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Does Residential Mobility Anticipate Urban Growth? The Importance of the Local Socioeconomic Context in a European Metropolitan Region

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Abstract

Urban growth at different spatial scales is analysed using the assumptions that large cities have experienced sequential cycles of urbanization, suburbanization and re-urbanization that reflect complex demographic dynamics. Original approaches, quantitative methodologies and indicators are employed to support analysis of urban growth at different spatial scales. Residential mobility is considered as a proxy measure for spatial dynamics, intensity of urban expansion and socioeconomic development at local and regional scales in Mediterranean Europe. By computing the percent share of the population living in the same municipality five years before the census date in the total resident population at the census date, a spatial analysis of residential mobility and related background context allowed for the identification of specific urban cycles, outlining heterogeneous patterns of growth in the metropolitan region of Athens, Greece, over the last three decades (1981-2011). Results indicate that changes in spatial patterns of residential mobility are associated with multiple factors (directly or indirectly), dependent on demographic dynamics and economic cycles exposing (apparent or latent) variability in the socio-spatial urban structure and functional re-organization processes across larger metropolitan areas. Multiple socioeconomic transitions are identified in the study area, with short-range population movements diverging with urbanization, suburbanization and re-urbanization. Under both economic expansion and recession, spatial patterns of residential mobility reflect differential population dynamics, whose knowledge provides innovative visions for future urban cycles in Europe.

Keywords

Economic cycles, demographic indicators, recession, urban-rural gradient, Greece

Introduction

Socio-demographic transition may reflect (apparent or latent) changes in urban structure and functions, re-densifying and diversifying metropolitan landscapes (Ogden and Hall 2000; Liu 2005; Lee and Painter 2013; Kazemzadeh-Zow et al. 2017). City-scale fluctuations in demographic indicators represent recent trends in urban expansion, which can be compared with empirical evidence derived from narrative and quantitative analysis of town planning and land-use policy (Goldstein et al. 2013; Gkartzios and Scott 2015; Remoundou et al. 2016). On this point, Mediterranean European cities are paradigmatic examples of demographic dynamics that are contributing to highly differentiated processes of suburbanization, economic delocalization and population redistribution over larger regions (Rontos 2010; Bayona-Carrasco and Gil-Alonso 2012; Salvati et al. 2016a).

The joint outcome of multiple drivers of urban change has been rarely explored in southern Europe under both suburbanization and re-urbanization (Salvati 2016). Suburbanization is one of the most representative phenomena with definite effects on spatial development at the metropolitan level (Bourne 1996; Kulu et al. 2009; Munafò et al. 2013; Cuadrado-Ciuraneta et al. 2017). In Mediterranean Europe, research on suburbanization has focused mainly on low-density contexts and often coincided with economic phases characterized by accelerated building cycles and land speculation (Allen et al. 2004; Arapoglou and Sayas 2009; Perez 2010). Suburbanization has also interacted with emerging processes of re-urbanization in some contexts, shaping non-linear patterns of growth and change in the medium term (Catalàn et al. 2008; Walford and Kurek 2016; Duvernoy et al. 2018).

Greece is probably one of the southern European countries that has experienced the most accelerated economic fluctuations over its recent history, alternating expansion and stagnation with profound impacts on metropolitan configurations (Zitti et al. 2015; Colantoni et al., 2016; Pili et al. 2017). Land legalization, continuous revisions of rent level, changes in building codes, industrial decentralization, bureaucratic inertia, clientele politics and pressure by landowners have characterized Greek urban development in the aftermath of World War II (Gargiulo Morelli et al., 2014; Di Feliciantonio and Salvati 2015; Zambon et al., 2017). Housing has been self-financed for a long time – mostly by a system of pre-selling and exchange arrangement (called *antiparochi*), which was established in the 1930s, and by household savings in the self-built informal sector (Leontidou 1990). Mortgage fears from banks started to infiltrate the speculative sector, beginning in the early 1980s. With land allocation being partly de-regulated, the institutional milieu for urban expansion has been long polarized in central and local government, without any significant middle tier (Wassenhoven 1984). The property transfer tax (formally abolished in 1984) created further rigidity in the housing market, negatively impacting residential mobility (Delladetsima 2006).

Since the late 1980s, sequential waves of economic expansion and stagnation have been observed in Athens, the largest metropolitan area in Greece. Housing demand increased, fuelled by natural population increase, and the number of informal settlements declined significantly, with a moderate expansion of larger new dwellings. A strategic master plan for the Athens

metropolitan region (AMR) was enforced in 1985, and several municipalities in the area approved specific town plans in the following years (Salvati 2016). The strategic plan offered a vision for the future development of Athens along well-defined spatial directions, securing high-quality fringe land under environmental protection (Rontos et al. 2016). Since the early 1990s, urban expansion has been the result of distinct socioeconomic processes, including: (i) massive immigration from the Balkans; (ii) a slow decline in local housing markets paralleled by a decrease in the interest rate; (iii) an intense building boom in correspondence with the 2004 Olympic games, (iv) state-driven infrastructural investments and, finally, (v) economic crises (Kourliouros 1997; Beriatos and Gospodini 2004; Giannakourou 2005; Delladetsima 2006; Schneider et al. 2010; De Rosa and Salvati 2016; Gil-Alonso et al. 2016). Although being exposed to a self-alimenting housing bubble up to the late 2000s, the 2007 recession negatively impacted local job markets, house prices and, more generally, individual lifestyles (Allen et al. 2004; Lesthaeghe and Nieder 2006; Kreyenfeld et al. 2012; Stockdale 2016). The 2007 crisis has undoubtedly affected urban growth and metropolitan socio-spatial systems, with a side effect on short-term population dynamics in larger cities (Dijkstra et al. 2015; Carlucci et al. 2016; Salvati and Carlucci 2017).

Demographic decline and population aging have progressively increased social vulnerability to economic shocks, increasing class segregation and consolidating a spatially polarized distribution of economic activities in urban and rural areas, which has influenced job and housing markets (Goldblum and Wong 2000; Serra et al. 2014; Ren 2015). Given the 2007 recession and its short-term consequences, population-driven urban decline has advanced concerns in the management of metropolitan areas, encouraging place-based policy strategies (Carbonaro et al. 2016).

Demographic indicators help explain metropolitan transformations under different economic cycles (Ogden and Hall 2000; Champion 2001; Kroll and Kabisch 2012). A comprehensive analysis of economic cycles helps researchers evaluate their implications and consequences on urban transformations, considering together short-term changes in demographic dynamics and population redistribution at the metropolitan scale (Salvati and Carlucci 2017). The present study assumes that residential mobility may reflect intrinsic socioeconomic changes at the regional scale over a relatively long time period. In southern Europe, given the mixed structure of cities derived from both planned and informal expansion processes within a general context of reduced short-range population movements (Economou et al. 1997, Coccossis et al. 2005, Giannakourou 2005), residential mobility is increasingly associated with solid social networks and neighbourhood relationships (Sampson 1988; Elder et al. 2003; Kang and Kwak 2003; Oishi et al. 2007, 2010; Lancee and Schaeffer 2015; Coulter et al. 2016). These social bonds have assumed a key role in shaping spatial direction and intensity of residential movements, anticipating economic restructuring (Maloutas 2004; Mulder 2007; Coulter et al. 2016).

Furthermore, residential mobility depends on additional factors, such as commuting, job market dynamics and other social forces (Weinberg et al. 198l; Ioannides, l987; Mulder and Hooimeijer, 1999; Van Ommeren et al. 2000; Battu et al. 2005; Coulter et al. 2016). In this regard, housing choice has been found to be strongly associated with the economic capacity of households (Blokland 2003). Residential mobility increases with the rise of income as wealthier

families can better sustain the costs of moving (Pissarides and Wadsworth, 1989; Buck, 1994, 1997; Böheim and Taylor, 1999). Such conditions have often determined an increasingly strong relationship between residential mobility and socio-spatial segregation in modern cities (Maloutas 2004). For example, social segregation in Athens has been associated with urban dispersion since the 1970s (Leontidou, 1990).

