The future of shrinking cities in the EU: pathways 1991-2050

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ABSTRACT

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Introduction

Shrinking cities have been a growing topic of investigation for researchers and practitioners in the US, EU and beyond in the past two decades. The concept of *shrinking city* has been defined from different perspectives, and research agendas have been framed in order to deepen the knowledge around a broadening circumstance (Hollander et al., 2009). The paper builds upon the definition promoted by the Shrinking City international Research Network (SCiRN) of an urbanized area with a minimum population of 5,000 residents that has faced a remarkable population loss of annually more than 0.15 % at least for 5 years. According to more descriptive definitions, shrinkage events typically involve much more than just the demographic trend of population loss; causes and effects are intertwined around social, economic and environmental factors which can signal symptoms of a structural crisis.
Despite the growing attention which has expanded the volume of research and its results, urban shrinkage has been having a hard time in climbing the priority list of policy makers at supra-local level (Bernt et al., 2014). Notwithstanding its efforts, it seems that European policy making has not yet answered the growing challenges of local population decline with a strategic focus and structured approach.
The results of the paper highlight, with a forward looking approach and quantitative evidence, how European governance will be concerned. In consideration of its means and resources, the EU has the opportunity to be the leading actor in steering shrinkage processes towards new equilibria; place-sensitive approaches are a key ingredient, and these need a growing body of information and methods to fuel successful response strategies.

Objectives and contribution

The paper aims bridging past and future demographic trends of shrinking cities. The creation of new knowledge about where shrinking cities are going, if no planned action is put in place, serves the primary objective of the paper: calling for the commitment of European policy makers around a problem that has been rising and spreading across the UE in the past, and will significantly increase its presence in the years to come.
The population forecasts at local level can not only be the trigger raising awareness around shrinkage, but they can provide foresight on the geographies and intensities of the phenomena, sustained by quantitative evidence.

The paper offers a knowledge base that favours an anticipatory approach in addressing shrinkage; it fuels a timely action, rather than a reaction to the economic, social and environmental consequences that such trends can have on the urban fabric.
The same knowledge base is the starting point of a broader contextual investigation to unveil new information that is able to accommodate the design of a structured, place-sensitive, response to shrinkage at European scale.
The element of novelty in this research design lies in its future perspective and its methodology to project population at municipal level, on a cross-national scope that targets shrinking cities in the entire EU. An original contribution of the paper is found in the geographical unit projected as previous studies, at EU level, have realized projections only at regional and sub-regional levels (NUTS2 and NUTS3). This paper builds from their solid conclusions to design and implement a method that obtains a best estimate of expected future population at municipal level (LAU2).
Elements of novelty will also be found in the statistical analytical framework, inspired from existing research, that has been adapted and developed to increase the explanatory power of shrinkage as a relevant phenomenon for the EU.

Methods and Data

The paper displays the results of statistical analysis conducted from a database, compiled to investigate shrinking patterns that affect municipalities across the European Union. The database includes all European municipalities above 5.000 inhabitants that have experienced shrinkage in the period 1991-2018, studied at time intervals of 10 years.
The analysis builds upon a merging exercise of municipal data sources. The historical data from 1991 to 2018 is taken from three sources: I) Eurostat validated census databases; II) Eurostat non validated databases collecting yearly voluntary submissions of national statistical offices; III) BBSR[1] collection of municipal data (2001-2017) from National Statistical offices. The three sources have been merged to reach a more representative and updated sample of population data at municipal level.

Thanks to an original methodology it has been possible to use existing sub-regional projections to generate data on future municipal population, thus creating time series from 1991 to 2050. The data population projections is taken from the Eurostat regional yearbook 2016, which has developed population projections at 2050 for almost all European NUTS 3 units (Eurostat, 2016).
For estimating future municipal population data on a European scale, a tailored model has been designed. The model uses elements of the *share of growth* model and the *linear model* within the ratio extrapolation methods of population projections (Siegel et al., 2004). The *share of growth model* moves from the basic assumption that the area targeted to be projected will change in the same share of its parent area, as it did in the past. However, this model alone, besides having been applied before (Munthree et al., 2016), presents two shortcomings: I)the sub-regional projection may not be sufficiently accurate, or subject to bias when predicting municipal population of very small units II) the formula runs into algebraic inconsistencies for a set of cases, due to sign divergence in factorial operations. The *linear model* comes in help to mitigate such imbalances, and combined they convey in

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a mixed method that ensures more adequate balancing between the local dynamics and the sub-regional projected trend. Combining the two models has only been possible thanks to a weighting instrument that assigns normalized coefficients to the two components (linear and share of growth) based on the relevance, in quantitative terms, of the municipality (LAU) within its sub-regional unit (NUTS 3). In other words, the weighting functions assigns a greater value to the share of growth component if the municipality is relatively big with relation to the NUTS 3 area. Vice versa, if the municipality is very small in relation to the parent area, the linear component, which accounts for the local trend, will be given greater importance in the mathematical calculation.

