00045 | 0,00049 | 0,00069 | 0,00065 | 0,00055 | 0,00068 | 0,00073 |
| Xaraugi | 0,00092 | 0,00119 | 0,00135 | 0,00174 | 0,00213 | 0,00355 | 0,00238 | 0,00285 | 0,00318 | 0,00319 |
| Anthoupoli | 0,00193 | 0,00198 | 0,00227 | 0,00250 | 0,00250 | 0,00224 | 0,00263 | 0,00291 | 0,00294 | 0,00246 |
| Pirovolika | 0,00040 | 0,00047 | 0,00068 | 0,00075 | 0,00093 | 0,00089 | 0,00102 | 0,00140 | 0,00165 | 0,00138 |
| Averwf | 0,00025 | 0,00030 | 0,00029 | 0,00047 | 0,00059 | 0,00079 | 0,00067 | 0,00082 | 0,00087 | 0,00093 |
| Laxanokhpoi | 0,00151 | 0,00141 | 0,00148 | 0,00168 | 0,00157 | 0,00149 | 0,00199 | 0,00222 | 0,00212 | 0,00218 |
| Nea Smyrni | 0,29567 | 0,28313 | 0,27490 | 0,25976 | 0,25213 | 0,46223 | 0,24978 | 0,24326 | 0,23298 | 0,24126 |
| Ampelokhpoi | 0,00351 | 0,00352 | 0,00387 | 0,00385 | 0,00454 | 0,00295 | 0,00372 | 0,00437 | 0,00472 | 0,00450 |
| Ippokratis | 0,00229 | 0,00266 | 0,00304 | 0,00331 | 0,00337 | 0,00594 | 0,00458 | 0,00479 | 0,00472 | 0,00488 |
| Neraida | 0,00010 | 0,00023 | 0,00022 | 0,00031 | 0,00048 | 0,00069 | 0,00071 | 0,00104 | 0,00118 | 0,00135 |
| Hpeirwtika | 0,00000 | 0,00000 | 0,00000 | 0,00000 | 0,00000 | 0,00000 | 0,00000 | 0,00001 | 0,00002 | 0,00002 |
| Papastavrou | 0,00030 | 0,00044 | 0,00059 | 0,00073 | 0,00110 | 0,00037 | 0,00133 | 0,00172 | 0,00145 | 0,00166 |
| Ag.Gewrgios | 0,00052 | 0,00058 | 0,00077 | 0,00083 | 0,00099 | 0,00099 | 0,00111 | 0,00133 | 0,00138 | 0,00145 |
| Ag. Athanasios | 0,00021 | 0,00035 | 0,00042 | 0,00058 | 0,00063 | 0,00044 | 0,00075 | 0,00098 | 0,00103 | 0,00125 |
| Ag.Nikolaos | 0,00306 | 0,00303 | 0,00290 | 0,00339 | 0,00405 | 0,00276 | 0,00422 | 0,00387 | 0,00414 | 0,00441 |
| Ag. Kwn/nos | 0,00235 | 0,00250 | 0,00246 | 0,00261 | 0,00291 | 0,01069 | 0,00448 | 0,00486 | 0,00525 | 0,00569 |
| Agioi Saranta | 0,00517 | 0,00574 | 0,00635 | 0,00704 | 0,00767 | 0,01180 | 0,00698 | 0,00612 | 0,00577 | 0,00622 |
| Ag.Achilleios | 0,00919 | 0,00980 | 0,01183 | 0,01260 | 0,01347 | 0,03648 | 0,01229 | 0,01308 | 0,01522 | 0,01503 |
| Ag.Thwmas | 0,00085 | 0,00123 | 0,00115 | 0,00127 | 0,00160 | 0,00069 | 0,00162 | 0,00129 | 0,00163 | 0,00098 |
| Stathmos | 0,00221 | 0,00294 | 0,00252 | 0,00385 | 0,00348 | 0,00622 | 0,00302 | 0,00367 | 0,00531 | 0,00528 |
| Nea Politeia | 0,00000 | 0,00000 | 0,00000 | 0,00000 | 0,00000 | 0,00000 | 0,00001 | 0,00002 | 0,00000 | 0,00001 |

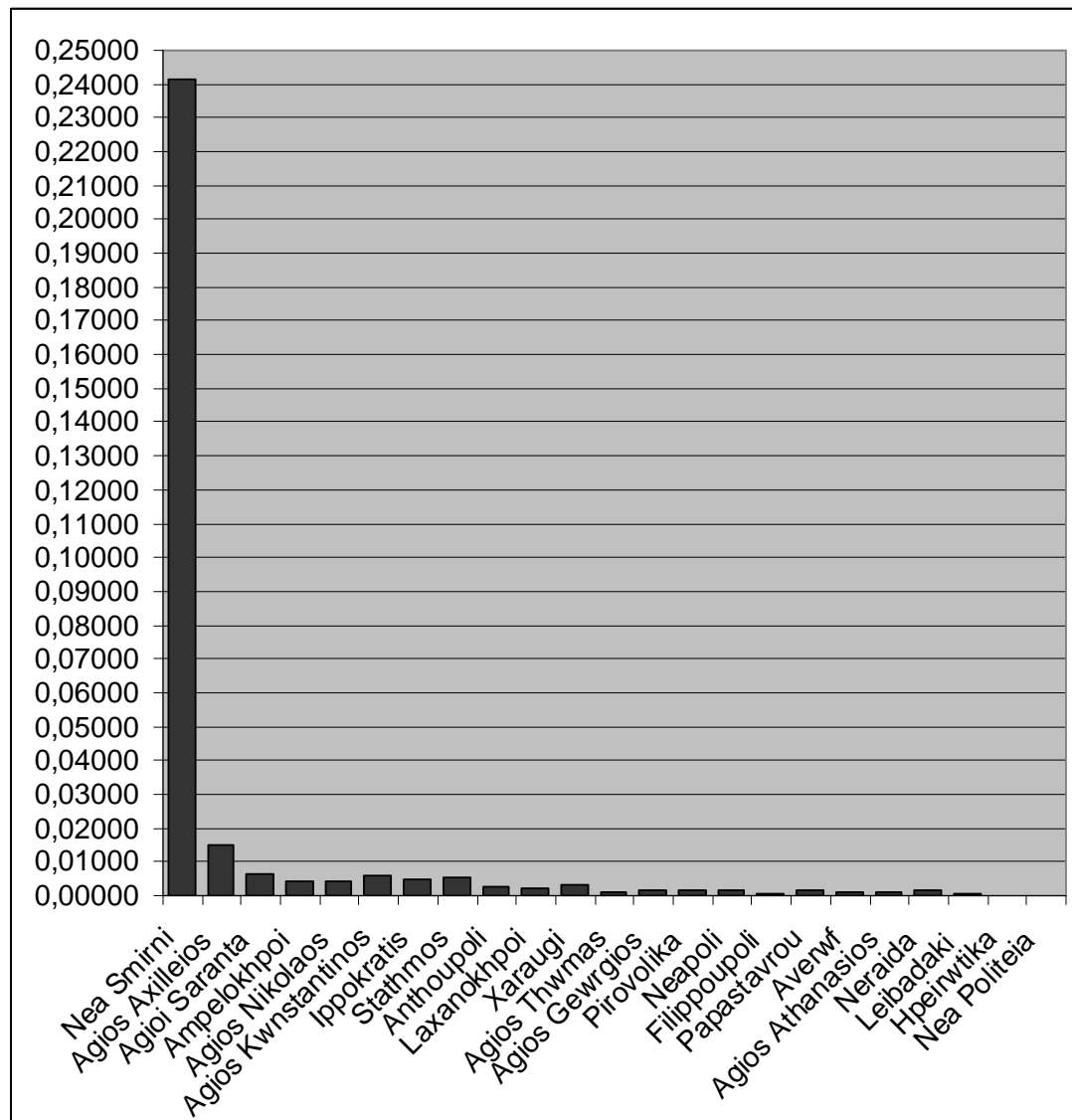
Figure 5.3: Rank of Neighbourhoods According to the Isolation Index of Segregation(Year 2000-2001)



Source: own construction

As Figure 5.3 indicates, the year 200-2001, the area with the highest IIS is Nea Smyrni (0,29567), indicating a relative high degree of segregation. Agios Achilleios is the area, which has the second highest value of IIS (0,00919) and Agioi Saranta follows (0,00517). In Hpeirwtika and Nea Politeia, zero values are recorded, indicating that there is no residential segregation. Finally, it is observed that the values of IIS for the 22 areas are lower than 0,01 indicating a relative low degree of segregation.

Figure 5.4: Neighborhoods' Isolation Index (Year 2009-2010)³



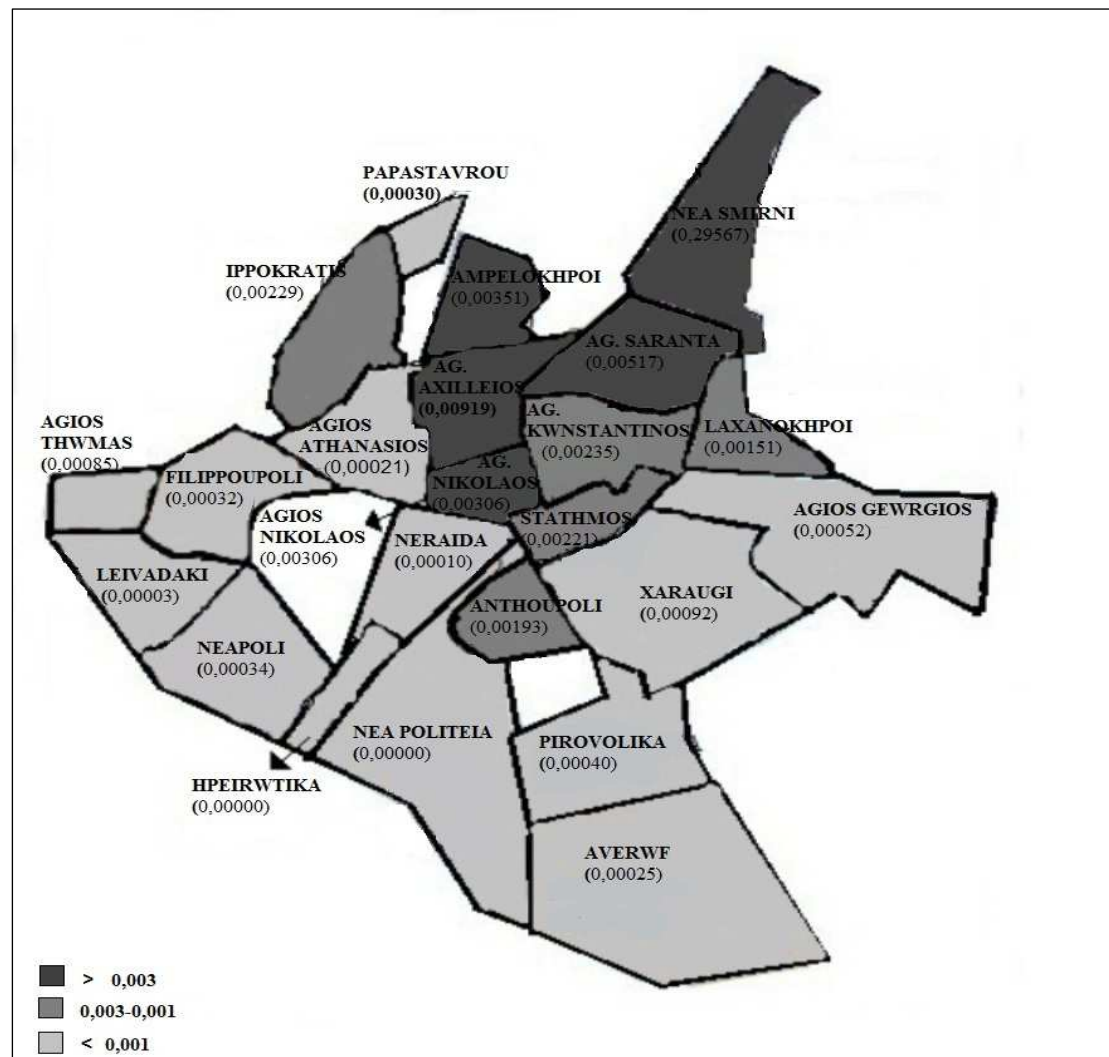
Source: own construction

The year 2009-2010, Nea Smyrni (0,24126) exhibited the highest segregation and Agios Achilleios followed (0,01503). The lowest values of IIS are that of Hpeirwtika (0,00002) and Nea Politeia (0,00001).

Comparing the two Figures, almost all values of Isolation Index are increased: Agios Nikolaos and Agios Gewrgios are the areas having the greatest variation.

³ The order of Neighborhoods is the same as in Figure 5.3.

Map 5.3: Isolation Index of Segregation for each neighbourhood (Year 2000-2001)



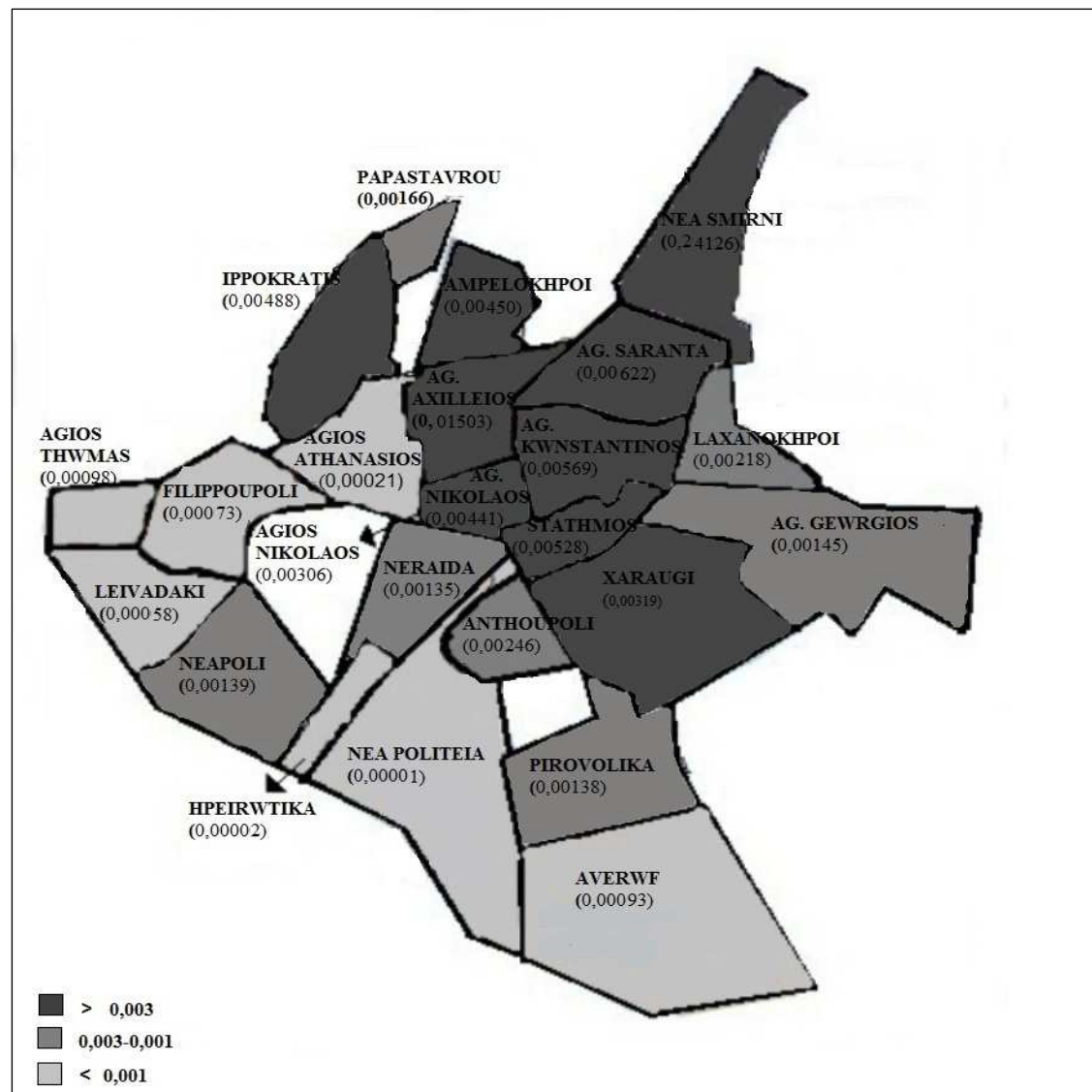
Source: www.larissa-dimos, own construction

Moreover, the results of Isolation Index for the year 2000-2001 and 2009-2010 are plotted in the Map 5.3 and 5.4 respectively. Comparing the two plots of the map of Larissa, it can be seen that both for the 2000-2001 and 2009-2010, the highest segregation of immigrants is exhibited to Nea Smyrni. Nea Smyrni does not locate in the centre, but it is an area which attracts a large amount of Romas and this is the reason why its value of IIS is high.