These assumptions highlight that residential mobility is a key factor to understand socioeconomic, demographic and institutional processes underlying sequential cycles of suburbanization and re-urbanization in expanding metropolitan regions (Magre et al. 2016). Earlier studies on residential mobility – not restricted to specific urban cycles – found mobility to be associated with multiple economic dynamics (Milbourne 2007; Gkartzios and Scott 2015; Stockdale 2016; Gkartzios et al. 2017). For instance, recession leads to a fall in the housing market, trapping people in undesirable real estate properties and reducing their ability to move to other locations within the same city (Henley, 1998).

Although research on residential mobility has progressively focused on community lifestyles and individual choices, including (but not limited to) job and housing (e.g. Battu et al. 2005; Feijten et al. 2008; Gargiulo Morelli et al. 2014), few studies have dealt with spatial patterns of residential mobility during a long economic cycle, reflecting different social conditions and urbanization cycles. A comparative analysis of residential mobility in the AMR may shed further light on the general patterns of urbanization observed in southern Europe, distinguishing effects driven by large-scale processes from those emerging from local contexts (Salvati et al. 2016b). In the present study, the role of residential mobility in the latent transformation of metropolitan structures and functions is explored by reframing local-scale patterns in view of sequential economic cycles from the early 1980s to the early 2010s in Greece. By distinguishing expansion from stagnation waves, the main forces influencing residential mobility are identified, providing future visions for metropolitan development and going beyond the opposition between urbanization and suburbanization, which is typical of the recent history of European cities.

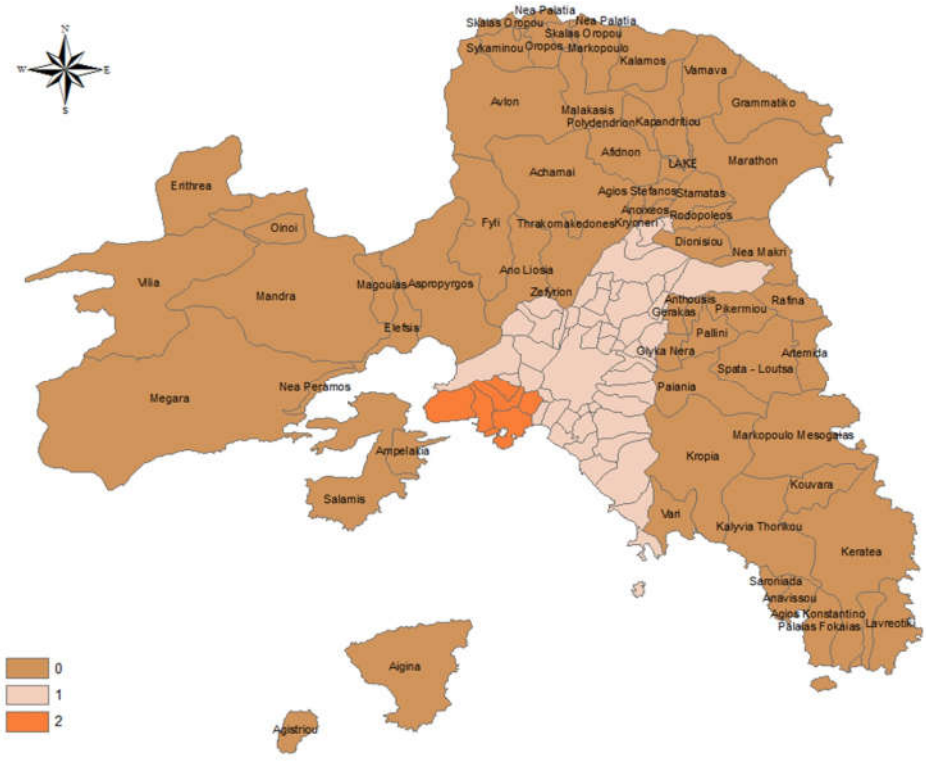
Data and methods

Study area

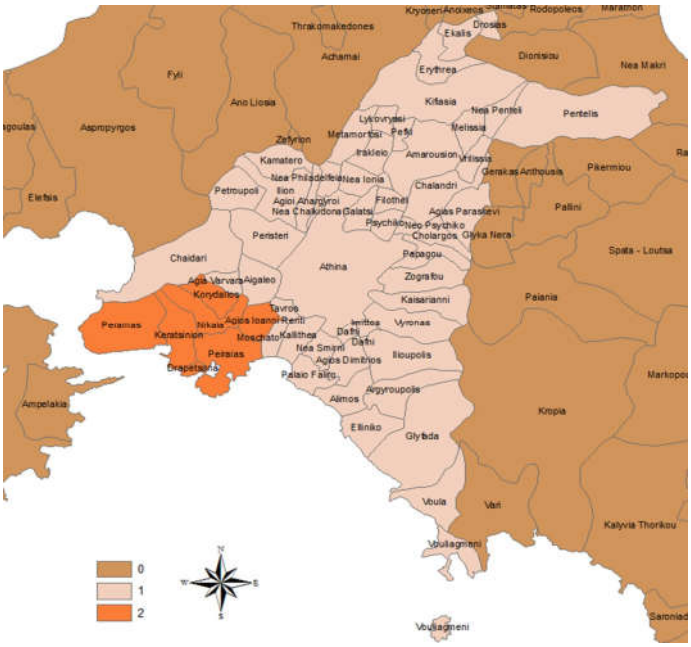
AMR comprises an area of more than 3,000 km^2 in the administrative region of Attica (central Greece), and it includes the island of Salamina (see Figure 1, next page). AMR was governed by 115 municipalities with spatial boundaries referring to the *Kapodistrian* administrative asset in force during the study period. The 115 municipalities were used as the elementary analysis unit of the present study (Rontos et al. 2016). The entire study area can be subdivided into three partitions (Salvati 2014): urban municipalities in the Athens basin (classified with code 1), Greater Piraeus district (classified with code 2), and rural municipalities in the rest of Attica (classified with code 0). The Greater Athens area includes all the municipalities numbered with codes 1 or 2 (Figure 1). Greater Athens is a compact urban area (430 km^2) that is administered by 58 municipalities; it has a population density ranging between 3,000 and 15,000 inhabitants/km^2 (average 7,000 inhabitants/km^2). The remaining 57 municipalities in Attica are

mainly rural with a population density usually below 3,000 inhabitant/km^2 (average 250 inhabitants/km^2).

Figure 1. Maps illustrating boundaries and names of municipalities in the study area



(a)



(b)

Legend: a = AMR; b = a particular zoom of the Greater Athens area; 0 = municipalities in the rest of Attica region; 1 = municipalities in urban Athens; 2= municipalities in Piraeus; code 1 and 2 = all the municipalities included in greater Athens area

Since the early 1980s, Athens has attracted an increasing flow of public and private investments to endure urban and suburban growth, creating a discontinuous metropolitan structure (Delladetsima 2006). The 2004 Olympics altered the economic face of Athens (Beriatos and Gospodini 2004) and encouraged the development of new infrastructures (Salvati and Serra 2016). Nevertheless, during that period, a negative impact on the public debt of Greece contributed to the socioeconomic outcome of the 2007 recession (Chorianopoulos et al. 2014), reducing building activity by more than 50 percent over few years (Pili et al. 2017).

