2 Long-term urbanisation and rural population decline in the EU[1]

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2.1 Introduction

Cities are singular locations of spatial organization of humans and their activities and have always played an important role in socioeconomic, cultural and technological development [1]. Cities and, more broadly, urban areas are still gaining importance, with urbanisation rates expected to continue increasing globally [2,3]. Especially in Africa and some parts of Southeast of Asia, cities are attracting vast numbers of people from rural areas, while in highly urbanized world regions, such as Europe, cities are becoming actors of own right by new governance mechanisms and leading innovation and economic growth [3].

The concentration of population in urban areas is not a recent phenomenon, though. The urbanisation process in Europe, but also elsewhere globally, was fuelled by industrialisation already since the late 18th century, with a shift from agrarian-based to industrial-based economies and, more recently, to services. In addition, infrastructure development in urban areas and the flow of migrants from rural to urban areas seeking better employment and living conditions have boosted urbanisation.

The importance of cities can be explained by the competitive advantages offered by agglomeration effects such as i) increasing returns to scale and higher productivity (e.g., higher GDP per capita, higher rates of innovation) as well as ii) economies of scale, leading to more efficient resource use (e.g., land, energy, materials). Some scholars have observed that such agglomeration effects can be described as scaling laws, whereby the population size of cities has a superlinear effect on levels of socioeconomic activity and a sublinear effect on resource use [4]. Because large and dense urban agglomeration are major pools of labour, and offer many services and opportunities for social interaction and exchange, they drive innovation, resulting in higher productivity gains and growth [4-10]. Notwithstanding, recent findings suggest that the association between city size and growth is conditional to other contextual factors such as economic structure, urban infrastructure, governance and even the size of the country [11].

Clearly, urbanisation entails beneficial outcomes, but unfortunately not without some negative externalities too. For example, rapid and uncontrolled urbanization is often associated with high housing prices, congestion, social issues [12-13] and environmental degradation levels, namely the concentration of land, water and air pollution [14-15]. Such negative externalities, not only impact quality of life directly but may also hinder productivity and compromise sustainable growth in the long run [16]. Furthermore, when fast urban growth leads to lower densities, this may lead to lower energy efficiency of the urban system [17] and potentially less opportunities for sustainable transport modes [18]. Hence, it is important to monitor and manage urbanisation processes.

Recent developments in data, methods and definitions allow us to estimate urbanisation more accurately and consistently across time and space. In this study we apply the internationally agreed

[1] How to cite this chapter: Batista e Silva F, Pigaiani C, Dijkstra L (2024) Long-term urbanisation and rural population decline in the EU. *In*: Batista e Silva F and Dijkstra L (eds.) Challenges and opportunities for territorial cohesion in Europe - contributions to the 9th Cohesion report. Joint Research Centre Science for Policy report. Publications Office of the European Union, Luxembourg. doi:10.2760/466949

classification of the Degree of Urbanisation [19] at 1 km-cell level to a novel time series of population grids for the EU, spanning from 1961 until 2021 in 10-year time-steps. This unprecedented time series allowed us to assess where urbanisation levels stands today and how it have evolved since the early 1960's until today, per main EU macro-regions, per country, and even at more granular, local levels. Such data will also allow us to analyse the geography of population decline, a topic for upcoming research.

2.2 Results

Figure 1.1 shows the total and relative population per Degree of Urbanisation (cities, towns and suburbs, and rural areas), from 1961 to 2021, for the EU27 and per main geographical area (north-western, southern and eastern Europe). Between 1961 and 2021, the EU population increased from 359 to 456 million inhabitants. This overall demographic growth was accompanied by a steady urbanisation process, with population living in urban areas (cities, towns and suburbs) increasing from 59% to 71% at the expense of rural areas, which dropped to a share of 29% of the EU population in 2021. The increase in urban population was split between cities (+7pp) and towns and suburbs (+5pp).

However, current levels of urbanisation and the trends in this period spanning 60 years differ between macro European areas. Contrary to the population growth observed in the northwestern and southern EU, population in the eastern EU has been declining steadily since 1991. And even the population share in cities declined from 31% to 28% in the last three decades. In 2021, the eastern EU remained the least urbanised, with 61% of the population living in urban areas (cities plus towns and suburbs), compared to 71% in the northwestern and 78% in southern EU.