In general, immigrants can be found in almost all areas of the city, but a large amount, mainly Romas, lives in spectacular area (Nea Smyrni), which does not locate in the centre. So the general assertion that immigrants prefer to locate in the inner-city is affirmed, because their first preference is in the centre. It can also be observed that

from 2000 to 2010, the areas belonging to the second category 0,001 – 0, 003 are increased; this means that the number of immigrants who came from other countries or areas may be increased.

Map 5.4: Isolation Index of Segregation for each neighbourhood (Year 2009-2010)



Source: www.larissa-dimos.gr, Own Construction

5.3 Evaluation on Concentration

5.3.1 Delta

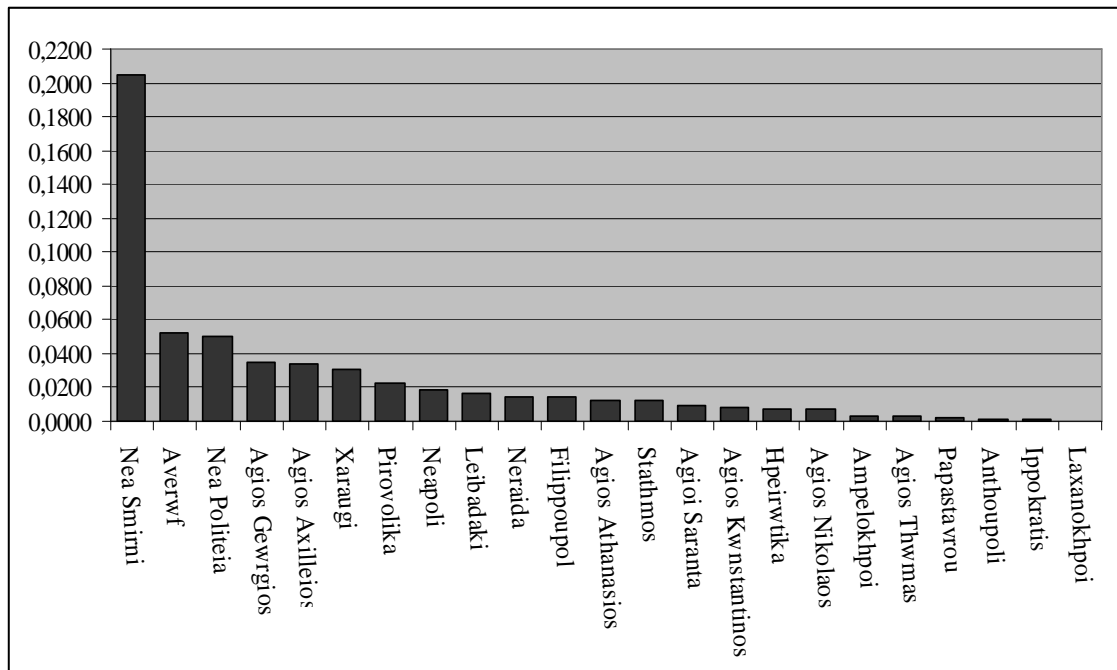
In order that the dimension of concentration is analyzed, the measure Delta is calculated. In Table 5.4 (page 35), the values of Del for each neighbourhood and year are presented.

Table 5.4: The.Delta for each Neighbourhood and Year

| Areas | 2000-2001 | 2001-2002 | 2002-2003 | 2003-2004 | 2004-2005 | 2005-2006 | 2006-2007 | 2007-2008 | 2008-2009 | 2009-2010 |
|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Neapoli | 0,0182 | 0,0180 | 0,0171 | 0,0170 | 0,0165 | 0,0161 | 0,0151 | 0,0146 | 0,0146 | 0,0141 |
| Leibadaki | 0,0161 | 0,0149 | 0,0139 | 0,0135 | 0,0097 | 0,0124 | 0,0134 | 0,0131 | 0,0124 | 0,0121 |
| Filippoupoli | 0,0140 | 0,0137 | 0,0140 | 0,0133 | 0,0133 | 0,0124 | 0,0124 | 0,0132 | 0,0126 | 0,0125 |
| Xaraugi | 0,0309 | 0,0297 | 0,0291 | 0,0278 | 0,0267 | 0,0249 | 0,0260 | 0,0248 | 0,0243 | 0,0245 |
| Anthoupoli | 0,0008 | 0,0009 | 0,0003 | 0,0001 | 0,0004 | 0,0004 | 0,0002 | 0,0002 | 0,0000 | 0,0014 |
| Pirovolika | 0,0222 | 0,0219 | 0,0210 | 0,0209 | 0,0203 | 0,0189 | 0,0200 | 0,0188 | 0,0184 | 0,0191 |
| Averwf | 0,0518 | 0,0515 | 0,0518 | 0,0505 | 0,0499 | 0,0490 | 0,0496 | 0,0489 | 0,0489 | 0,0487 |
| Laxanokhpoi | 0,0001 | 0,0008 | 0,0007 | 0,0004 | 0,0011 | 0,0008 | 0,0001 | 0,0006 | 0,0000 | 0,0001 |
| Nea Smyrni | 0,2050 | 0,1937 | 0,1859 | 0,1737 | 0,1633 | 0,1612 | 0,1603 | 0,1543 | 0,1468 | 0,1473 |
| Ampelokhpoi | 0,0034 | 0,0030 | 0,0034 | 0,0029 | 0,0039 | 0,0026 | 0,0020 | 0,0028 | 0,0029 | 0,0023 |
| Ippokratis | 0,0007 | 0,0000 | 0,0008 | 0,0011 | 0,0007 | 0,0024 | 0,0037 | 0,0037 | 0,0030 | 0,0030 |
| Neraida | 0,0145 | 0,0129 | 0,0131 | 0,0123 | 0,0111 | 0,0102 | 0,0098 | 0,0082 | 0,0078 | 0,0073 |
| Hpeirwtika | 0,0072 | 0,0072 | 0,0072 | 0,0072 | 0,0072 | 0,0072 | 0,0072 | 0,0067 | 0,0063 | 0,0063 |
| Papastavrou | 0,0020 | 0,0015 | 0,0011 | 0,0008 | 0,0000 | 0,0009 | 0,0004 | 0,0012 | 0,0004 | 0,0007 |
| Ag. Gewrgios | 0,0344 | 0,0342 | 0,0333 | 0,0333 | 0,0328 | 0,0319 | 0,0325 | 0,0319 | 0,0319 | 0,0318 |
| Ag.Athanasios | 0,0127 | 0,0117 | 0,0113 | 0,0106 | 0,0105 | 0,0106 | 0,0101 | 0,0094 | 0,0093 | 0,0087 |
| Ag. Nikolaos | 0,0069 | 0,0065 | 0,0058 | 0,0065 | 0,0075 | 0,0062 | 0,0071 | 0,0065 | 0,0066 | 0,0069 |
| Ag.Kwnstantinos | 0,0084 | 0,0086 | 0,0085 | 0,0084 | 0,0091 | 0,0112 | 0,0155 | 0,0150 | 0,0152 | 0,0161 |
| Agioi Saranta | 0,0089 | 0,0096 | 0,0106 | 0,0113 | 0,0117 | 0,0106 | 0,0094 | 0,0063 | 0,0050 | 0,0053 |
| Ag. Achilleios | 0,0336 | 0,0342 | 0,0382 | 0,0383 | 0,0391 | 0,0367 | 0,0353 | 0,0355 | 0,0388 | 0,0375 |
| Ag. Thwmas | 0,0030 | 0,0021 | 0,0024 | 0,0022 | 0,0016 | 0,0007 | 0,0017 | 0,0025 | 0,0018 | 0,0017 |
| Stathmos | 0,0124 | 0,0154 | 0,0130 | 0,0176 | 0,0157 | 0,0128 | 0,0131 | 0,0146 | 0,0188 | 0,0182 |
| Nea Politeia | 0,0500 | 0,0500 | 0,0500 | 0,0500 | 0,0500 | 0,0500 | 0,0490 | 0,0486 | 0,0496 | 0,0492 |

In the following Figure (5.5), neighborhoods are ranked according to the values of Delta.

Figure 5.5: Rank of Neighbourhoods According to the Delta (2000-2001)

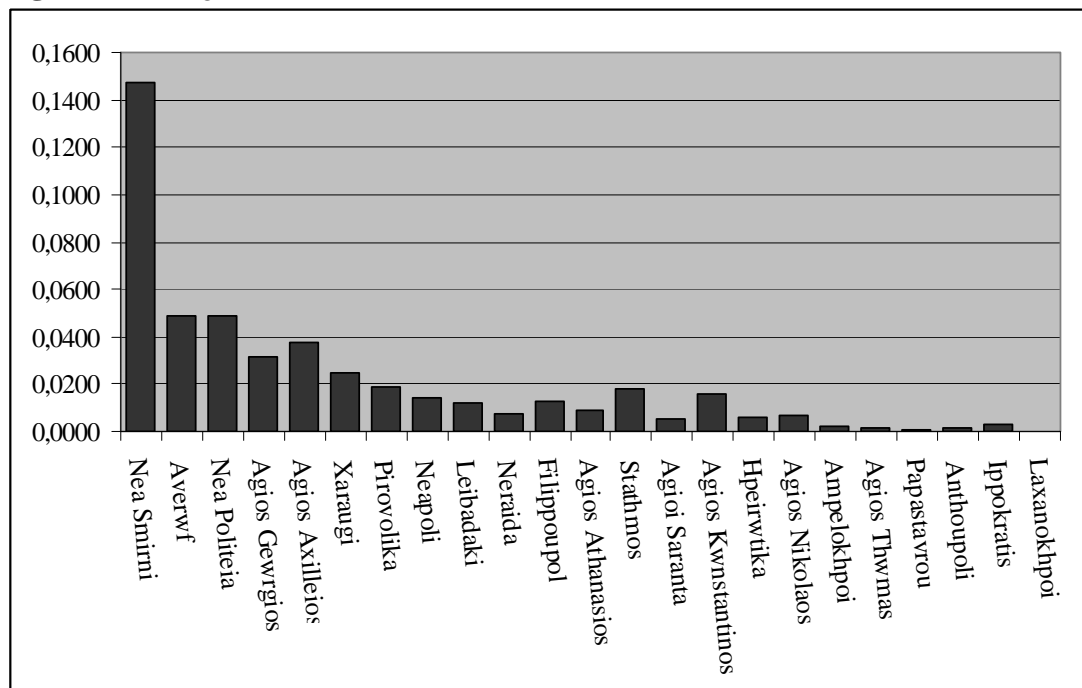


Source: Own Construction

According to the Figure 5.5, the year 2000-2001, the neighbourhood which exhibits the highest Concentration of Immigrants is Nea Smyrni (0,4471), which is four times larger than that of the next highest, Averwf (0,0518). Next, the areas Nea Politeia (0,0500) and Agios Gewrgios (0,0344) follow.

In the Figure 5.6, the values of Delta are presented (areas have the same order as in Figure 5.5). The first three areas which have the highest values Delta are the same as 2000-2001. It is observed that the Delta of Nea Smyrni is decreased and the values of Averwf and Nea Politeia seem to remained stable. The area with the lowest values of Delta is, like 2000-2001, Laxanokhpoi.

Figure 5.6: Neighborhoods' Delta (2009-2010)⁴



Source : Own Construction

⁴ The order of Neighborhoods is the same as in Figure 5.5.

5.4 Evaluation on Centralization

5.4.1 Pcc

Using the formula of $Pcc = X_{cc}/X$, Pcc_1 ='immigrants living in unit i/immigrants of the city', the Pcc_2 ='natives living in unit i/natives of the city' and Pcc_3 ='immigrants of the city centre / immigrants of city' are calculated.

5.4.1.1 Pcc₁

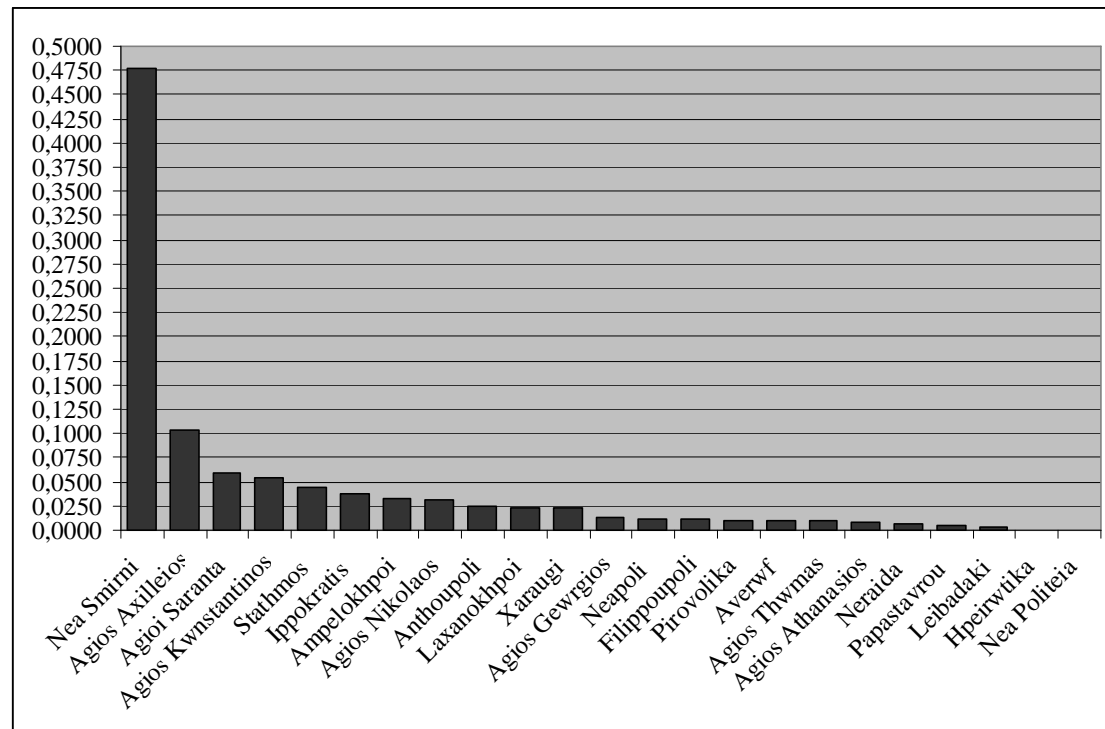
In Table 5.5, the Pcc_1 for each year and neighbourhood are presented.

