Re-urbanizing the European City: a Multivariate Analysis of Population Dynamics during Expansion and Recession Times

Abstract

After a long phase of suburbanization promoting economic decentralization and uneven expansion of urban rings, re-urbanization has been observed in an increasing number of European cities. However, a comprehensive analysis of demographic dynamics identifying spatial patterns (and inferring factors of) re-urbanization is still lacking for the European continent. The objective of this study is to fill this knowledge gap proposing a comparative analysis of population dynamics at two spatial scales ('inner cities' and 'large urban zones') in 129 European metropolitan regions under economic expansion (2000-2007) and recession (2008-2014). Non-parametric correlations, Principal Component Analysis and step-wise multiple regressions were used to identify different spatial patterns of population growth at continental and regional scale in Europe. Cities showing a trend toward re-urbanization increased in the studied sample from 36% in 2000-2007 to 47% in 2008-2014. Positive rates of population growth in inner cities were found associated with high levels of disposable per-capita income at the metropolitan scale. With recession, differential population growth rates in the European cities have reflected a moderate spatial rearrangement towards re-urbanization in northern and central Europe and less polarized metropolitan regions with declining population in inner cities of southern and eastern Europe. Based on peculiar demographic dynamics found in the study area, the analysis performed brings useful insights on the debate about the future development of European cities.

Key words: Population dynamics, Inner city, Large Urban Zones, Data mining.

1. Introduction

With half of the world's population living in urban areas, population dynamics in metropolitan regions are becoming progressively more complex and less dependent on economic dynamics (Cohen, 2006; Florida et al., 2008; Angel et al., 2011). Multiple and contradictory demographic shifts from growth to decline and *vice versa* have been observed for an increasing number of cities (Hohenberg and Lees, 1985; Cheshire, 1995; Champion, 2001; Andersen et al., 2011). Usually, the development of metropolitan regions has been described by observing how population of the inner city and surrounding areas changes through time, thus allowing the distinction between urban cycles (Buzar et al., 2007; Beauregard, 2009; Bayona-Carrasco and Gil-Alonso, 2012). Cycle is the period of time during which a demographic phase at a defined spatial unit emerges and declines (Fielding, 1982). The life cycle theory of urban growth introduced by Klaassen et al. (1981), and firstly adopted by van den Berg et al. (1982), was suitable to exploring the relationship between urbanization and population dynamics at local and regional scales (Hall, 1997).

Based on empirical analysis of changes in direction (i.e. growth or decline) and rate of population in the urban core relative to ring areas, van den Berg et al. (1982) identified four cycles, namely 'urbanization', 'suburbanization', 'counter-urbanization' and 're-urbanization'. Although criticized for the extreme simplification of urban patterns and poor connection with economic theories (Nyström, 1992; Henderson and Venables, 2009; Haase et al., 2010; Kabisch and Haase, 2011), the life cycle paradigm remains a reference framework to describe growth and decline of contemporary cities (Hall and Hay, 1980; Cheshire and Hay, 1989; Pacione, 2005).

Because of relatively modest empirical evidences, re-urbanization was likely the less studied process among the four cycles mentioned above (Heikkilä and Kaskinoro, 2009). Re-urbanization is observed when the core city starts re-attracting population and economic activities after a long decline while suburbs still experience demographic loss or particularly low rates of growth (Lever, 1993). This usually occurs when urban re-development projects take place in inner cities, ameliorating housing conditions and the quality of the urban environment and promoting a more dynamic local job market (Martinez-Fernandez et al., 2012). Changes in the economic structure of metropolitan regions are additional factors driving re-urbanization (Partridge et al., 2009). Above all, the development of advanced services together with the rising cost of energy and transportation brings the economic activity back to inner cities (Rink et al., 2012). Re-urbanization is thus understood as a process of populating and diversifying urban cores with a variety of residential groups of different ages and socioeconomic backgrounds (Rérat, 2012).

According to Pacione (2005), early signs of a population reversal between urban and rural areas after a long wave of suburbanization were first identified in the United States during the 1980s, and similar trends have been subsequently detected in other advanced nations, including Canada and Australia (Couch et al., 2007; Bettencourt et al., 2007; Beauregard, 2009). Following suburbanization and counter-urbanization, re-urbanization has been considered an emergent expansion wave also in Europe (Buzar et al., 2007), intensifying after the 2007 global financial crisis (Buzakovski et al., 2010; Kabisch et al., 2010; López-Gay, 2014). The reasons for a reversal of long established trends differed between European regions, leading to the conclusion that a unique explanation of the factors determining this new urban phase would result inadequate and too

simplistic (Heikkilä and Kaskinoro, 2009; van Criekingen, 2010; Haase et al., 2013).

However, consensus has been reached on the pivotal role of demographic transformations as a factor of change in urban dynamics (Haase et al., 2010). The demographic regime has changed (more or less rapidly) in European regions being substantially different from the one observed in the immediate aftermath of World War II and continuing to evolve (Leontidou, 1995; Longhi and Musolesi, 2007; Hatz, 2009; Kroll and Kabisch, 2012). At the same time, settlement systems have been altered significantly in spatial structure, with the emergence of polycentric urban configurations reflecting a slow decline of compact cities and a progressive lowering of urban-rural divides at the metropolitan scale (Longhi and Musolesi, 2007; Turok and Mykhnenko, 2007; Schneider and Woodcock, 2008; Marchetti et al., 2014; Bencardino, 2015).

Population redistribution along urban gradients in response to economic cycles was relatively well studied in Europe, a region with more than 70% of the population living in urban areas today, possibly increasing to 85% by 2050 (Kabisch and Haase, 2011; Kroll and Kabisch, 2012; Lang et al., 2013).Since World War II, European cities were characterized by multiple growth paths determining the proliferation of compact cities, with consolidated dense settlements and radio-centric expansion up to the late 1960s (Kasanko et al., 2006; Schneider and Woodcock, 2008; Salvati and Carlucci, 2015). Suburbanization took place in the 1960s and 1970s with a time slicing between western and northern Europe (early suburbanization) and eastern and southern Europe (late suburbanization). Exurban development has reflected economic de-concentration of inner cities, increased social inequalities and urban continuums with mixed land-use (Catalàn et al., 2008; Arapoglou and Sayas, 2009; Salvati, 2013).