Despite the overall demographic growth, rural areas lost population in absolute terms in all 'corners' of the EU, from 145 to 130 million inhabitants. The decline in rural population as a share of the total population was particularly marked in the southern EU, decreasing from 36% to 22% since 1961. The increase in the city population share was highest in the southern EU (+12pp), followed by the eastern EU (+9pp), while it barely increased in the northwestern EU (+1pp). The population share in towns and suburbs grew most in the eastern (+6pp) and the northwestern EU, while it increased much less in the southern EU (+2pp).

As shown in Figure 1.2, urbanisation levels in 2021 vary substantially between Member States, ranging from more than 80% in Malta, The Netherlands and Spain to 55% or less in Slovakia and Slovenia. Member States can be further distinguished between those which experienced a strong urbanisation surge since the 1961, such as Cyprus, Bulgaria, Greece, Finland, Slovakia, Portugal, with 20 percentage points gain in urbanisation, and those which remained at similarly high levels such as The Netherlands, Germany or Malta, or similarly low levels such as Slovenia.

The map in Figure 1.3 shows the average population change per decade between 1961 and 2021 per regular grids cells of 5 x 5 km. The areas in yellow or red observed an average positive population growth, whereas the areas in dark or light blue observed population decline over this period. Areas in white either uninhabited or have experienced limited population fluctuation over the same period. The observed patterns depend on the country and are influenced by geography. Nevertheless, population growth and decline both tend to cluster in space. In addition, a marked urban-rural divide can be observed across the EU. Population has increased substantially in or around the main cities. Coastal areas and coastal cities observed important population growth too, especially in the southern EU. Rural areas lost population overall. But the rural decline has been more pronounced in the southern and eastern EU, with large swaths of inner/rural parts of, for example, Portugal, Spain,

Croatia, Bulgaria, Romania and the Baltic countries experiencing a strong population decline in many areas.

This illustrates an increasing 'bipolar' EU, with an ever-higher concentration of population in fewer cities and large towns, and less population in most rural areas. There is no expectation that this trend will invert in the foreseeable future, although the speed of urbanisation is likely to decrease, especially in countries with already very high urbanisation levels.