Table 5.5: The Pcc_1 for each Neighbourhood and Year

| Areas | 2000-2001 | 2001-2002 | 2002-2003 | 2003-2004 | 2004-2005 | 2005-2006 | 2006-2007 | 2007-2008 | 2008-2009 | 2009-2010 |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Neapoli | 0,0118 | 0,0123 | 0,0141 | 0,0142 | 0,0153 | 0,0161 | 0,0179 | 0,0191 | 0,0191 | 0,0201 |
| Leibadaki | 0,0026 | 0,0049 | 0,0070 | 0,0077 | 0,0153 | 0,0100 | 0,0080 | 0,0086 | 0,0100 | 0,0105 |
| Filippoupoli | 0,0118 | 0,0123 | 0,0117 | 0,0131 | 0,0133 | 0,0151 | 0,0150 | 0,0134 | 0,0145 | 0,0149 |
| Xaraugi | 0,0222 | 0,0246 | 0,0258 | 0,0284 | 0,0306 | 0,0341 | 0,0319 | 0,0344 | 0,0355 | 0,0350 |
| Anthoupoli | 0,0248 | 0,0246 | 0,0258 | 0,0263 | 0,0255 | 0,0271 | 0,0259 | 0,0268 | 0,0264 | 0,0236 |
| Pirovolika | 0,0105 | 0,0111 | 0,0129 | 0,0131 | 0,0143 | 0,0171 | 0,0150 | 0,0172 | 0,0182 | 0,0166 |
| Averwf | 0,0105 | 0,0111 | 0,0105 | 0,0131 | 0,0143 | 0,0161 | 0,0150 | 0,0163 | 0,0164 | 0,0166 |
| Laxanokhpoi | 0,0235 | 0,0221 | 0,0222 | 0,0230 | 0,0214 | 0,0221 | 0,0239 | 0,0249 | 0,0236 | 0,0236 |
| Nea Smyrni | 0,4771 | 0,4545 | 0,4391 | 0,4147 | 0,3939 | 0,3896 | 0,3878 | 0,3757 | 0,3609 | 0,3619 |
| Ampelokhpoi | 0,0327 | 0,0319 | 0,0328 | 0,0317 | 0,0337 | 0,0311 | 0,0299 | 0,0315 | 0,0318 | 0,0306 |
| Ippokratis | 0,0379 | 0,0393 | 0,0410 | 0,0416 | 0,0408 | 0,0442 | 0,0469 | 0,0468 | 0,0455 | 0,0455 |
| Neraida | 0,0065 | 0,0098 | 0,0094 | 0,0109 | 0,0133 | 0,0151 | 0,0160 | 0,0191 | 0,0200 | 0,0210 |
| Hpeirwtika | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0010 | 0,0018 | 0,0017 |
| Papastavrou | 0,0052 | 0,0061 | 0,0070 | 0,0077 | 0,0092 | 0,0110 | 0,0100 | 0,0115 | 0,0100 | 0,0105 |
| Agios Gewrgios | 0,0131 | 0,0135 | 0,0152 | 0,0153 | 0,0163 | 0,0181 | 0,0169 | 0,0182 | 0,0182 | 0,0184 |
| Agios Athanasios | 0,0078 | 0,0098 | 0,0105 | 0,0120 | 0,0122 | 0,0120 | 0,0130 | 0,0143 | 0,0145 | 0,0157 |
| Agios Nikolaos | 0,0314 | 0,0307 | 0,0293 | 0,0306 | 0,0327 | 0,0301 | 0,0319 | 0,0306 | 0,0309 | 0,0315 |
| Agios Kwnstantinos | 0,0536 | 0,0541 | 0,0539 | 0,0536 | 0,0551 | 0,0592 | 0,0678 | 0,0669 | 0,0673 | 0,0691 |
| Agioi Saranta | 0,0588 | 0,0602 | 0,0621 | 0,0635 | 0,0643 | 0,0622 | 0,0598 | 0,0535 | 0,0509 | 0,0516 |
| Agios Achilleios | 0,1033 | 0,1044 | 0,1124 | 0,1127 | 0,1143 | 0,1094 | 0,1067 | 0,1071 | 0,1136 | 0,1110 |
| Agios Thwmas | 0,0105 | 0,0123 | 0,0117 | 0,0120 | 0,0133 | 0,0151 | 0,0130 | 0,0115 | 0,0127 | 0,0131 |
| Stathmos | 0,0444 | 0,0504 | 0,0457 | 0,0547 | 0,0510 | 0,0452 | 0,0459 | 0,0488 | 0,0573 | 0,0559 |
| Nea Politeia | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0020 | 0,0029 | 0,0009 | 0,0017 |

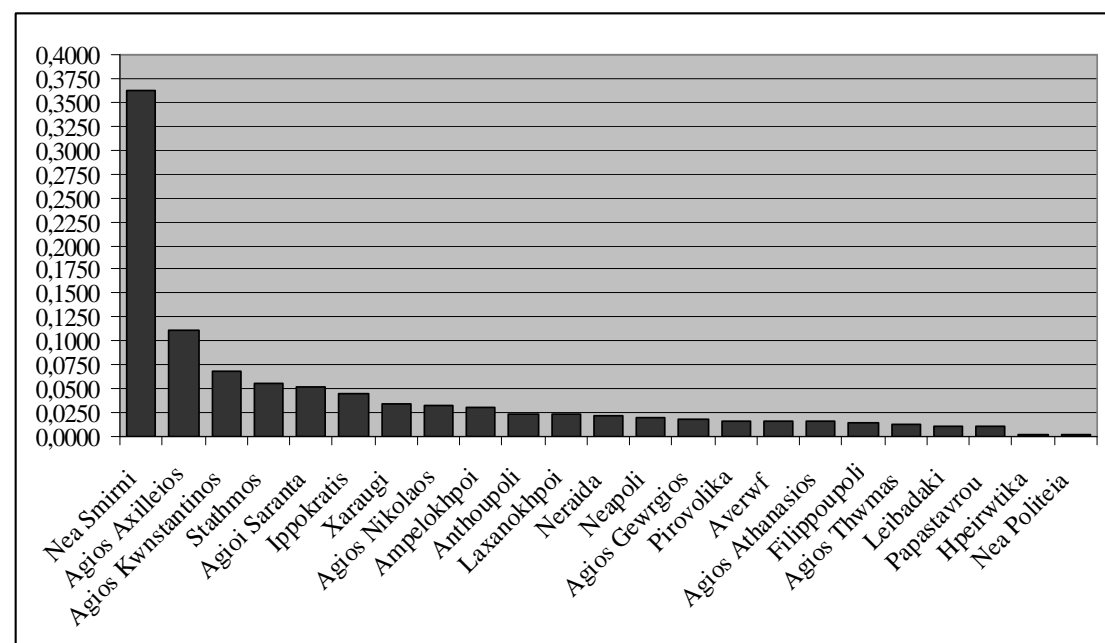
In Figure 5.7 and 5.8, the neighbourhoods are ranked according the Pcc1 in year 2000-2001 and 2009-2010 respectively.

Figure 5.7: Rank of Neighbourhoods According to the Pcc₁ (Year 2000-2001)



Source: own construction

Figure 5.8: Rank of Neighbourhoods According to the Pcc1 (Year 2009-2010)



Source: Own Construction

According to the Figure 5.7, the neighbourhood which exhibits the highest Pcc1 of Immigrants for the year 2000-2001 is Nea Smyrni (0,4471), which is four times larger than that of the next highest, Agios Achilleios (0,1033). Next, come the areas Agioi Saranta (0,0588) and Agios Kwnstantinos (0,0536).

A similar pattern is seen in the Figure 5.8, which shows that ,the year 2009-2010, the area with the highest Pcc1 of Immigrants is , Nea Smyrni, (0,3619) and the next one is Agios Achilleios (0,1110). Comparing the two figures, there are not many changes during these ten years.

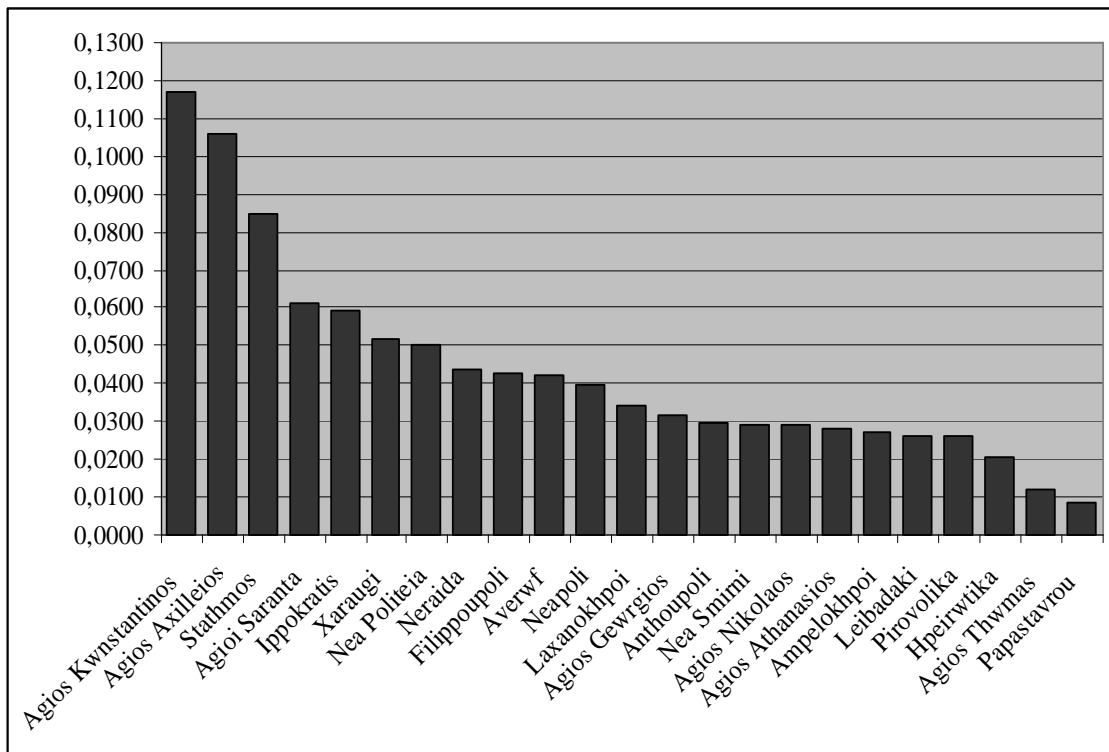
5.4.1.2 Pcc2

The calculated values of Pcc2 for each neighbourhood and year are presented in Table 5.6 and neighbourhoods are presented ranked according Pcc₂ in Figures 5.9 (year 2000-2001) and 5.10 (year 2009-2010).

Table 5.6: The Pcc₂ for each Neighbourhood and Year

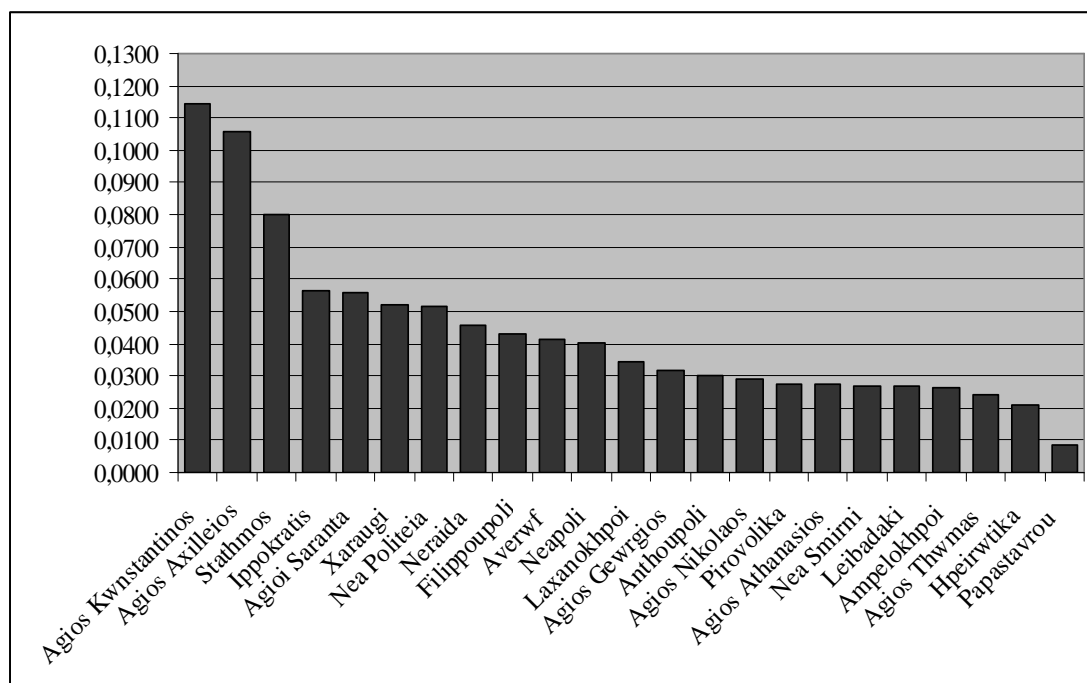
| Areas | 2000-2001 | 2001-2002 | 2002-2003 | 2003-2004 | 2004-2005 | 2005-2006 | 2006-2007 | 2007-2008 | 2008-2009 | 2009-2010 |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Neapoli | 0,0396 | 0,0396 | 0,0394 | 0,3359 | 0,0390 | 0,0399 | 0,0401 | 0,0410 | 0,0408 | 0,0404 |
| Leibadaki | 0,0263 | 0,0261 | 0,0263 | 0,2254 | 0,0336 | 0,0265 | 0,0266 | 0,0267 | 0,0269 | 0,0267 |
| Filippoupoli | 0,0427 | 0,0426 | 0,0425 | 0,3665 | 0,0428 | 0,0437 | 0,0428 | 0,0429 | 0,0428 | 0,0430 |
| Xaraugi | 0,0515 | 0,0512 | 0,0514 | 0,4365 | 0,0506 | 0,0512 | 0,0514 | 0,0524 | 0,0523 | 0,0520 |
| Anthoupoli | 0,0295 | 0,0296 | 0,0294 | 0,2495 | 0,0290 | 0,0298 | 0,0298 | 0,0303 | 0,0305 | 0,0302 |
| Pirovolika | 0,0261 | 0,0261 | 0,0255 | 0,2177 | 0,0254 | 0,0257 | 0,0264 | 0,0269 | 0,0264 | 0,0272 |
| Averwf | 0,0419 | 0,0417 | 0,0415 | 0,3534 | 0,0409 | 0,0416 | 0,0415 | 0,0419 | 0,0421 | 0,0415 |
| Laxanokhpoi | 0,0344 | 0,0344 | 0,0344 | 0,2921 | 0,0336 | 0,0342 | 0,0343 | 0,0349 | 0,0348 | 0,0345 |
| Nea Smyrni | 0,0293 | 0,0291 | 0,0289 | 0,2473 | 0,0274 | 0,0281 | 0,0278 | 0,0282 | 0,0288 | 0,0270 |
| Ampelokhpoi | 0,0272 | 0,0273 | 0,0269 | 0,2298 | 0,0268 | 0,0272 | 0,0273 | 0,0270 | 0,0265 | 0,0264 |
| Ippokratis | 0,0591 | 0,0573 | 0,0563 | 0,4803 | 0,0560 | 0,0560 | 0,0561 | 0,0566 | 0,0570 | 0,0563 |
| Neraida | 0,0438 | 0,0435 | 0,0437 | 0,3753 | 0,0435 | 0,0449 | 0,0448 | 0,0457 | 0,0463 | 0,0456 |
| Hpeirwtika | 0,0204 | 0,0205 | 0,0205 | 0,1772 | 0,0215 | 0,0216 | 0,0204 | 0,0209 | 0,0215 | 0,0210 |
| Papastavrou | 0,0086 | 0,0084 | 0,0084 | 0,0722 | 0,0083 | 0,0083 | 0,0084 | 0,0090 | 0,0086 | 0,0083 |
| Agios Gewrgios | 0,0318 | 0,0317 | 0,0313 | 0,2670 | 0,0312 | 0,0312 | 0,0313 | 0,0317 | 0,0321 | 0,0318 |
| Agios Athanasios | 0,0280 | 0,0278 | 0,0278 | 0,2374 | 0,0278 | 0,0280 | 0,0276 | 0,0270 | 0,0276 | 0,0272 |
| Agios Nikolaos | 0,0290 | 0,0296 | 0,0292 | 0,2462 | 0,0285 | 0,0277 | 0,0272 | 0,0291 | 0,0290 | 0,0288 |
| Agios Kwnstantinos | 0,1170 | 0,1181 | 0,1238 | 1,0492 | 0,1221 | 0,1207 | 0,1245 | 0,1176 | 0,1153 | 0,1146 |
| Agioi Saranta | 0,0610 | 0,0604 | 0,0599 | 0,5088 | 0,0587 | 0,0598 | 0,0587 | 0,0572 | 0,0578 | 0,0560 |
| Agios Achilleios | 0,1057 | 0,1067 | 0,1051 | 0,8950 | 0,1058 | 0,1061 | 0,1063 | 0,1060 | 0,1066 | 0,1056 |
| Agios Thwmas | 0,0119 | 0,0117 | 0,0119 | 0,1018 | 0,0120 | 0,0117 | 0,0118 | 0,0125 | 0,0125 | 0,0242 |
| Stathmos | 0,0849 | 0,0859 | 0,0861 | 0,7232 | 0,0862 | 0,0855 | 0,0845 | 0,0826 | 0,0814 | 0,0800 |
| Nea Politeia | 0,0503 | 0,0502 | 0,0499 | 0,4256 | 0,0494 | 0,0506 | 0,0505 | 0,0516 | 0,0524 | 0,0518 |

