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# Uncovering Demographic Trends and Recent Urban Expansion in Metropolitan Regions: A Paradigmatic Case Study

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**Abstract:** While urbanization trends have been characterized for a long time by deconcentration of inner cities with expansion of low-density settlements, economic repolarization leading to re-urbanization and recovery of central districts are now counterbalancing population shrinkage in compact urban areas and slowing down suburban growth. In this context, the recent demographic evolution of a large metropolis such as Athens (Greece)—following expansion, crisis, and a more subtle economic recovery—may reveal original relationships between form and functions at the base of recent urban growth. Based on an exploratory analysis of demographic indicators on a metropolitan and urban scale, the present study provides an updated and integrated knowledge framework that confirms and integrates the most recent urban trends in southern Europe. Documenting the emergence of more individualized paths of urban expansion at the local scale (recovery of the historic center, shrinkage of semicentral neighborhoods, ‘reverse gentrification’ of disadvantaged peripheral areas, late suburbanization of accessible peripheral areas), results of the present study justify an ad hoc analysis of metropolitan growth based on demographic indicators as a proxy for sustainable land management and local development.

**Keywords:** urban growth; gentrification; migratory balance; suburbanization; shrinkage

## 1. Introduction

Urbanization projections—including those from the United Nations Population Division—outline a future period of increasing uncertainty during which metropolitan growth will be highly dynamic, spatially uncoordinated, and mostly heterogeneous across countries and regions [1–6]. By emphasizing plurality and diversity in future urban trends, the dynamic relationship between economic downturns and metropolitan life cycles needs further investigation [7,8], uncovering a larger range of socioeconomic conditions and territorial contexts [9,10]. In these regards, the argument of a dynamic relationship

between economic cycles and metropolitan expansion seeks “to reframe how the fate of the city, its social fabric, economy and political structures are viewed and engaged” [11], being relevant for both present and future studies, since it concerns complex and interconnected problems with evidence and solutions grounded on past and current experience [12–15]. While urbanization trends have been characterized for a long time by (a more or less rapid) deconcentration of inner cities with a faster outbound expansion of low-density settlements [16–19], empirical evidences for a new wave of economic repolarization leading to re-urbanization and recovery of central districts have been emerged recently. These processes may counterbalance population shrinkage in urban areas, slowing down suburban growth and settlement sprawl [20–23].

How much the different phases of growth and economic stagnation have guided such processes is not yet clear. More specifically, there is no consensus on hypotheses whether a more diluted development in space has been more frequently associated with an economic expansion than compact-dense growth patterns [24–27]. At the same time, mixed evidences [28–30] were collected responding to the assumption that an economic stagnation led to a slowdown in suburban growth and a progressive return to a more centralized development. More complex economic-urban dynamics have led to a lower interpretative capacity of recent sociodemographic transformations in metropolitan areas [31,32], since these processes were progressively decoupled from traditional economic assumptions (e.g., the role of scale and agglomeration forces) and classical stages of the urban cycle (e.g., urbanization versus suburbanization) [33,34]. At the same time, quantitative information available up to now, including homogeneous data from official statistical sources, allows a sort of ‘anodyne’ reading of metropolitan dynamics, e.g., over relatively short time intervals. When based on insufficiently long temporal periods, a partial interpretation of such dynamics does not allow generalizations to other socioeconomic contexts, preventing emergence of innovative paradigms to interpret the multifaceted challenges of contemporary cities’ development [35–37].

Going beyond the most usual interpretations based on the dichotomy between thinking categories such as ‘development’ or ‘underdevelopment,’ ‘north’ or ‘south,’ ‘capitalism’ or ‘socialism,’ the marked individualism of urban paths worldwide justifies formulation of new urban models. In this regard, broadening the empirical knowledge on the most recent metropolitan dynamics, through descriptive and comparative analysis of relevant indicators, is considered a still necessary and urgent research issue [38–40]. With reference to the last two decades, the accelerated sequence of economic expansions and recessions in some world regions highlights interesting background contexts when studying the relationship between metropolitan development and economic downturns [41–44]. In Mediterranean Europe, the intrinsic volatility of economic expansions during the 2000s and the intense recession starting at the end of the 2000s—combined with greater individualism in urban growth paths—have shaped a sort of ‘laboratory’ condition to test the latent relationship between economic downturns and urban cycles, based on the analysis of simplified characteristics of metropolitan systems, e.g., population dynamics [45,46]. These conditions—associated with the increased heterogeneity in regional demography [47]—appear even more evident when compared with long-term population dynamics. As a matter of fact, long-term dynamics were oriented toward greater spatial homogeneity, being intimately associated with urbanization–suburbanization sequences in southern European cities [48–50].

While confirming these trends intrinsically, postwar development in Athens, the Greek capital and one of the largest cities in Mediterranean Europe, was characterized by sequential waves of economic expansion and stagnation shaping metropolitan sustainability and resulting in subsequent waves of urbanization and suburbanization [51]. A more recent growth wave, mostly driven by the infrastructural development preceding and following the 2004 Olympic Games in Athens, resulted in (more or less intense) leapfrog urban expansion, ribbon sprawl along the main roads, and isolated settlements in rural areas [52]. The 2008 recession was supposed to promote a progressive shift toward settlement densification and brownfield recovery, partially abandoning the ‘sprawled’ way of metropolitan growth observed since the mid-1970s [53]. Representing, together with other Mediterranean metropolises (like