The methodology makes then use of both historical data and already made projections to extrapolate the best estimate of each targeted municipality.
Whilst the mixed method for population projections is considered the most elaborate element of novelty, its implementation in the database opens up a variety of data analyses on geographies and intensities of shrinking trends in the EU. With respect to previous publications that have introduced an EU wide application of the typology approach (Wolff and Wiechmann, 2018) thereby operationalizing the conceptual model of urban shrinkage (Haase et al., 2014), the present paper adds present and future dimensions to the analysis; it allows to replicate an updated version of previous studies and, most importantly, it brings a foresight approach to understanding shrinkage, unlocking new layers of investigation.
For instance, it has been possible to create and combine typologies for shrinking cities that rely both on past and future data. On top of the categorization of currently shrinking cities it has been possible to shed light on new potential cases of shrinkage:

- *blind spots of future shrinkage*: cross-checking projections (NUTS 3) with historical data has unveiled areas in Europe where shrinkage is now completely absent but will become a new reality to face.
- *negative outlook cities*: municipalities that have shown symptoms of starting a potential shrinking path (>0,15% per annuum) only in very recently (2011-2018). Their projections allow to estimate if they are expected to become shrinking cities.

Preliminary findings

Key finding

Shrinkage should not be underestimated or classified as a cyclic event; instead, it seems to be a persistent situation. One result emerges clearly from the analysis on currently shrinking cities, cities with negative outlook, and the blind spots of future shrinkage: population loss in the EU, after establishing itself as a consistent trend for almost ¼ of European municipalities in the period 1991-2018, will expand its relevance even further until 2050.

Quantitative impact of shrinkage on European municipalities

The most striking result is that only 3% of the currently shrinking cities are expected to start a regrowth path in the period 2018-2050. An additional 10% is predicted to be on stabilization process, that however, in most cases seems the natural conclusion to past trajectories of strong population decline.
The remaining cases, accounting for a 77% of the total are expected to continue experiencing shrinkage at different degrees of intensity in the period 2018-2050: 15% standard shrinkage, 28% intense shrinkage, 18% serious shrinkage and 15% severe shrinkage.

The investigation of blind spots of future shrinkage reimports a worrying scenario: on the total number of NUTS 3 geographical units present in the EU (1348), 208 are identified as blind spots of future shrinkage: 15%.
The future of cities with a negative outlook contributes to reinforce the scenario: whilst 311 municipalities will drift towards stabilization or regrowth, 267 of the negative outlook cases are expected to consolidate the trend and establish themselves as new shrinking cities with varying intensities.

Pathways of shrinkage: geographies of incidence

European countries differ between themselves on the period in time where the trend of population loss has been mostly concentrated, on its intensity and on the level of diffusion of throughout each national territory (incidence). Some countries have started the process from 1991 with capillary episodes of population loss that involve the majority of municipalities and are expected to continue in the future at lower intensity. Other countries have started as early in the process, though with a more localised geographical extension that is expected to expand significantly in the future. More countries have experienced shrinkage in very limited areas of their territory and are now expected to either keep it at a local scale with only few additional spots or expand its incidence to new territories that haven't experienced shrinkage at all until present.

Conclusions

The results confirm and reinforce shrinkage being an issue that should be tackled with a structured and comprehensive strategy from the European Union.
The predicted trends and blind spots underline the relevance of past, present and future shrinkage for cities and its citizens. The magnitude of shrinking events is going to increase, thereby opening challenges for European policy makers: I) how to approach shrinkage ensuring that place-specific information is used to design responses? II) to which extent regrowth shall be pursued by response strategies with respect to a different paradigm that privileges citizen well-being and liveability conditions whilst accompanying cities toward new equilibria?
Different typologies of shrinking cities can be traced and described across the EU Member States(Wolff and Wiechmann, 2018). Such cross-national typologies and the information they embed should be used to enrich policy processes in designing responses that will shape future trajectories for these cities, and their citizens.
The results of the statistical analysis of currently shrinking cities and especially the identification of blind spots of future shrinkage can be highly relevant in the policy debate around shrinkage as they represent "asymptomatic" cases of future population decline. On the one hand these territories, and their cities, should start to be included already in the policy discourse about shrinkage as they can benefit from the same measures and build on the experience of other shrinking cities to ease the transition towards a new equilibrium. On the other hand, the same territories can offer a playing field for experimenting new approaches to shrinkage, thus allowing to intervene much earlier in the process than in all other cases where the population decline has been addressed (or not yet) only when being a manifested trend.
Research has shown that contextual elements are essential in determining shrinkage paths and their dynamics (Haase et al., 2016, 2014), and this information should be included already from the European design of policy responses by adopting ex ante evaluation

approaches like Territorial Impact Assessment (Camagni, 2006; Eduardo José Rocha Medeiros, 2014) and Territorial Foresight (Böhme et al., Forthcoming).
The *flashforward* on future shrinking trajectories raises concern around the liveability of cities across Europe. EU policy makers have the opportunity, within the upcoming programming period, to activate a coordinated response strategy that embeds a place-sensitive approach and engages citizens for the design of better solutions at local level.

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