Figure 5.9: Rank of Neighbourhoods According to the Pcc_2 (Year 2000-2001)



Source: Own Construction

Figure 5.10: Rank of Neighbourhoods According to the Pcc_2 (Year 2009-2010)



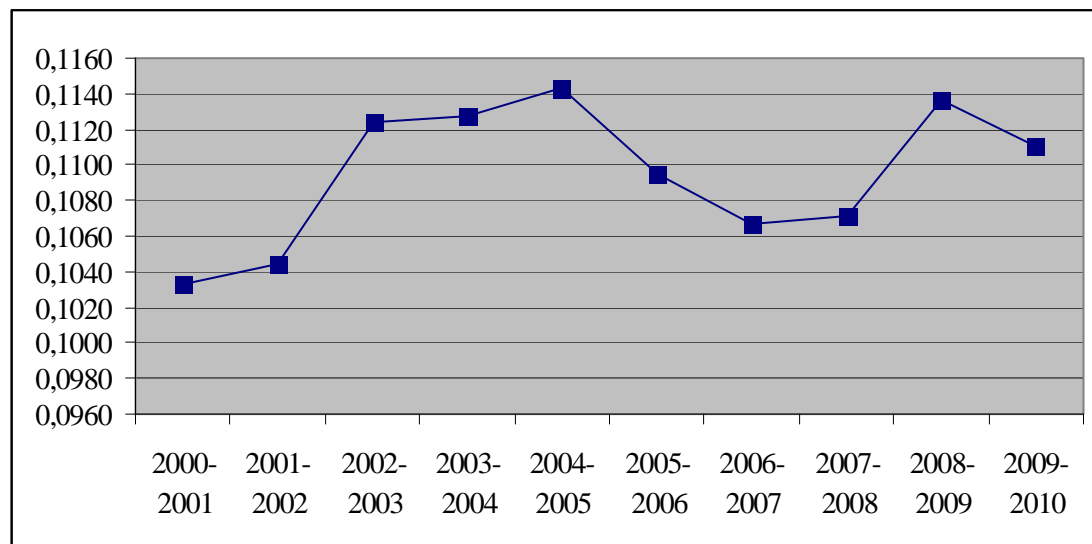
Source: Own Construction

5.4.1.3 Pcc_3

Table 5.7 provides the calculated values of Pcc_3 for the last decade and its annual variation is presented in Figure 5.11

Table 5.7: The Pcc3 for each Year

| Year | Pcc3 |
|-----------|--------|
| 2000-2001 | 0,1033 |
| 2001-2002 | 0,1044 |
| 2002-2003 | 0,1124 |
| 2003-2004 | 0,1127 |
| 2004-2005 | 0,1143 |
| 2005-2006 | 0,1094 |
| 2006-2007 | 0,1067 |
| 2007-2008 | 0,1071 |
| 2008-2009 | 0,1136 |
| 2009-2010 | 0,1110 |

Figure 5.11: Pcc3 for each Year

Source: Own Construction

As can be seen in Figure 5.11, Pcc3 have some fluctuations from 2000 to 2010. The highest Pcc is observed in the year 2004-2005 and the lowest the 2000-2001. From the year 2000-2001 to Year 2004-2005, the value of Pcc is increased, next it decreased until 2006-2007, when it increases again in the last three years.

5.4.2 Absolute Centralization Index

Absolute centralization Index is another and more significant measure of centralization. The calculated values of ACE for each neighbourhood in the last decade are presented in Table 5.8 (page 44). As can be seen in the Table 5.8, most of the values of ACE are positive, while some of them are negative.

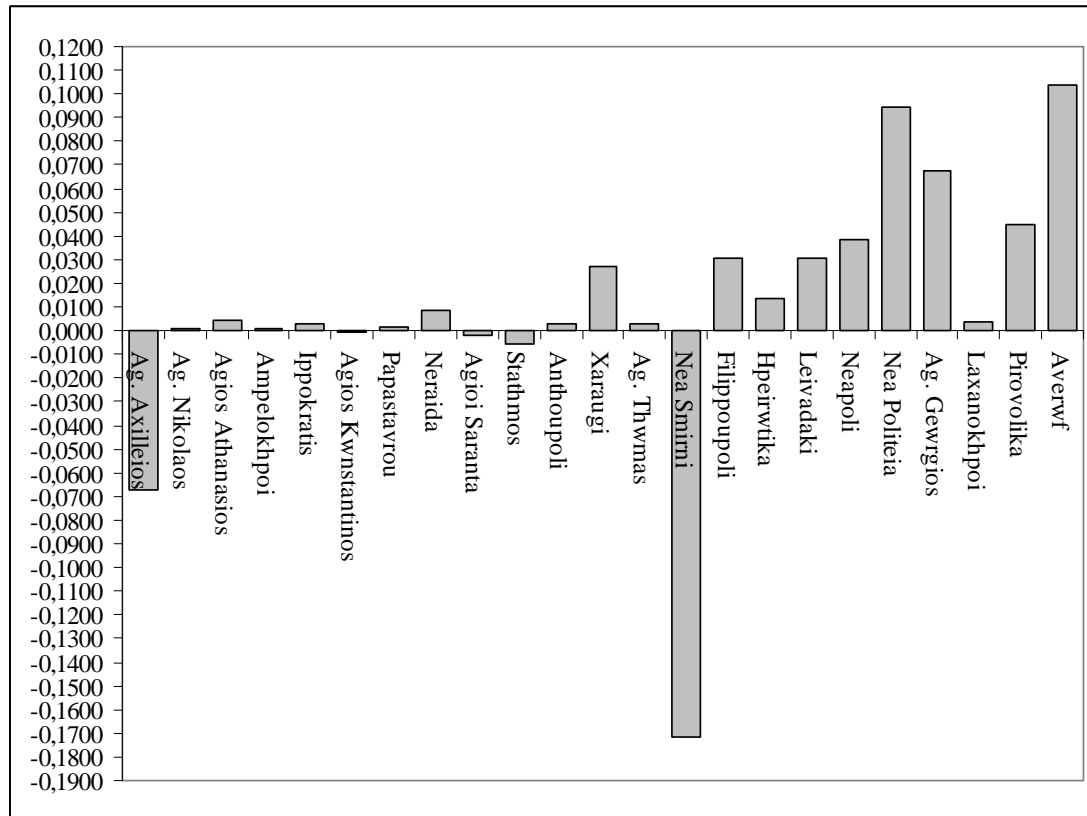
Table 5.8: The Ace for each Neighbourhood and Year⁵

| Areas | 2000-2001 | 2001-2002 | 2002-2003 | 2003-2004 | 2004-2005 | 2005-2006 | 2006-2007 | 2007-2008 | 2008-2009 | 2009-2010 |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Ag. Achilleios | -0,0672 | -0,0684 | -0,0764 | -0,0698 | -0,0783 | -0,0734 | -0,0707 | -0,0710 | -0,0776 | -0,0750 |
| Ag. Nikolaos | 0,0007 | 0,0007 | 0,0009 | 0,0008 | 0,0008 | 0,0008 | 0,0007 | 0,0008 | 0,0009 | 0,0008 |
| Agios Athanasios | 0,0040 | 0,0040 | 0,0041 | 0,0039 | 0,0042 | 0,0040 | 0,0039 | 0,0038 | 0,0040 | 0,0039 |
| Ampelokhpoi | 0,0009 | 0,0010 | 0,0011 | 0,0011 | 0,0012 | 0,0012 | 0,0013 | 0,0012 | 0,0014 | 0,0014 |
| Ippokratis | 0,0026 | 0,0025 | 0,0027 | 0,0024 | 0,0030 | 0,0022 | 0,0019 | 0,0019 | 0,0024 | 0,0023 |
| Agios Kwnstantinos | -0,0003 | -0,0003 | 0,0001 | 0,0000 | 0,0002 | -0,0007 | -0,0019 | -0,0017 | -0,0015 | -0,0019 |
| Papastavrou | 0,0015 | 0,0013 | 0,0012 | 0,0011 | 0,0009 | 0,0005 | 0,0008 | 0,0006 | 0,0009 | 0,0008 |
| Neraida | 0,0084 | 0,0079 | 0,0083 | 0,0079 | 0,0080 | 0,0076 | 0,0077 | 0,0072 | 0,0072 | 0,0070 |
| Agioi Saranta | -0,0023 | -0,0023 | -0,0024 | -0,0028 | -0,0023 | -0,0018 | -0,0008 | 0,0009 | 0,0018 | 0,0017 |
| Stathmos | -0,0056 | -0,0070 | -0,0055 | -0,0081 | -0,0066 | -0,0051 | -0,0051 | -0,0059 | -0,0082 | -0,0078 |
| Anthoupoli | 0,0028 | 0,0032 | 0,0031 | 0,0032 | 0,0038 | 0,0031 | 0,0037 | 0,0035 | 0,0039 | 0,0047 |
| Xaraugi | 0,0270 | 0,0275 | 0,0278 | 0,0278 | 0,0281 | 0,0266 | 0,0279 | 0,0273 | 0,0279 | 0,0279 |
| Ag. Thwmas | 0,0028 | 0,0024 | 0,0027 | 0,0028 | 0,0026 | 0,0018 | 0,0027 | 0,0034 | 0,0031 | 0,0029 |
| Nea Smyrni | -0,1714 | -0,1606 | -0,1535 | -0,1435 | -0,1325 | -0,1307 | -0,1298 | -0,1244 | -0,1172 | -0,1178 |
| Filippoupoli | 0,0307 | 0,0303 | 0,0303 | 0,0293 | 0,0289 | 0,0279 | 0,0279 | 0,0284 | 0,0278 | 0,0276 |
| Hpeirwtika | 0,0133 | 0,0133 | 0,0132 | 0,0131 | 0,0130 | 0,0129 | 0,0129 | 0,0123 | 0,0118 | 0,0119 |
| Leivadaki | 0,0308 | 0,0295 | 0,0281 | 0,0275 | 0,0231 | 0,0259 | 0,0270 | 0,0264 | 0,0256 | 0,0253 |
| Neapoli | 0,0381 | 0,0378 | 0,0365 | 0,0361 | 0,0355 | 0,0346 | 0,0335 | 0,0324 | 0,0326 | 0,0319 |
| Nea Politeia | 0,0943 | 0,0943 | 0,0940 | 0,0935 | 0,0934 | 0,0927 | 0,0915 | 0,0903 | 0,0918 | 0,0913 |
| Ag. Gewrgios | 0,0677 | 0,0674 | 0,0659 | 0,0654 | 0,0646 | 0,0628 | 0,0638 | 0,0625 | 0,0625 | 0,0624 |
| Laxanokhpoi | 0,0037 | 0,0048 | 0,0047 | 0,0039 | 0,0052 | 0,0046 | 0,0031 | 0,0023 | 0,0033 | 0,0033 |
| Pirovolika | 0,0451 | 0,0445 | 0,0429 | 0,0425 | 0,0415 | 0,0389 | 0,0408 | 0,0388 | 0,0379 | 0,0393 |
| Averwf | 0,1036 | 0,1030 | 0,1035 | 0,1009 | 0,0998 | 0,0980 | 0,0991 | 0,0978 | 0,0977 | 0,0975 |

⁵The data needed for the calculation of ACE (land area of each district) were provided by Larissa's Department of Planning.

The values of ACE for the 23 neighborhoods the year 2000-2001 and the year 2009-2010 are presented in Figure 5.12 and 5.13 respectively.

Figure 5.12: ACE for each Neighbourhood (Year 2000-2001)

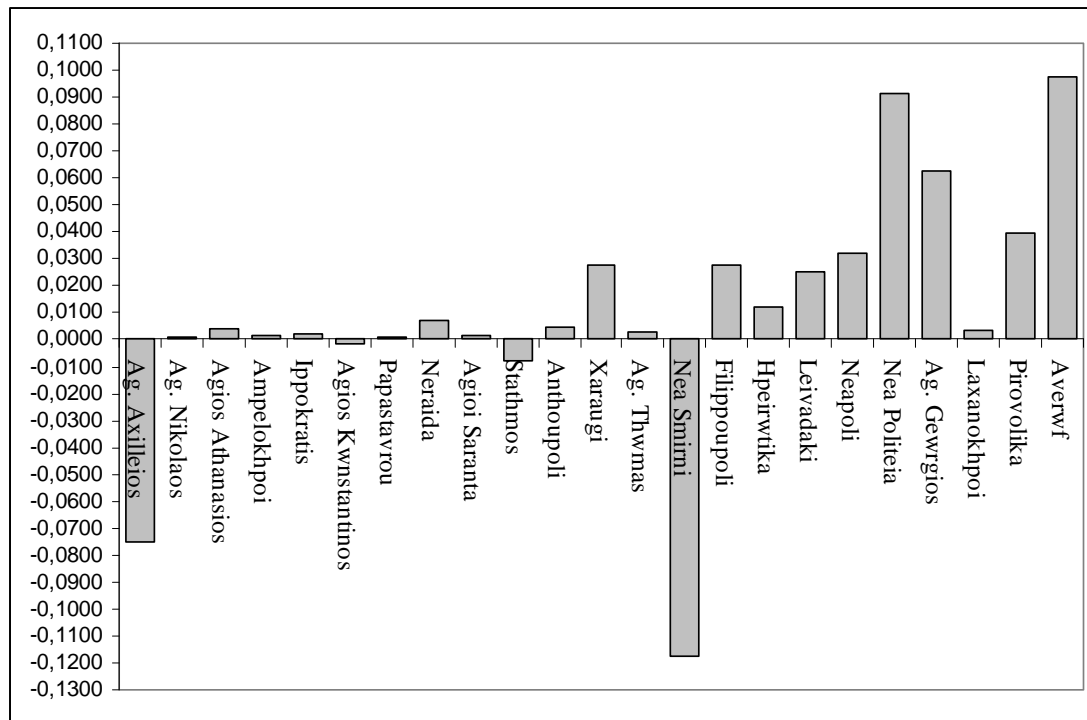


Source: Own Construction

The Year 2000-2001, as it seems in Figure 5.12, five areas have negative ACE, which indicates a tendency for immigrants to live in outlying areas: Agios Achilleios (-0,0672), Agios Kwnstantinos (-0,0003), Agioi Saranta (-0,0023), Stathmos (-0,0056) and Nea Smyrni (-0,1714). The rest of the areas have positive values of ACE, indicating a tendency for immigrants to reside close to the city centre. The areas characterized by a high degree of centralization is Averwf(0,1036), Nea Politeia (0,0943). The lowest values of ACE and near 0 is that of Agios Nikolaos (0,0007), indicating a uniform distribution.

