Suburbanisation: A Post World War II Phenomenon into the Athens Metropolitan Area, Greece

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1. Introduction - The Theoretical Scheme

The current high level of urbanisation globally is a relatively recent phenomenon. At the end of 19th century the extension of the world urbanisation was limited. According A. F. Weber (1899) only Britain, NW Europe and the USA were more than 25% urban.

The increasing levels of urbanisation and urban growth are the result of natural increase of the urban population and of net immigration to urban areas. The two major processes reinforce each other, although their relative importance varies. Findley (1993) for example, found that for 24 developing countries, between 1975 and 1990 the average contribution of migration to urban growth was 54%.

But, according many studies, such as A. Fielding (1982), A. Champion (1989), D. Cross (1990), the international indicators of urbanisation shouldn't be taken to mean that urbanisation is a unidirectional (low to high) process. In a large number of advanced countries the level of urbanisation actually decreased between 1965 and 1990. And this phenomenon is now generally acknowledged to indicate a process of population redistribution, which involves either the relatively faster growth of smaller urban places or the absolute decline of the largest cities.

The theory of spatial cycle, introduced by Leo H Klaassen *et al* (1981), adopted by Van den Berg *et al* (1982) and many others aims to explain the stages of urban centers development with relation to their wider geographical environment.

A cycle defines the period of the space/time continuum during which a system emerges and declines, while a transition is the period between two cycles.

A cycle is based upon the fact that a system, once in place, works according to a relative stability of its parameters and their dynamics in time and space. (Jean-Paul Rodrigue *et al*, 1997).

According to Klaassen approach, the development of metropolitan areas is formed in four phases:

- The Urbanisation phase ,when certain settlements grow at the cost of their surrounding countryside

- The Suburbanisation (or Exurbanisation) phase, when the urban ring (commuter belt) grows at the cost of urban core

- The Disurbanisation (or Counterurbanisation) phase, when the population loss of the urban core exceeds the population gain of the ring, resulting in agglomeration losing population overall

- The Reurbanisation phase, when either the population loss in the core is reduced, or the core starts regaining population with the ring still losing population.
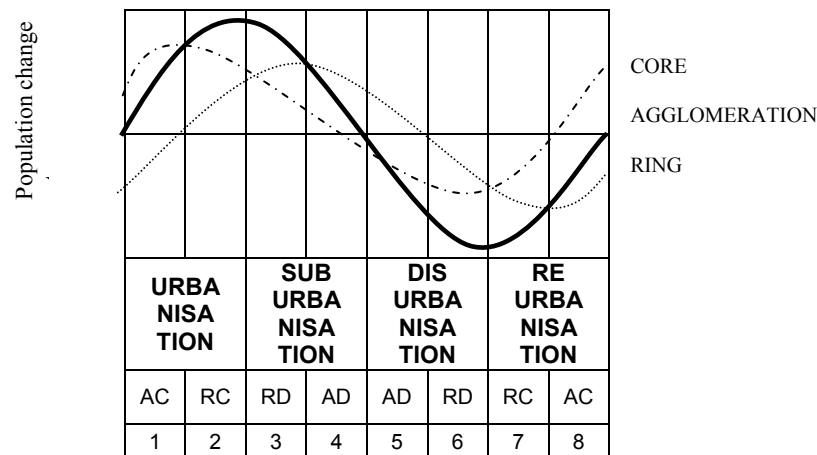
A=Absolute, R=Relative

C=Centralisation, D=Decentralisation

Source: A. Champion (2000)

Figure 1 Population change of agglomeration core and ring during the several stages of spatial cycle

As Figure 1 indicates, the model is based on changes in the direction and the rate of population movement between urban core and urban ring. The two types of change are absolute shifts when the directions of population change in the two zones differ, and relative shifts when change occurs in the same direction but at different rates.

At the urbanisation stage, there is an intense move of population and economic activities from the perimetrical regions towards the metropolitan centre.

The development of the secondary and tertiary sectors in the urban area in combination with other factors such as the installation of the primary sector in the perimeter, as well as the promotion and adoption of new patterns and the attractive power of metropolis which are formed by external economies, together with the infrastructure and other institutional factors, create the proper conditions for urbanisation.

With the accumulation of population and activities into the metropolitan centre, the negative external economies are getting inflated; the traffic jam appears together with the delays in the movement of employees to and from the work as well as the transportation of raw materials or final products. Also, the shortage of space to expand premises units (especially of extensive activities, like storage or distribution of products) appears together with pollution and other adverse conditions of living.

In order to meet these unfavourable conditions, households of medium and especially high income move to the suburbs of high environmental quality and favourable conditions of housing. Thus, the second phase of the spatial cycle, i.e. suburbanisation emerges.

Very interesting is a list of ten differing interpretations by L. Bourne (1996) about suburbs, where he analyses their importance as natural ecological extensions of the accommodating growth, as means of escapism of the social and environmental problems, as macro-economic policy tools for generating local employment and promoting capital accumulation, as a means of social engineering, as means of individual utility maximisation, as a means of socio-political strategies assuring social homogeneity, recapturing an assumed rural way of life, without losing the advantage of urban living.

The move of households and employees to the suburbs worsens the condition at the core city because it contributes to the increase of the daily traffic towards the centre either for work or for contact with clients; this move leads to aggravation of the traffic problem and to further environmental pollution

In the UK dormitory settlements were grown almost solely because of out-migration from central cities. These have been termed metropolitan villages.

According to F. Masser and D. Stroud (1965), metropolitan villages are defined as settlements, where 20% or more of their workforce is employed in certain towns or cities.

Due to the above mentioned conditions, the enterprises of free installation - mainly companies of the tertiary sector are re-established into suburbs close to their executives and clients. In addition, better environmental conditions ensure higher performance of the employees and upgrade of the company's prestige.

Very interesting are the opinions of Heinrich Mäding (2004) about the situation of Germany, which represent the situation of about all the Central Europe. According to him, there has been a long debate about the "correct" M demarcation for the inner urban area, the surrounding area (various "rings") and the urban region in its entirety, about suitable indicators and statistical methods. His main aspects about the trends can be summed up to the following: Suburbanisation coefficients were slowly but continuously increasing everywhere. The degree of suburbanisation of the population was greater than that of employment; the degree of urbanisation was greater in the secondary sector than in the tertiary sector. In the 1960s and 1970s the cities were "overflowed" like a full wash basin. Commuter distances increased. In the 1980s and 1990s inter-regional migration and the establishment of companies strengthened the surrounding areas more and more directly. Settlement axes were grown according the extension of the road infra-structure. The suburbanisation of employment was less dispersed, concentrated in places with good transport links. Large area shopping and large area leisure facilities were appearing to a great extent in surrounding areas, which were easily reached by car. The inhabitants of a region were no longer so focused on the town or city as the centre for work, shopping and cultural services. There were also surprising "spatial" connections, for example, those who live to the south of an inner city, often move to a southern suburb.