Although many cities in Europe have experienced a continuous process of urban growth, a number of metropolitan regions underwent long periods of shrinkage over recent decades and, in between these two groups, some cities have displayed less pronounced or mixed expansion trajectories (Haase et al., 2013; Salvati and Gargiulo Morelli, 2014; Dijkstra et al., 2015;). A 'turnaround' from urban shrinkage towards stabilization and, possibly, recovery in population numbers, has been increasingly observed in recent years (Andersen et al., 2011). Leipzig in Germany and Liverpool in the United Kingdom are probably the most studied cities that underwent a phase of long-term shrinkage from the 1930s, reversed since the late 1990s by a moderate population growth dependent on external public investments (Kabisch et al., 2010; Rink et al., 2012). Rérat (2012) addressed re-urbanization in Swiss cities, which gained inhabitants since 2000 thanks to international migrants, young adults, non-family households and some parts of the middle to upper class. Southern European cities did not escape this general trend, with inner cities in Spain experiencing signs of re-urbanization since the early 2000s (Serra et al., 2014) because of internal migration and residential mobility (López-Gay, 2014). Salvati and Carlucci (2016) reported some evidences of re-urbanization for Rome, as an indirect response to economic crisis. Early evidence of re-urbanization was also reported for Athens (Gargiulo Morelli et al., 2014). Although the demographic dimension of such residential shifts is gradually being acknowledged by urban scholars, empirical evidence for re-urbanization processes in Europe is still sparse and, in some way, contradictory (Kroll and Kabisch, 2012). Linkages between population dynamics and urban growth need further specification, especially with regard to the role of household-driven processes in the stabilization of inner-city neighbourhoods and the reshaping of residential perceptions, wants and needs (Buzar et al., 2007). Among these

processes, distinct demographic factors seem to play a major role in inner-cities' population growth (Van Gent and Musterd, 2016): internal and foreign migration (Lopez-Gay, 2014), aging population (Lauf et al., 2012), and the emergence of 'non-traditional' households (Bouzarovski et al., 2010), such as single-parent households and cohabitant flat-sharers, or, more generally, the increase in 'adult-centred' families, less attracted by space availability provided by suburban settlements (Rérat, 2012). Housing preferences expressed by elder population, young migrants and new kinds of households 'foster the current re-urbanization processes in inner-city residential area' (Lauf et al., 2012).

Based on the assumption that recent demographic dynamics for both inner cities and ring areas are still underexplored in Europe, our study is aimed at investigating re-urbanization patterns in a representative sample of European metropolitan regions, linking knowledge on earlier urbanization waves with an in-depth understanding of socioeconomic conditions at the base of the progressive re-polarization of inner cities. This analysis benefits from a comparison of population dynamics during economic expansion (2000-2007) and recession (2008-2014). Although the 2007 financial crisis has had a heterogeneous impact on western economies - heavier in southern Europe than elsewhere in the continent - recession has undoubtedly influenced urban growth altering building cycles and shaping house and labour markets, as a consequence of social disparities and a polarized distribution of firms (Capello et al., 2015). With comparative analysis of crisis' impact on population dynamics being mostly occasional and restricted to local contexts (Salvati et al., 2016), identifying similarities and differences in short-term population growth before and during recession is meaningful to shed light on the most recent transformations of European cities and regions.

2. Methodology

2.1. Study area

We studied a set of metropolitan regions from 23 European countries (see list in Appendix 1). Metropolitan boundaries were identified according to the Large Urban Zones (LUZs) delineated by Eurostat Urban Audit (UA). The UA program was aimed at collecting homogeneous statistical data for a representative sample of metropolitan regions > 100,000 inhabitants (Figure 1). This program assures a diachronic and coherent data collection for comparisons at continental, national and local scale (Salvati and Carlucci, 2015). Demographic dynamics were studied using data on population residing in both 'inner cities' and LUZs during two time intervals (2000-2007 and 2008-2014) for 129 metropolitan regions with complete statistical data covering the study period. A LUZ represents a functional urban area consisting of a city and its commuting zone. An 'inner city' is a local administrative unit where the majority of the population lives in an urban centre of at least 50,000 inhabitants. Regional classifications of cities have been used extensively as a reference framework for generalizing morphological patterns and discussing the underlying socioeconomic trends (Angel et al., 2011). Although European cities are generally difficult to be categorized because of their variable size and specialized functions (Hall, 1997), we have partitioned the metropolitan areas investigated in this study into five macro-regions following the classification provided by Hall and Hay (1980) and subsequently used by Hohenberg and Lees (1985), Cheshire and Hay (1989), Couch et al. (2007) and Salvati and Carlucci (2015). This approach has identified European macro-regions with similar attributes on the base of population and economic trends, housing

characteristics, urban planning and developmental policies. Based on this classification, each city was grouped into one of 5 macro-regions (C: Central Europe including Germany, for a total of 34 cities; E: Eastern Europe including Bulgaria, Czech Republic, Estonia, Latvia, Leetonia, Romania, Slovakia and Slovenia: 41 cities; N: Northern Europe including Sweden, Finland, Norway and Denmark: 18 cities; S: Southern Europe including Portugal, Spain, Italy, Malta, Greece and Cyprus: 20 cities; W: Western Europe including United Kingdom, France, Luxembourg and Switzerland: 16 cities).

2.2. Indicators

Population growth (annual percent rate) at both 'inner city' and LUZ scales was calculated for two time intervals reflecting different economic phases (expansion: 2000-2007; recession: 2008-2014). To provide an in-depth assessment of local contexts, a basic set of ancillary variables were calculated for each city: (i) population density at LUZ scale (inhabitants/km^2) by year (2000, 2007, 2014), (ii) city-to-LUZ percent ratio of resident population by year, (iii) LUZ surface area (km^2), (iv) LUZ perimeter-to-area ratio (measuring regularity in the shape of each metropolitan region), (v) a dummy indicating metropolitan regions with > 500,000 inhabitants, (vi) a dummy indicating European capital cities and (vii-xi) 5 dummies classifying cities into one of the 5 European macro-regions (see section 2.1). A dummy variable (xii) indicating metropolitan regions with population growth concentrated in inner cities (most likely experiencing re-urbanization processes) was finally developed with the aim of identifying regions that experience positive rates of population growth at the city scale and a higher rate of population growth at the city scale compared with the rate observed at the LUZ scale in a given time interval (expansion or recession).