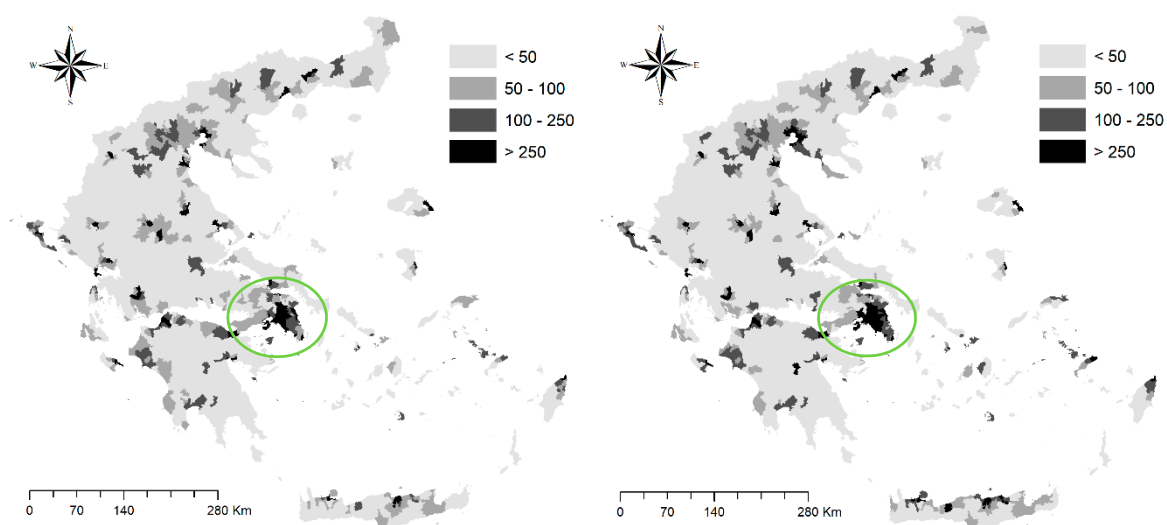
Rome and Barcelona [12,13,24,26,43]), an example of cities suspended between planning and informal housing, the recent evolution of a large metropolis such as Athens, following expansion, crisis, and a more subtle economic recovery, may reveal new (and more intricate) functional relationships at the base of current urbanization processes [54].

Based on these premises, our study presents an exploratory analysis of demographic indicators on a metropolitan and urban scale evaluating the most recent trends illustrated above and thus providing an empirically oriented knowledge of contemporary Mediterranean urbanization. Recognizing the central role of comparative analysis in contemporary urban studies [55], the present work combines an investigation of population data from multiple statistical sources with a qualitative interpretation of recent development paths, connecting with empirical evidence on a regional and continental scale. By documenting the emergence of more individualized paths of urban expansion at the local scale, results of this study justify an ad hoc analysis of metropolitan growth based on demographic indicators as a proxy for sustainable urban management and local development.

## 2. Methodology

### 2.1. Study Area

Attica is a small region of central Greece (3808 km<sup>2</sup>) hosting Athens, the Greek capital. With the reform of local administrative councils in 2012 ('Kallikratis' law), the administrative region of Attica (NUTS-2 level of the European classification of statistical units) was partitioned into seven local prefectures distinguishing urban districts (Central Athens, Western, Southern, and Northern Athens) and a mixed district with urban/suburban settlements (Piraeus and islands) from two peri-urban districts (Western and Eastern Attica). The Greater Athens area, the densest region in the country (Figure 1), includes the four Athens prefectures and the largest part of the Piraeus prefecture [25]. Spatial divides are particularly evident in the metropolitan region concentrating more than 30% of the Greek population, with a density above 7000 inhabitants/km<sup>2</sup>—one of the highest in Europe, together with Naples, Barcelona, Milan and, in part, Madrid and Istanbul [49]. The study area was traditionally characterized by two geographical gradients depending on the observation scale: (i) a marked divide in urban and rural areas districts, with a density gap surpassing 15,000 inhabitants/km<sup>2</sup> at some neighbor locations and (ii) more subtle disparities between eastern districts (affluent and more accessible) and western districts (economically disadvantaged and less served).



**Figure 1.** Population density (inhabitants/km<sup>2</sup>) in Greek municipalities (1991: left; 2011: right; position of Attica is highlighted with a circle).

## 2.2. Data Sources and Demographic Variables

According to the working hypothesis, the present study integrated different statistical data sources to provide a demographic picture of the study area that is homogeneous in time and sufficiently accurate in space. Indicators considering together population dynamics and age structure and with a documented linkage with urban growth [1,2,4,5,9,12] were therefore chosen on the basis of this objective. Population density was derived from the national population register held by the National Statistical Service (ELSTAT) and disseminating aggregated information by year and prefecture. Population growth rates (crude rate of natural change of population and crude rate of net migration) were taken annually from Eurostat demographic statistics at the same spatial scale (NUTS-3 prefectures) based on elementary data provided by ELSTAT. Resident population by citizenship and marriage status was derived annually from the Labor Force Survey held by the National Statistical Service (ELSTAT) on a regional basis in Greece since the late 1980s. Basic categories were used for citizenship (native Greeks, non-native residents with European citizenship and non-native residents with non-European citizenship) and marriage status (unmarried, married, and divorced/widowers). Population structure was studied considering seven age classes (0–14, 15–19, 20–24, 25–29, 30–44, 45–64, and 65+ years) at the regional scale (the whole of Attica), whose information was derived annually from Labor Force Survey. Population age structure at the district scale was investigated considering three basic classes (<15 years, 15–64 years, 65+ years) derived from the national population survey released annually by ELSTAT. Selected demographic indicators for the last five years (2014–2018) were finally derived from the Eurostat regional database (median age of population, age dependency ratio, young-age dependency ratio, old dependency ratio, as well as proportion of population aged 0–19, 20–39, 40–59, and 60+ years).