The suburbanisation wave reaches its greatest extension in the phenomenon of extended suburbanisation or exurbanisation. Nelson (1992) identified four principal factors to explain exurbanisation in USA:

1. Continued deconcentrisation of employment at the rise of exurban industrialisation

2. The latent anti-urban and rural location preferences of US households

3. Improved technology that makes exurban living possible

4. An apparent policy bias favouring exurban development over compact development.

Exurbia tends to be dominated by middle-class residents, many of whom commute long distances to work in city or in the newer suburbs, but other groups also present, including retirees and young households seeking social status, more land and new housing at a lower cost than is available in the suburbs. J.S Davis *et al* (1994) found that in the USA the exurbs have captured as much as 25% of recent national population growth and 60% of recent manufacturing investment. For W. Lucy and C. Philips (1997) this heralds a 'post-suburban' era characterized by inner suburban population loss and relative income decline, an increase in suburban employment, a reduction in population and income, and increased farmland inversion to urban use."

With the re-establishment of companies and the over-concentration of population into the suburbs, the previous stage is completed and the disurbanisation stage begins. Households and businesses have vacated a big part of the centre of the metropolis. This evolution has two consequences: (a) in the core city, the economical activity is shrunk and (b) the abandoned space is occupied by social and national groups which are often involved in illegal activities.

In 2000 the 50% of the USA population leave at the suburbs. According to J. Gareau (1988), the functions of the suburbs range from undifferentiated residential areas to a more recent mix. This mix includes of specialized retail corridors, high-techno logy industrial clusters, and high-density office and commercial nodes or "edge cities".

These consequences result into the ghettoisation of the centre of the metropolis.

In the 1960s several US cities, notably New York, became technically bankrupt and unable to finance their current expenditure on services. Rising local taxes and deteriorating local services merely served to accelerate the flight of many residents and firms into the suburbs, leaving behind the less dynamic economic sectors and less wealthy people, notably African-Americans and recent immigrants. Even in 1980s when New York City's population grew by 3.5%, its white non-Hispanic population fell by 11.5% and the proportion of its total residents accounted for by the 'minority population' rose to over 60% in 1990.

Another extreme example is Detroit, where almost half the white population of the central city during the 1990s matched the rate of the previous decade, with the result that nearly 90% of the residents of central Detroit are from minority ethnic groups.

The negative external effects according to H. Mäding (2004) have an impact on public property and social objectives are endangered. This will be explained briefly with regard to two points:

Firstly, higher "middle class families" leave the inner cities and look for areas of preferential single family housing, while the well known urban problem groups are concentrated in the inner city. In some German cities, the share of single households in the city centre has risen to over or close to 50%. There are well situated persons with an "urban life-style" among them (Yuppies, Dinks), but these are in the minority.

Secondly, population growth, changes in household structure, income growth and the higher demand for housing resulting from it, increase the demand for further settlement areas. (In West Germany the living area per inhabitant grew from 22 to 37 m^2 between 1965 and 1991. This will continue to grow until 2010 to 42 m^2). This spatial extension of settlement areas (city sprawl) lead to a constantly increasing demand for space and grave ecological consequences.

All these factors have as a result the disurbanisation stage. This stage is completed by the appearance of adverse conditions in saturated suburbs and the movement of households in new cities or settlements of high environmental quality and better standards of living.

According to M. Pacione (2005), signs of a population reversal in rural areas were first identified in the USA, but similar trends were soon detected in other advanced nations, including Canada, Australia, Western Europe and Britain. Counterurbanisation in Britain dates from the early 1960s when for the first time areas situated far away from metropolitan influence began to grow faster than the main conurbations and their dependent regions. Population growth in rural Britain was particularly strong in the late 1960s and early 1970s but has continued over recent decades, with net out-migration from the main metropolitan areas to the rest of the UK averaging around 90,000 people per year, a rate of 0.5%." The reasons for this reversal of long-established trends are so multifaceted that any attempt apply a single explanation to the widely diverse changes under way in different regions would unduly simplistic. Synthesizing findings from a range of investigations provides a useful inventory of contributory factors. These include:

1. Continuing growth of metropolitan centers and their spillover into adjacent non-metropolitan counties

2. Decentralisation of manufacturing in pursuit of lower land and waste costs

3. Increase pursuit of leisure activities at all ages

4. Narrowing the traditional gap between rural and urban lifestyles with extension of access to modern facilities

5. More long-distance commuting

6. Lower cost of living in rural areas

7. Residential preference for lower density rural living

8. Government decentralisation policies etc

The extension to which each factor contributes to population turnaround will depend on local conditions.

At a theoretical level, there is a next phase (reurbanisation) where the core city shows a more slight decrease in population; in parallel, the ghettoisation phe-

nomenon, which was formed in the previous phase start to disappear. (Lever, 1993). The ability of ameliorating the housing conditions of the core city, where some old houses are demolished and restored, constitutes a primary factor of the above mentioned evolution. In the later period of this phase, the centre presents an augmentation of its population while the suburbs' population is continuously decreased. In some cases, households of this phase move from the suburbs to the centre.

The changes in the structure of the international economy as well as the economy at the national and city levels are additional reasons of redevelopment in the initial urban centres. The development of the tertiary sector, the evolution in informatics and the changes in the cost of energy and transportation, bring the economic activity back to the centre of the city and make again the areas close to the core city liveable. (Lever, 1993).

The empirical evidence for reurbanisation is mixed. P. Cheshire (1995) found that in 241 functional urban regions (FURs) in Europe between 1981 and 1991 the proportion of urban cores gaining population reached 47%, compared with, only 22% over the period 1975-81. However, it was mainly the smaller FURs (particularly those with ancient cathedrals and universities) that exhibited reurbanisation, not the larger, older urban regions. In the UK reurbanisation occurred in only four of 36 FURs (Glasgow, Oxford, Cambridge and Canterbury), with only Glasgow confirming model expectations.

On the other hand, there is a growing body of case-study evidence that indicates a recovery of large cities from the high levels of population loss experienced in the 1970s era of counter urbanisation. In the USA 1980s witnessed the re-emergence of the larger metropolitan areas as the fastest growing elements the urban landscape. Overall, metropolitan areas with 1 million or more residents grew by 12% in the 1980s compared with 8% in the previous decade.

According to M. Pasione (2005), the population growth that has occurred in the central areas of US cities was fuelled by two principal migration streams. First, new migrants, primarily from Latin America and Asia, moved into lower-value areas of cities such as New York and Los Angeles, as well as into other metropolitan areas on the west coast (San Diego and San Francisco), in the South-West (Houston) and Florida (Miami) that historically had attracted relatively fewer migrants. The second stream comprised a flow of 'baby-boomers' (those born just after the Second World War and during the affluence of the 1950s and early 1960s), investing in high-status residential areas. During the 1980s the strongest magnets for adult 'boomers' were metropolitan areas with expanding high-tech and defence-oriented economies, including coastal cities such as Boston and Seattle and sunbelt locations like Dallas and Atlanta. Australia and Canada also provide evidence of strengthening metropolitan areas and inner-city growth in the 1980s.