Indicators evaluating changes in personal income (Euros) at local scale were finally calculated as: percent annual growth rate of per-capita disposable income at both 'inner city' and LUZ scale during expansion (2000-2007) and recession (2007-2014), per-capita disposable income (LUZ scale) and city-to-LUZ percent ratio of disposable income at the three investigated years (2000, 2007, 2014). Personal income indicators were derived for a sub-sample of metropolitan regions due to lacking data for some cities in the Eurostat UA database (Salvati and Carlucci, 2015).

2.3. Data analysis

The objective of this study was to provide a comparative analysis of recent re-urbanization patterns in Europe based on individual cities' population dynamics, distinguishing local-scale from regional-scale trajectories and identifying the contribution of different socioeconomic contexts to urban expansion. Annual rates of population growth at the spatial scale of inner city and LUZ were considered as key variables assessing trends toward population decline or recovery. A dummy variable considering together changes over time in population growth rates at both spatial scales was also proposed to identify cities with a specific trend towards re-urbanization. A data mining strategy including descriptive statistics, Principal Component Analysis (PCA), non-parametric Spearman correlations and step-wise multiple regression was developed to provide a comprehensive profile of re-urbanizing cities compared with the rest of European metropolitan regions.

2.3.1. Descriptive statistics and spatial analysis

Digital maps provided by Eurostat and representing boundaries of inner cities and LUZs were used to illustrate population growth in European urban areas (Figure 1). Descriptive statistics (average and coefficient of variation) were calculated to assess basic patterns of population increase and decrease in European cities under economic expansion and recession. Descriptive statistics of percent annual rate of change in resident population were tabulated by European macro-regions, population size classes (LUZs > 500,000 inhabitants) and capital cities. Metropolitan regions were classified based on positive or negative growth rates at spatial scales of 'inner city' and LUZ and frequency tables were provided separately for expansion and recession times. Convergence (or divergence) in population growth rate over time and space was studied using scatterplots and Pearson linear correlation analysis testing for a significant relationship ($p < 0.05$) between inner city and LUZ rates under (i) expansion and (ii) recession, and comparing demographic rates synchronically under expansion and recession times separately for (iii) inner cities and (iv) LUZs.

2.3.2. Principal Component Analysis

A Principal Component Analysis was run on the data matrix composed of 15 variables (4 demographic rates and 11 background indicators numbered from (i) to (xi) and presented in section 2.2) calculated for 129 metropolitan regions in Europe. Relevant components were chosen according to the scree-plot criterion fixing the minimum eigenvalue threshold to 1. Component loadings and scores were used to profile spatial variability in population dynamics at the metropolitan scale in Europe.

2.3.3. Regression models

Multiple linear regressions were developed with the aim of defining models that describe the most relevant background conditions associated with population growth (or decline) in European cities. Separate regression models were run using 4 dependent variables (annual population growth rate at both inner city and LUZ scale under expansion and recession times). As in the PCA, 11 background indicators (see section 2.2) were used as regression predictors. Each model was run using a forward stepwise approach with the aim of identifying (and ranking the importance of) the most relevant factors associated with population dynamics using adjusted R^2 as model's diagnostic. A Fisher-Snedecor's F-statistic testing for significant contribution of each indicator entering the regression model was run prior to regression on a standardized data matrix. Predictors were included in a regression model when the *p*-value associated with the respective Fisher-Snedecor test was below 0.01. Results of each regression model are presented using standardized coefficients and tests of significance for each variable (an overall Fisher-Snedecor's F-statistic testing for the null-hypothesis of non-significant model and a Student's t-statistic testing for the null hypothesis of non-significant regression coefficient). A Durbin-Watson (DW) statistic testing for the null hypothesis of serially uncorrelated errors was applied separately to the residuals of each regression. A DW statistic close to 2 indicates serially uncorrelated errors.

2.3.4. Non parametric correlations

Spearman non-parametric correlations were finally run in two separate analysis' steps with the aim to identify (i) significant pair-wise relationships

between the dummy variable indicating metropolitan regions with growing inner cities and 10 background indicators (dummies for northern, central, southern, western, eastern cities in Europe, dummies for capital cities and cities > 500,000 inhabitants, LUZ surface area, LUZ population density and city-to-LUZ population share) and (ii) significant pair-wise relationships between selected income indicators (per-capita disposable income at LUZ scale, percent rate of change in disposable income at both city and LUZ scale, City-to-Luz disposable income ratio) and 16 territorial and demographic variables (background indicators (i) to (xii) *plus* 4 demographic rates, see section 2.2). Significance was tested at $p < 0.05$ after Bonferroni's correction for multiple comparisons.

3. Results

3.1. Population distribution in the European metropolitan regions

Population density at the LUZ scale was particularly high in southern Europe and declined in western, central and eastern Europe, reaching the lowest values in northern Europe (Table 1). Spatial variability in metropolitan population density was relatively low in all European macro-regions. Conversely, the share of population living in inner cities to population residing in LUZs was variable across metropolitan regions, spanning from 39% (western Europe) to 69% (eastern Europe), with values increasing over time in all regions except eastern Europe. In this macro-region, inner cities concentrated, on average, 69% and 66% of total LUZ population respectively in 2000 and 2014.

3.2. Population growth and decline in European cities (2000-2014)

Population growth during the expansion period was higher in LUZ areas compared with inner cities in 73% of the study regions. The reverse pattern was observed during recession, with growth rates being higher in urban cores in 64% of the study regions. With economic expansion, population increased in 68 metropolitan regions (Table 2) at both city and LUZ scale (at a rate of respectively 0.2% and 0.8% per year). In four metropolitan regions population grew in inner cities (0.5%) while declining in the respective LUZ (-0.2%). Population increased in the LUZ (0.3%) while declining in the respective inner city (-0.4%) in 25 cases and, finally, a negative growth rate at both city (-0.4%) and LUZ scale (-0.7%) was observed in 32 cases. With recession, population increased in 83 metropolitan regions at both city (1.0%) and LUZ scale (0.9%). Growing population in inner cities (0.5%) with declining population at the LUZ scale (-0.5%) was observed in 11 metropolitan regions. Population grew in the LUZ (0.2%) while declining in the respective inner city (-0.3%) in 17 cases and, finally, a negative growth rate at both city (-0.9%) and LUZ scale (-0.9%) was observed in 18 cases.