## 2.3. Statistical Analysis

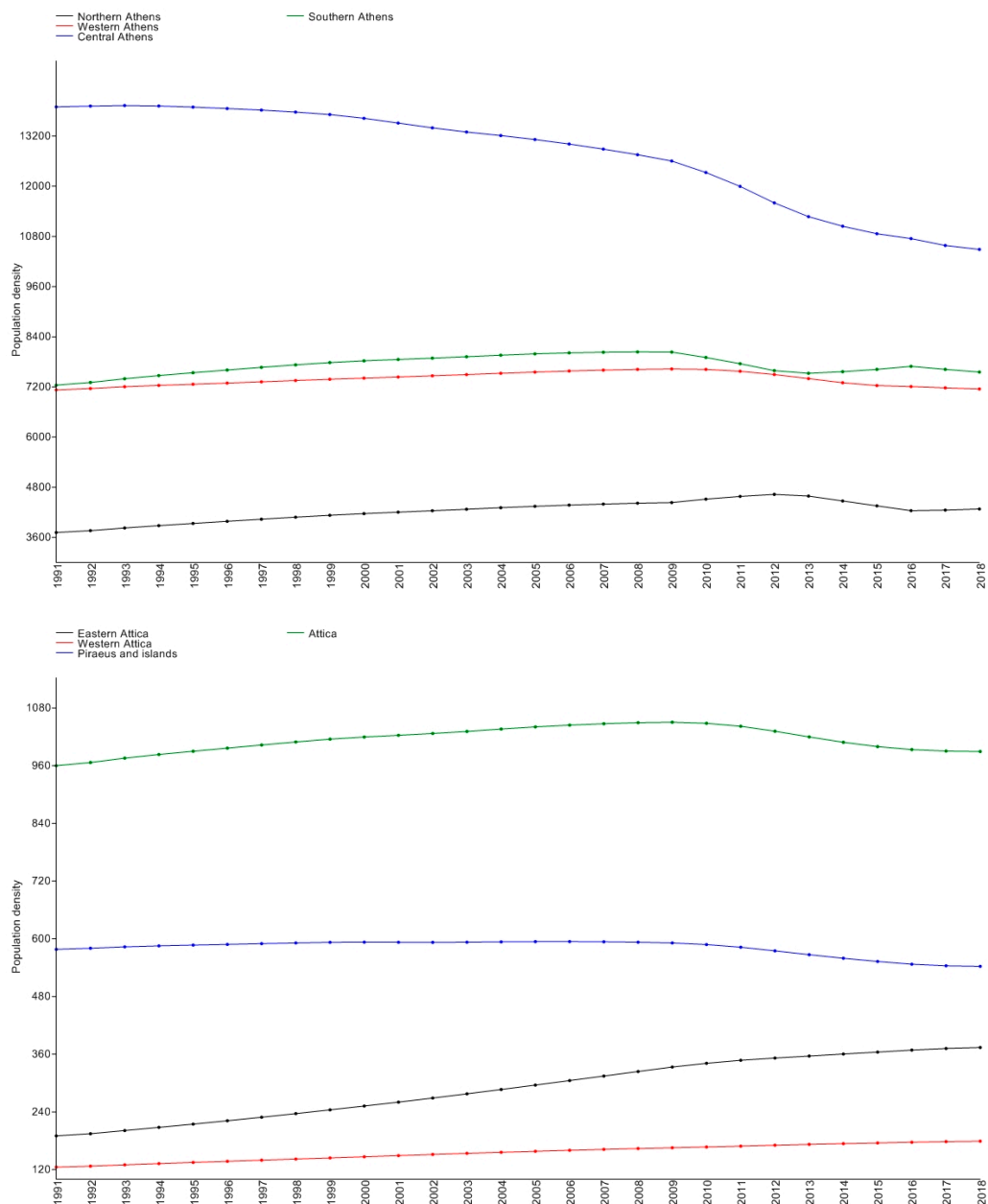
Graphs and tables were used to illustrate trends over time in demographic indicators (Section 2.2). A summary of the main population trends in the area was derived from two Principal Component Analysis (PCA) trials run separately at the regional and district scales. The regional-scale analysis evaluates two complexity levels (years versus demographic indicators) and includes population structure variables (masculinity ratio, 'M-F' and percent share of population at six age classes in total population, '0–14,' '15–19,' '20–24,' '25–29,' '30–44,' and '65+'; the intermediate class aged 45–64 years was removed from analysis to avoid multicollinearity) and demographic dynamics (population density, 'Den'; crude rate of natural growth of population, 'Nat'; crude rate of net migration 'Mig'; the percent share of unmarried people and divorced/widowers in total population, 'Aga' and 'Wid'; as well as percent share of non-native population with European and non-European citizenship in total population, 'EE' and 'Oth').

The district-scale analysis evaluates three complexity levels (years versus demographic indicators versus districts). Districts were numbered from 1 to 7 (Northern Athens, 1; Western Athens, 2; Central Athens, 3; Southern Athens, 4; Eastern Attica, 5; Western Attica, 6; Piraeus and islands, 7). Based on different data sources and availability at the district scale, a restricted number of variables were considered in this trial: (i) population density ('De'), (ii) crude rate of natural growth of population ('Na'), (iii) crude rate of net migration ('Mi'), (iv) masculinity ratio ('MF'), percent share of (v) young population <15 years ('<15'), and (vi) adult population aged 15–65 years ('>15') in total population. In both trials, components with eigenvalue >1 were retained and investigated [50]. Joint inspection of component loadings and scores allowed identification of spatial similarities and differences in population age structure and demographic dynamics along the last two decades and across urban/suburban districts in Attica [48]. Multivariate analysis was aimed at decomposing significant development paths at the appropriate spatial scale based on a selection of basic indicators, distinguishing the specific contribution of population structure and demographic dynamics to recent urban growth [51].