Demographic and background indicators

The temporal period considered in this study extends from 1981 to 2011 and includes different urban phases in Athens (Leontidou 1990; Beriatos and Gospodini 2004; Rontos et al. 2016; Salvati 2016; Salvati et al. 2016a). Statistical data from national censuses of population and quantitative information from additional official sources were considered in this study. Residential mobility was assessed at four years (1981, 1991 2001, and 2011) by computing the percent share of population living in the same municipality five years before each census in total resident population at the census date at municipal scale (Geronimus et al. 2014). Additional indicators (see Table 1, next page) were considered at the same geographical scale with the aim to describe the local background context based on three domains: (i) population and land-use (five indicators), (ii) metropolitan form and functions (seven indicators), and (iii) territorial structure (nine indicators). For population and land-use, basic indicators were considered, such as the rate of population living in sparse settlements and the per-capita amount of built-up area. Metropolitan form and functions were described through indicators derived from the census of buildings, such as self-contained buildings, one-dwelling buildings, diversity in urban land-use and industrial buildings. The local context was described using territorial indicators, such as mean elevation, the distance from the main urban centres and indexes of soil and climate quality. Indicators assessing the local context (more or less) associated with higher (or lower) rates of residential mobility were chosen according with information derived from earlier studies (Rontos et al. 2016; Salvati 2016; Salvati et al. 2016b). The selected indicators provide a comprehensive assessment of multiple aspects that characterize the socioeconomic configuration of the AMR changing over the entire period of study (Gargiulo Morelli et al. 2014; Zitti et al. 2015; Pili et al. 2017).

Statistical analysis

Spatial patterns of residential mobility were illustrated through maps at different points in time (1981, 1991, 2001, 2011). Descriptive statistics (median, coefficient of variation, minimum and maximum) were calculated by year for the indicator of residential stability (percent share of population living in the same municipality five years before the census date in total resident population at the census date), and distinguishing figures referring to the Greater Athens area from those concerning the remaining part of AMR (see section above on *Study area*). A Multiway Factor Analysis (MFA) was applied to the data matrix composed of 22 indicators (residential stability and 21 background indicators, as pointed out above in the section on *Study area*) at four time points (1981, 1991, 2001, 2011), considering together all elementary spatial units. Indicators were standardized prior to the analysis. The MFA was run with the aim of

providing a comprehensive spatio-temporal outline of (i) the (changing) socioeconomic contexts and (ii) the underlying residential mobility in the AMR over different economic cycles founded on sequential expansion and stagnation waves. As a generalization of Principal Component Analysis (Coppi and Bolasco 1988), MFA examines sets of variables collected on the same set of observations (Kroonenberg 2008) and identifies complex structures in higher-order datasets where data have more than two dimensions (e.g. data recorded at three or more times).

Table 1. List of the indicators considered in the present study by thematic domain

Variable	Measurement unit	Source	Time interval
Population and land-use			
Residential stability	Percent share of population living in the same municipality 5-years before the census date in total resident population at the census date	Census of population	1981-2011
Population living in sparse	Percent share in total population		
Per-capita built-up area	m^2	Census of land-use and UA	1980-2010
Forested area	Percent share in total municipal		
Protected land	Dummy (0: non-protected; 1:	Territorial statistics	
Municipal town plan	Dummy (0: not yet; 1: yes)	Spatial Planning Office	
Metropolitan form and functions			
Self-contained buildings	Percent share in total building	Census of buildings	1980-2010
One-dwelling buildings			
Diversity in urban land-use	No. building uses in municipal		
Industrial buildings	Percent share in total building		
Hotel-use buildings			
Service/commerce buildings			
Multiple usage buildings			
Territorial structure			
Mean elevation	m	Census of population	Once per time
Coastal municipality	Dummy (0: internal; 1: coastal)	Territorial statistics	
Distance from Athens	km		
Distance from Piraeus			
Distance from Olymp. Stad., Maroussi			
Distance from Markopoulo			
Municipal surface area	km^2		1980-2010
Soil Quality Index	Score (high: 1; low: 2)	Salvati et al. (2014)	Once per time
Climate Quality Index			

The number of relevant factors was selected according to the scree-plot criterion, fixing the minimum eigenvalue threshold at 1. This criterion allows considering relevant factors that extract a satisfactory proportion of variance from the input data matrix. Factor loadings – indicating the degree of pair-wise correlation between input variables and MFA axes – were used to recognize multidimensional changes over time in the socioeconomic context associated with specific spatial patterns of residential mobility. While MFA output can be considered (in some ways) similar to a classical factor analysis (Colantoni et al. 2016), changes in the input variables over time are considered together in the case of MFA, allowing an implicit analysis of the spatio-temporal structure of the dataset.

To identify the most relevant analysis dimensions, interpretation of MFA outcomes was based on intensity and sign of the relationship between the indicator of residential stability and each MFA axis (factor loadings). Loadings of socioeconomic indicators assessing the local context were subsequently analysed in relation with these dimensions. In this way, MFA considered together the variables with the aim to identify latent effects of individual variables on residential mobility. This approach allows a specific focus on (i) the correlation of anticipated variables with the specific dimension associated to a given axis, and (ii) the persistent correlation of a variable with a specific analysis dimension along the entire study period. In this line of thought, MFA axes are thus interpreted as latent variables describing the dominant spatial pattern of residential mobility at a given year, being identified by the highest loading of the residential stability indicator to a given axis over the investigated time period. Establishing a causal relationship between residential mobility and socioeconomic forces could lead to an interesting outcome, but it is hard to realize in a complex social context such as the study area (Gargiulo et al. 2014; Rontos et al. 2016; Pili et al. 2017). Thus, we prefer to investigate the characteristic local context underlying different spatial patterns of residential mobility in the study area over a sufficiently long-time interval (1981-2011), which encompasses sequential phases of urbanization and suburbanization. A multivariate analysis that considers the intrinsic spatio-temporal structure of multiple indicators is particularly suited to identify apparent and latent relationships between residential mobility and socioeconomic forces (Salvati and Serra, 2016).

Results

Descriptive statistics

Descriptive statistics of residential stability indicator (average, coefficient of variation, minimum and maximum value per year) indicate a progressive change in residential mobility patterns in both the greater Athens area and the remaining part of Attica (Table 2). Increases in the average value of residential stability was particularly evident in the greater Athens area, with residential mobility involving 33.5% and 15.0% of resident population in 1981 and 2011 respectively. In the remaining part of Attica, residential mobility was slightly lower than in greater Athens (32.2% in 1981), declining moderately to 19.7% in 2011, 5 percentage points higher than in greater Athens. Spatial variability in the residential stability indicator was particularly high in 1981, 17% in greater Athens and 20% in the rest of Attica and declined over time in both spatial partitions. Although maximum values of residential stability remained almost stable, minimum values of residential stability increased over time, doubling in the

Table 2. Descriptive statistics of an indicator of residential mobility at the census date, COM – in AMR by year

Year	Greater Athens area (n = 57)				Rest of the AMR (n = 58)			
	Mean	Coeff. Var.	Minimum	Maximum	Mean	Coeff. Var.	Minimum	Maximum
1981	66.5	16.9	31.4	83.6	67.8	20.0	21.1	93.6
1991	79.1	9.1	58.0	88.6	72.6	15.3	43.0	95.1
2001	78.1	5.5	67.7	85.9	75.6	11.0	51.0	89.9
2011	85.0	4.2	73.0	90.4	80.3	6.5	68.4	89.5