3.3. Spatial variability in population dynamics over expansion and recession

Population dynamics in the European metropolitan regions were investigated on the base of a comparative analysis of growth rates over expansion and recession waves at the spatial scale of inner cities and LUZs (Table 3). Population growth rates were spatially heterogeneous at both city and LUZ scale (Figure 1): with economic expansion, the highest growth rates were observed in cities of northern and western Europe, declining slightly in southern and central Europe and assuming the lowest values in eastern Europe.

A similar spatial pattern was observed for European LUZs, with the highest growth rates observed in northern Europe. Population dynamics under recession were similar to what was observed in the precedent time interval at the city scale, with the highest growth rates observed in northern, western and southern Europe. Population increase in European LUZs was spatially-heterogeneous: eastern and central metropolitan regions experienced, respectively the highest positive and negative growth rates in Europe. Population growth rates during economic expansion were also highly differentiated among European regions: the largest spatial variability was observed at the city scale in both southern and central Europe and decreased considerably under recession. Heterogeneity in population growth rates was evident also at the LUZ scale with the highest spatial variability found in metropolitan regions of central and eastern Europe.

The relationship between population growth rate at the spatial scales of inner city and LUZ (Figure 2, upper panels) evidences a higher heterogeneity of population dynamics over expansion than under recession time. Population growth rates at the two spatial scales were positively correlated in both time intervals, displaying increasing coefficients during recession. A scatterplot comparing population dynamics over expansion and recession at both city and LUZ scale illustrates a non-linear trend characterized by a substantial heterogeneity in metropolitan growth rates among European macro-regions (Figure 2, lower panel). Conversely, patterns of growth and decline were similar at city and LUZ scale: western cities in Europe clustered in the first quadrant indicating positive growth rates in both expansion and recession times and at both spatial scales; the reverse pattern was observed for eastern cities.

3.4. Principal Component Analysis

A summary analysis of the spatial variability of population growth rates in 129 European cities according to the spatial distribution of background indicators was developed using a Principal Component Analysis (Table 4). Three principal components were extracted explaining 58% of the total variance. PC 1 (26%) identified metropolitan regions with above-average rate of population growth at both city and LUZ scale during economic expansion. Our analysis indicates that the highest growth rates were associated with large LUZs characterized by regular morphology (low perimeter-to-area ratio) and medium-low population density. Urban regions with these characteristics were more frequently observed in northern Europe and less frequently observed in eastern Europe. PC 2 (17%) identified metropolitan regions with above-average rate of population growth at both city and LUZ scale during recession. The highest growth rates were observed for metropolitan regions < 500,000 inhabitants, mainly situated in central Europe. PC 3 (15%) identified cities along a population density gradient with the highest loading observed for southern European regions and showing no relationship with population dynamics.

The score plot draws on components 1 and 2 classified cities according to positive (or negative) population growth rates during economic expansion (component 1) and recession (component 2). Two groups were identified along component 1 (Figure 3). A group of 15 cities situated in northern Europe (except for Luxembourg, Ioannina and Lefkosia) clustered along positive values of both components 1 and 2 indicating continuous population increase at both inner city and LUZ scales. Another group of cities situated in eastern Europe (except for Trieste) clustered along negative values of component 1 and positive values of component 2, being characterized by demographic decline during economic

expansion and a progressive population recovery during recession at both inner city and LUZ scales. Large metropolitan regions such as Paris, Berlin and Madrid clustered in the second quadrant and received positive and negative scores respectively to component 1 and 2, evidencing rapid increase and moderate decline of resident population respectively during expansion and recession.

3.5. Modelling population dynamics using step-wise regression

The influence of background socioeconomic factors on population dynamics was studied using step-wise multiple regressions (Table 5). With economic expansion, population growth rates in inner cities decreased significantly with population density (LUZ scale) and, more generally, in cities of eastern and central Europe. At the LUZ scale, population growth increased significantly in northern, southern and western Europe and in cities with > 500,000 resident inhabitants, decreasing with population density (LUZ scale) and city-to-LUZ population ratio. With recession, population growth rates at both inner city and LUZ scales increased significantly in northern Europe and, more generally, in capital cities, decreasing in central Europe and in metropolitan regions with > 500,000 inhabitants. A higher goodness of fit was observed for regressions calculated for the expansion time compared with the subsequent recession time. These results suggest that population dynamics under recession were influenced by more complex factors of change compared with the expansion wave.

3.6. Characterizing metropolitan regions with growing inner cities

A total of 46 metropolitan regions out of 129 (35.6%) displayed positive rates of population growth (city scale) and a positive city-to-LUZ ratio of population growth under expansion, increasing to 61 regions (47.3%) in the following recession time (Figure 4). In these areas, annual population growth rates during expansion were found relatively high at both inner city (0.8%) and LUZ scale (0.5%), increasing in the following recession phase to 1.0% (inner city) and 0.6% (LUZ). A pair-wise Spearman correlation analysis was run with the aim to identify significant relationships between a dummy variable indicating growing inner cities and 10 background variables (Figure 5). Under economic expansion, growing inner cities were relatively common in central Europe and quite scarce in eastern Europe. With recession, population of inner cities grew fast in large metropolitan regions of northern Europe.

3.7. Population dynamics and personal income

Pair-wise correlations between population dynamics and selected indicators of disposable income at both inner city and LUZ scale were carried out separately for expansion and recession times (Table 6). Population growth at the city level was positively correlated with average per-capita disposable income at LUZ scale (r_s = 0.49 and 0.51 respectively during expansion and recession). In line with these findings, the annual rate of population growth at LUZ scale decreased with the share of city-to-LUZ per-capita disposable income (r_s = -0.52). Population density (LUZ scale) increased with per-capita disposable income at the same spatial scale during expansion (r_s = 0.44) and recession (r_s = 0.55). Population density (LUZ scale) was also negatively correlated with the annual rate of income growth (LUZ scale) under recession (r_s = -0.59) and the share of city-to-LUZ disposable income (r_s = -0.45). With recession, the share of

city-to-LUZ population increased together with the annual rate of income growth at LUZ scale (r_s = 0.47) and decreased with per-capita disposable income at the same spatial scale (r_s = -0.54).