### 3. Results

#### 3.1. Descriptive Analysis of Population Changes in Athens

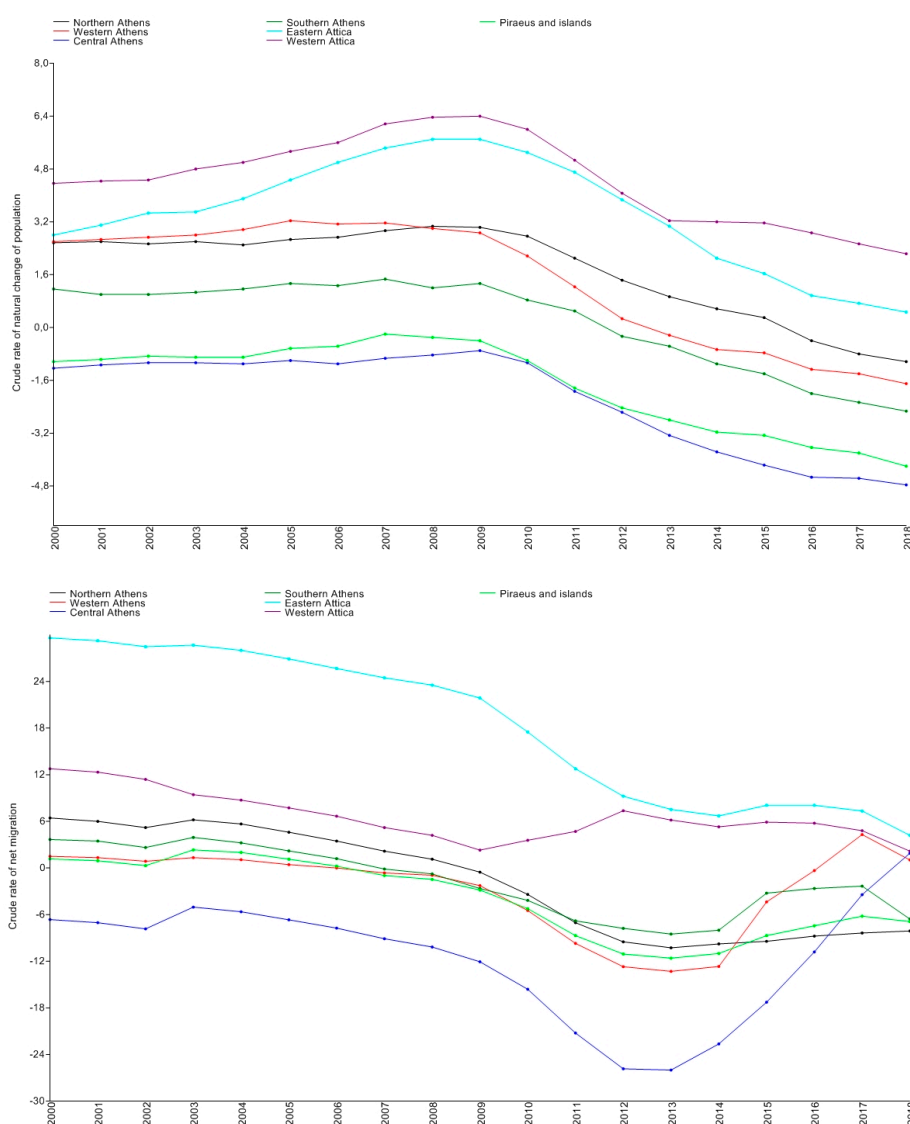
Populations residing in the study area experienced a slight decrease over time, with a residual growth in peri-urban districts (Western and Eastern Attica) and a more evident reduction in the urban area (Central, Northern, Southern, and Western Athens districts). Diachronic analysis of population density (Figure 2) confirms these trends and highlights a progressive deconcentration of downtown Athens (from 14,000 inhabitants/km<sup>2</sup> to nearly 10,000 inhabitants/km<sup>2</sup>) and a moderate shrinkage of the Piraeus district. Urban districts surrounding Athens showed substantial population stability until the end of the 2000s, and a slight decrease afterward. Eastern Attica was the district with the highest increase in population density.



**Figure 2.** Trends over time in population density (inhabitants/km<sup>2</sup>) in Attica, by district and year (upper graph: Greater Athens' districts; lower graph: peri-urban districts and Attica, total).

### 3.1.1. Population Increase

Population growth rates in Attica vary significantly over time and space (Figure 3). Natural population growth rates were rather consistent over space during economic growth (2000s), displaying positive rates except in Central Athens and Piraeus. During the recession (2010s), natural population growth rates showed a more generalized decline, becoming negative since 2012 (or 2013) in all districts of the Greater Athens area. With crisis, only peri-urban districts have maintained positive rates of natural population growth. The migratory balance shows an even more volatile trend than the natural balance. In the 2000s, the migration balance was positive in all districts except in Central Athens. With recession, the only districts with a positive migration balance were Western and Eastern Attica. However, in both 2017 and 2018, a positive migration balance was recorded also in Central and Western Athens.