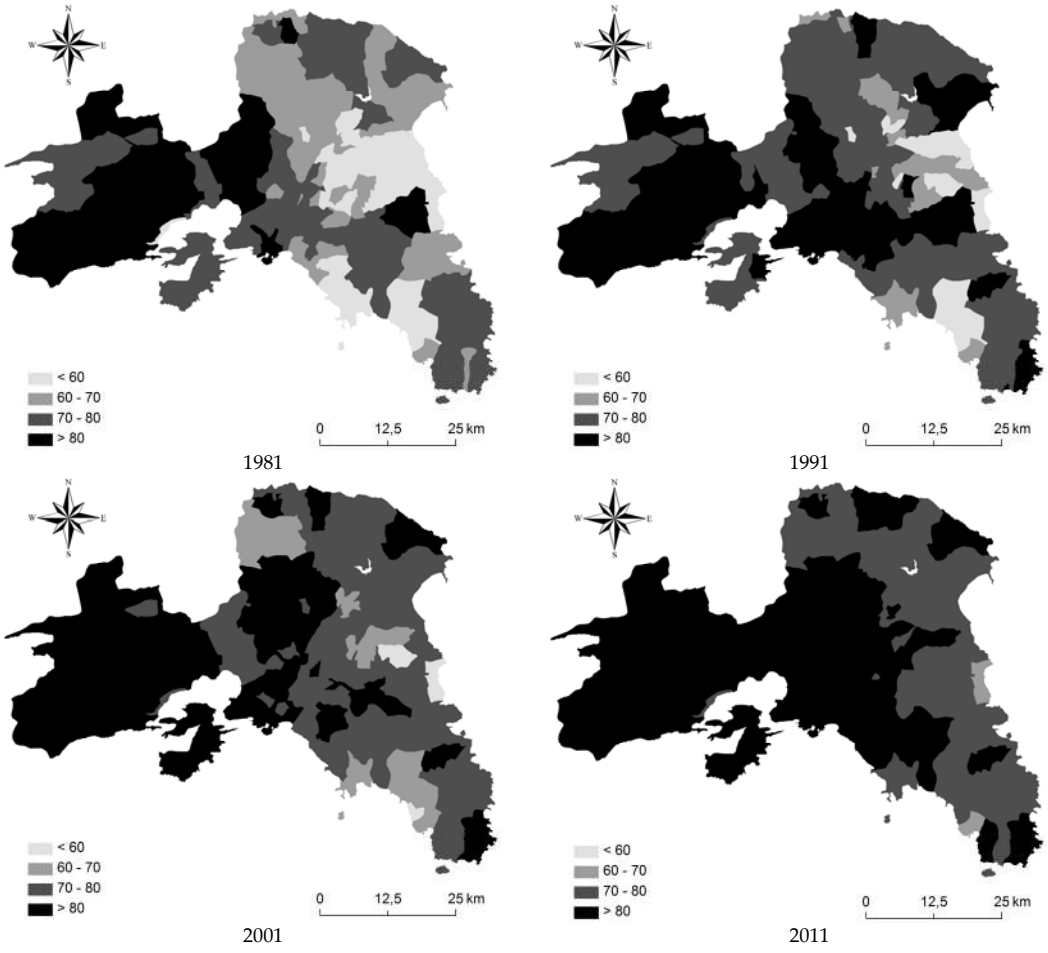
n = number of municipalities

greater Athens area and tripling in the rest of Attica.

Spatial analysis

Figure 2 illustrates the percentage share of population living in the same municipality five years before the census date in total resident population at the census date. Low values of residential stability indicate municipalities characterized by intense residential mobility. Conversely, residential stability values close to 100 percent outline more stable population dynamics, possibly leading to urban consolidation. Residential mobility was the highest in eastern Attica all over the study period. The total flow of residential movements was less intense in central Athens and in western Attica, especially in high-density municipalities close to the inner cities of Athens and Piraeus.

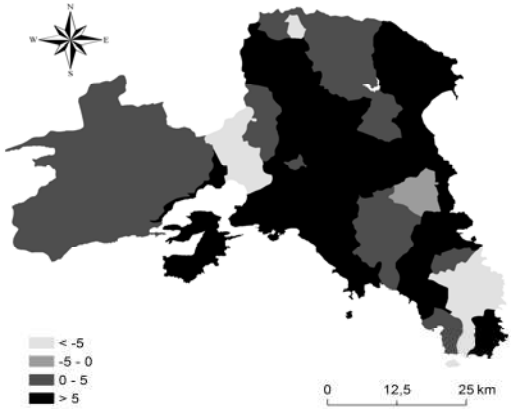
Figure 2. Spatial distribution of an indicator of residential stability by year in AMR



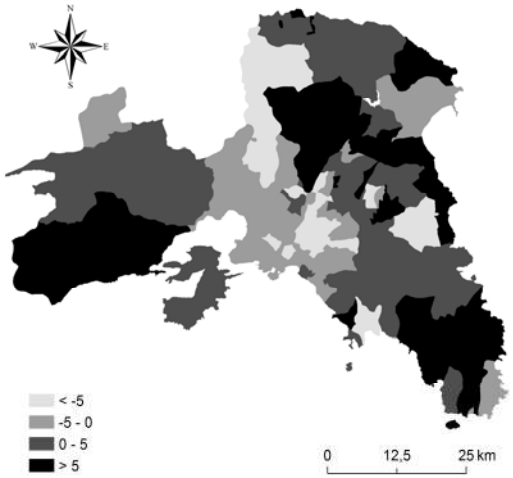
A progressive but spatially heterogeneous decline in the percent rate of residential mobility – reflected in the increase of residential stability values – was observed in the study area (see

Figure 3), determining a polarization in western and eastern Attica, with a divide by nearly 10 points between eastern municipalities (the highest mobility rate) and western municipalities in

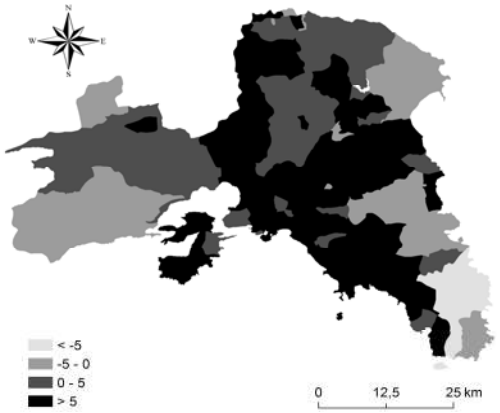
Figure 3. Changes over time (%) in residential stability by time period in AMR



1981-1991



1991-2001



2001-2011

2011. During the entire study period, eastern Attica was likely the most dynamic context in both demographic and economic terms, contrasting the stable socioeconomic context characterizing western Attica. Eastern Attica was also the district with the highest suburbanization pressure, leading to intense urban sprawl and industrial delocalization. The Greater Athens area experienced a rapid decline (> 5%) in residential mobility, especially over the 1981-1991 decade, outlining demographic stabilization and increasing polarization in urban and rural districts. In this sense, decreasing residential mobility was associated with a progressive (but spatially heterogeneous) shift from suburbanization (with high residential mobility) to more complex urban phases characterized by low residential mobility, moderate population growth and slow, spatially-discontinuous urban expansion.

Multidimensional analysis

Multiway Factor Analysis (MFA) extracted four relevant axes explaining 54 percent of the total variance (Table 3, next page) with the final objective to profile the local socioeconomic context associated with specific spatial patterns of residential mobility during the study period. MFA indicates two local-scale patterns of residential mobility, the former for the early 1990s and the early 2010s (Axis 1) and the latter for the early 1980s and the early 2000s (Axis 4), being associated to peculiar territorial conditions and socioeconomic processes. Specific characteristics of the spatial distribution of residential mobility in the early 1980s and 2000s were identified respectively along Axis 3 and Axis 2, being associated with a distinct socioeconomic context at the municipal scale.

Examining Axis 1 structure (27% of the total variance), a separate analysis of each dimension extracted by MFA suggests that residential mobility increased linearly with the distance from the inner city of Athens in both the early 1990s and 2010s, evidencing a spatial divergence along the urban gradient. Loadings to Axis 1 show the most relevant socioeconomic variables characterizing the local context are associated with high residential mobility in the early 1990s and 2010s. Local contexts with high or moderately-high residential mobility in the early 1990s and 2010s have positive loadings on Axis 1, being characterized by rural conditions (high forest cover at the beginning of the study period (1980), high per-capita built-up area and high share of one-dwelling buildings in total building stock during the entire study period, and a considerable distance from three urban nodes: Athens, Piraeus and Maroussi-Olympic Stadium). Variables receiving negative loadings to Axis 1 include proxies of economic agglomeration, such as diversity in urban land-use, service-commercial buildings, multiple usage buildings and a municipal master plan in force since time. These results demonstrate how residential mobility in the early 1990s and 2010s reflected (more or less) intense suburbanization processes, leading to a spatially discontinuous urban expansion into rural areas.