4. Discussion

After having lost population for some decades, many cities in Europe are recently experiencing a new growth wave characterized by demographic recovery of inner cities and renewed socioeconomic polarizations along urban-rural gradients. Based on empirical evidences outlining that inner cities are increasingly regaining attractiveness after years of decline, this study looks at the underlying dynamics of re-urbanization in a representative sample of European metropolitan regions. Using demographic data from 2000 to 2014, statistical evidences of diversifying population trajectories for core cities and fringe areas were presented and discussed. We considered population dynamics as a reliable proxy of differential speed and direction of urban growth during expansion and recession, distinguishing local-scale from regional-scale patterns of change and evidencing the contribution of spatially-varying socioeconomic contexts to urban growth (Kabisch and Haase, 2011; Rérat, 2012; Carlucci et al., 2016). Based on an exploratory approach, the results of this study contribute to the implementation of policies facing the emergence of a new urbanization phase in Europe (Andersen et al., 2011). In rapidly changing socioeconomic contexts (Martinez-Fernandez et al., 2012), policies merging sustainable development and containment of urban expansion with targets of economic growth, attraction of skilled jobs, and reduction of social divides between urban and rural areas may promote local competitiveness, re-launching inner cities in global urban arenas (Storper and Scott, 2009).

While population redistribution along urban gradients has been investigated in a number of theoretical models and empirical approaches (Henderson and Venables, 2009; Dijkstra et al., 2015; Kazemzadeh-Zow et al., 2016), stability or changes in population dynamics at different economic cycles were relatively less studied in cities characterized by complex and non-linear patterns of growth (Buzar et al., 2007; Haase et al., 2010; Kabisch et al., 2010). To support these findings, our study was supplemented with multivariate statistics investigating latent relationships between population dynamics and background indicators, and assessing the specificity of each territorial context studied at both urban and metropolitan scale (Mudu, 2006; Rérat, 2016; Rontos et al., 2016; Cuadrado Ciuraneta et al., 2017). Empirical evidence provided by this study indicates that the number of metropolitan regions with growing population in the core city increased during recession with a reduced spatial heterogeneity in respect with the precedent expansion phase. Northern and western European cities experienced re-urbanization patterns more frequently than southern cities. Central cities showed a mixed pattern, alternating slight decline to moderate growth during economic expansion and recession. Eastern cities were less responsive to re-urbanization, showing a diffused decline of inner cities and LUZs during the early 2000s; however, some of these cities provided early signs of population recovery during the most recent years. Multivariate analysis distinguished demographic dynamics during expansion and recession: the former economic phase was characterized by population increase in the largest metropolitan regions with medium-low settlement density, discriminating northern and central European cities from eastern cities under demographic decline. The latter phase resulted in population increases concentrated in metropolitan regions < 500,000 inhabitants with a relatively high city-to-LUZ population ratio. Correlation analysis indicated that positive

rates of population growth in inner cities were associated with high levels of disposable income at metropolitan scale in both expansion and recession times. However, the same relationship was not observed for population growth rates at metropolitan scale. With recession, less dense urban regions experienced the highest increase of disposable income. This result suggests that the densest central cities were less resilient to crisis than smaller cities (Partridge et al., 2009; Capello et al., 2015; Dijkstra et al., 2015). With economic expansion, the spatial distribution of metropolitan regions with growing inner cities has reflected a gradient distinguishing central from eastern European cities. Recession has affected moderately this gradient, better separating northern from eastern European cities. Large metropolitan regions are those concentrating the highest proportion of growing inner cities in the sample.

Multiple, place-specific factors may explain the different population dynamics observed under expansion and recession, including (i) a decline in housing prices oriented along the urban gradient (Delladetsima, 2006; Perez, 2010; Helbich, 2015), with the highest reductions likely observed in core cities, as suggested by Salvati et al. (2016), (ii) a progressive reduction of wages with impact on households' disposable income, limiting e.g. travel-to-work movements, (iii) an intrinsic response to employment de-concentration following delocalization of economic activities; (iv) a slow decline in anti-urban location preferences of households and, finally, (v) improved technology and specific urban rehabilitation programs, especially in western, central and northern Europe (Allen et al., 2004; Buzar et al., 2007; Martin, 2011; Rink et al., 2012).

In this line of thinking, the mutual interplay between economic and socio-demographic factors is at the base of patterns and processes of re-urbanization in the European cities (Rérat, 2016). Supply of new dwellings in central cities

was sustained by construction of new buildings saturating urban voids, authorized enlargement of existing dwellings and buildings in residential areas, transformation of industrial settlements into residential buildings, re-structuring of abandoned settlements earlier used for residential purposes. These factors are reinforced by socio-demographic factors including age structure of native population, family and household characteristics, changes in housing preferences, as well as migration.

Initially, re-urbanization processes were dominated by middle-class residents, mainly one-person households attracted by urban ways of life, but other social groups have gained an increasing role, including young families and even retirees seeking for affordable housing (Lever, 1993). With the most recent crisis, re-urbanization was seen as a result of changes in life-styles in response to transformations in land prices, housing regimes and local labour markets (Rérat, 2012). However, re-urbanization processes remain rather ambiguous and sometimes difficult to explain given the mixed empirical evidence gathered (van Criekingen, 2010). The contrasting results presented by Cheshire (1995) and Pacione (2005) can be mentioned to illustrate the confusion over the true nature of this process. Moreover, population re-densification of central cities was frequently observed without a specific link with local or regional policies aimed at promoting urban compaction and reversing urban dispersion (Salvati and Carlucci, 2016).