This measure is affected by the land area of each neighbourhood. Granted that Averwf and Nea Politeia are the largest areas of Larissa, their highest positive values are more easily understood.

Figure 5.13: ACE for each Neighbourhood (Year 2009-2010)



Source: Own Construction

The year 2009-2010, the areas whose values of ACE are negative are Agios Achilleios (-0,0750), Agios Kwnstantinos (-0,019), Stathmos (-0,078) and Nea Smyrni (-0,1178). The areas characterized by a high degree of Centralization are those of Averwf (0,0975) and Nea Politeia (0,0913).

5.5 Evaluation on Clustering

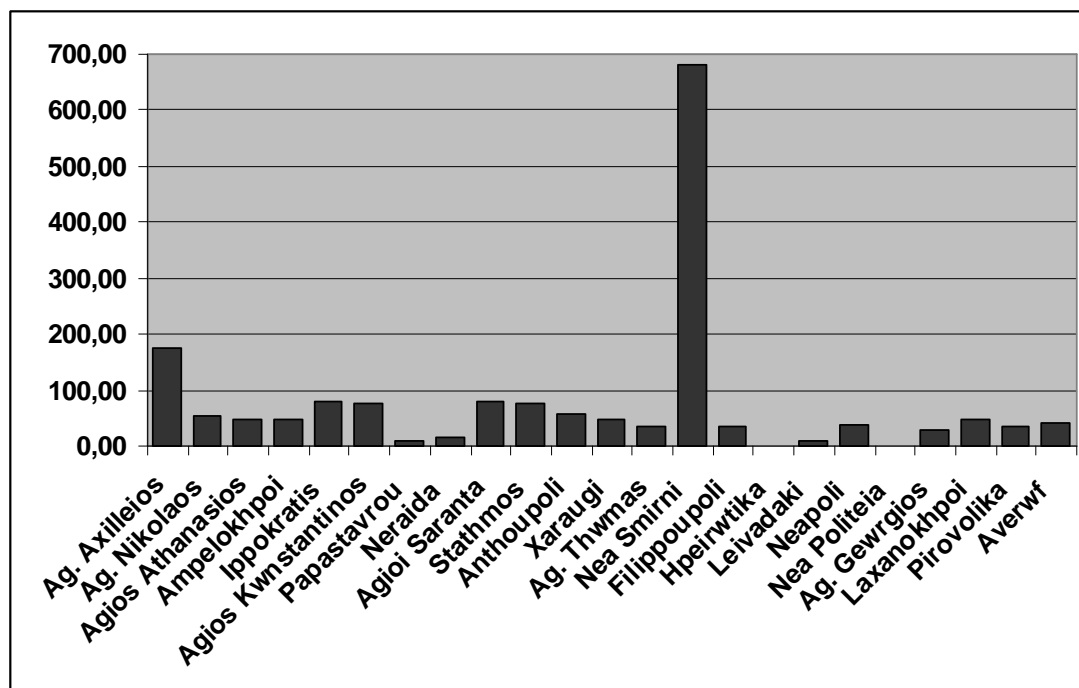
5.5.1 Proximity of immigrants (Pxx)

The last measure which is calculated is Pxx, for the years 2000-2001 and 2009-2010 and is presented in the Table 5.9. These results are presented in Figure 5.18 and 5.19 respectively and are plotted in Figures 5.14 and 5.15.

Table 5.9: The Pxx for Year 2000-2001 and 2009-2010

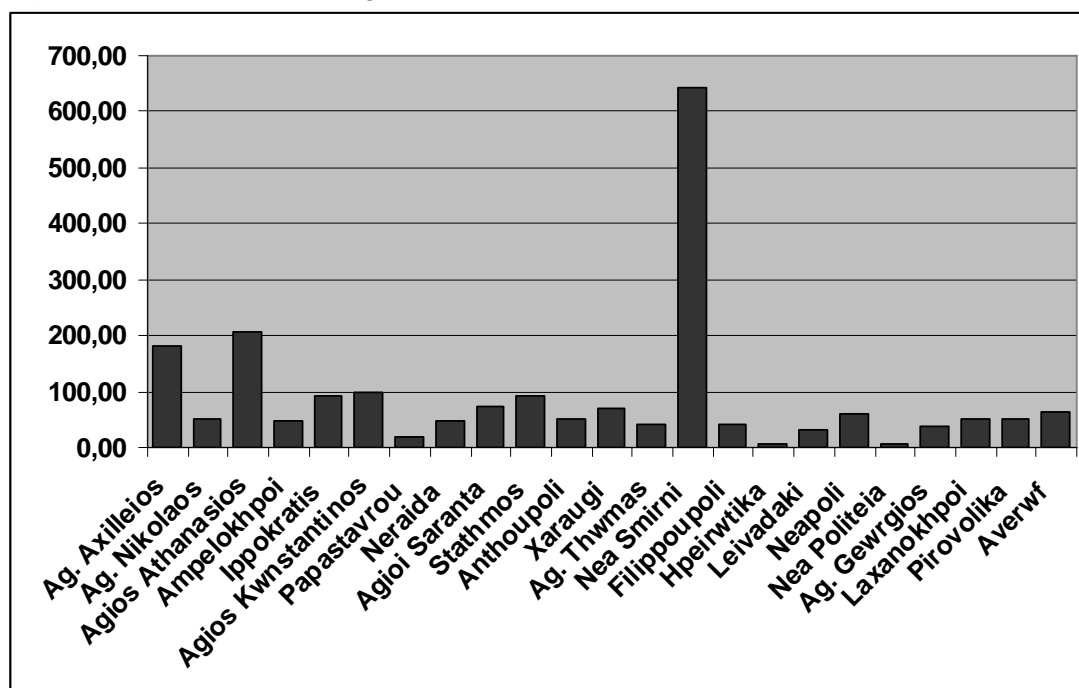
| Areas | 2000-2001 | 2009-2010 |
|--------------------|-----------|-----------|
| Ag. Achilleios | 174,05 | 182,53 |
| Ag. Nikolaos | 55,19 | 51,88 |
| Agios Athanasios | 47,43 | 207,49 |
| Ampelokhpoi | 49,11 | 48,39 |
| Ippokratis | 79,49 | 92,66 |
| Agios Kwnstantinos | 75,35 | 97,54 |
| Papastavrou | 9,81 | 20,41 |
| Neraida | 15,70 | 46,19 |
| Agioi Saranta | 78,52 | 73,86 |
| Stathmos | 75,56 | 91,47 |
| Anthoupoli | 56,25 | 49,75 |
| Xaraugi | 47,46 | 71,04 |
| Ag. Thwmas | 35,40 | 41,75 |
| Nea Smyrni | 681,40 | 644,00 |
| Filippoupoli | 33,95 | 40,19 |
| Hpeirwtika | 0,00 | 5,07 |
| Leivadaki | 8,78 | 32,85 |
| Neapoli | 39,19 | 61,90 |
| Nea Politeia | 0,00 | 5,37 |
| Ag. Gewrgios | 28,07 | 39,48 |
| Laxanokhpoi | 46,35 | 50,31 |
| Pirovolika | 33,89 | 50,74 |
| Averwf | 42,29 | 64,44 |

Figure 5.14: Pxx for Each Neighbourhood (Year 2000-2001)



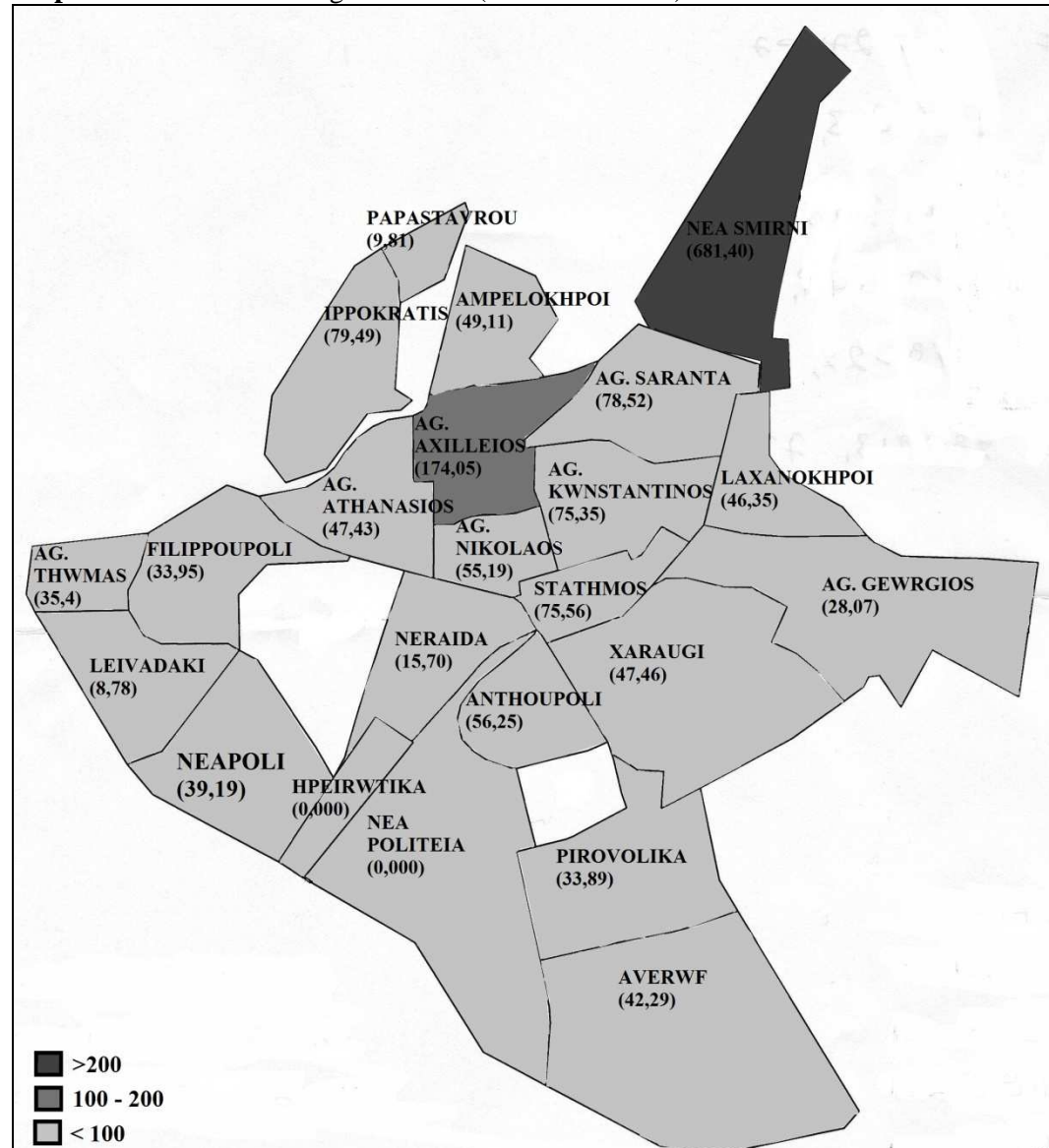
Source : Own Construction

Figure 5.15: Pxx for Each Neighbourhood (Year 2009-2010)



Source : Own Construction

Map 5.5: Pxx for Each Neighbourhood (Year 2000-2001)



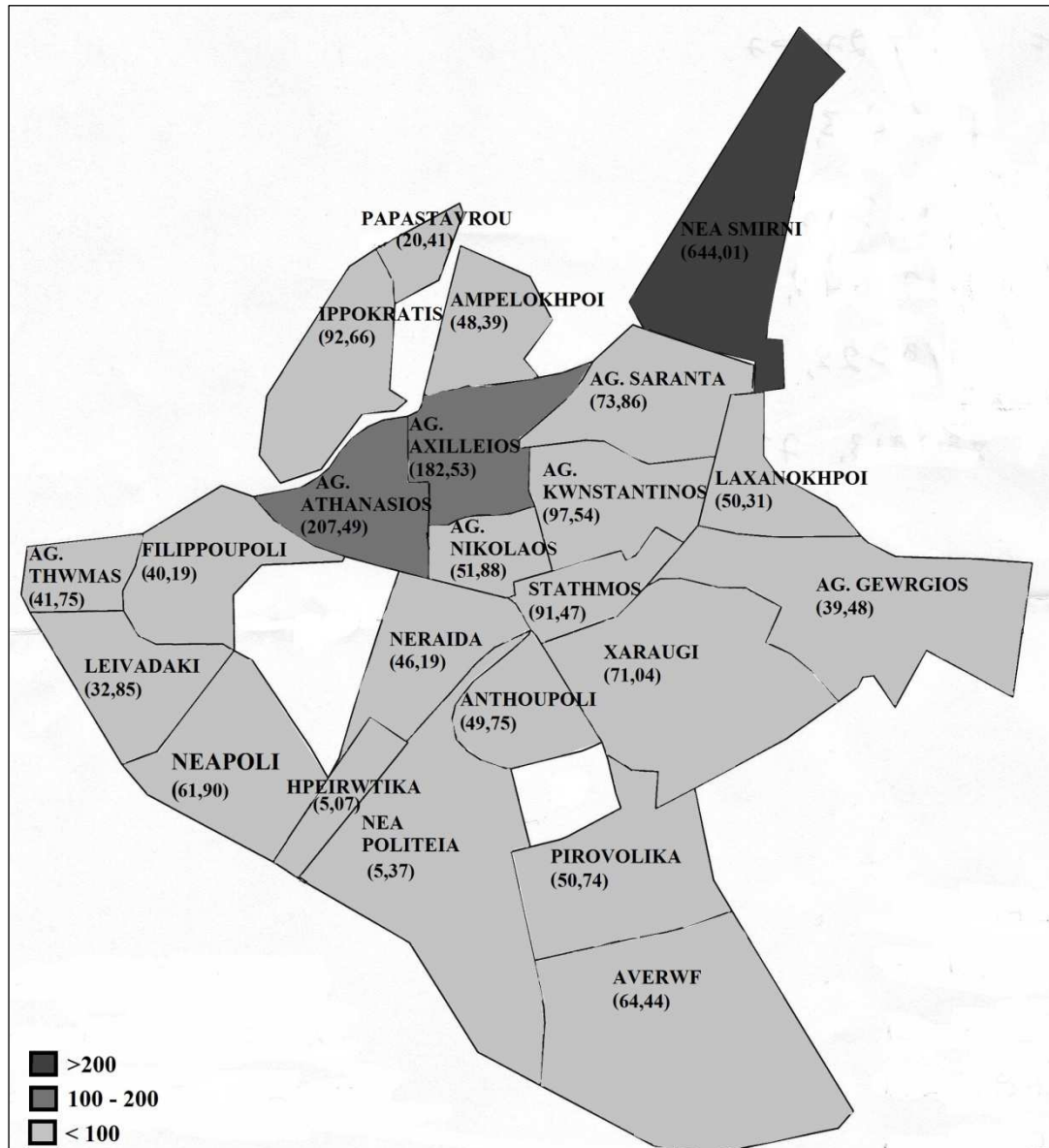
Source: www.larissa-dimos.gr , Own Construction

In the Map 5.5, the Year 2000-2001, as it seems, Nea Smyrni is the area with the highest degree of clustering, justified by large number of Romas, who reside there. The area with the next highest value of Pxx is Agios Achilleios, and it is almost six times smaller than that of Nea Smyrni. The Year 2009-2010, Nea Smyrni, remains the area with the highest value of Pxx and comparing to its value of 2000-2001, it is characterized by a minimal decrease (681,40 to 644,00).

In the map 5.6, the existence of Cluster in Nea Smyrni seems more clear. Most areas, according to the categorization, belong to the <100, which indicates a low degree of Clustering. Agios Achilleios belongs to second category, indicating a relative high

degree of Clustering. For the year 2009-2010, there is a similar pattern. The area with the highest value is Nea Smyrni which is decreased by 37,4 (from 684,40 to 644,01). The value of Pxx for Ag. Achilleios, however, is increased from 174,05 to 182,53 and the same is observed with the value for Ag. Athanasios from 47,43 to 207,49 and ,thus, they are characterized by a relative high degree of clustering.