Axis 2 (10%) was mostly associated with a geographical gradient that characterized the early 2000s spatial pattern of residential mobility in Athens. Compared with the neighbouring rural districts devoted to agriculture, residential mobility was the lowest (the highest residential stability) in districts dominated by forest land cover with relatively poor soils – frequently under environmental constraints (national and/or regional parks, natural reserves, other regimes of

land protection). These results suggest that local processes of residential mobility in the early 2000s involved both strictly urban locations and accessible agricultural fringe districts close to

Table 3. Selected loadings of a multiway factor analysis of residential mobility and background indicators at the municipal scale in AMR

Variable	Axis 1	Axis 2	Axis 3	Axis 4
Expl.Var.(%)	*26.8*	*9.7*	*8.9*	*7.0*
Residential stability				
1980			0.50	0.53
1990	-0.52			
2000		-0.56		0.54
2010	-0.58			
Forested area				
1980	0.53			
1990		-0.53		
2000		-0.72		
2010		-0.56		
Protected land (presence/absence)				
1980		-0.55		
1990		-0.70		
2000		-0.70		
2010		-0.63		
Municipal town plan				
2000	-0.59			
2010	-0.50			
Per-capita built-up area				
1980	0.61			
1990	0.55			
2000	0.56			
2010	0.78			
One-dwelling buildings				
1980	0.86			
1990	0.89			
2000	0.86			
2010	0.70			
Diversity in urban land-use				
1980	-0.71			
1990	-0.70			
2000	-0.70			
2010	-0.75			
Industrial buildings				
1980			0.76	
1990			0.77	
2000			0.73	
2010			0.70	
Service/commerce buildings				
1980			0.65	
1990	-0.63		0.52	
2000	-0.55		0.57	
2010	-0.51			
Multiple usage buildings				
1980	-0.79			
1990	-0.85			
2000	-0.86			
2010	-0.64			
Distance from Athens	0.82			
Distance from Piraeus	0.86			
Distance from Olymp. Stad, Maroussi	0.54			0.52
Distance from Markopoulo Messoghia				0.51
Soil Quality Index		-0.54		

Note: Variables with loadings < |0.5|: Climate Quality Index, Municipal surface area, Coastal municipality, Mean elevation, Hotel-use buildings (1980, 1990, 2000, 2010), Self-contained buildings (1980, 1990, 2000, 2010), Municipal town plan (1980, 1990).

high-rank infrastructures (highways, ports, the international airport), evidencing late suburbanization and early signs for re-urbanization at the same time (Gargiulo Morelli et al. 2014).

Axis 3 (9%) outlined a specific pattern of residential mobility observed in the early 1980s and coincided with a mixed urbanization-suburbanization phase in Athens. Resident population was more stable (less residential mobility) in municipalities with a local economic base dominated by industry, which was also the preferential location of commerce and service activities in the urban area. Residential mobility in the early 1980s was found higher in urban municipalities with a more mixed economic structure. Finally, Axis 4 (7%) identified spatial patterns common to both early 1980s and early 2000s socioeconomic dynamics. In both time periods, residential mobility (lower residential stability values) decreased with the distance from two suburban centers in AMR: Maroussi (the central municipality of the Olympic district northeast of Athens) and Markopoulo Messoghias (the most important urban node in the rural Messoghia district, progressively urbanized with the construction of the Athens International Airport in the early 1990s). These results indicate that the northeastern fringe of Athens was the most dynamic district in terms of population growth and socioeconomic transformations during both late urbanization and early re-urbanization phases, in partial agreement with earlier findings by Chorianopoulos et al. (2014).

Discussion

Understanding latent interactions between economic cycles and demographic processes contributes to better define complex mechanisms of urban growth at different temporal scales. Spatio-temporal changes in residential mobility make it possible to recognize distinct phases of metropolitan growth in a paradigmatic southern European city, based on a comprehensive knowledge of its local socioeconomic contexts (Salvati and Carlucci 2017).

Focusing on changes in the place of residence, our study defines a proxy indicator of residential mobility in AMR, quantifying the proportion of population with stable residence, i.e. people that live in the same municipality for a period longer than five years (Geronimus et al. 2014). Residential mobility reflects differentiated socioeconomic contexts that can be better interpreted using multivariate exploratory techniques (Blokland 2003; Battu et al. 2005; Kitrinou and Mytilini 2014; Lancee and Schaeffer 2015; Coulter et al. 2016). Several analysis dimensions have been identified using multidimensional techniques in urban studies (e.g. Carlucci et al. 2016; Magre et al. 2016; Salvati and Serra 2016). Being conceptually different from commuting flows and long-range migration, residential mobility spatial patterns highlight which municipalities attract more intense flows of new inhabitants from neighbouring zones (Blokland 2003; Musterd et al. 2016; Salvati et al. 2016a).

Residential preferences stem from individual choice, economic background and social relationships shaping any given place (Mulder 2007; Michielin and Mulder 2008; Michielin et al. 2008; Hedman et al. 2011; Coulter and van Ham 2013; Hedman 2013). In this sense, housing is one of the most powerful macro-scale factors leading to social homogenization or class

segregation (Delladetsima 2006; Arapoglou and Sayas 2009; Rontos et al. 2016), with influence on short-range residential movements (Di Feliciantonio and Salvati 2015). Increasing disparities between rich and poor neighbourhoods indicate a more polarized social structure at the metropolitan scale, possibly reflected in the spatial regime of residential mobility (Salvati 2016). In Athens, spatial divides in the indicator of residential stability were particularly high in the first-time interval, decreasing over the most recent decades, indicating a progressively more balanced territorial context (e.g. Chorianopoulos et al. 2014).

Local patterns of residential mobility have also diverged in the study area possibly due to the influence of intrinsic drivers linked to economic cycles (Van Ommeren et al. 2000). Our analysis has identified distinct economic phases linked to urban cycles in AMR, with short-range population movements (in terms of spatial changes in the place of residence) representing a distinctive attribute of sequential urbanization, suburbanization and re-urbanization phases (Kroll and Kabisch 2012). Urbanization waves under economic stability or moderate growth (especially observed in the 1980s) were characterized by medium-high rates of residential mobility oriented along the urban gradient (Magre et al. 2016). Suburbanization and economic expansion in the 1990s influenced considerably population dynamics, with the highest values of residential mobility scattered in suburban areas, possibly influenced by place-specific economic factors, including high accessibility, services, land availability to building and natural amenities (Rontos et al. 2016). Economic recession under late suburbanization or early re-urbanization was characterized by the lowest residential mobility, again oriented along the urban gradient, marking a profound divide between rich (eastern Attica) districts and poor (western Attica) municipalities.

Planning deregulation and informal economy succeeded in diverting policies aimed at increasing competitiveness, modernization and the development of a new business district in northeastern Athens, determining an uncontrolled urban growth in AMR in past decades (Vaiou 1997). In addition to urban sprawl, several factors affected spatial polarization in wealthier and disadvantaged districts (Kourliouros 1997). Demographic dynamics and industrialization processes have been responsible for long-term urban concentration, since the industrial sector preferred urban locations to exploit the intrinsic benefits derived from agglomeration economies. However, industrial activities moved into peripheral areas since the 1980s, with the rise of agglomeration diseconomies (Petrakos and Tsoukalas, 1999). At the same time, although a slowdown in suburbanization trends has been increasingly associated with demographic processes, such as international and internal migration (Arapoglou and Sayas 2009), (re)densification processes have been indirectly stimulated together by economic stagnation and regional policies aimed at urban containment, as in other metropolitan regions in Europe (e.g., see Haase et al. 2010).