In line with earlier studies, our analysis indicates that the demographic evolution of European cities is not adequately explained by the 'stages of urban development' model that tends to consider urban regions as closed systems (Bettencourt et al., 2007; Heikkila and Kaskinoro, 2009; Bayona-Carrasco and Gil-Alonso, 2012; Martinez-Fernandez et al., 2012). The present study pointed out the existence of multiple evolutionary stages of urban development with a

coexistence of emerging re-urbanization and lowering suburbanization (Kroll and Kabisch, 2012) in a socioeconomic context influenced more by place-specific patterns of change than by traditional factors of growth reflecting common mechanisms and system's properties (Haase et al., 2010). To interpret the increasing heterogeneity in urban trajectories, theories describing metropolitan growth as a response to movements of people in search of consumer or lifestyle preferences should be integrated with an in-depth understanding of the economic geography of production, focusing on the complex recursive interactions between the location of firms and the movements of labour (Capello et al., 2015). These evidences are in line with prominent approaches to urbanization outlining the role of (individual) location choice in response to amenity values as the engine of contemporary metropolitan growth (Hall, 1997; Florida et al., 2008; Henderson and Venables, 2009). Reinforcing these assertions, large urban centres have demonstrated to exert a positive growth effect for more proximate places of less than 250,000 people (Storper and Scott, 2009). At the same time, contributions grounded on the New Economic Geography paradigm outlined that the largest urban areas cast growth shadows on proximate medium–sized metropolitan areas, enhancing competition among small metropolitan areas at the same time (Partridge et al., 2009).

Based on these premises, re-urbanization should be analyzed by unfolding the underlying mechanisms that include housing consumption and in-out migration flows (Van Gent and Musterd, 2016). Earlier evidence indicates how inner cities have gained inhabitants mainly thanks to international migrants, young adults, non-family households and some parts of the middle to upper class (Hatz, 2009; Lopez-Gay, 2014; Rérat, 2016). Although families' residential behaviour remains the driving force of suburbanization even in re-urbanizing cities (Rérat, 2012), the contribution of family households in inner city re-

growth was acknowledged in some cases, especially in cities experiencing rapid decrease in house prices (Salvati and Carlucci, 2016). In this line of thinking, overlaps and differences between re-urbanization and the concept of gentrification could be better discussed (e.g. Mudu, 2006). Haase et al. (2010) argued that, although they are partly driven by similar dynamics, the two processes are, in a qualitative sense, distinctive (see also van Criekingen, 2010). According to Bouzarovski et al. (2010), the term re-urbanization has been – untruly – accused to have 'been adopted by urban developers as a discursive method of camouflaging the adverse social impacts of gentrification'. In this view, re-urbanization encompasses more dimensions than the purely economic processes through which middle-class 'gentrifiers have increasingly come in competition with lower class urbanites… [resulting] in replacement and displacement of population segments and new patterns of segregation' (van Gent and Musterd, 2016). In other words, while gentrification characterizes substitution processes leading towards the so-called 'suburbanization of poverty' (Hochstenbach and Musterd, 2017), re-urbanization refers to real growth processes, involving the complex interplay of population change, urban renovation and housing markets (Bouzarovski et al., 2010).

Demographic growth is only one of the factors indicating re-urbanization (Lopez-Gay, 2014), since an increase in resident population may be caused by different processes (e.g. mortality, fertility, migration) and does not necessarily imply a change in the attractiveness of an area, an important aspect at the base of metropolitan recovery (Salvati et al., 2016). Studies integrating multi-source data information that evaluate joint demographic dynamics, land-use, construction and housing markets, and socioeconomic transformations at large, are increasingly required to provide a comprehensive overview of re-urbanization patterns and processes in Europe and, more generally, in

developed countries (Bettencourt et al., 2007; Beauregard, 2009; Angel et al., 2011).

From a functionalist point of view, although large metropolitan regions continue playing a role as economic attractors due to infrastructural development, quality of production factors hosted and density of external linkages and cooperation networks, inner city population growth has concentrated in these areas during economic expansion (Rérat, 2012). With recession, population growth in inner cities demonstrated to be spatially decentralized and concentrated in medium- and small-size urban agglomerations, irrespective of their geographical location and administrative role (Garcia, 2010). Although capital cities are now central to the problems faced by national economies in Europe, our results indicate that these agglomerations are rarely 're-urbanization leaders', in line with the key vision provided by Dijkstra et al. (2015): "a development strategy primarily focused on leading metropolitan regions, as represented in many cases by capital cities, could lead to more volatile and potentially lower growth, than a more spatially-balanced development strategy".

Recession has undoubtedly stimulated re-urbanization in Europe, determining subtle changes in the geography of growing cities. How this process may have indirectly lowered the gap between leading and lagging metropolitan regions (from both demographic and economic points of view) is an important research issue that needs further investigation based on integrated analysis of long-term social trends (Longhi and Musolesi, 2007). In this sense, urban pictures are definitely complicated by heterogeneous population dynamics associated with the 'second demographic transition', which involves new family relations, less and later marriage, declining fertility rates, population ageing, postponement of child-bearing and smaller households (Champion, 2001; Arapoglou and Sayas,

2009; Bayona-Carrasco and Gil-Alonso, 2012; Salvati, 2013). Such dynamics are having a powerful transformative effect on inner cities, by diversifying and re-densifying their social landscapes (Buzar et al., 2007). Analysis of population dynamics in a sample of cities in Germany, Slovenia, Italy and Spain revealed that cities are being populated with, and fragmented by, multiple migration trends and new household structures connected with the second demographic transition (Bouzakowski et al., 2010).

Based on these considerations, re-urbanization remains a heterogeneous process both within and between metropolitan regions (Kabisch and Haase, 2011). Under both economic expansion and recession, the spatio-temporal distribution of relevant indicators in selected case studies indicates a stratification of different factors contributing to re-urbanization (Kabisch et al., 2010). In contrast to a prevailing tendency to understand re-urbanization as an expression of 'back-to-the-city' movements – relating more to housing than lifestyle preferences – the role of changing socioeconomic and demographic factors should be better investigated (Storper and Scott, 2009), identifying driving forces and impacts on inner cities, housing markets and socioeconomic structure at large (Bouzakowski et al., 2010).