In general, the empirical observations of M. Pasione (2005) suggest that:

1. There are widespread signs of renewed growth or reduced population decline for larger metropolitan areas, as well as a population recovery for urban cores

2. There is no evidence of suburban-ring areas losing out to core areas, not even in

relative terms, let alone in accordance with the absolute change associated with the later phase of reurbanisation specified in the 'stages of urban development' model.

3. There is also considerable disagreement over the extent to which the inner-city revitalisation that took place in the 1980s will be able to continue and lead to a fundamental change in the form of the Western city.

The process of decentralisation, on the other hand, is likely to continue as a major feature of post-industrial urbanisation, though in a form very different from the dormitory-style sub-urbanisation of the early post-Second World War period.

Interesting is the conclusion of the study of the Australian cities by E. Baker *et al* (2000):

The model of inner and middle city decline and growth in the outer rings of urban development has been replaced by a more complex pattern in which the positive correlation between population growth rate and distance from the city centre has been eroded. This undoubtedly is partly due to demographic factors. It has been shown that in the early post-war years of rapid population growth and lateral expansion of Australian cities whole suburbs tended to be initially settled by people in the young family formation ages and their children. As these groups have aged and their children left, the population declines.

However, as these original settlers die or move into aged care accommodation their houses come onto the market and are purchased by younger people. This often sees one occupant of a home replaced by two or three occupants, causing population growth. However, it is also clear that other elements are also at work. On the one hand local city and state governments are encouraging urban consolidation.

There are some elements in the population who are showing a preference for inner city "café society" type lifestyles. This has undoubtedly caused increased population growth in inner and middle suburbs. On the other hand growth on the periphery has certainly not ceased especially in the fastest growing cities. So, in recent decades however along with all the OECD nations Australia has attempted to move toward more "sustainable" compact cities by changing land use policy to encourage increases in population density in built up areas

The urban centres' development, according to the theory of spatial cycles, is shown in the circular diagrams of the Fig. 2 (Kawashima, 1986).

The stages of the spatial cycle are presented in the areas of the cycle which are enumerated as following:

- The stage of the urban centre development (urbanisation phase) is presented in areas 1 and 2,

- The stage of the suburbs development (suburbanisation phase) is shown in areas 3 and 4.

- The stage, where decentralisation trends towards the satellite urban centres (disurbanisation phase) appear, is shown in areas 5 and 6.

- The stage, where the initial urban centre presents a new development (reurbanisation phase), is shown in areas 7 and 8 of the cycle.

Each of the 8 parts represents a certain stage indicated at Figure 1.
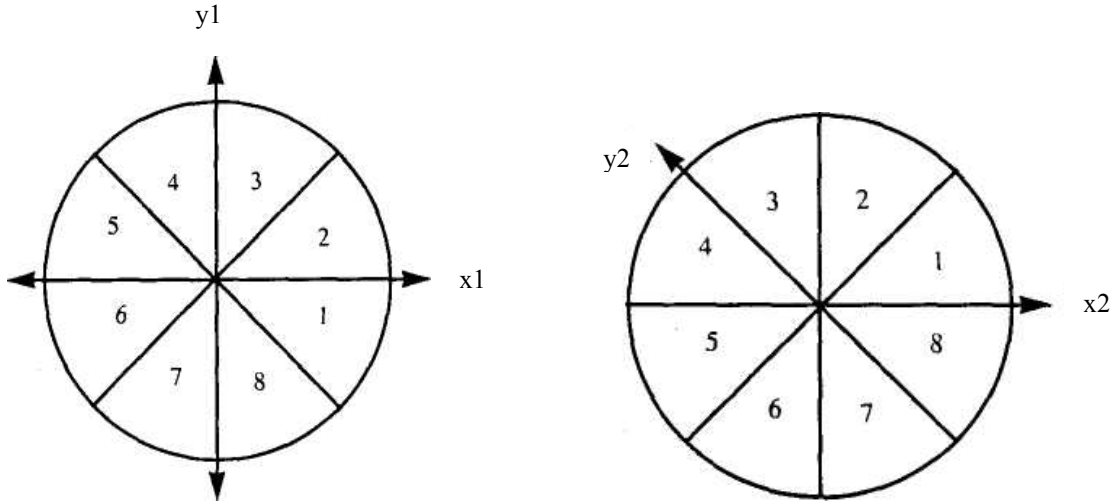
x1= the absolute change of population in central city

y1= the absolute change of population in the suburbs

x2= the change coefficient of population in central city

y2= the change coefficient of population in the suburbs

Source: T. Kawashima (1986)

Figure 2 : Stages of Spatial Cycle

The process of urbanisation at a local level was specified by Nordstrom who studied the settlement pattern changes in all the development phases of a given city.

According to Nordstrom (1981), the settlement pattern of population and activities is seriously affected by the economic development, the time of its completion as well as the general social changes caused by it. He reports that, when a society develops, then all the activities which affect employment - and consequently the settlement pattern - undergo changes which pass through various developing phases. Also, he points out the impact of the environmental conditions and the exercised policy function as basic parameters in the form of the settlement pattern in modern societies. The impact of the latter factor is stressed in other studies, too (Korcelli, 1986).

At a local level, the urban structure depends on two variables: the available space per inhabitant and the total number of inhabitants (Nordstrom, 1981).

In the frame of the empirical analysis of the urban centres development and according to the theory of the spatial cycle, the usual variables can be the absolute or

relative change of population in the geographical units of interest (Kawashima, 1986; Korcelli, 1986) or their population density (Nordstrom, 1981; Schwizer, 1985; Alperowitz, 1983).

Regardless of the choice of variable or the analysis level of the urban development, a systematic empirical implementation of the spatial cycle is succeeded through the division of the city into zones or of the metropolitan area into communes and municipalities and then clustering according to their distance from a central point of the core city. Next step consists of examining the development of these clustered areas or communities within a given period of time.

In an implementation of this method, Nordstrom (1981) distinguishes the city of Gothenburg to parishes; he clusters them according to their distance from a central point and studies the evolution of the population density for these grouped parishes within a certain period of time (1910-1975). Kawashima (1986), in one of his studies about the development stages of the Tokyo Metropolitan Area, divides it into zones of cities and villages - according to their distance from a central point of the city of Tokyo - and studies the population changes in these zones (distance zones) during the period 1960-1985. The idea of mean distance of all the inhabitants from the centre of the core city is used in other applications (Mordridge and Parr, 1997).

The basic conclusion of the empirical applications, relative to the spatial cycle, for a given zone, is that: the longer the distance from the central point is, the shorter it appears the highest value of the variable used (either density of population or population change).