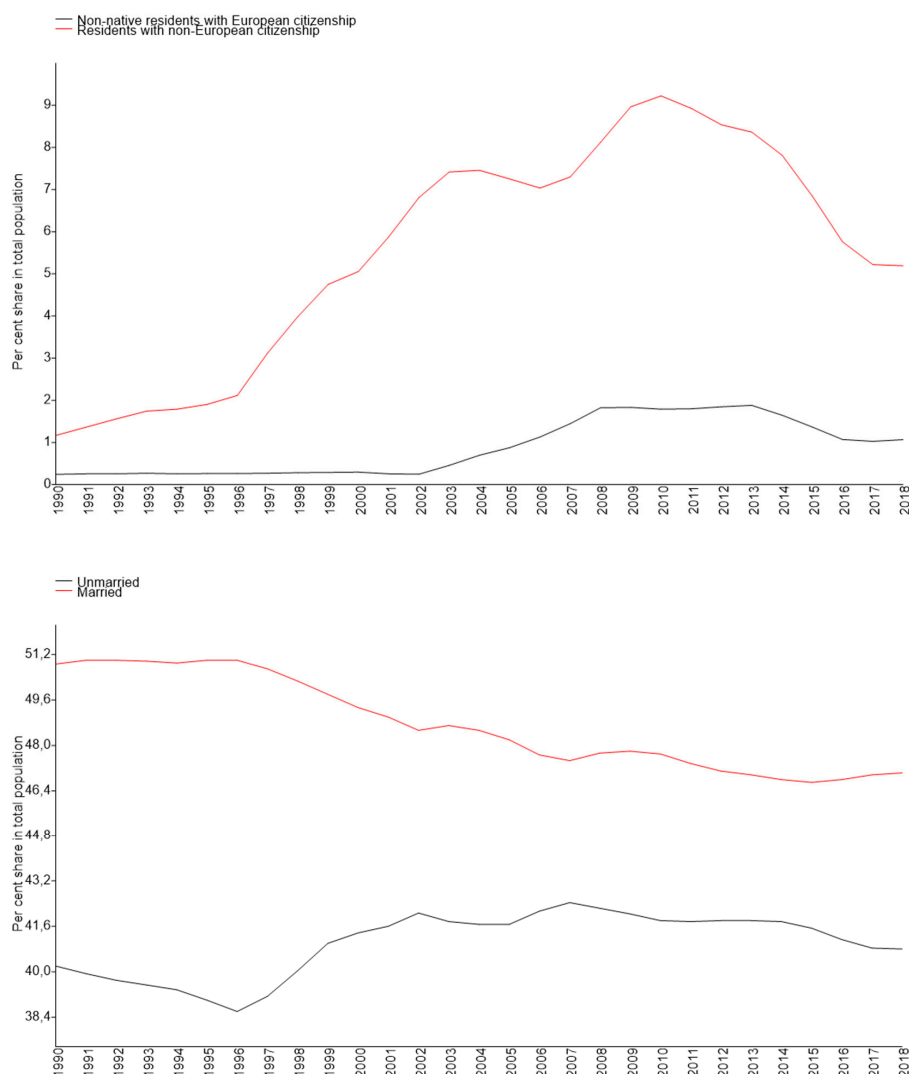
**Figure 3.** Trends over time in annual percent rates of population growth (upper graph: crude rate of natural change of population; lower graph: crude rate of net migration) in Attica, by district and year.

### 3.1.2. Trend of Selected Population Components

Trends over time in selected population segments were illustrated in Figure 4. The percentage of non-native residents with European citizenship has increased progressively since 2002 and reached its



peak at the end of the economic expansion, starting to decline since 2014. The percentage of migrants with non-European citizenship has increased gradually since 1997, stabilizing at values higher than 9% at the end of the 2000s. With recession, the percentage of residents with non-European citizenship fell to 5% of the total population and showed a modest sign of recovery in the last year of investigation.

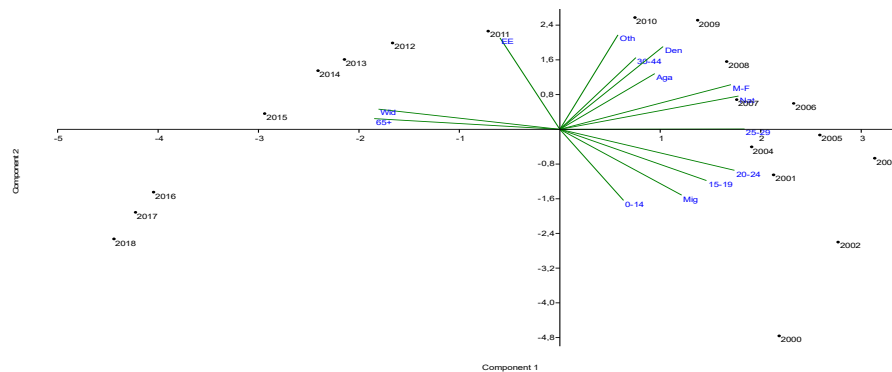


**Figure 4.** Percent share of selected demographic components in total population (upper graph: non-native residents with European citizenship versus residents with non-European citizenship; lower graph: unmarried versus married population) in Attica by year.

### 3.2. Uncovering Metropolitan Dynamics: A Summary Analysis of Demographic Indicators, 2000–2018

Population trends were summarized through exploratory analysis of selected indicators at the metropolitan scale (Figure 5). Principal Component Analysis extracted two axes that explain, respectively, 50.4% and 29.0% of the overall variance, discriminating three demographic patterns. Population increase fueled by migrants and young age classes characterized the years of the early 2000s (lower right quadrant). The following years (2006–2010) were grouped in the upper right quadrant, being characterized by the highest contribution of the natural balance to the overall population growth, the highest population density, and the dominance of specific population segments (unmarried individuals and immigrants from non-European countries). The most recent years (from 2011 onwards) have been grouped in the left quadrants, being associated with specific population components (non-native residents with European citizenship and elderly people aged 65 and over and/or widowers).