Map 5.6: Pxx for each Neighborhood (Year 2009-2010)

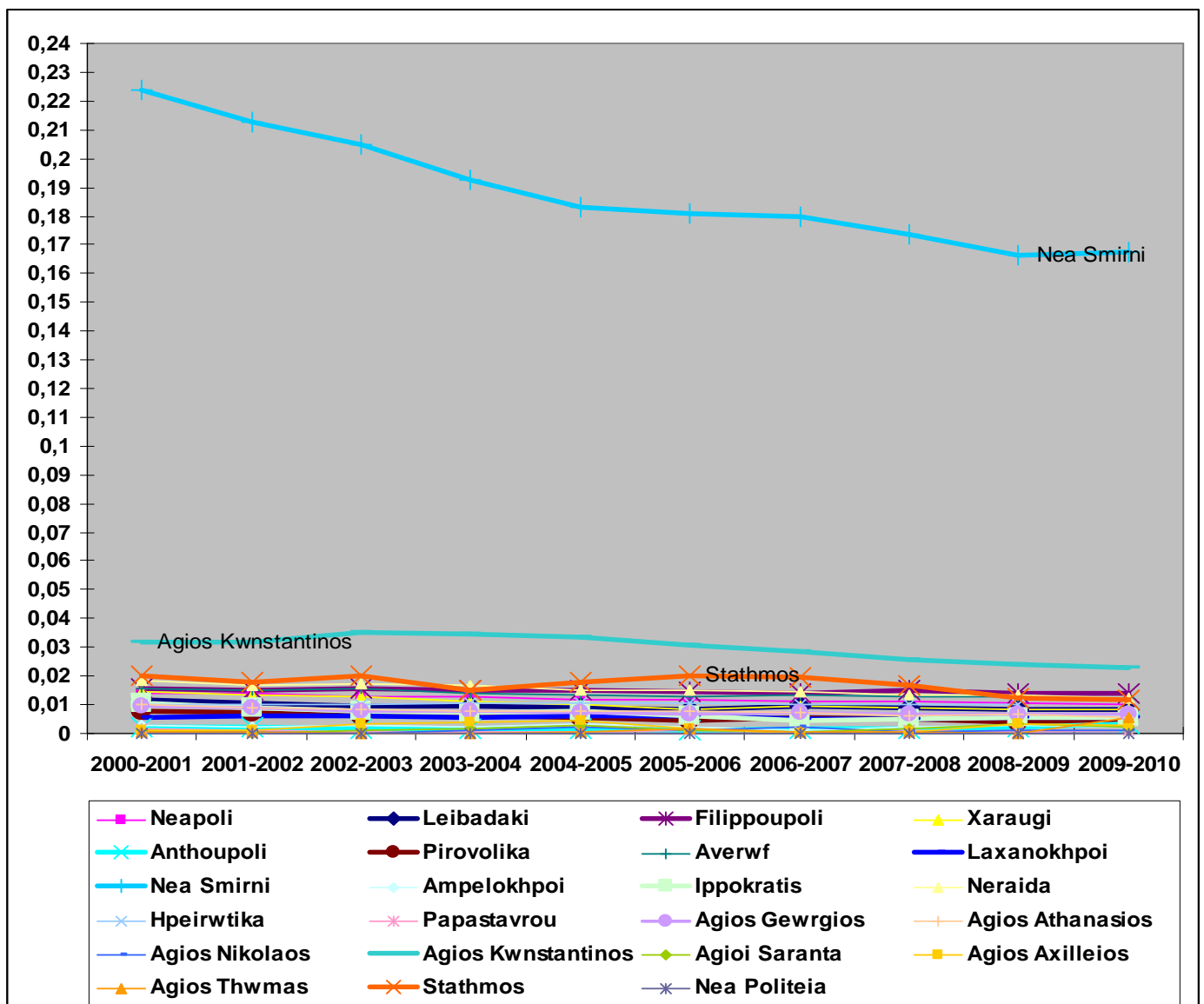


Source: www.larissa-dimos.gr , Own Construction

5.6 Annual Evaluation on Measures of Segregation

After examining the calculated results of each measure of the five dimensions of residential segregation, some observations in the diachronic changes of these values for each neighbourhood should be made. Next, the Figures of Dissimilarity Index, Isolation Index, Absolute Centralization Index and Pxx for each neighbourhood and for ten years are presented, in order that the patterns of residential segregation become more clear.

Figure 5.16: Diachronic Dissimilarity Index of neighborhoods in the last decade

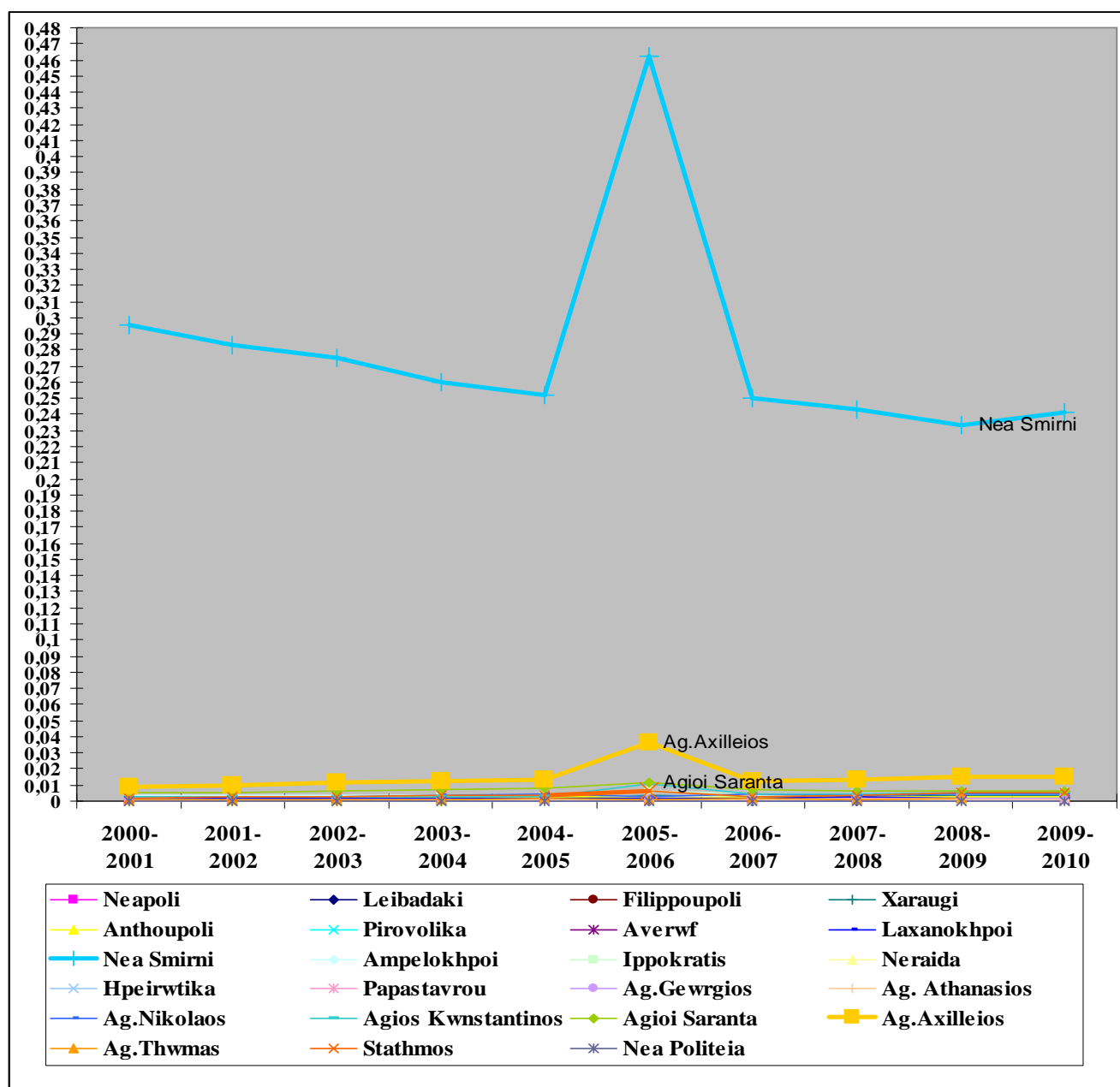


Source: Own Construction

In Figure 5.16, the values of Dissimilarity Index during the last ten years and for each area are plotted. For the most of the areas the values of that measure range in low level, and specially, between 0 and 0,02 without observing many fluctuations.

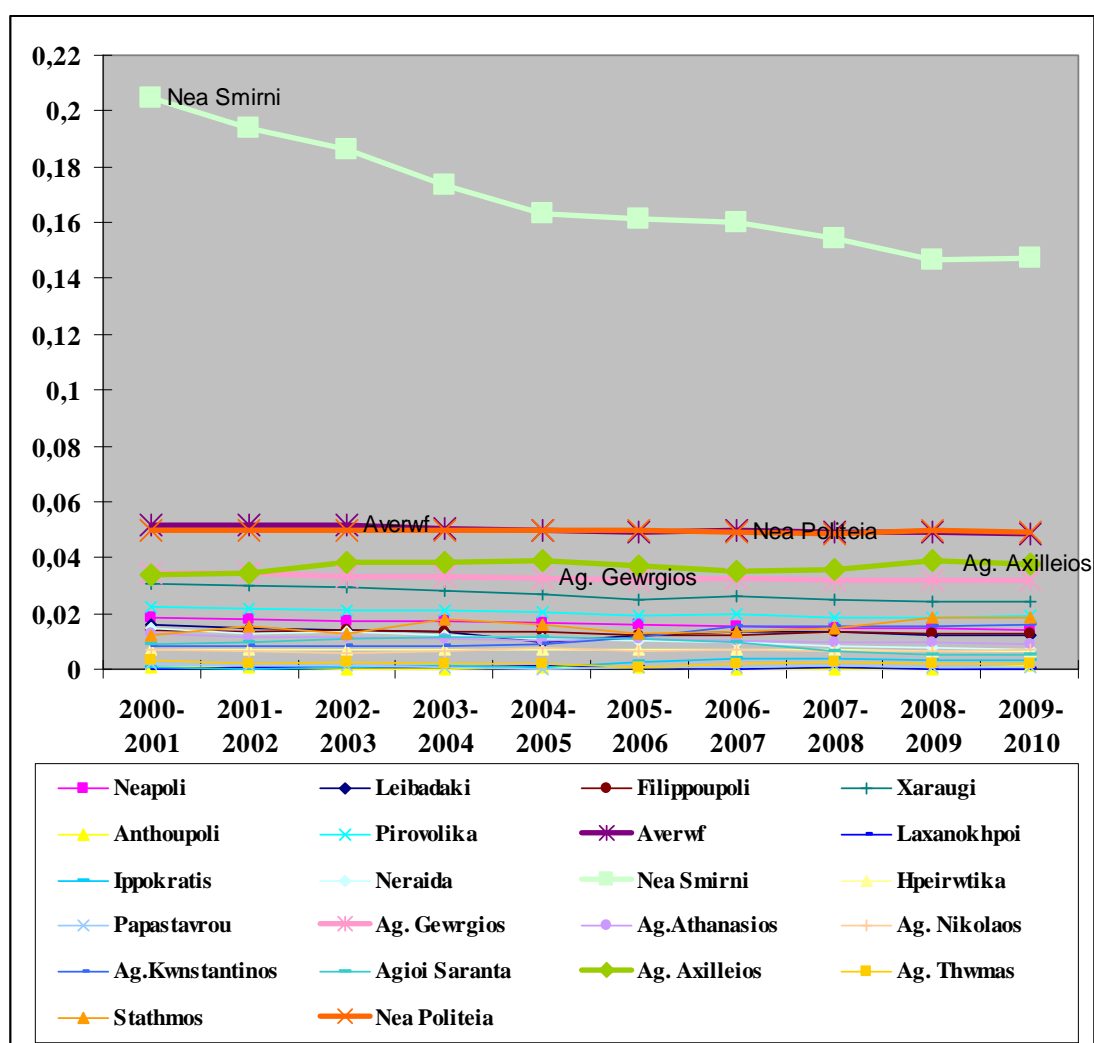
There are three areas with the highest Dissimilarity value. The first one is Nea Smyrni, whose Dissimilarity Index is high in relation to the other areas, and its values are characterized by a decrease each year. The second area is Ag. Kwnstantinos, whose values range around 0,03, without significant changes. And to finish with, Stathmos whose values range around 0,02. In general, there seems to be a relative uniform distribution of immigrants.

Figure 5.17: Diachronic Isolation Index of Neighbourhoods in the last decade



In the Figure 5.17, as can be seen, the values of Isolation Index for the most of the areas range between 0 and 0,01, which there seems to increase from 2000 to 2009. Four areas seem to have even higher values. The first one is Nea Smyrni, whose values of Isolation Index abstain from the other areas. Its values are generally stable until its peak (around 0,46) in the year 2005-2006 and then it decreases and arrives in the same levels as before 20005-2006. The second one is Agios Achilleios, which has a similar attitude. Its values are stable, but it has a peak of 0,3648 in year 2005-2006. Ending with, the third and fourth area is Agioi Saranta and Ampelokipoi whose values are almost the same. Also for the two areas, their peak of values takes place in year 2005-2006. The peak for the 2005-2006 shows that the number of immigrants increased.

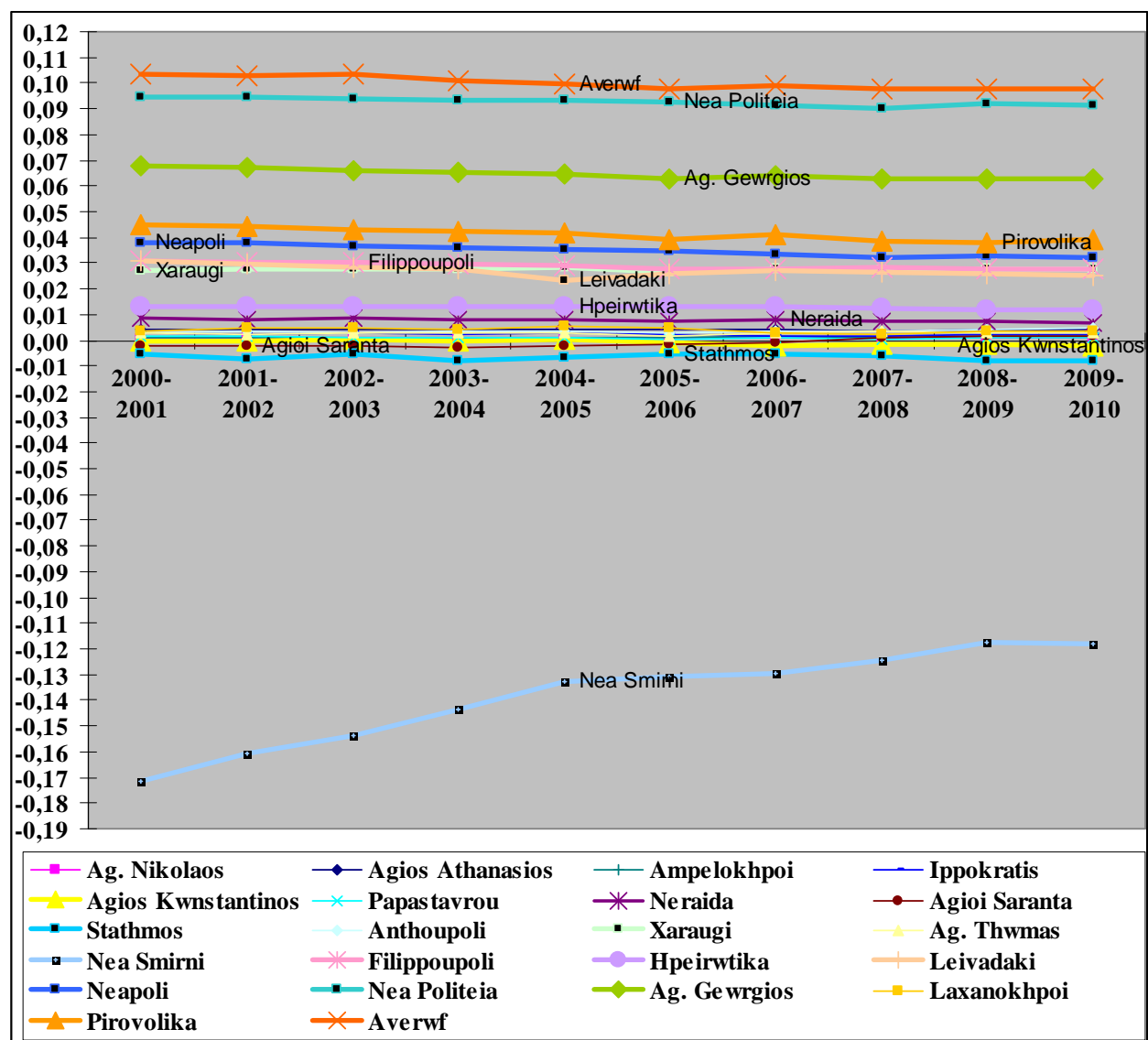
Figure 5.18: Diachronic Delta of Neighbourhoods in the last decade



Source: Own Construction

In general, the values of Delta remain stable during these years and in relative low levels, meaning that there is a satisfied degree of uniform density of immigrants in these areas, as the number of immigrants that could affect change all over the areas is small. On the other hand, areas with the highest values of Delta show that in these areas there is not a uniform density of immigrants in relation to the sum of areas. The area with the highest and the smallest changes is Nea Smyrni, whose values seem to decrease each year. The two following areas, Averof and Nea Politeia, have almost the same attitude.