In the present study the theory of the spatial cycle is applied for the Athens Metropolitan Area based on the techniques which are in accordance with the ones mentioned above. This study is the third one for the capital of Greece. The first one (Rontos, 1987) and the second one (Rontos and Papadaskalopoulos, 1994), gave the first evidences for the issue in consideration. Since then new data derived from the recent population census of 2001 will light the relative evolutions in the greater urban area in Greece during the decade 1991-2001. That is the reason why we believe that it is worth studying again the spatial cycle approach in Athens Metropolitan Area. Additionally, the recent empirical results worldwide that are reviewed above are making the paper more informative. Next to this introduction, the methodology and the implementation of the specific techniques used are developed, while in the part three a discussion and some basic conclusions about the stages of the urban evolution are made.

2. Study of spatial cycle in the Athens Metropolitan area – Implementation

The analysis covers the time period 1951-2001. The study could not be extended before 1951 because of the decade 1941-51, when the changes in the settlement patterns were a result of other factors different from the ones matching with the theory of the spatial cycle. Those radical changes in the population and the economic relations resulted from exceptional external factors of big scale, consequences of the World War II and the following civil war in Greece. The time limitation does not permit the use of the population density as a variable because, according to the spatial cycle analysis, it is used in case of studying long-term population changes.

Before the analysis, we should define the geographical units which are used in this study. As Athens Metropolitan Area (AMA), we consider the Region of Attica which, according to the geographic and previous administrative system of the Country, is divided into the Greater Athens (central city and suburbs) and the Rest of Attica Region. Rest of Attica Region contains cities and villages more or less independent than the core city of Athens.

Based on the circular diagram of the spatial cycle, we initially study the in-metropolitan population relations of the capital area during the period 1951-2001. X
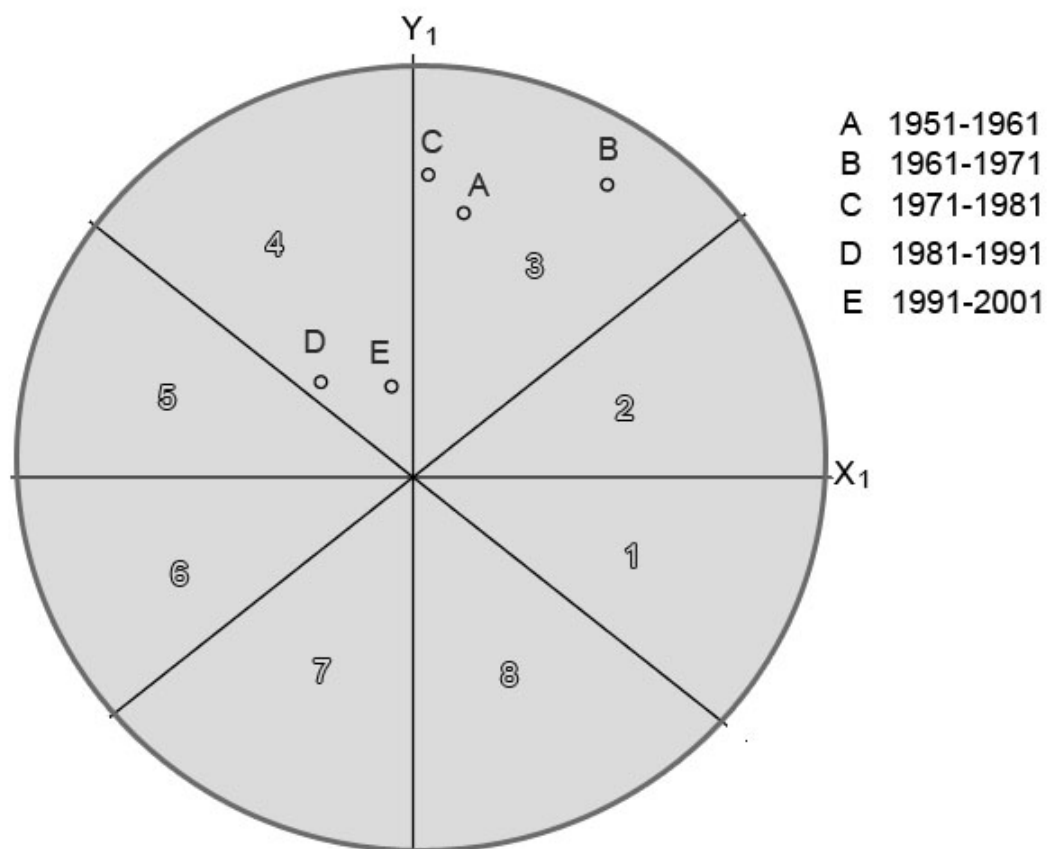
X1 = absolute polpulation change of City of Athens
Y1 = absolute population change of Greater Athens (except Athens City)

Figure 3 Circular diagram of the spatial cycle

10

axis counts the absolute difference of the Athens City population and the Y axis counts the absolute difference of the suburbs population during the Censuses interval. In the Figure 3 the points A, B And C (referring to the decades1951-61, 1961-71 and 1971-81) are placed within the 3rd octant of the cycle; this fact implies that, during period 1951-81, the AMA was at the development phase of suburbs around the core city of Athens (suburbanisation phase) and particularly at the stage 3, the so called stage of relative suburbanisation where both core and suburbs populations are increasing.

During the decade 1981-91, the Cartesian product of population (city of Athens change **x** the suburbs change) shifts to point D which is within the 4th octant of the cycle. This evolution means that, even at the phase of suburbanisation, the differentiation is obvious: the population of the city of Athens decreases while the population of the suburbs increases slowly. In fact the AMA had passed to the stage of absolute suburbanisation. The urban Centre as a whole (core and suburbs) continues to gain population.

In the recent decade 1991-2001 point E is remaining in stage 4 but is changing direction closing towards octant 3 again.