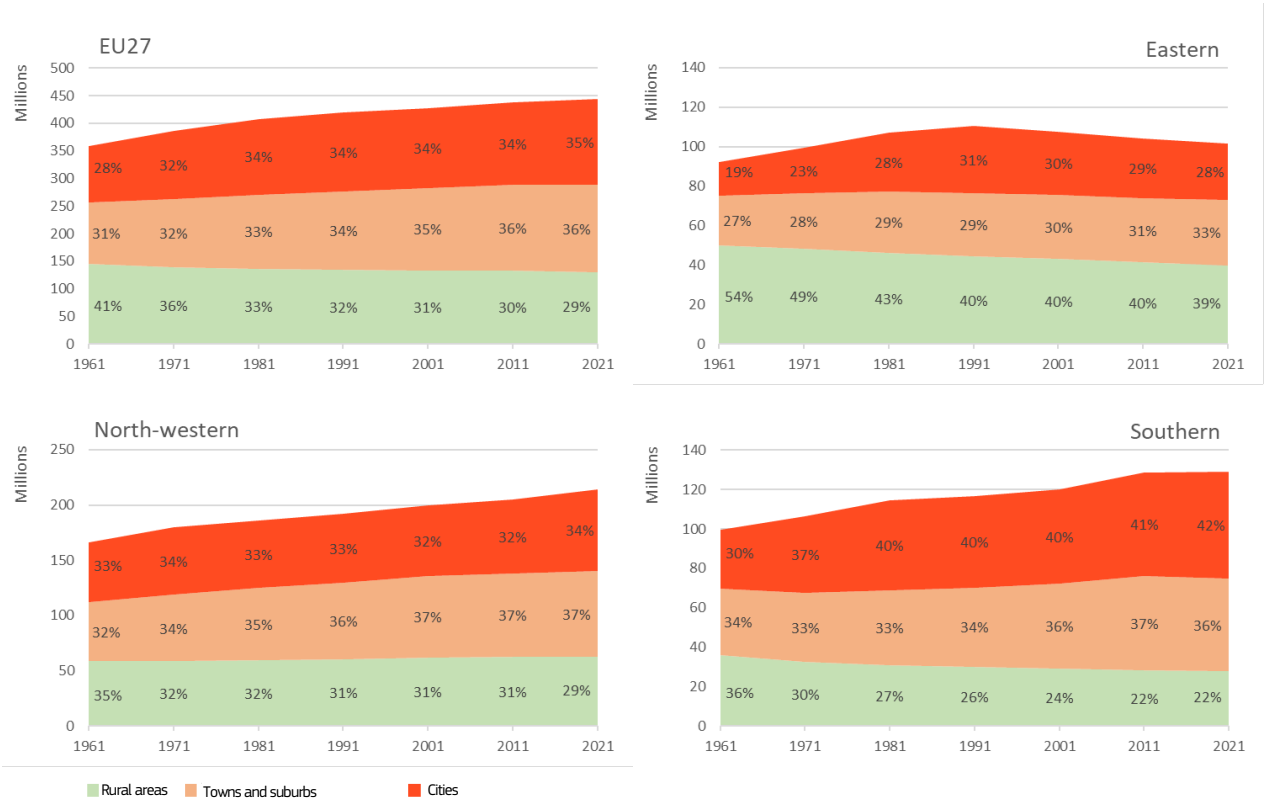

Figure 1.1. Total and relative population per degree of urbanisation (Cities, towns and suburbs, and rural areas), from 1961 to 2021, for the EU27 and per EU macro-regio (northwestern, southern and eastern EU).

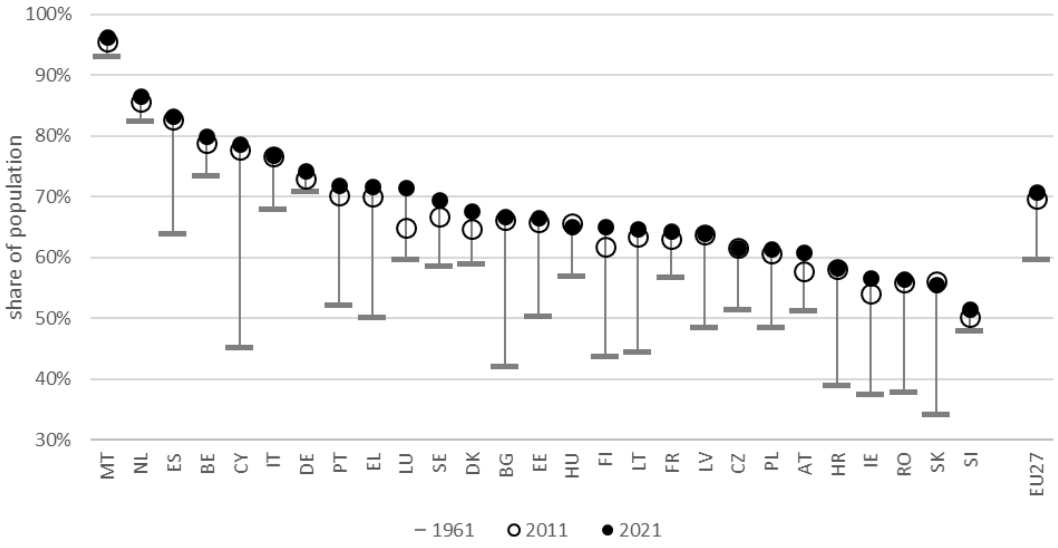

Figure 1.2. Share of urban population per EY Member State in 1961, 2011 and 2021.

2.3 Discussion and conclusions

The concentration of population in cities and urban areas is not a recent trend in Europe. However, new developments in data, methods and definitions allowed us to estimate urbanisation more accurately and consistently. According to our estimates, European urbanisation rate was already relatively high in 1961, with 59% of the population living in cities, towns and suburbs. Currently, the EU has an average urbanisation rate around 71%. There is no expectation that this trend will go into reverse, though on average the speed of urbanisation is likely to decline, especially in countries with already very high urbanisation levels.