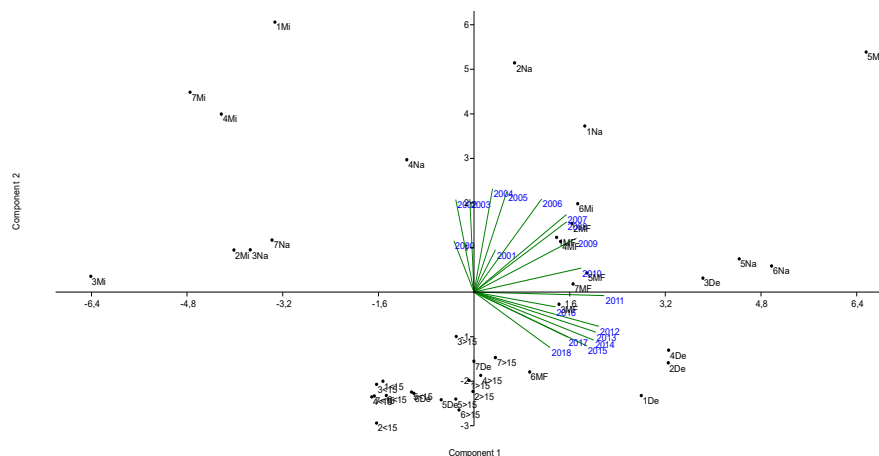
This indicates population aging associated with urban shrinkage on a local scale. Based on these results, PCA has powerfully described the recent demographic evolution in Attica, highlighting sequential growth and decline, mostly in line with economic downturn. Population growth was associated with the typical economic expansion of the 2000s. The following recession was associated with a progressive decline of population.



**Figure 5.** Biplot of a Principal Component Analysis investigating the evolution over time (2000–2018) of selected demographic indicators in Attica (see Section 2 for variables’ abbreviations).

### Population Structure and Dynamics at District Level, 2000–2018

A multivariate analysis of population data at the district level (Figure 6) identified demographic components that contributed differentially to Athens’ growth. Components 1 and 2 explained, respectively, 39.5% and 33.1% of the overall variance. In particular, economic expansion (2000s) and recessions (2010s) were discriminated along component 2, while component 1 distinguished the differential contribution of population structure (negative correlation with component 1) and demographic dynamics (positive correlation with component 1) to urban growth.



**Figure 6.** Biplot of a Principal Component Analysis investigating the evolution over time (2000–2018) in selected demographic indicators at seven urban and peri-urban districts of Attica (see Section 2 for variables’ abbreviations; 1: Northern Athens; 2: Western Athens; 3: Central Athens; 4: Southern Athens; 5: Eastern Attica; 6: Western Attica; 7: Piraeus and islands).

### 3.3. Inferring Future Scenarios of Urban Growth from Changes in Population Structure, 2014–2018

A more detailed analysis (Table 1) was run on selected indicators of population dynamics and structure by age over the last five years (2014–2018). The analysis illustrates the most recent trends in the area of study, prefiguring future scenarios of urban growth in the short and medium term. Despite



population aging, median population age showed slightly differentiated trends on the district scale: Central Athens went in contrast with the surrounding districts, as the median population age has stabilized in the past three years. Peri-urban districts in Western and Eastern Attica displayed the youngest demographic structure in the metropolitan area. By contrast, urban districts north and south of Athens had the highest median age of the whole region.

**Table 1.** Selected demographic indicators by year and prefecture in the study area.

District	2014	2015	2016	2017	2018	2019	2014	2015	2016	2017	2018	2019
	Median age of population						Proportion of population aged 0–19 years					
Attica	42.4	43.0	43.5	43.8	44.1	44.4	18.8	18.7	18.7	19.0	19.1	19.2
Central Athens	43.4	44.1	44.7	45.1	45.2	45.1	16.2	16.2	16.3	16.7	17.2	17.8
Northern Athens	43.7	44.3	44.9	45.4	45.9	46.5	19.2	19.1	19.1	19.0	19.0	18.9
Western Athens	41.6	42.2	42.7	42.7	43.0	43.3	19.7	19.6	19.6	20.1	20.3	20.4
Southern Athens	43.6	44.1	44.6	44.8	45.3	45.8	18.4	18.3	18.3	18.6	18.6	18.6
Eastern Attica	40.2	40.6	41.1	41.3	41.7	42.2	21.7	21.4	21.2	21.2	21.0	20.8
Western Attica	36.6	36.9	37.1	37.3	37.5	37.8	24.0	23.6	23.3	23.2	23.0	22.8
Piraeus and islands	42.9	43.5	44.0	44.4	44.8	45.2	18.3	18.2	18.2	18.4	18.5	18.6
	Age dependency ratio						Proportion of population aged 20–39 years					
Attica	49.4	50.5	51.5	52.5	53.4	54.1	27.3	26.5	25.7	25.0	24.4	23.7
Central Athens	48.4	50.0	51.4	53.0	54.4	55.3	28.5	27.4	26.4	25.4	24.6	24.1
Northern Athens	53.0	54.3	55.7	57.0	58.1	59.3	24.8	23.9	23.1	22.2	21.4	20.6
Western Athens	46.9	47.7	48.5	49.4	50.0	50.3	27.7	26.8	25.9	25.5	24.9	24.3
Southern Athens	50.3	51.4	52.6	53.8	54.9	55.8	25.9	25.1	24.4	23.8	23.0	22.2
Eastern Attica	49.0	49.6	50.0	50.5	50.6	50.8	28.1	27.6	27.0	26.7	26.2	25.7
Western Attica	46.3	46.2	46.3	46.4	46.4	46.4	31.3	31.4	31.4	31.3	31.1	30.7
Piraeus and islands	50.2	51.1	52.0	53.0	53.8	54.5	27.1	26.3	25.4	24.6	23.7	22.9
	Young-age dependency ratio						Proportion of population aged 40–59 years					
Attica	21.2	21.3	21.4	21.8	22.0	22.1	29.1	29.4	29.7	29.8	30.0	30.1
Central Athens	18.0	18.2	18.4	19.1	19.9	20.6	28.8	29.2	29.4	29.6	29.6	29.4
Northern Athens	22.3	22.5	22.6	22.7	22.8	22.8	29.8	30.1	30.3	30.6	30.8	31.0
Western Athens	21.8	21.9	21.9	22.6	22.8	22.8	30.2	30.6	30.9	30.7	30.9	31.0
Southern Athens	20.8	20.9	21.0	21.6	21.8	21.7	29.9	30.2	30.3	30.2	30.4	30.6
Eastern Attica	24.7	24.4	24.2	24.1	23.7	23.2	28.3	28.6	28.9	29.1	29.3	29.6
Western Attica	26.0	25.7	25.6	25.5	25.4	25.1	26.2	26.3	26.4	26.4	26.6	26.8
Piraeus and islands	20.7	20.8	20.9	21.2	21.4	21.5	29.0	29.4	29.8	30.1	30.4	30.7
	Old dependency ratio						Proportion of population aged 60 years and more					
Attica	43.7	45.2	46.6	47.8	48.8	50.0	24.7	25.3	25.8	26.2	26.5	26.9
Central Athens	46.2	48.1	50.0	51.7	52.7	53.4	26.5	27.2	27.9	28.4	28.6	28.6
Northern Athens	48.0	49.8	51.6	53.6	55.2	57.2	26.2	26.9	27.6	28.2	28.8	29.5
Western Athens	38.7	40.0	41.5	42.1	43.0	44.0	22.4	23.0	23.6	23.7	24.0	24.3
Southern Athens	46.2	47.8	49.5	50.6	52.1	54.0	25.8	26.4	27.1	27.4	27.9	28.6
Eastern Attica	38.9	39.9	40.8	41.4	42.3	43.4	21.9	22.4	22.8	23.1	23.5	24.0
Western Attica	32.1	32.4	32.8	33.2	33.5	34.2	18.5	18.7	18.9	19.2	19.3	19.7
Piraeus and islands	45.5	46.8	48.0	49.2	50.4	51.8	25.5	26.1	26.5	26.9	27.3	27.8