Without effective tools promoting regional development, cities under recession are increasingly competing for economic resources (Garcia, 2010) because of the reduction of financial transfers from the state and the European Union and the decline of private investments. However, Florida (2011) emphasized how the global financial crisis allows revisiting 'sprawled' and 'polycentric' development modes, by elaborating a more sustainable and (possibly resilient) way of growth that promotes inner city rehabilitation, moderate densification with urban containment and economic growth (Schneider et al., 2010). Spatially-heterogeneous population dynamics may reflect a differential response to crisis

between cities. It was largely demonstrated how metropolitan regions hosting financial activities have been severely hit during recession (Dijkstra et al., 2015). However, hard and soft territorial capitals (physical accessibility, access to information/knowledge, advanced functions, agglomeration economies) distinguishing large metropolises from medium and small-size cities contribute to adjust to the crisis in the near future (Capello et al., 2015).

5. Conclusions

A comprehensive analysis of population dynamics based on spatially detailed and updated data integrating socioeconomic indicators, demographic variables, settlement and land-use patterns, may be particularly useful to identify re-urbanization as an emerging phenomenon in Europe. Analysis of re-urbanization patterns and processes should take account of the increasing evidence demonstrating that this phenomenon is now global and multidimensional — but also little understood in all its manifestations. Future research is required to match diversity of analytical perspectives and country-based studies with the aim to profile distinct types of re-growing cities and to understand the role urban policies have played in the regeneration of these metropolitan regions. Distinguishing urban expansion fuelled by innovation versus growth driven by economies of scale is crucial to understand conditions for a sustainable development of cities. In this sense, a comparative analysis of population dynamics under economic expansion and recession is particularly useful to characterize re-urbanization processes driven by internal or external factors and to predict future paths of urban expansion in contemporary cities. An improved knowledge of socioeconomic factors influencing demographic patterns definitely contributes to shed light in the complex linkage between

heterogeneous population dynamics and non-linear patterns of growth typically observed in the European cities.

6. References

Allen, J., Barlow, J., Leal, J., Maloutas, T., Padovani, L. 2004. Housing in southern Europe. London, Blackwell.

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

Angel, S., Parent, J., Civco, D.L., Blei, A., Potere, D. 2011. The dimensions of global urban expansion: Estimates and projections for all countries, 2000 – 2050. Progress in Planning, 75, 53 – 107.

Arapoglou, V.P., Sayas, J. 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.

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

Beauregard, R.A. 2009. Urban population loss in historical perspective: United States, 1820-2000. Environment and Planning A, 41(3), 514-523.

Bencardino, M. 2015. Consumo di suolo e sprawl urbano: drivers ed azioni politiche di contrasto. Bollettino della Società Geografica Italiana, Serie XIII, VIII(2), 217-237.

Bettencourt, L.M., Lobo, J., Helbing, D., Kühnert, C., West, G.B. 2007. Growth, innovation, scaling, and the pace of life in cities. Proceedings of the National Academy of Sciences, 104(17), 7301-7306.

Bouzarovski, S., Haase, A., Hall, R., Kabisch, S., Steinführer, A., Ogden, P.E. 2010. Household structure, migration trends and residential preferences in inner-city Leon, Spain: unpacking the demographies of reurbanization. Urban Geography, 31, 211-235.

Buzar, S., Ogden, P., Hall, R., Haase, A., Kabisch, S., Steinführer, A. 2007. Splintering urban populations: emergent landscapes of reurbanisation in four European cities. Urban Studies, 44(4), 651-677.

Capello, R., Caragliu, A., Fratesi, U. 2015. Spatial heterogeneity in the costs of the economic crisis in Europe: are cities sources of regional resilience? Journal of Economic Geography, 15(5), 951-972.

Carlucci, M., Grigoriadis, E., Rontos, K., Salvati, L. 2016. Revisiting an Hegemonic Concept: Long-term 'Mediterranean Urbanization' in between city re-polarization and metropolitan decline. Applied Spatial Analysis and Policy, DOI: 10.1007/s12061-016-9186-2.

Catalàn, B., Sauri, D., Serra, P. 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.

Cheshire, P. 1995. A new phase of urban development in Western Europe? The evidence for the 1980s. Urban Studies, 32(7), 1045-1063.

Cheshire, P.C., Hay, D.G., 1989. Urban Problems in Western Europe: An Economic Analysis. Unwin Hyman, London.

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

Couch, C., Petschel-held, G., Leontidou, L., 2007. Urban sprawl in Europe: landscapes, land-use change and policy. Blackwell, London.

Cuadrado-Ciuraneta, S., Durà-Guimerà, A., Salvati, L. 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.

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

Fielding, A. 1982. Counterurbanisation in Western Europe. Progress in Planning, 17(1), 1-52.

Florida, R., Gulden, T., Mellander, C. 2008. The rise of the mega-region. Cambridge Journal of Regions, Economy and Society, 1(3), 459-476.

Florida, R. 2011. The Great Reset. New York: Harper Collins.

Garcia, M. 2010. The breakdown of the Spanish urban growth model: Social and territorial effects of the global crisis. International Journal of Urban and Regional Research, 34(4), 967-980.

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

Haase, A., Bernt, M., Großmann, K., Mykhnenko, V., Rink, D. 2013. Varieties of shrinkage in European cities. European Urban and Regional Studies, 23(1), 86-102.

Haase, A., Kabisch, S., Steinführer, A., Bouzarovski, S., Hall, R., Ogden, P. 2010. Emergent spaces of reurbanisation: exploring the demographic dimension of

1 inner-city residential change in a European setting. Population, Space and
2 Place, 16(5), 443–463.
3 Hall, P. 1997. The future of the metropolis and its form. Regional Studies, 31,
4 211-220.
5 Hall, P., Hay, D. 1980. Growth Centres in the European Urban System.
6 Heinemann, London.
7 Hatz, G. 2009. Features and Dynamics of Socio-spatial Differentiation in Vienna
8 and the Vienna Metropolitan Region. Tijdschrift voor Economische en Sociale
9 Geographie, 100(4), 485–501.
10 Heikkilä, E., Kaskinoro, H. 2009. Differential urbanization trends in Europe: the
11 European case. International Handbook of Urban Policy, 2, 25-45.
12 Helbich, M. 2015. Do Suburban Areas Impact House Prices? Environment and
13 Planning B, 42(3), 431-449.
14 Henderson, J.V., Venables, A.J. 2009. The dynamics of city formation. Review of
15 Economic Dynamics, 12(2), 233-254.
16 Hochstenbach, C., Musterd, S. 2017. Gentrification and the suburbanization of
17 poverty: changing urban geographies through boom and bust periods. Urban
18 Geography, DOI: 10.1080/02723638.2016.1276718.
19 Hohenberg, P.M., Lees, L.H., 1985. The Making of Urban Europe, 1000-1994.
20 Harvard University Press, Cambridge, MA.
21 Kabisch, N., Haase, D. 2011. Diversifying European agglomerations: evidence of
22 urban population trends for the 21st century. Population, Space and Place,
23 17(3), 236–253.
24 Kabisch, N., Haase, D., Haase, A. 2010. Evolving reurbanisation? Spatio-
25 temporal dynamics as exemplified by the East German city of Leipzig. Urban
26 Studies, 47(5), 967-990.