Urbanisation is associated with innovation and increasing returns to scale, leading to higher productivity and socio-economic development. Because of the density of urban areas, they can also offer environmental advantages such as reduced land, energy and material consumption. On the other hand, the increasing population density and diversity in urban areas pose challenges related to local pollution, congestion, crime, and lack of social cohesion, potentially affecting well-being of residents. Conversely, the analysis herein allowed us to highlight the ongoing population decline in vast parts of the EU, in particular rural areas. To some extent, rural and remote areas are already lagging in terms of relevant territorial assets compared with more urbanised regions [20, 21]. Territories experiencing rapid and sustained population reductions may face a range of issues such as abandoned housing and difficulties to maintain infrastructure in increasingly thinly populated territories, leading to limited availability and access to both private and public services. The ageing and outmigration experienced in these areas further reduces investment decisions and growth prospects, potentially accentuating the declining trend.

In conclusion, the changing population distribution in space and across the urban-rural spectrum has implications for territorial, social, and economic cohesion. The analysis of past and recent trends can support decision makers anticipate future developments and propose place-based adaptations solutions for existing and emerging issues. Taking advantage of the increasing supply of statistical and geospatial data at high spatial and temporal granularity, future research will continue looking

into demographic trends in Europe at different scales, including with a forward looking perspective of both urbanisation and spatial population dynamics.