Based on these premises, residential mobility should be regarded as a demographic process demanding distinct explanation according to economic and urban cycles, as it reflects the joint action of multiple forces at local, regional and country scale (Smith 2014). Results of the present study contribute to shed light on these complex dynamics at the local and regional levels in a paradigmatic case study in southern Europe, discriminating among the demographic outcomes of different urban phases. In the first-time interval (1981-1991), economic expansion

has implied greater residential mobility in Athens. Attica has experienced a rapid population growth resulting in a discontinuous urban expansion (Leontidou, 1990). Especially in eastern Attica, urban sprawl and rapid economic development fuelled a speculative real estate market in peripheral areas, attracting population and, to a lesser extent, economic activities (Colantoni et al. 2016). Urban consolidation emerged in the 1990s with a profound restructuring in the spatial regime of residential mobility, evidencing a progressive slowdown in suburbanization processes (Rontos et al. 2016). However, with the advent of the Olympic Games, a moderate rise in the intensity of residential mobility was observed, especially in the Greater Athens area (Pili et al. 2017). In the most recent period corresponding with the 2007 recession, residential mobility was the lowest through the study area, while maintaining an evident divide between the most dynamic districts in eastern Attica and demographically stable districts in western Attica (Salvati et al. 2016). Taken together, economic expansion in the 1980s and early 2000s encouraged residential mobility in a context of suburbanization, with agricultural areas experiencing an intense urban expansion into vacant land. The early 1990s and the early 2010s were definitely considered as time periods characterized by a more stagnant economy.

The results obtained through the indicator of residential mobility emphasized the effect of economic cycles, such as the recent crisis in AMR. As in other southern European cities, Athens has faced new societal changes linked to crises, indirectly endorsing a new urban cycle since 2007 (Salvati and Carlucci 2016). Recent socioeconomic fluctuations have led to new urban structures, reducing the spatial dispersion of settlements – transformed into more compact and land-saving forms (Haase et al. 2010). The 2007 economic downturn impacted negatively on residential mobility in Greece. Areas with the highest rates of residential mobility corresponded to the wealthier and economically dynamic places in Attica, undergoing a residual sprawl in the early 2010s (Chorianopoulos et al. 2014).

Identifying multiple patterns of residential mobility over time allows understanding spatial direction and intensity of demographic dynamics impacting structure and functions of metropolitan regions. These findings constitute the necessary information base to design more effective policies addressing urban sustainability and containing social segregation, even in a context of economic restrictions imposed by cuts in the budget of central and local authorities (Dijkstra et al. 2015). As residential flows are related to both demographic and economic variables, understanding how spatial patterns of residential mobility anticipate local-scale urban growth and metropolitan-scale socioeconomic transformations is increasingly required to inform policies mitigating territorial disparities, social conflicts and economic polarization (Rontos et al. 2016). Such strategies may benefit from an extensive analysis of differential sensitivity of social groups and activities to economic fluctuations (Psycharis et al. 2016), in a way to act through targeted interventions for social protection and spatially balanced economic development.

Conclusion

Original approaches, suitable indicators and analysis techniques have been implemented at different spatial scales, and especially over metropolitan regions, supporting studies on urban growth at local and regional scales (Pacione 2005; Cohen 2006; van Criekingen 2010; Andersen

et al. 2011; Angel et al. 2011). Contributing to a better understanding of recent metropolitan transformations under progressively more unpredictable economic cycles, a quantitative approach grounded on indicators was combined with empirical findings derived from earlier studies, with the final objective to verify if residential mobility anticipates urban growth and change. Changes in spatial patterns of residential mobility are demonstrated to be associated to factors (directly or indirectly) dependent on demographic dynamics and economic cycles, including (evident or subtle) fluctuations in the socio-spatial urban structure and economic re-organization across large metropolitan areas. This study employed an approach accounting for both economic shocks and mechanisms that stimulated socio-demographic transformations. Spatial direction and intensity of residential mobility proved to be indicators that discriminated among different urban phases, reflecting also place-specific demographic trends and short-term economic dynamics. Revealing an intrinsic socioeconomic background over the last three decades, residential mobility in AMR can be defined as a suitable indicator to delineate future scenarios of urban growth. In fact, under sequential waves of economic expansion and stagnation, residential mobility is an important factor influencing population dynamics and demographic structure in contemporary cities, providing a more general vision beyond the effects of the traditional urbanization-suburbanization cycle in southern Europe.

References

Allen, J. et al. (2004). *Housing in southern Europe*. London: Blackwell.

Andersen, H.T., L. Møller-Jensen and S. Engelstoft (2011). "The end of urbanization? Towards a new urban concept or rethinking urbanization." *European Planning Studies* 19(4): 595-611.

Angel, S. et al. (2011). "The dimensions of global urban expansion: Estimates and projections for all countries, 2000 - 2050." *Progress in Planning* 75: 53-107.

Arapoglou, V.P. and J. Sayas (2009). "New facets of urban segregation in southern Europe - Gender, migration and social class change in Athens." *European Urban and Regional Studies* 16(4): 345-362.

Arbaci, S. (2008). "(Re)Viewing Ethnic Residential Segregation in Southern European Cities: Housing and Urban Regimes as Mechanisms of Marginalisation." *Housing Studies* 23(4): 589-613.

Battu, H., V. Gerova and E. Phimister (2005). *Residential mobility*. In J.F. Ermisch and R.E. Wright (Eds.): Changing Scotland: Evidence from the British Household Panel Survey (pp. 63-81). Bristol: Policy Press.

Bayona-Carrasco, J. and F. Gil-Alonso (2012). "Suburbanisation and international immigration: The case of the Barcelona Metropolitan Region (1998-2009)." *Tijdschrift voor Economische en Sociale Geographie* 103(3): 312-329.

Beriatos, E. and A. Gospodini (2004). " 'Glocalising' urban landscapes: Athens and the 2004 Olympics." *Cities* 21(3): 187-202.

Blokland, T. (2003). *Urban Bonds*. Cambridge: Polity Press.

Böheim, R. and M. Taylor (1999). *Residential mobility, housing tenure and the labour market in Britain*. Essex: Institute for Social and Economic Research, University of Essex.

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

Buck, N. (1994). *Housing and residential mobility*. In N. Buck, Gershuny J., Rose D. and Scott J. (eds.): Changing Households, ESRC Research Centre on Micro-Social Change. Essex: University of Essex.

Buck, N. (1997). *Using panel surveys to study migration and residential mobility*. In D. Rose (ed.): Researching Social Change. London: UCL Press.

Carbonaro, C. et al. (2018). "Demographic decline, population aging, and modern financial approaches to urban policy." *International Regional Science Review* 41(2): 210-232.

Carlucci, M. et al. (2016). “Revisiting an Hegemonic Concept: Long-term 'Mediterranean Urbanization' in between city re-polarization and metropolitan decline.” *Applied Spatial Analysis and Policy* 10(3): 347-362.

Catalàn, B., D. Sauri and P. Serra (2008). “Urban sprawl in the Mediterranean? Patterns of growth and change in the Barcelona Metropolitan Region 1993-2000.” *Landscape and Urban Planning* 85: 174-184.

Champion, A.G. (2001). “A changing demographic regime and evolving poly centric urban regions: Consequences for the size, composition and distribution of city populations.” *Urban Studies* 38(4): 657-677.

Chorianopoulos, I. et al. (2014). “The shift to competitiveness and a new phase of sprawl in the Mediterranean city: Enterprises guiding growth in Messoghia - Athens.” *Citie*s 39: 133-143.

Coccossis, H., D. Economou and G. Petrakos (2005). “The ESDP relevance to a distant partner: Greece.” *European Planning Studies* 13(2): 253-264.