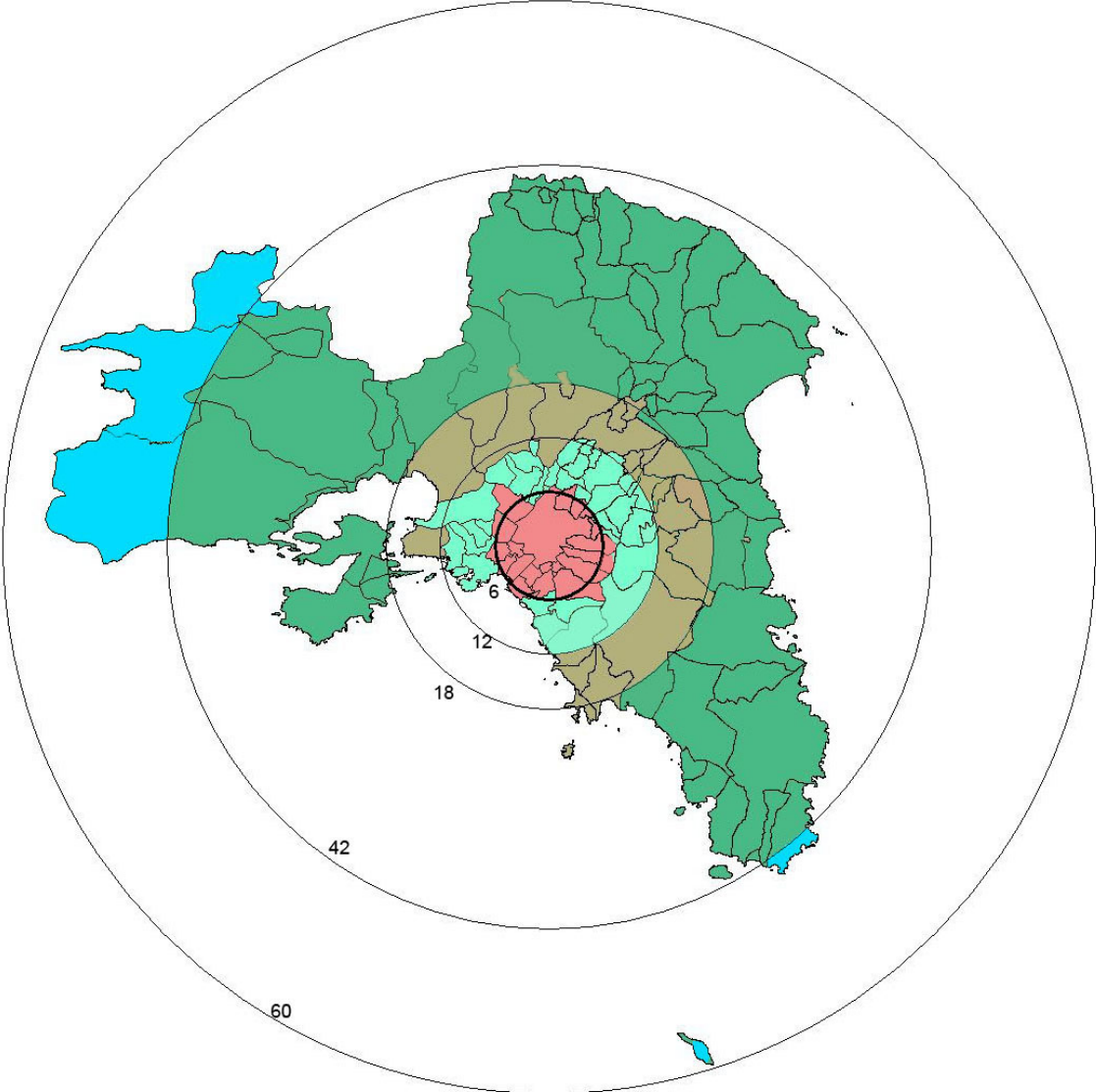Next a systematic classification of the Attica municipalities and communes into pe-

Figure 4 : Athens Metropolitan Area divided in perimetric zones 11

rimetric zones according to their distance (distance zones) from a central point of Athens (Syntagma Square) is introduced. The aim is to examine the population variation in these distance zones and through these results, the time definition of the stages of the spatial cycle in the biggest metropolitan area of Greece. It must be pointed out that the specific analysis is expanded to the whole AMA, which includes not only the Greater Athens (core city and suburbs) but the Rest of Attica Region as well. For the definition of the perimetric zones, concentric cycles with radius of 6, 12, 18, 42 and 60 kilometres have been designed on a map of the Attica Region in a scale of 1:200,000 and centred at Syntagma Square. In this way, there have been perimetric zones which include groups of municipalities located in a distance of 0-6, 6-12, 12-18, 18-42 and 42-60 kilometres from Syndagma Square. We should mention that the definition of the first cycle with a radius of 6 kilometres was necessary in order to include the whole Athens city. Figure 4 presents the general idea on the map, of Athens metropolitan area municipalities. In the cases that partial settlements of a municipality were cut from the cycle they were calculated in the proper zone.

In table 1, we can initially see the absolute population evolution of the municipalities and communes of the Attica Region in total, per perimetric zone and according to their distance from the Syndagma Square.

Table 1 : Population of AMA according to concentric zones for the 1951-2001 time period

| Peripheral Zones Km	Number of Municipalities	Population for the years					
		1951	1961	1971	1981	1991	2001
0-6	**20**	**850.435**	**1.123.027**	**1.595.901**	**1.817.059**	**1.681.767**	**1.691.532**
6-12	**30**	**469.713**	**664.044**	**870.866**	**1.081.506**	**1.169.646**	**1.263.788**
12-18	**20**	**77.784**	**108.838**	**162.675**	**241.589**	**335.012**	**450.349**
18-42	**46**	**97.993**	**113.369**	**131.619**	**178.288**	**244.250**	**312.791**
42-60	**1**	**4.286**	**4.170**	**3.879**	**4.973**	**6.017**	**5.933**
Total	117	1.500.211	2.013.448	2.764.940	3.323.415	3.436.692	3.724.393

Table 2 presents the rate of population change per perimetric distance zone during periods 1951-1961, 1961-1971, 1971-1981, 1981-1991 and 1991-2001.

Table 2 : Population change rate per perimetric distance zone during 1951-2001 time period

Peripheral Zones Km	Period				
	1951-1961	1961-1971	1971-1981	1981-1991	1991-2001
0-6	**28**	**36**	**13**	**-8**	**1**
6-12	**35**	**27**	**22**	**8**	**8**
12-18	**34**	**41**	**40**	**33**	**30**
18-42	**15**	**15**	**31**	**32**	**25**
42-60	**-3**	**-7**	**25**	**19**	**-1**
Total	**30**	**32**	**19**	**3**	**8**

Also, Figure 5 presents the relative curves of the population change rates for the population of the perimetric distance zones in these decades; the resulting data permits to draw important conclusions about the in-metropolitan population development in the biggest urban area of the country area that is examined in this study. We should point out that the time restrictions for the periods covered by the analysis, restrain our ability for a detailed study on the development of urban structure in

the above mentioned metropolitan area. Nevertheless, the basic characteristics of the diachronic development of the settlement pattern in the AMA are obvious.