Kasanko, M., Barredo, J.I., Lavalle, C., McCormick, N., Demicheli, L., Sagris, V., Brezger, A. 2006. Are European Cities Becoming Dispersed? A Comparative Analysis of Fifteen European Urban Areas. Landscape and Urban Planning, 77, 111-130.

Kazemzadeh-Zow, A., Zanganeh Shahraki, S., Salvati, L., Neisani Samani, N. 2016. A Spatial Zoning Approach to Calibrate and Validate Urban Growth Models. International Journal of Geographic Information Systems, 31(4), 763-782.

Klaassen, L., Molle, W., Paelinck, J. 1981. Dynamics of Urban Development. St. Martin's Press, New York.

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

Lauf, S., Haase, D., Seppelt, R., Schwarz, N. 2012. Simulating demography and housing demand in an urban region under scenarios of growth and shrinkage. Environment and Planning B: Planning and Design, 39, 229-246.

Leontidou, L. 1995. Repolarization of the Mediterranean: Spanish and Greek cities in neo-liberal Europe. European Planning Studies, 3(2), 155-172.

Lever, W.F. 1993. Reurbanisation - The policy implications. Urban Studies, 30, 267-284.

Longhi, C., Musolesi, A. 2007. European cities in the process of economic integration: towards structural convergence. Annals of Regional Science, 41, 333-351.

López-Gay, A. 2014. Population growth and re-urbanization in Spanish inner cities: The role of internal migration and residential mobility. Quetelet Journal, 2(1), 67-92.

Marchetti, M., Vizzarri, M., Lasserre, B., Sallustio, L., Tavone, A. 2014. Natural capital and bioeconomy: challenges and opportunities for forestry. Annals of Silvicultural Research, 38(2), 62-73.

Martin, R. 2011. The local geographies of the financial crisis: from the housing bubble to economic recession and beyond. Journal of Economic Geography, 11(4), 587-618.Martinez-Fernandez, C., Audirac, I., Fol, S., Cunningham-Sabot, E. 2012. Shrinking cities: urban challenges of globalization. International Journal of Urban and Regional Research, 36(2), 213-225.

Mudu, P. 2006. Patterns of segregation in contemporary Rome. Urban Geography, 27(5), 422–440.

Nyström, J. 1992. The cyclical urbanization model. A critical analysis. Geografiska Annaler B, 74(2), 133-144.

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

Partridge, M.D., Rickman, D.S., Ali, K., Olfert, M.R. 2009. Do New Economic Geography agglomeration shadows underlie current population dynamics across the urban hierarchy? Papers in Regional Science, 88(2), 445-466.

Pérez, J.M.G. 2010. The real estate and economic crisis: An opportunity for urban return and rehabilitation policies in Spain. Sustainability, 2(6), 1571-1601.

Rérat, P. 2012. The New Demographic Growth of Cities. The Case of Reurbanisation in Switzerland. Urban Studies, 49(5), 1107-1125.

Rérat, P. 2016. The return of cities. The phenomena of demographic decline and renewal in Swiss cities. Espace-Populations-Societes, 2015(3)-2016(1), 1-20.

Rink, D., Haase, A., Grossmann, K., Couch, C., Cocks, M. 2012. From long-term shrinkage to re-growth? The urban development trajectories of Liverpool and Leipzig. Built Environment, 38(2), 162-178.

Rontos, K., Grigoriadis, S., Sateriano, A., Syrmali, M., Vavouras, I., Salvati, L. 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.

Salvati, L. 2013. From compactness to what? Long-term population trends in six large Mediterranean cities. Journal of Environmental Planning and Management, 56(6), 826–849.

Salvati, L., Gargiulo Morelli, V., 2014. Unveiling Urban Sprawl in the Mediterranean Region: Towards a Latent Urban Transformation? International Journal of Urban and Regional Research, 38(6), 1935–1953.

Salvati, L., Carlucci, M. 2015. Land-use structure, urban growth, and peri-urban landscape: a multivariate classification of the European cities. Environment and Planning B, 42(5), 801-829.

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

Schneider, A., Woodcock, C.E. 2008. Compact, dispersed, fragmented, extensive? A comparison of urban growth in twenty-five global cities using remotely sensed data, pattern metrics and census information. Urban Studies, 45, 659-692.

Schneider, F., Kallis, G., Martinez-Alier, J. 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.

1 Serra, P., Vera, A., Tulla, A.F., Salvati, L. 2014. Beyond urban-rural dichotomy:
2 Exploring socioeconomic and land-use processes of change in Spain (1991-
3 2011). Applied Geography, 55, 71-81.
4 Storper, M., Scott, A.J. 2009. Rethinking human capital, creativity and urban
5 growth. Journal of Economic Geography, 9(2), 147-167.
6 Turok, I., Mykhnenko, V. 2007. The trajectories of European cities, 1960-2005.
7 Cities, 24, 165-182.
8 van Criekingen, M. 2010. Gentrifying the re-urbanisation debate, not vice versa:
9 the uneven socio-spatial implications of changing transitions to adulthood in
10 Brussels. Population, Space and Place, 16(5), 381–394.
11 van den Berg, L., Drewett, R., Klaassen, L.H., Rossi, A., Vijverberg, C.H.T. 1982.
12 Urban Europe: A study of growth and decline. Pergamon Press, Oxford.
13 van Gent, W., Musterd, S. 2016. Class, migrants, and the European city: spatial
14 impacts of structural changes in early twenty-first century Amsterdam. Journal
15 of Ethnic and Migration Studies, 42(6), 893-912.