Cohen, B. (2006). “Urbanization in Developing Countries: Current Trends, Future Projections, and Key Challenges for Sustainability.” *Technology and Society* 28: 63-80.

Colantoni, A. et al. (2016). “Cities as selective land predators? A Lesson on Urban Growth, (Un)effective planning and Sprawl Containment.” *Science of the Total Environment* 545-546: 329-339.

Coppi, R. and S. Bolasco. (1988). *Multiway Data Analysis*. North-Holland: Elsevier.

Coulter, R. and M. van Ham (2013). “Following people through time: An analysis of individual residential mobility biographies.” *Housing Studies* 28: 1037-1055.

Coulter, R., M. V. Ham and A. M. Findlay (2016). “Re-thinking residential mobility: Linking lives through time and space.” *Progress in Human Geography* 40(3): 352-374.

Cuadrado-Ciuraneta, S., A. Durà-Guimerà and L. Salvati (2017). “Not only tourism: unravelling suburbanization, second-home expansion and "rural" sprawl in Catalonia, Spain.” *Urban Geography* 38(1): 66-89.

Delladetsima, P. (2006). “The emerging property development pattern in Greece and its impact on spatial development.” *European Urban and Regional Studies* 13(3): 245-278.

De Rosa, S. and L. Salvati (2016). “Beyond a 'side street story'? Naples from spontaneous centrality to entropic polycentricism, towards a 'crisis city'.” *Cities* 51: 74-83.

Di Feliciantonio, C. and L. Salvati (2015). “'Southern' alternatives of urban diffusion: Investigating settlement characteristics and socioeconomic patterns in three Mediterranean regions.” *Tijdschrift voor Economische en Sociale Geografie* 106(4): 453-470.

Dijkstra, L., E. Garcilazo and P. McCann (2015). “The effects of the global financial crisis on European regions and cities.” *Journal of Economic Geography* 15(5): 935-949.

Duvernoy, I. et al. (2018). “Pictures from the Other Side of the Fringe: Urban Growth and Peri-urban Agriculture in a Post-industrial City (Toulouse, France).” *Journal of Rural Studies* 57: 25-35.

Economou, D. (1997). “The planning system and rural land use control in Greece: an European perspective.” *European Planning Studies* 5(4): 461-476.

Elder, G.H., M.K. Johnson and R. Crosnoe (2003). *The emergence and development of life course theory*. In J.T. Mortimer and M.J. Shanahan (Eds.) Handbook of the Life Course (pp. 3-19). New York: Kluwer Academic/Plenum Publishers.

European Environment Agency (2011). *Mapping guide for a European urban atlas*. Copenhagen: EEA.

Feijten, P., P. Hooimeijer and C.H. Mulder (2008). “Residential experience and residential environment choice over the life-course.” *Urban Studies* 45: 141-162.

Gargiulo Morelli, V., K. Rontos and L. Salvati (2014). “Between suburbanisation and re-urbanisation? Revisiting the Urban Life Cycle in a Mediterranean Compact City.” *Urban Research and Practice* 7(1): 74-88.

Geronimus, A. T., J. Bound and A. Ro (2014). “Residential mobility across local areas in the United States and the geographic distribution of the healthy population.” *Demography* 51(3): 777-809.

Grinin, L., A. Korotayev and S. Malkov (2010). “II. The Models of Economic and Demographic Processes.” *History and Mathematics: Processes and Models of Global Dynamics* 138.

Giannakourou, G. (2005). “Transforming spatial planning policy in Mediterranean countries. Europeanization and domestic change.” *European Planning Studies* 13(2): 253-264.

Gil-Alonso, F., J. Bayona-i-Carrasco and I. Pujadas-i-Rúbies (2016). “From boom to crash: Spanish urban areas in a decade of change (2001-2011).” *European Urban and Regional Studies* 23(2): 198-216.

Gkartzios, M. and K. Scott (2015). “A cultural panic in the province? Counterurban mobilities, creativity, and crisis in Greece.” *Population, Space and Place* 21(8): 843-855.

Gkartzios, M., K. Remoundou and G. Garrod (2017). “Emerging geographies of mobility: The role of regional towns in Greece's ‘counterurbanisation story’.” *Journal of Rural Studies* 55: 22-32.

Gkartzios, M. and K. Scott (2015). “A Cultural Panic in the Province? Counterurban Mobilities, Creativity, and Crisis in Greece.” *Population, Space and Place* 21(8): 843-855.

Goldblum, C. and T. C. Wong (2000). “Growth, crisis and spatial change: a study of haphazard urbanisation in Jakarta, Indonesia.” *Land Use Policy* 17(1): 29-37.

Goldstein, J. et al. (2013). “Fertility reactions to the" Great Recession" in Europe: Recent evidence from order-specific data.” *Demographic Research* 29, 85-104.

Haase, A. et al. (2010). “Spaces of reurbanisation: exploring the demographic dimension of inner-city residential change in a European setting.” *Population, Space and Place* 16(5): 443-463.

Hedman, L. (2013). “Moving near family? The influence of extended family on neighbourhood choice in an intraurban context.” *Population, Space and Place* 19: 32-45.

Hedman, L., M. van Ham and D. Manley (2011). “Neighbourhood choice and neighbourhood reproduction.” *Environment and Planning A* 43: 1381-1399.

Henley, A. (1998). “Residential mobility, housing equity and the labour market.” *Economic Journal* 108: 414-427.

Hionidou, V. (1995). “The demographic system of a Mediterranean Island: Mykonos, Greece 1859-1959.” *International Journal of Population Geography* 1(2): 125-146.

Ioannides, Y.M. (l987). “Residential mobility and housing tenure choice.” *Regional Science and Urban Economics* l7: 265-287.

Kang, N. and N. Kwak (2003). “A Multilevel Approach to Civic Participation: Individual Length of Residence, Neighborhood Residential Stability, and Their Interactive Effects With Media Use.” *Communication Research* 30(1): 80-106.

Kazemzadeh-Zow, A. et al. (2017). “A Spatial Zoning Approach to Calibrate and Validate Urban Growth Models.” *International Journal of Geographical Information Science* 31(4): 763-782.

Kitrinou, E. and L. Mytilini (2014). “Development of a behavioural framework for analyzing employment mobility decisions in island areas: the case of the Aegean Islands, Greece.” *Island Studies Journal* 9(2): 307-326.

Kourliouros, E. (1997). “Planning industrial location in Greater Athens: the interaction between deindustrialization and anti-industrialism during the 1980s.” *European Planning Studies* 5(4): 435-460.

Kroll, F. and N. Kabisch (2012). “The Relation of Diverging Urban Growth Processes and Demographic Change along an Urban-Rural Gradient.” *Population, Space and Place* 18(3): 260-276.

Kroonenberg, P.M. (2008). *Applied multiway data analysis*. London: Wiley.

Kulu, H., P.J. Boyle and G. Anderson (2009). H"igh Suburban fertility: Evidence from Four Northern European Countries." *Demographic Research* 31: 915-944.

Lancee, B. and M. Schaeffer (2015). *Moving to diversity. Residential mobility, changes in ethnic diversity, and concerns about immigration*. In R. Koopmans, B. Lancee, and M. Schaeffer (Eds.): Social Cohesion and Immigration in Europe and North America: Mechanisms, Conditions, and Causality (pp. 38-55). London: Routledge.

Lee, K.O. and G. Painter (2013). "What happens to household formation in a recession?" *Journal of Urban Economics* 76: 93-109.

Leontidou, L. (1990). *The Mediterranean city in transition: Social change and urban development.* Cambridge: University Press.

Lesthaeghe, R.J. and L. Neidert (2006). "The second demographic transition in the United States: Exception or textbook example?" *Population and Development Review* 32(4): 669-698.

Liu, L. (2005). "Fertility trends in china's more developed urban districts: the case of four cities." *Population, Space and Place*,11(5): 411-424.