Figure 5 : Relative curves of the population change rates
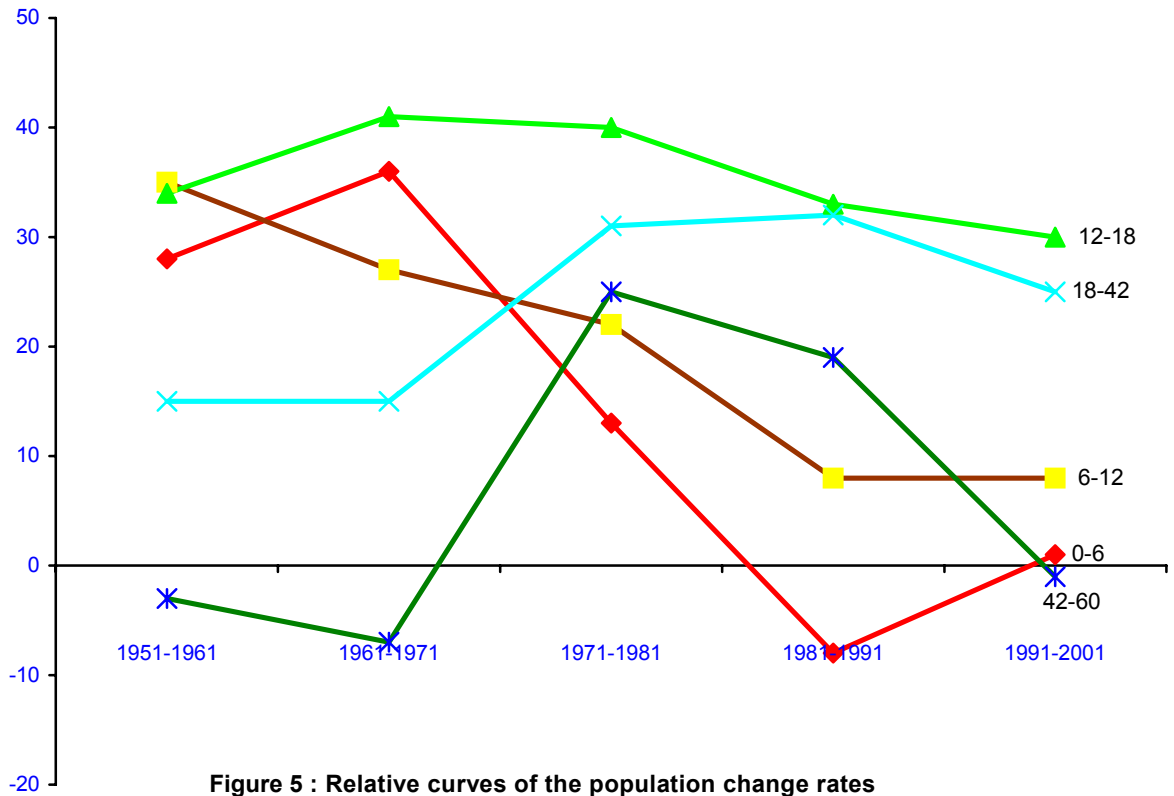
As the time goes by, we initially notice a shift of the maximum population change rate from the perimetric distance zones, which are next to the Athens centre, towards further zones. The maximum population change index appears in the zone of 6-12 kilometres for the period 1951-61 (35%), while in next periods (1961-71, 1971-

Figure 6 population change rate according to concentric perimetric zones

13
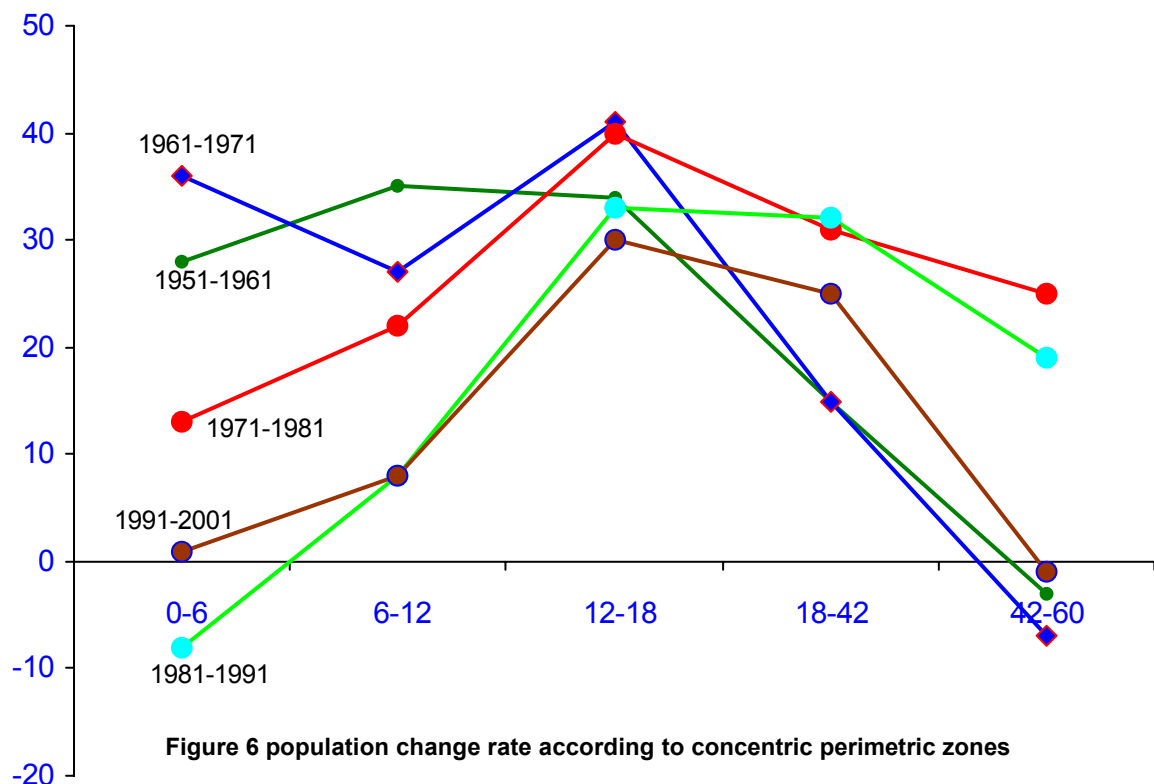
81,1981-91 and 1991-2001) the maximum index moves to the distance zone of 12-18 kilometres from the centre of Athens (41%, 40%, 33% and 30% respectively). In any period, neither the perimetric zone of 0-6 kilometres which includes the city of Athens (central city) nor the furthest perimetric distance zones of 18-42 and 42-60 kilometres, reveal the maximum population change in the system of the defined zones.

The fact that the suburbs of second zone (6-12 kilometres) developed faster in period 1951-61 and the next suburbs of the third zone (12-18 kilometres) developed faster in periods 1961-71, 1971-81 1981-91 1991-2001, confirms the previous analysis according to which, the AMA went through the stage of the suburbs development in period 1951-2001. Nevertheless, we must note that the furthest distance zones of 18-42 and 42-60 kilometres present a remarkable increase in the population rates in the period 1971-81 (Table 2 & Fig 5). In the decade 1981-91, the big population increase in the furthest distance zones was continued or strengthened especially in the zone of 18-42 kilometres which nearly equalled the increase of the previous zone (32%);.

Table 3 : Time period when the maximum population change rate is achieved for each distance zone.

Peripheral Zones Km	Period				
	1951-1961	1961-1971	1971-1981	1981-1991	1991-2001
0-6		•			
6-12	•				
12-18		•			
18-42				•	
42-60			•		

Also for the zone 42-60, based on the data of Table 2 and Figure 6, we almost reach an empirical verification of the following relation in the AMA: the bigger the distance of the given zone from the central city of the given metropolitan area is, the later it reaches the maximum value (peak) of its population change. In this application, the relation between the distance from the centre and the time of reaching the peak change value is marked with an bullet in Table 3.