Dependence indexes increased on a metropolitan scale, showing a progressive imbalance between working and inactive population. Western Attica is the only district where this variable revealed stable over time, indicating a younger and more balanced demographic structure. The young dependency index was more stable in the surroundings of Athens, displaying the fastest increase in the dependency index at older ages. Analyzing the intrinsic dynamics of four age groups (0–19, 20–39, 40–59, and 60+ years), differentiated trends over time have been observed across districts. In Central Athens, the proportion of the young population (0–19 years) and adults (40–59 years) has grown together with the elderly population. These results clearly indicate how downtown Athens has become attractive again to traditional households, the main engine of suburbanization in the 2000s. Similar dynamics have also been observed in Piraeus and Western Athens. The latter also had a slightly younger population structure than the remaining urban districts. North and south of Athens, the adult and elderly populations (40+ years) grew, while the young population (0–39 years) significantly decreased. Western Attica was the only district where the 20–39 years class decreased moderately. In some ways, this district maintained a high attractiveness not only for families, but also for other young segments of the population.

#### 4. Discussion

In Europe, more than 70% of the population currently lives in urban areas. This figure is likely to increase to 84% by 2050 [56–58]. Agglomerations in advanced economies do not show a single evolutionary stage of urban development, displaying a more subtle coexistence of suburbanization and re-urbanization [21–23]. Urban clusters revealed to have “variable” boundaries, with each urban settlement being part of its “own” cluster of populated places, located within its commuting range [59]. The effect of clustering on urban growth was assumed to be not uniform, being positive in low-density clusters, and negative in densely populated ones. Recent studies [38] indicate that urban concentration levels have, on average, decreased or remained stable, camouflaging diverging trends across regions. A spatially variable relationship between urban concentration and economic growth may indicate urban concentration as beneficial for economic growth only in high-income contexts [60]. Diachronic and comparative approaches seem to be appropriate to identify similarities and differences in the restructuring of urban spaces [19].

Denser regions in Europe grow slower than other regions, indicating a net negative effect of agglomeration [27]. The inter- and intra-regional aspects of agglomeration also influenced convergence rate, where the former (latter) results in lower (slightly higher) convergence estimates [11]. However, the concept of agglomeration economies and its relation with spatial economic performance has maintained a central role—being closely intertwined with the policy debate [32]. Unfortunately, these notions seem to be less effective in interpreting more individualized growth paths in postcrisis contemporary cities, at least in some world regions [45]. At the same time, demographic structures (e.g., by age) have different impacts on urban growth, since population aging strengthens concentration tendencies, and population growth acts as a dispersion force [61–64]. This assumption allows a refined assessment of agglomeration forces under multiple demographic scenarios, considering also other disciplinary dimensions and operational scales of analysis and planning, e.g., landscape [65]. Further approaches have been proposed to evaluate the contribution of demographic behaviors to natural population growth and, thus, metropolitan expansion [38].

Recent studies pointed out that defining peculiar demographic-urban cycles in Mediterranean Europe presents inevitable difficulties because country-, regional-, and place-specific attributes make the future development path of each city distinctive and less predictable [28]. In Athens, urban evolution was partly decoupled from an integrated planning strategy, being instead influenced by sequential waves of unregulated expansion characterized by distinctive morphological traits and driven by specific socioeconomic forces [33]. Although building informality and out-of-plan settlements have been marginal in Athens’ growth, at least in the last two decades (unlike what was observed

until the late 1970s), recent expansion of settlements has nevertheless reflected an insufficient spatial coordination and poor stakeholder participation in urban management [52].

On the one hand, deconcentration of downtown Athens paralleled with a residual increase of the suburban population in Eastern Attica, which have acted as an important attractor of residential flows from Greater Athens between the early 1980s and the late 2000s. Decomposition of annual population growth rates in two components (natural and migratory balances) allows a refined understanding of urban dynamics, highlighting different demographic behaviors during expansion and recession [34,46,55]. With expansion, natural balance was a minor—but not negligible—component of the overall population growth at all urban locations [1,2]. In the subsequent phase, the natural balance was negative almost everywhere, and especially in urban districts forming the Greater Athens area. Natural balance was still positive in Western and Eastern Attica, likely a result of a younger and more balanced population structure.