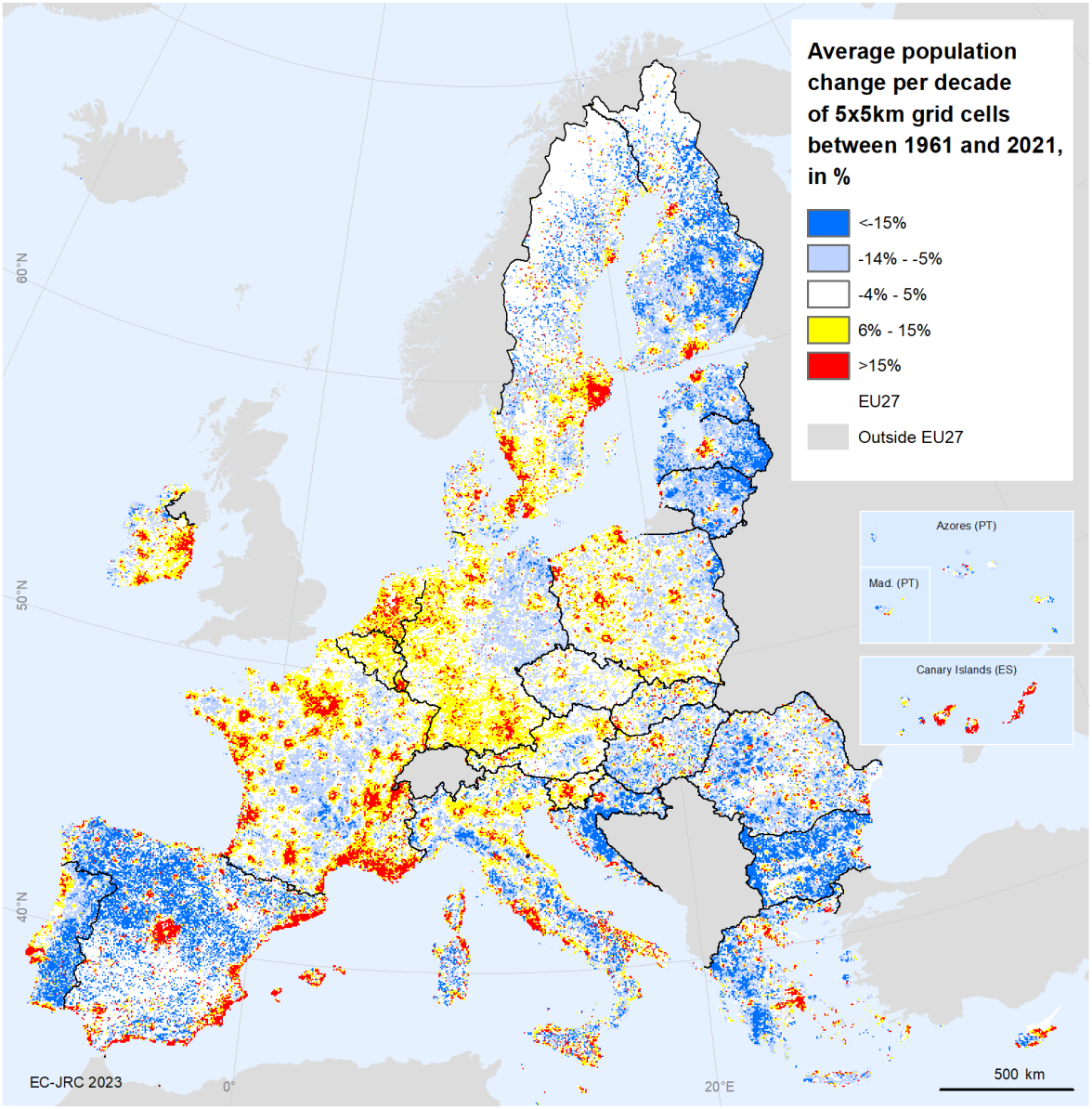

Figure 1.3. Average population growth per decade per areas of 5 x 5 km between 1961 and 2021.

2.4 Methodological note

The degree of urbanisation from 1961 to 2021 was calculated using the Degree of Urbanisation Grid tool developed by the European Commission, Joint Research Centre [22]. This tool produces a grid-level classification of settlements based on population grids at 1 km^2 resolution, according to the definition of the Degree of Urbanisation [19]. For the analysis herein, we used the first classification tier of 1 km^2 grid cells, in three classes: urban centres, urban clusters and rural grid cells. For

assessing urbanisation (Figures 1.1 and 1.2), we used the combination of urban centres and urban clusters, which are contiguous 1 km^2 cells with at least 300 inhabitants per km^2 and a minimum population of 5000 inhabitants.

As input to the tool, we used a novel, consistent time-series of population grids at 1 km^2 resolution for the period 1961-2021, with 10-year intervals, matching the census years. This time-series was constructed by the authors of this chapter combining two main types of grids and approaches, as follows:

— For the years 2021 and 2011 we used the population grids assembled and disseminated by Eurostat, based on address- or point-based, census population registers from National Statistical Institutes. These grids are often referred to 'bottom-up' grids, because address- or point-based population counts are aggregated to 1 km^2 grid cells, making them the closest available product to ground-truth.

— The population grids for 2001, 1991, 1981, 1971 and 1961 were estimated sequentially via a new, chain-linked, backcasting approach, starting from the year 2001. The approach combines the census grid for 2011[2], built-up data derived from Earth Observation [23], and known population per municipality for the covered years [24]. In a nutshell, population in 2001 is estimated by assuming a population change between 2011 and 2001 proportional to the observed change in residential built-up volume at the level of each individual 1 km^2 grid cell. The residential built-up volume is obtained from the GHS-BUILT-H dataset [23]. In a second step, the obtained population in the grid cells is rescaled so that their sum matches the known population in 2001 at municipality level[3]. The remainder grids are produced sequentially, and in a similar fashion, backcasting population from the previously estimated population grid.

In their production, all population grids in this time-series (including 2021 and 2011) are rescaled to match the NUTS3 population totals from the Annual Regional Database of the European Commission's Directorate General for Regional and Urban Policy (ARDECO) [25].

References

[1] OECD (2015) The Metropolitan Century: Understanding Urbanisation and its Consequences. OECD Publishing, Paris, https://doi.org/10.1787/9789264228733-en

[2] Chen S, Huang Q, Muttarak R, *et al.* (2022) Updating global urbanization projections under the Shared Socioeconomic Pathways. Scientific Data, 9, 137. https://doi.org/10.1038/s41597-022-01209-5

[3] UN-Habitat (2022) World Cities Report 2022. United Nations Human Settlements Programme. https://unhabitat.org/sites/default/files/2022/06/wcr_2022.pdf

[2] https://ec.europa.eu/eurostat/web/gisco/geodata/population-distribution/geostat

[3] The historical total population at municipality level is obtained from a time-series produced by the Directorate-General for Regional and Urban Policy [24]. The data is published by Eurostat at: https://ec.europa.eu/eurostat/web/nuts/local-administrative-units

[4] Bettencourt LMA, Lobo J, Helbing D, *et al.* (2007) Growth, innovation, scaling, and the pace of life in cities. Proceedings of the National Academy of Sciences, 104(17), 7301-7306. https://doi.org/10.1073/pnas.0610172104

[5] Carlino GA, Chatterjee S, Hunt RM (2007) Urban density and the rate of invention. Journal of Urban Economics, 61(3), 389–419.