The zone of 6-12 kilometres reached the peak value change during first period (1951-61), next zone of 12-18 kilometres reached it during second period (1961-71), and the furthest zones of 18-42 and 42-60 kilometres during last periods of analysis (1981-91 and 1971-81 respectively). If the maximum change value of the first zone of 0-6 kilometres was reached during first period (1951-61), the maximum values of the perimetric zones in table 4 would have a clearer diagonal direction from left upwards to right downwards; this fact would fully prove the basic hypothesis.

The appearance of the maximum change value of the Athens population and its closer suburbs during period 1961-71 could possibly be attributed to an irregularity which occurred from the huge inflow of immigrants in the region of Athens. An irregularity is also appeared in the distance zone 42-60 kilometres, where the peak is coming back to the period 1971-81 In any case, if there was the possibility of studying a longer period of time as well as more distance zones - especially for the city of Athens -, then we could make more obvious the relation between time and dis-

tance in reaching the maximum value of the in-metropolitan population changes.

3. Stages of Urban Evolution and Developing Procedures at the Athens Metropolitan Area during the Post-War Era & Basic Conclusions

Based on the spatial cycle approach, it is possible to explore the regional developing procedures in connection with the evolution of the settlement pattern. The empirical approach of the spatial cycle shows clearly that this region went through the suburbanization phase during period 1951-2001 while there are serious indications of development of new settlements and intense problems at the historical centre of the city. According to the results of the present spatial cycle's application, the whole post war era should be divided in two sub-periods. Firstly the period 1951-81 matches the stage of relative suburbanisation with both parts (core city and suburbs) to gain population and the later to gain more population than the former. Secondly, the period 1981-2001 is that of absolute suburbanisation which is characterised by population loses for core city (Athens) and population gain for suburbs.

The population in the suburbs of Athens city presents a bigger growth in relation of Athens population during the whole post-war era. It is characteristic that the increase rates of the population in Athens city were close to zero during period 1951-61; this trend was reversed during period 1961-71 while the zero increase rates came back in the decade 1971-81. Within the decade 1981-91, the population of Athens city decreased. A very small augmentation is established for the last recent decade 1991-2001 (1%).

The impact of intense population changes, during 1941-51, explains to a certain degree the irregular behaviour at the beginning of the post-war period. When Greece returned to the normal developing procedures of peace period, the evolution of the population changes in Athens and its suburbs came back to a normal tempo and the suburbs present obviously faster population increase rates.

The huge accumulation of emigrants from the provinces to the capital during period 1961-71, leads quickly - and maybe prematurely - to the over concentration of population and activities in the city of Athens; as a consequence, a respectively big part of its new inhabitants was led to the suburbs-mainly in the Departments of Western Attica and Piraeus (Rontos, 1987).At the same time, the degradation of the Life quality at the core city led part of the inhabitants, mainly of high income, to the northern and eastern suburbs within decade 1961-71.

The later reason of movement becomes obvious from the big population change rates in the north-eastern suburbs which attracted the high-income inhabitants, like the municipalities of Kifissia, Amaroussio, Filothei, Psychiko etc. (NATIONAL STATISTICAL SERVICE OF GREECE , 1984). We make the assumption of the high-income inhabitant movements in the intraregional level taking in account that it is rather impossible to have a remarkable population increase in expensive suburbs that could be justified form the flow of low- and medium-income immigrants, originating from the rest of the country.

During 1961-71 negative external economies appear and they become even more obvious within next period 1971-81. We should mention that Athens city population almost stagnates during the decade 1971-81 while the population of suburbs increased almost by the same absolute number as the ones in previous periods. The population movement from Athens to the suburbs played an important, determining factor in the change of settlement patterns within decade 1971-81 since the impact of immigrants' flow was much lower compared to previous years. (Rontos, 1987). Also, during period 1976-80, the inter-commune movements into the Region of Athens reach approximately the 250,000 inhabitants (NATIONAL STATISTICAL SERVICE OF GREECE, 1987). Within the decade 1971-81, the overpopulated - even saturated - city of Athens led the immigrants from the rest of the country to settle in the Athens suburbs. In addition, we should point out the accumulation of the public and private sectors' services in central areas of the city of Athens which functioned competitively to the housing needs and concurred to the movement of inhabitants towards the suburbs.

The centralized administrative system and the necessity to satisfy the need of services for a continuously increased population pushed the population to settle in the suburbs. The relation of environmental conditions to this change of pattern - from the city of Athens to the suburbs - has not been analyzed empirically but it must have played an important role in the decade 1981-91.

However the last decade 1991-2000 presents an interesting situation leading to two different scenarios for the future. Initially AMA, remains at the absolute Suburbanization stage (octant 4 of spatial cycle fig. 3). As a result an advance to the next stage of disurbanisation phase (5 or 6 stage) does not seem to occur. On the contrary the Cartesian product approaches again stage 3. During 1991-2001 we observe a slow down of centre Athens population decrement in relation with 1981-1991. For the suburbs we observe that the excessive deceleration of population increase during 1981-91 in relation with the previous periods (transition from points A, B, C to point D) during the last period present a stabilisation of population increase (from point D to E). We can assume that if the increase deceleration for suburb population continues in conjunction with the centre population variation we should advance to stage 5. In case of a decrease of suburbs population we could advance to stage 6 or 7.

The reason of this irregularity can probably be credited to the foreign emigrants who definitively boost the Athens centre population. Rehabilitation and return of local population from the suburbs does not seem probable. The recent census (2001) shows a heavy concentration of emigrants (foreign nationality population) in Athens prefecture as seen in table 4

Table 4 Population with foreign nationality in Greece, Attica Region and Greater Athens

Total of Greece	761.813
Attica Region	369.973
Greater Athens	274.882

It is evident that prefecture of Athens concentrates 74,3% of Attica emigrants and 36,08% of all Greece.

Foreign emigrants choose to settle in Athens centre because of the following reasons:
— Cheaper house rents
— Less and easier transportation
— Possibilities of collective residence
— Benefits from State or Municipal organisations (soup kitchen)
— Rallying (Nationality ghettos)

During 1991-2001 period we face a similar situation with the 1961-1971 when the excessive internal immigration had caused irregularities to the spatial cycle evolution, as it is already mentioned above. .

Furthermore, the analysis which was based in the clustering of municipalities and communes in the Attica Region into perimetric zones and according to their distance from the centre of Athens proves the faster development of the Athens suburbs in a distance of 6-12 kilometres from its centre, during decade 1951-61. Within the next decades 1961-71, 1971-81, 1981-91 and 1991-2001, a fast population development appears in the suburbs of the next perimetric zone in a distance of 12-18 kilometres. The furthest distance of 18-42 and 42-60 kilometres which did not constitute suburbs of the city of Athens but rather independent local urban centres, presented an important population change within the recent decades 1971-81 and 1981-91.