Migration balance also showed heterogeneous trends over time. Central Athens was the only district experiencing a negative rate even during economic expansion. In the surrounding urban districts, migration negatively contributed to urban growth since 2007 (or 2008). These results highlight the role of economic crisis as a sort of mediator of international migratory flows, which have progressively slowed down despite the increasing pressure on Greek borders [45,59,64]. Migration balance was positive only in suburban districts. The migration rate in Eastern Attica—including the richest and most accessible region of Messoghia [18], hosting the international airport and attracting the most intense flows of residential mobility from downtown Athens since the 1980s—has progressively reduced over time. On the contrary, the migration rate in Western Attica (an economically disadvantaged district, with predominance of industrial land use and spontaneous or unplanned settlements) has increased since 2009. In such context, a slow recovery has been also observed in Central and Western Athens, reaching the lowest-low rates in 2012 (or 2013) and assuming positive rates in both 2017 and 2018. This evidence suggests, at the end of the economic crisis, a new attractiveness of central settlements for migrants [17]. While Athens' shrinkage was basically the result of (i) residential mobility toward peri-urban locations in the 1980s and the 1990s and (ii) intense emigration under recession, demographic dynamics in Eastern Attica imply a totally different settlement evolution, still oriented towards a traditional suburbanization model [48]. Despite the somehow difficult environmental and socioeconomic conditions, the district of Western Attica, likely because of decreased house prices, became the attractor of specific population segments, especially young people waiting to form a family. This phenomenon marked a sort of 'reverse gentrification'—which contributed to repolarize peripheral agricultural/industrial areas (and especially the Thriasian Plain), which have less benefited from suburbanization processes [35,41,66].

Basing on appropriate demographic indicators, the most recent growth dynamics have shown a greater diversification on a local scale [7,20,53,67]. In recent years, the central city has shifted towards shrinkage, although a slight but continuous recovery of the youngest population groups is now observed. However, this process does not concern the 20–40 age group, which was at the basis of gentrification in historic centers and re-urbanization of consolidated settlements in other large Mediterranean cities, as in many European metropolises [5]. On the contrary, population recovery seems to be driven by the young population (0–20 years) and adults (40–60 years), suggesting how traditional households, which had left the central city with suburbanization, slowly begin to return, thanks to significantly lower house prices. Improvement in the quality of life thanks to the substantial infrastructural interventions of the Olympic decade and more occasional restructuring of building heritage under mostly private initiatives provide further ground to re-urbanization [23,31].

Results of such a 'reverse gentrification' can be interpreted *vis à vis* with the greater attractiveness of the marginal district of Western Attica for younger adults (20–40). Although with less intensity, the demographic dynamism of downtown Athens has also been observed in recent years in Western Athens and Piraeus, the districts with the highest population density. At the same time, the urban districts north and south of Athens display a more intense population aging and no longer seem to attract either the

huge migratory flows of the 2000s, or the residential mobility of the 1990s. The Eastern Attica district, on the other hand, continues to develop according to a typical suburbanization model, even though elements of progressive saturation are evident, limiting opportunities for future development [27].

## 5. Conclusions

Considering the intimate relationship between economic downturns and urban stages, our study assumes that the demographic context in urban areas is particularly sensitive to short-term economic impulses and may anticipate future trends in metropolitan expansion. In this direction, the present work hypothesizes and documents that sequential expansions and recessions have led to different demographic trends on a local scale. More specifically, (i) re-urbanization—mostly coinciding with recession in the study area—was associated with increasingly heterogeneous demographic patterns over space, and (ii) impact of the most recent economic recovery (2016–2018) on population dynamics seems to be more intense at central locations rather than at peripheral districts.

With urban development paths becoming more fragmented and individualized everywhere in the world, as our analysis outlines for Athens, the coexistence of contrasting demographic dynamics highlights the inherent challenge in formulating reliable scenarios of future urban growth, in line with what has already been observed for other Mediterranean cities, including Rome in Italy and Barcelona in Spain [12,13,24,26,43]. For instance, it seems difficult to estimate what the predominant trend will be among the four alternatives delineated in this study—recovery of the historic center, shrinkage of semicentral neighborhoods, ‘reverse gentrification’ of disadvantaged peripheral areas, or late suburbanization of the most accessible peripheral areas. Results of our study suggest how recent mechanisms of urban growth have been increasingly decoupled from the effect of scale and agglomeration factors, following only in part the classic urbanization/suburbanization/re-urbanization scheme [27]. Assuming equilibrium when population movements between regions eliminate any difference in their relative attractiveness, migration—driven by differential earnings and amenity levels—is interpreted as a disequilibrium process [49]. This interpretation is valid also for the study area, where immigration was a powerful engine of urban growth with economic expansion (2000s), giving instead a substantial contribution to urban shrinkage under recession [59].

The base of knowledge developed in this paper can be generalized to similar socioeconomic contexts outside the Mediterranean region (focusing specifically on, e.g., large and medium-size cities, expanding metropolitan areas, economically dynamic regions with urban–rural polarizations) with the aim of informing alternative, short-term urban forecasts. The most reliable scenario implies a sort of dynamic equilibrium of different urban models, which will lead to moderate growth on a regional scale and the creation of new attraction poles on an urban scale. These poles will gradually replace the old centralities, reconstituting the necessary link between the consolidated city and the suburbs moving towards a slowdown in population expansion. At the same time, these poles will make growth processes even more localized and heterogeneous over space, completely subtracting the impact of scale factors and agglomerations, but also deviating from the traditional sequence of the city life cycle [27]. The coexistence of differentiated urban models on a local scale justifies an integrated analysis of the most recent demographic dynamics and stimulates further research providing a truly comparative knowledge to future scenarios of metropolitan growth.

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