Figure 5.19: Diachronic ACE of neighborhoods in the last decade



Source: Own Construction

It is observed that most of the values of ACE are positive, indicating that the immigrants have the tendency to live close to the city centre. Also, most of the values remain stable, except of Nea Smyrni. The areas with the highest value of ACE are Averof and Nea Politeia, showing that the tendency of immigrants to reside close to the city centre is more intense than in other areas. On the contrary, Nea Smyrni has the lowest negative value, indicating that the tendency to reside in outlying areas is intense. The ACE is also negative for Stathmos, Agioi Saranta and Agios Kwnstantinos. As far as Agios Kwnstantinos is concerned, its values were rising until 2003-2004, when it showed 0 indicating that the immigrants of this area have a uniform distribution throughout the city. For the next year, the value was also increasing to 0,0002 and the consequent years it was decreasing.

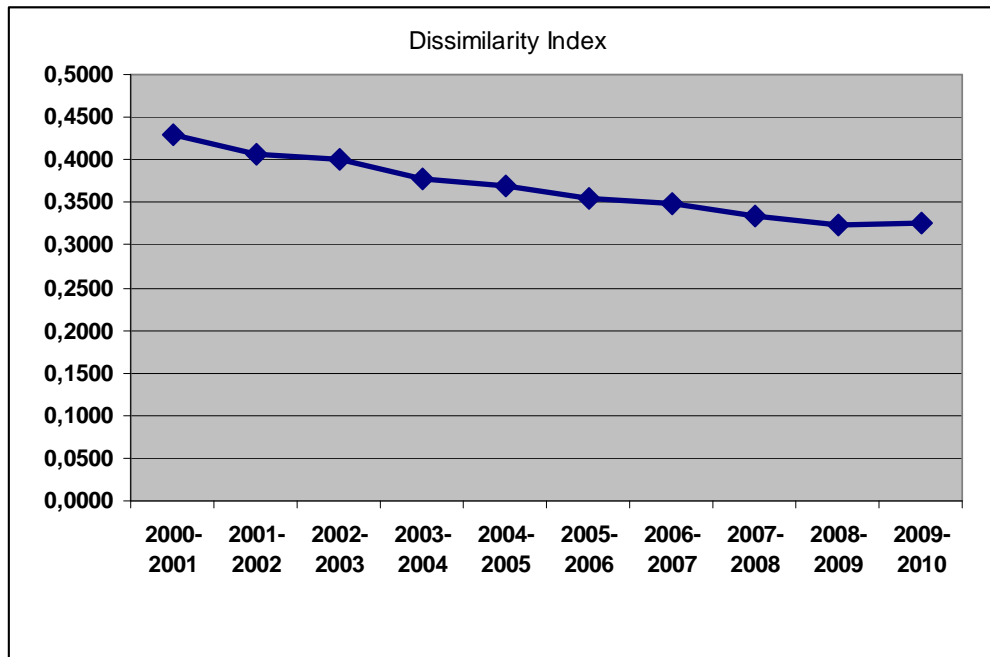
5.7 Evaluation on segregation of city

The analysis also examines the five dimensions of segregation of city. So, the sum of values of Dissimilarity Index, Isolation Index, Delta, ACE and Pxx of the 23 neighborhoods for each year is calculated. These values are presented in the Table 5.10.

Table 5.10: The values of Dissimilarity Index, IIS, Delta, ACE and Pxx of the city in the last decade

| | 2000-2001 | 2001-2002 | 2002-2003 | 2003-2004 | 2004-2005 | 2005-2006 | 2006-2007 | 2007-2008 | 2008-2009 | 2009-2010 |
|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Dissimilarity Index | 0,4303 | 0,4066 | 0,4006 | 0,3783 | 0,3690 | 0,3542 | 0,3482 | 0,3338 | 0,3232 | 0,3254 |
| Isolation Index | 0,3311 | 0,3224 | 0,3182 | 0,3086 | 0,3062 | 0,5530 | 0,3052 | 0,3027 | 0,2980 | 0,3068 |
| Delta | 0,5572 | 0,5420 | 0,5325 | 0,5197 | 0,5021 | 0,4901 | 0,4939 | 0,4814 | 0,4754 | 0,4748 |
| ACE | 0,2312 | 0,2368 | 0,2333 | 0,2390 | 0,2381 | 0,2344 | 0,2419 | 0,2388 | 0,2400 | 0,2414 |
| Pxx | 1713,24 | | | | | | | | | 2069,31 |

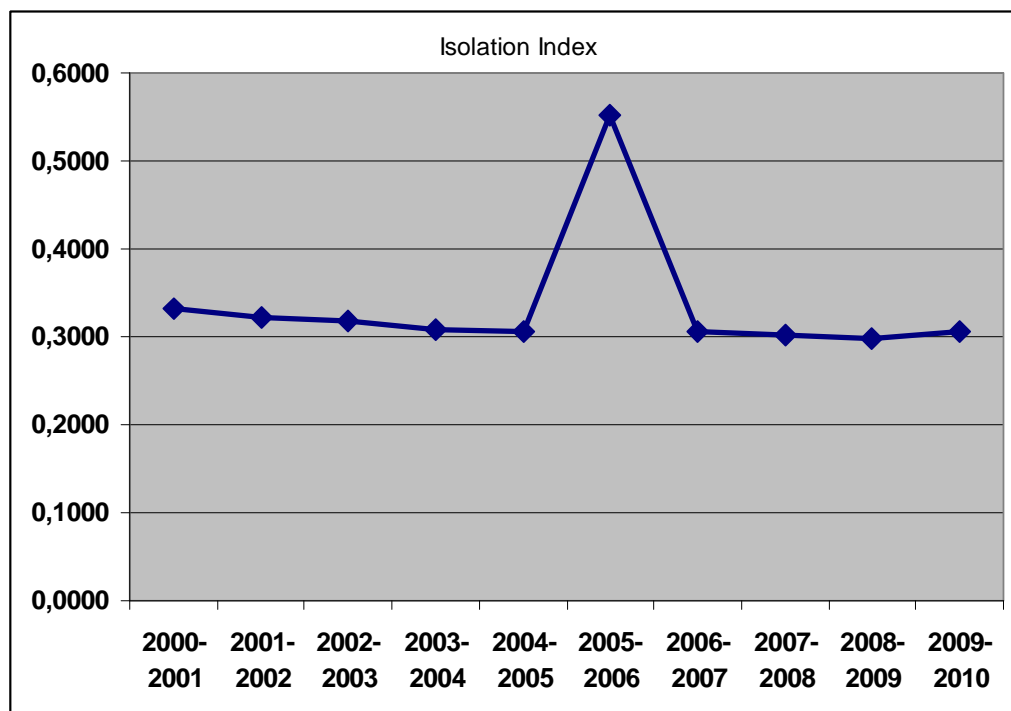
Figure 5.20: Dissimilarity of Index of Larissa in the last decade



Source: own construction

The values of Dissimilarity Index of Larissa in the last decade are figured in Figure 5.20. As can be seen, during the last ten years, the Dissimilarity Index has been decreasing by 65 %. According to the Dissimilarity Index of city, the degree of segregation seems to be decreased.

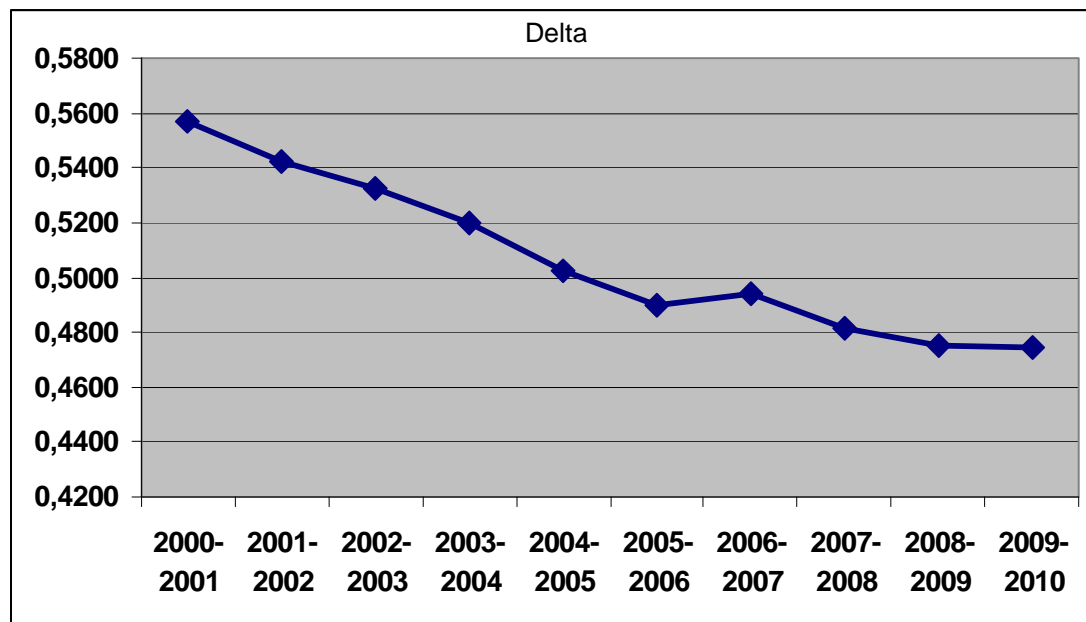
Figure 5.21: Isolation Index of Larissa in the last decade



Source: own construction

In the last decade, the Isolation Index of the city is decreased by 69 %, but its values fluctuate: from 2000-2001 to 2004-2005, there is a decrease, while the year 2005-2006 the Isolation Index has its highest value. Then , the measure remains in the same levels. In comparison to Figure 5.17 (neighborhoods' Isolation Index in the last decade are presented), it is observed that the diagram of Larissa's Isolation Index is similar to the diagrams of Nea Smyrni, Agios Achilleios, Agioi Saranta, Stathmos, Agios Nikolaos, Pirovolika.

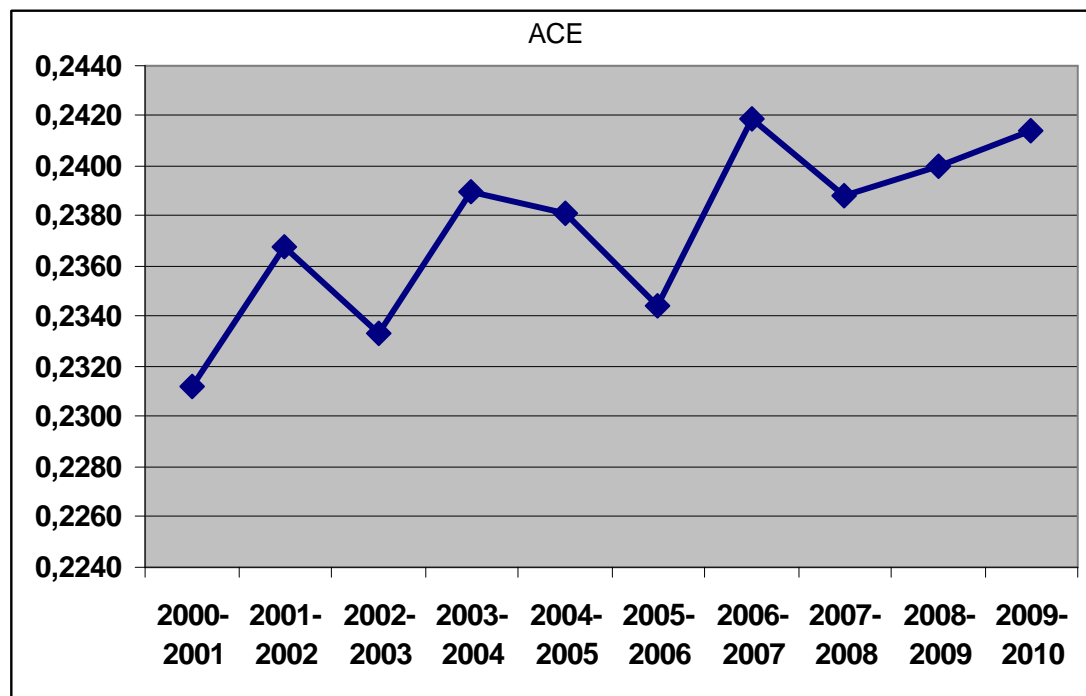
Figure 5.22: Delta of Larissa in the last decade



Source: own construction

In Figure 5.22 , the city's Delta seems to fluctuate. Until 2005-2006, the value delta has a downward course, then it is increased and continues to decrease. Comparing to Figure 5.18 ,the downward course has been due to the downward course of Nea Smyrni's Delta since the Delta for the other areas remain stable.

Figure 5.23: ACE of Larissa in the last decade



Source: own construction

From 2000-2001 to 2009-2010, the value of ace has been increased even though we can observe intense variations. Positive values show the tendency of the immigrants to stay in the city.