As it was indicated by the same analysis, during 1991-2001 we can identify a recovery of the near zones (0-6 Km and 6-12 Km) in relation to a slow down of the zones 12-18 Km and 18-42 Km. On the other hand, we observe that during the last decade (1991-2001) the biggest increase among the zones presents again at the zone 12-18 (30%) followed by the zone 18-42 (25%). That indicates a possible tendency for disurbanisation in the next decades.

In general we can estimate two possible scenarios for the future evolution of AMA:

1. If the Athens centre rehabilitation is temporary and in the future is discontinued (that means acceleration of core population decrease in combination with a deceleration of suburbs population increase) we will advance at stage 5 (absolute disurbanisation). If the suburbs population decreases we will advance at stage 6 or 7 (relative disurbanisation or relative reurbanisation stage).
2. In case the centre of Athens (core city) presents a population increase (continues the recent tendency) combined with a population decrease in suburbs we will advance at stage 8 (absolute reurbanisation stage).

Further research, including future population projections of cities and villages in AMA and intra-suburbs analysis, should be undertaken in order to gather new evidences for the future evolution of the area in examination. In any case the forthcoming population census of 2011 will verify the existence of the one or of the other scenarios or possibly the existence of another (third) scenario.

REFERENCES

1. G. Aplerovich (1983) "An empirical study of population, density gradients and their determinants", *Journal of Regional Science.* 23, p.p. 529-540.

2. E. Baker, N. Coffee and G. Hugo (2000): "*Suburbanisation Vs Reurbanisation: Population Distribution Changes in Australian Cities*" Department of the Environment and Heritage, Canberra

3. M. Batty and Karmeshu (1983) "A Strategy for Generating and Testing Models of Migration and Urban Growth", *Reg. Studies.* 17, pp. 223-236

4. L. van de Berg, R. Drewett, L. Klaassen, L. Rossi and C. Vijverberg (1982): "A Study of Growth and Decline", Oxford

5. L. Bourne (1996): "Reinventing the suburbs: old myths and new realities" *Progress in Planning 4b(3), 163-84*

6. A. Champion (1990): "Counterurbanisation: The Changing Pace and Nature of Population Decentralisation, London,

7. A. Champion (2000): "Urbanisation, suburbanisation, counterurbinisation and reurbanisation" *in R. Paddison and W. Lever "Handbook of Urban Studies"* London

8. P. Chesire (1995): "A new phase of urban development in Western Europe?" *Urban Studies, 32*

9. D. Cross (1990): "Counterurbanisation in England and Wales" Aldershot

10. J.S Davis et al (1994): "The new 'burbs: The exurbs and their implications in planning policies" *Journal of the American Planning Association, 60*

11. A. Fielding (1982): "Counterurbanisation in Western Europe" *at Progress in Planning 17(1)*

12. S. Findley (1993): "The third world city: development policy and issues" *in J. Kasarda and A. Parnel "Third world Cities*, London

13. W.H. Frey (1983) "A Multiregional population-projection framework that incorporates both migration and residential mobility streams: application to metropolitan city-suburb redistribution", *Environment and Planning A.* 15, pp. 1613-1632.

14. W.H. Frey (1990) "Metropolitan America: beyond the transition", *Population Bulletin.* 45, pp. 1-51.

15. J. Garreau (1988): "Edge city" New York

16. P. Hall (1997) "The future of the metropolis and its form" *Reg. Studies. 31, pp. 211-220.*

17. T. Kawashima (1986) "Spatial cycle hypothesis and Roxy index method: implications of the 1985 population census figures for the stage of suburbanisation of Tokyo Metropolitan area". *A paper prepared for the RSA twenty Sixth European Congress,* Krakow, Poland, 26-29 of August.

18. H. Kingsley and W. Enders (1975) "Distance, Direction and Entropy in the Evolution of a Settlement Pattern", *Economic Geography.* 51, pp. 357-365.

19. L. H. Klaassen (1981): "Transport and re-urbanisation". Gower Publishing Company, Hants, England

20. L. Klaassen, W. Molle and J. Paelinck (1981): "Dynamics of Urban Development" New York

21. P. Korcelli (1986): "Growth rate fluctuations and alternative trajectories of future populations change: A case of Warsaw region", *a. paper prepared for the RSA twenty Sixth European Congress,* Krakow, Poland, 26-29 of August.

22. M. Law (1988) "The Uncertain Future of the Urban Core", London, Routledge.

23. W. F. Lever (1993): "Reurbanisation - The policy implications". *Urban studies.* 30, pp. 267-284.

24. W. Lucy and C. Philips (1997): "The post-suburban era comes to Richmond: city decline, suburban transition, and exurban growth" *Landscape and Urban Planning, 36*

25. H. Mäding (2004): "Suburbanisation and Urban Development in Germany. Trends - Models – Strategies" Deutsches Institut für Urbanistik

26. F. Masser and D. Stroud (1965): "The Metropolitan Village" *Town Planning Review, 36*

27. M. Mordridge and J. Parr (1997): "Metropolis or region: On the development and structure of London". *Reg. studies.* 31, pp. 97-115.

28. A. Nelson (1992): "Characterising exurbia "*Journal of Planning Literature,5, 350-68*

29. L. Noordstrom (1981): "Population changes in a functional regional system". *Economic Geography,* 57, pp. 183-198

30. M. Pasione (2005): "Urban Geography", 2nd edition, Abingdon, UK

31. Jean-Paul Rodrigue, Brian Slack and Claude Comtois (1997): "Transportation and spatial cycles: Evidence from maritime" *Journal of Transport Geography, Vol. 5, No. 2, pp. 87-98*

32   K. Rontos (1987) "A study on the Regional and Urban Population of Greece", Ph. D thesis, Panteion University of Athens"

33   K. Rontos and A. Papadaskalopoulos (1994) " The Approach of Spatial Cycle : The Case of the Athens Metropolitan Area 1951-1991" Journal of Greek Official Statisticians, vol. 30, no 1-2.

34   V. Schwitzer (1985) " Fiscal Independence, Spilovers and Residential Choice", Regional Science Association, 56, pp. 59-70.

35.   A.F. Weber (1899): "The growth of cities in 19th century", New York

REFERENCE BOOKS

NATIONAL STATISTICAL SERVICE OF GREECE (1984) *Results of the 1981 population census. Demographic and social characteristics of the population - A 10% sample,* Vol.11.

NATIONAL STATISTICAL SERVICE OF GREECE (1955)*The population of Greece 1951.*

NATIONAL STATISTICAL SERVICE OF GREECE (1962)*The population of Greece 1961.*

NATIONAL STATISTICAL SERVICE OF GREECE (1972)*The population of Greece 1971.*

NATIONAL STATISTICAL SERVICE OF GREECE (1982)*The population of Greece 1981.*

NATIONAL STATISTICAL SERVICE OF GREECE (1986), *Results of the 1981 population census,* Vol. IV.

NATIONAL STATISTICAL SERVICE OF GREECE *. Results of the 1991 population census.*

NATIONAL STATISTICAL SERVICE OF GREECE *. Results of the 2001 population census.*