[6] Ahrend R. and Schumann A (2014) Does Regional Economic Growth Depend on Proximity to Urban Centres? OECD Regional Development Working Papers, No. 2014/07, OECD Publishing, Paris. https://doi.org/10.1787/5jz0t7fxh7wc-en

[7] Carlino G, Kerr WR (2015) Agglomeration and Innovation. Handbook of Regional and Urban Economics, 5, 349–404.

[8] Bettencourt LMA, Lobo J (2016). Urban scaling in Europe. Journal of The Royal Society Interface 13(116). https://doi.org/10.1098/rsif.2016.0005

[9] Bai X, Chen J., Shi P (2012) Landscape urbanization and economic growth in China: Positive feedbacks and sustainability dilemmas. Environmental Science and Technology, 46(1), 132–139.

[10] Melo PC, Graham DJ, Levinson D, Aarabi S (2016) Agglomeration, accessibility and productivity: Evidence for large metropolitan areas in the US. Urban Studies, 54(1), 179–195. https://doi.org/10.1177/0042098015624850

[11] Frick SA, Rodríguez-Pose A (2017) Big or small cities? On city size and economic growth. Growth and change, 49(1), 4-32. https://doi.org/10.1111/grow.12232

[12] Power A (2001) Social exclusion and urban sprawl: Is the rescue of cities possible? Regional Studies, 35(8), 731–742. https://doi.org/10.1080/00343400120084713

[13] Cassiers T, Kesteloot C (2012) Socio-spatial Inequalities and Social Cohesion in European Cities. Urban Studies, 49(9), 1909–1924. https://doi.org/10.1177/0042098012444

[14] European Environment Agency and Swiss Federal Office for the Environment (2016) Urban Sprawl in Europe. Publications Office of the European Union, Luxembourg. https://doi.org/10.2800/143470

[15] Borrego C, Martins H, Techepel O, Salmim L, Monteiro A, Miranda AI (2006) How urban structure can affect city sustainability from an air quality perspective. Environmental Modelling and Software, 21(4), 461–467. https://doi.org/10.1016/j.envsoft.2004.07.009

[16] Bloom DE, Canning D, Fink G (2008) Urbanization and the Wealth of Nations. Science, 319(5864), 772–775. https://doi.org/10.1126/science.1153057

[17] Gilbert G, Dajani JS (1974) Energy, urban form and transportation policy. Transportation Research, 8(4–5), 267–276.

[18] Wegener M, Fuerst F (2004) Land-Use Transport Interaction: State of the Art. http://dx.doi.org/10.2139/ssrn.1434678

[19] European Union/FAO/UN-Habitat/OECD/The World Bank (2021) Applying the Degree of Urbanisation — A methodological manual to define cities, towns and rural areas for international comparisons — 2021 edition. Publications Office of the European Union, Luxembourg. https://doi.org/10.2785/706535

[20] Perpina-Castillo C, van Heerden S, Barranco R, *et al.* (2023) Urban–rural continuum: an overview of their interactions and territorial disparities. Regional Science Policy & Practice, 15(4), 729-769. https://doi.org/10.1111/rsp3.12592

[21] Perpina-Castillo C, Barranco R, Curtale R, *et al.* (2024) Are remote rural areas in Europe remarkable? Challenges and opportunities, 105, 103180. https://doi.org/10.1016/j.jrurstud.2023.103180

[22] GHSL tools, https://ghsl.jrc.ec.europa.eu/tools.php

[23] GHSL datasets, https://ghsl.jrc.ec.europa.eu/datasets.php

[24] European Commission, Directorate-General for Regional and Urban Policy, Lüer C, Gløersen E (2013) Population data collection for European local administrative units from 1960 onwards – Final report, Publications Office of the European Union, Luxembourg. https://data.europa.eu/doi/10.2776/96964

[25] Annual Regional Database of the European Commission's Directorate General for Regional and Urban Policy (ARDECO), https://knowledge4policy.ec.europa.eu/territorial/ardeco-database_en