Magre, J., J.J. Vallbé and M. Tomàs (2016). "Moving to suburbia? Effects of residential mobility on community engagement." *Urban Studies* 53(1): 17-39.

Maloutas, T. (2004). "Segregation and residential mobility: spatially entrapped social mobility and its impact on segregation in Athens." *European Urban and Regional Studies* 11(3): 195-211.

Michielin, F. and C.H. Mulder (2008). "Family events and the residential mobility of couples." *Environment and Planning A* 40: 2770-2790.

Michielin, F., C.H. Mulder and A. Zorlu (2008). "Distance to parents and geographical mobility." *Population, Space and Place* 14: 327-345.

Milbourne, P. (2007). "Re-populating rural studies: migrations, movements and mobilities." *Journal of Rural Studie*s 23: 381-386.

Mulder, C.H. and P. Hooimeijer (1999). *Residential relocations in the life course*. In: van Wissen L and Dykstra P (eds). "Population Issues: An Interdisciplinary Focus. New York: Kluwer Academic/Plenum Publishers, 159-186.

Mulder, C.H. (2007). "The family context and residential choice: A challenge for new research." *Population, Space and Place* 13: 265-278.

Munafò, M., L. Salvati and M. Zitti (2013). "Estimating soil sealing at country scale - Italy as a case study." *Ecological Indicators* 26: 36-43.

Musterd, S. et al. (2016). "Adaptive behaviour in urban space: Residential mobility in response to social distance." *Urban Studies* 53(2): 227-246.

Ogden, P.E. and R. Hall (2000). “Households, reurbanisation and the rise of living alone in the principal French cities 1975-1990.” *Urban Studies* 37(2): 367-390.

Oishi, S. (2010). “The Psychology of Residential Mobility: Implications for the Self, Social Relationships, and Well-Being.” *Perspectives on Psychological Science* 5(1): 5-21.

Oishi, S. et al. (2007). “The socioecological model of procommunity action: the benefits of residential stability.” *Journal of Personality and Social Psychology* 93(5): 831.

Pacione, M. (2005). *Urban Geography: A Global Perspective*. London: Routledge.

Petrakos, G. and D. Tsoukalas (1999). *Metropolitan Concentration in Greece: An Empirical Investigation*. In D. Economou, and G. Petrakos (Eds.): The development of the Greek Cities, (pp. 247-265). Volos: University of Thessaly Press - Gutenberg, Volos.

Pili, S. et al. (2017). “Towards Sustainable Growth? A Multi-criteria Assessment of (Changing) Urban Forms.” *Ecological Indicators* 76: 71-80.

Pissarides, C. and J. Wadsworth (1989). “Unemployment and the inter-regional mobility of labour.” *Economic Journal* 99: 739-755.

Psycharis, Y. et al. (2016). “Economic crisis and regional development in Greece.” *Région et Développement*, 39.

Remoundou, K., M. Gkartzios and G. Garrod (2016). “Conceptualizing mobility in times of crisis: towards crisis-led counterurbanization?” *Regional Studies* 50(10): 1663-1674.

Ren, X. (2015). “City power and urban fiscal crises: the USA, China, and India.” *International Journal of Urban Sciences* 19(1): 73-81.

Rontos, K. (2010). “Demographic trends, young people’s attitudes towards marriage and socio-economic changes related to family formation in Greece and in selected European Countries: A comparative analysis based on official and survey research data.” *International Journal of Criminology and Sociological Theory* 3(2): 543-562.

Rontos, K. et al. (2016). “Lost in Protest, Found in Segregation: Divided Cities in the Light of the 2015 'Oki' Referendum in Greece. “*City, Culture and Society* 7(3): 139-148.

Rontos, K. and L. Salvati (2014). “Is The Ratio of Present to Resident Population a Proxy for Urban Diffusion? A Case Study.” *International Journal of Ecological and Economic Statistics* 32(1): 75-82.

Salvati, L. (2014). “Exploring the Spatial Pattern of Soil Sealing in a Mediterranean Peri-urban Area.” *Journal of Environmental Planning and Management* 57(6): 848-861.

Salvati, L. (2016). “The dark side of the crisis: disparities in per-capita income (2000-2012) and the urban-rural gradient in Greece.” *Tijdschrift voor Economische en Sociale Geografie* 107(5): 628-641.

Salvati, L. and M. Carlucci (2016). “In-between stability and subtle changes: urban growth, population structure and the city life cycle in Rome.” *Population, Space and Place* 22(3): 216-227.

Salvati, L. and M. Carlucci (2017). “Urban growth, population, and recession: Unveiling multiple spatial patterns of demographic indicators in a Mediterranean City.” *Population, Space and Place* 23(8): e2079.

Salvati, L., A. Sateriano and S. Grigoriadis (2016a). “Crisis and the City: Profiling Urban Growth under Economic Expansion and Stagnation.” *Letters in Spatial and Resource Science* 9(3): 329-342.

Salvati, L., A. Sateriano, E. Saradakou and E. Grigoriadis (2016b). “'Land-use mixité': Evaluating Urban Hierarchy and the Urban-to-Rural Gradient with an Evenness-based Approach.” *Ecological Indicators* 70: 35-42.

Salvati, L. and P. Serra (2016). “Estimating rapidity of change in complex urban systems: a multidimensional, local-scale approach.” *Geographical Analysis* 48(2): 132-156.

Schneider, D. (2015). “The Great Recession, fertility, and uncertainty: evidence from the United States.” *Journal of Marriage and Family* 77: 1144-1156.

Schneider, F., G. Kallis and J. Martinez-Alier (2010). “Crisis or opportunity? Economic degrowth for social equity and ecological sustainability. Introduction to this special issue.” *Journal of Cleaner Production* 18(6): 511-518.

Serra, P., A. Vera, A.F. Tulla and L. Salvati (2014). “Beyond urban-rural dichotomy: exploring socioeconomic and land-use processes of change in Spain (1991-2011).” *Applied Geography* 55: 71-81.

Smith, M.E. (2014). “Peasant mobility, local migration and premodern urbanization.” *World Archaeology* 46(4): 516-533.

Stockdale, A. (2016). “Contemporary and ‘messy’ rural in-migration process: comparing counterurban and lateral rural migration.” *Population, Space and Place* 22(6): 599-616.

Vaiou, D. (1997). “Facets of spatial development and planning in Greece.” *European Planning Studies* 5(4): 431- 433.

van Criekingen, M. (2010). “Gentrifying the re-urbanisation debate, not vice versa: the uneven socio-spatial implications of changing transitions to adulthood in Brussels.” *Population, Space and Place* 16(5): 381-394.

Van Ommeren, J., P. Rietveld and P. Nijkamp (2000). “Job mobility, residential mobility and commuting: A theoretical analysis using search theory.” *The annals of regional science* 34(2): 213-232.

Walford, N. and S. Kurek (2016). “Outworking of the Second Demographic Transition: National Trends and Regional Patterns of Fertility Change in Poland, and England and Wales, 2002-2012.” *Population, Space and Place* 22(6): 508-525.

Weinberg, D.H., J. Friedman and S.K. Mayo (1981). “Intraurban residential mobility: the role of transaction costs, market imperfections and household disequilibrium.” *Journal of Urban Economics* 9: 332-348.

Zambon, I. et al. (2017). “Beyond the 'Mediterranean City': Socioeconomic Disparities and Urban Sprawl in three Southern European Cities.” *Geographiska Annaler B* 99(3): 319-337.

Zambon, I. et al. (2018). “Soil Matters? A Multivariate Analysis of Socioeconomic Constraints to Urban Expansion in Mediterranean Europe.” *Ecological Economics* 146: 173-183.

Zitti, M. et al. (2015). “Long-term Urban Growth and Land-use Efficiency in Southern Europe: Implications for Sustainable Land Management*.” Sustainability* 7(3): 3359-3385.