The general impression of Larisa is that the degree of segregation has been decreased over this decade

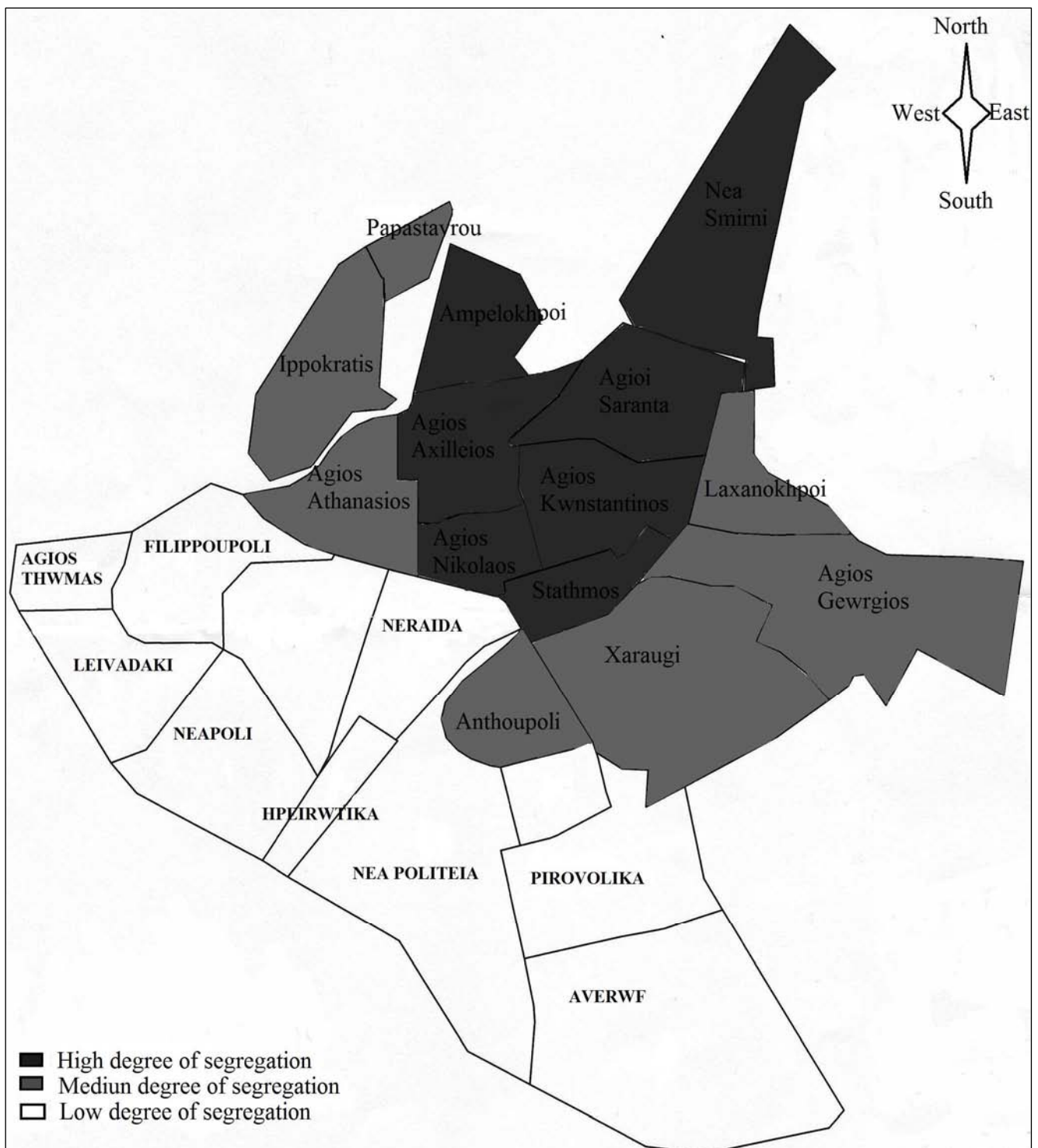
6. Discussion

After the analysis of five dimensions of segregation, the year 2000-2001, it is concluded that the areas which have the highest degree of segregation are the central: Agios Achilleios, Agios Kwnstantinos, Agios Nikolaos, Stathmos. So, immigrants tend to gather in central areas of city. In addition, the northern areas have a relative high degree of segregation, such as Ippokratis, Papastavrou, Ampelokhpoi. The possible reason why these areas seem to attract immigrants is that these areas are degraded in comparison to the other areas. Finally, Southern areas(Leivadaki, Neapoli, Hpeirwtika, Nea Politeia, Pirovolika) have the lowest degree of segregation.

Comparing residential patterns of 2000-2001 to 2009-2010, radical changes do not seem to happen. As 2009-2010, the areas where immigrants tend to gather are the central and northern.

In Map 6.1, the degree of segregation is plotted in year 2009-2010. The areas exhibited the highest degree of segregation are the central (Agios Achilleios, Agios Kwnstantinos, Agios Nikolaos, Stathmos) and the Northern (Ampelokhpoi, Nea Smirni, Agioi Saranta), while the lowest degree of segregation is recorded in Southern districts: Neapoli, Nea Politeia, Averwf.

Map 6.1: Segregation of Larissa (year 2009-2010)



Source: www.larissa-dimos.gr, own construction

The result of the analysis showed that there seems to be a cluster in Nea Smyrni, but in reality there is not a cluster of immigrants. Although that the values of each measure and especially of clustering, P_{xx} , in Nea Smyrni are extremely high in comparison to that of the rest of areas, it is justified by the fact that in Nea Smyrni a large number of Romas reside there for many years. For that reason, the minority group of Romas is almost the 2/3 of the total population in that area, and, thus, the formation of Romas in Nea Smyrni, cannot be considered as a cluster of 'ethnic' enclaves.

Apart from Nea Smyrni, the highest values of Dissimilarity Index are observed in Agios Kwnstantinos and Stathmos, areas located in the city centre, while Nea Politeia has the lowest value. Moreover, the highest values of Isolation Index are exhibited in Agios Achilleios, Agioi Saranta, Ampelkhpoi and Agios Nikolaos, areas of the city centre. The diachronic change of Isolation Index showed a minimal increase for almost areas each year from 2000-2001 to today, indicating that 'new' immigrants came to Larissa.

There seems to be a uniform distribution of immigrants, concluding that they are spread in all over the urban area, of course in some areas the percentages are higher and in other lower.

The values of Delta remain stable during these years and in relative low levels, meaning that there is a satisfied degree of uniform density of immigrants in these areas, because the number of immigrants that should change in order to achieve a uniform density all over the areas is small.

The fact that most of the values of ACE are positive, indicating that the immigrants have the tendency to live close the city centre. For the Agios Kwnstantinos, Stathmos, Agioi Saranta, the values of Ace are negative indicating that there is the tendency to reside in outlying areas. These values are near to zero, so there are a significant number of immigrants in these areas.

Apart from Nea Smyrni, the areas which seems to attract immigrants are the Northern districts: Agios Achilleios, Ampelokhpoi, Agios Kwnstantinos and the areas which do not attract them are the Southern districts, and, mainly, Nea Politeia.

So, the results of the analysis give support to the literature, which refers that the first preference of immigrants, when they are newcomers, is the inner-city. Larissa presents a similar pattern to Athens and Thessaloniki, where immigrants decide to locate in the centre.

Another significant issue is also the reasons why immigrants prefer the city centre. The reasons are economic and cultural confirming the spatial assimilation theory. Firstly, immigrants decide to settle in the centre, because there is availability of old and low-priced houses to rent or buy, in contrary to the Southern Districts, areas under growth, where there is not this capability. Especially, Nea Politeia is considered to be the best area of Larissa, where the most affluent and with the highest level of education reside. An important issue connected to that of the economic aspect is the commuting cost. If they decide to locate far from the centre, there will be a small increase on their expenses, because of their transportation from and to the centre. So, the need to make only the necessary expenses, specially, in the beginning reinforces them to locate in the centre.

In addition, their settlement in the city centre is result of cultural reasons. The newcomers prefer to reside in areas, where co-ethnics also reside. This fact creates for them a secure and safe environment, knowing that co-ethnics will help them in emergency. Most of them do not like the idea of living in an area, where the majority group of natives resides, so, they prefer areas where this number is as limited as possible.

In the analysis, during these ten years, there was not clear evidence for the mobility of immigrants to other areas. This can be explained by the intolerance and xenophobia of the natives. Particularly, after a period of time of settlement in an area, the immigrants may have the financial ability to change area and move to another, where the constructions and the apartments are newer and in better conditions than that in the centre. Despite this choice, immigrants prefer to remain in the same area. Thus, they remain segregated.

To sum up, the theoretical perspectives which support that immigrants prefer to locate in areas in the centre, which most of times are degraded with a low level of education and not affluent areas is affirmed. Moreover, the reasons why they have this attitude are also confirmed.

Conclusions

Taking into serious consideration all the above, this thesis has examined the five dimensions of residential segregation in the city of Larissa by using six basic measures of segregation. The results of this analysis showed that immigrants are spread in all urban areas of Larissa, but the largest percentage can be found in the city centre and expanded city centre, confirming thus the literature that immigrants have a preference in intra-urban locations.

Although Pxx measures in Nea Smyrni are extremely high in relation to that of the other areas, it can be justified by the fact that in Nea Smyrni a large number of Romas reside there for many years. So, they tend to be the majority of the population - almost 2/3 of population are Romas- as it seems by the number of natives and immigrants of the two schools located there. Unfortunately, this fact has led to the consideration of Nea Smyrni as a degraded area and in the last years there is no effort for growth in the area. The high values of the measures of segregation observed in the area of Nea Smyrni are due to the existence of this minority group and not of the existence of immigrants of other ethnicity, who chose our country and Larissa to locate. So, it cannot be considered as a formation of “ethnic enclaves”.

Also, the areas with the lowest percentages of immigrants are the Southern districts, the newest part of the city, where immigrants like it seems are not attracted. Because these areas are under growth and not very close to the centre, immigrants do not prefer to locate there. This happens for two reasons: economic and cultural. Firstly, because in these areas, they have not the option to rent or buy an apartment in low prices, they decide to locate in central areas, where there is availability of old and low priced apartments. Moreover, the economic reasons are related to the commuting costs. If they decide to settle in areas far from the centre, they will have an additional commuting cost. So, they decide to settle in areas in the inner city. Secondly, the cultural reasons are connected with the settlement of co-ethnics in the city-centre. Newcomers tend to cluster together.

Although, it becomes more clear that the main reason on why immigrants choose their location is economic, a matter of living and surviving not only for themselves but also for their families, and their general co-surroundings there is need for further research.

References

Alma R. and Nee V. (2003), *“Remarking the American Mainstream”*, Cambridge, Harvard University Press.

Arapoglou V. (2006), *“Immigration, segregation and urban development in Athens: the relevance of the LA debate for southern European metropolises”*, The Greek Review of Social Research, special issue, 121C:11-38.

Arvanitidis P., Skouras D. and Psycharis Y., (2008), *“Immigrant Residential Segregation in medium-sized Greek cities: the case of Volos”*, Paper published by the University of Thessaly Press.

Arvanitidis P. and Skouras D.,(2008). *“Immigrant’s locational patterns in Athens ”*, paper presented at the 3rd Pan-Hellenic Conference on International Political Economy, 16-18 May 2008, Athens, [in Greek].

Antoniou T., Melidou T. and Nikopoulos C., (2009), *“Immigrants in Greece”*, Article in Newspaper Ethnos, 19/05/2009, [In Greek], Available at: <http://www.ethnos.gr/article.asp?catid=11424&subid=2&pubid=34298948>.

Baldwin-Edwards M. (2004), *“Statistical data on immigrants in Greece: an analytic study of available data and recommendations for conformity with European Union standards”*, Mediterranean Migration Observatory UEHR, Panteion University.[in English and Greek].

Bauder H. and Sharpe B., (2002),*“Residential Segregation of visible minorities in Canada’s gateway cities”*, Canadian Geographer, 46, 3, Research Library.

Bayer P., McMillan R. and Rueben K., (2001), *“The causes and consequences of residential segregation: an equilibrium analysis of neighbourhood sorting”*, Public Policy Institute of California.

Bean F.D. and Stevens G. (2003), *“America’s Newcomers and the Dynamics of Diversity”*, Russell Sage Foundation, New York.

Burgess S. and Wilson D., (2004), *“Ethnic segregation in England’s schools”*, Discussion Paper, CASE paper 79.

Casciani D., (2005), *“Analysis: Segregated Britain?”*, Article in BBC News, 22/09/2005, available at: http://news.bbc.co.uk/2/hi/uk_news/4270010.stm, [last access: 4/10/2010]

Cavounidis J., (2004), *“Migration to Greece from the Balkans”*, South Eastern Europe Journal of Economics 2, 35-59.

Chindea A., Majkowska-Tomkin M., Mattila H. and Pastor I., (2008), *“Migration in Greece: A Country Profile 2008”*, International Organization for Migration.

Cristaldi F., (2002), *“Multiethnic Rome: Toward residential segregation?”*, GeoJournal, 58: 81–90.

Directorate of Primary Education of Thessaly, available at: www.larisa-dimos.gr [last access: 28/09/2010]

Directors of the Primary Schools of Larissa, (2010), Interview.

European Foundation for the Improvement of Living and Working Conditions, (2009), *“Housing and segregation of migrants: Case study: Stuttgart, Germany”*.

Feitosa F., Camara G., Monteiro A., Koschitzki T. and Silva M., (2006), *“Global and Local Spatial Indices of Urban Segregation”*, Instituto Nacional de Pesquisas Espaciais.

Grbic D., Ishizawa H. and Crothers C., (2010), “*Ethnic residential segregation in New Zealand, 1991–2006*”, *Social Science Research*, 39: 25–38.

Hatziprokopiou P., (2006), “*Processes of Social Incorporation of Balkan Immigrants in Thessaloniki*”, Amsterdam University Press, Amsterdam.

Hatziprokopiou P., (2005), “*Immigrants’ integration and social change: Greece as a multicultural society*”, Paper presented at the Second LSE Symposium on Modern Greece, London School of Economics and Political Science European Institute, Hellenic Observatory.

Iceland J., (2004), “*Beyond Black and White Metropolitan residential segregation in multi-ethnic America*”, *Social Science Research*, 33, 248-271.

Iceland J. and Scopilliti M. (2008), “*Immigrant Segregation in U.S. Metropolitan Areas, 1990-2000*”, *Demography*, Volume 45-Number 1: 79–94.

Johnston R., Poulsen M. and Forrest J., (2009), “*Evaluating Changing Residential Segregation in Auckland, New Zealand, using Spatial Statistics*”, *Tijdschrift voor Economische en Sociale Geografie*.

Kandylis G., Arapoglou V. and Maloutas T., (2008), “*Immigration and the Spatial (Dis)Equilibrium of Competitiveness – Cohesion in Athens*”.

Kasimis C. and Kassimi, C. (2004) “*Greece: a history of Migration*”. Migration Information Source. Available at:
<http://www.migrationinformation.org/Profiles/display.cfm?ID=228> [last access: 04/10/2010].

Kokkali I.E., (2005), “*Albanian immigration and urban transformations in Greece: Albanian migrant strategies in Thessaloniki, Greece*”, paper presented at 2nd LSE PhD Symposium on Modern Greece, 10 June.

Larissa’s Department of Planning, (2010), Interview.

Martori J., Hoberg K. and Surinach J., (2005),), “ *Segregation measures and spatial autocorrelation. Location patterns of immigrant minorities in the Barcelona Region*”, 45th Congress of the European Regional Science Association, Vrije Universiteit Amsterdam.

Massey D. and Denton N., (1988), “*The dimensions of Residential Segregation*”, Social Forces, Vol. 67, No. 2 (Dec., 1988), pp. 281-315.

Mudu P., (2006), “*Patterns of Segregation in contemporary Rome*”, Department of Sociology, Urban Geography, 2006, 27, 5, pp. 422–440.

Municipality of Larissa. Available at: www.larissa-dimos.gr [Last access: 17/09/2010]

Nebe J. M., (1988), “Residential segregation of ethnic groups in West German cities”, Department of Applied Geography, University of Trier, FR Germany.

Public Issue, (2009). Survey: “*The settlement of immigrants in the Metropolitan area of Athens*”, In Greek. Available at: <http://www.publicissue.gr/1520/> [Last access: 17/09/2010].

Quillian L., (2002), “*Why Is Black–White Residential Segregation So Persistent?: Evidence on Three Theories from Migration Data*”, Social Science Research 31, 197–229.

Sandoval J., Johnson H. and Tafoya S., “*Who’s Your Neighbor? Residential Segregation and Diversity in California*”, Public Policy Institute of California, Volume 4 Number 1.

White M. and Kim A., (2005), “Residential Segregation”, Encyclopedia of Social Measurement, Volume 3, Elsevier Inc.

Skouras D. and Arvanitidis P., (2007), *“Intra-urban patterns of immigrant location: a preliminary investigation”*, Department of Planning and Regional Development Department of Economics, University of Thessaly, Greece.