Wittgenstein Centre Conference 2021 – The causes and consequences of depopulation – Extended Abstract – The factors driving shrinkage within Irish Electoral Divisions

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Introduction

In recent years, the issue of regional shrinkage and the resulting effects has gained attention, from policymakers and academics (Batunova & Perucca, 2020). Despite the growing body of literature, there is no common approach to the examination of shrinkage (Reckien and Martinez-Fernandez, 2011; Haase et al., 2014). Urban and regional shrinkage still do not have agreed definitions that could consider all the complex aspects contributing to the phenomenon (Bontje, 2004; Hollander et al., 2009; Ubarevičiene et al., 2016; Batunova and Perucca, 2020) and their definitions are mainly based on depopulation (Grasland et al., 2008; Šimon and Mikešová, 2014). However, shrinkage is a wider concept than population decline and incorporates not only demographics but also drivers, outcomes and impacts of the process (Pužulis and Kūle, 2016).

The literature has predominately focused on urban shrinkage (Haase et al., 2014; Pužulis and Kūle, 2016). Studies, such as those by Grasland, et al. (2008) and Šimon and Mikešová (2014), have been extended to regional level analyses, as it is not just an urban occurrence, but transcends entire regional social and economic systems (Batunova and Perucca, 2020). Most research on regional shrinkage focuses on larger regional scales, such as the NUTS2 or NUTS3 level (Grasland et al., 2008; Šimon & Mikešová, 2014). There can be significant patterns both between and across rural and urban areas in the more aggregated regions, which highlights the need to observe sub-regional patterns of shrinkage (ESPON, 2020). The use of a more detailed spatial scale can reveal significant differences in population growth/shrinkage between regions (Šimon and Mikešová, 2014), as the socio-economic processes which result in shrinkage take place over varying geographic scales, which are very often smaller than NUTS 3 regions (Copus et al., 2021). Wang et al. (2020) emphasises that most current studies attempting to build a comprehensive shrinkage framework have remained at the theoretical level, without empirical evidence. In contrast to the more conceptual work on the topic, this paper adopts an empirical approach. The associated empirical model incorporates in various economic, sociodemographic, and locational factors. Moving beyond a purely demographic analysis of shrinking is helpful, as it opens the subject to explore the background socio-economic cause and effect processes of demographic change (ESPON, 2019).

The first section outlines the definition of shrinkage that is being used. The second section outlines the hypotheses for the research. The third section focuses on the data and methodology used. The fourth section discusses the preliminary results. The final section offers conclusions.

Background to the literature

When examining shrinkage, it is important that the term shrinkage is fully conceptualised (Rink & Kabisch, 2009). There are many potential definitions that could be used (Sepp and Veemaa, 2017). The main shrinkage indicator that is widely accepted is population loss (Batunova & Perucca, 2020). Different shrinkage definition involve different thresholds of population loss that must be experienced over a certain period before it can be classified as shrinkage. For example, Šimon and Mikešová (2014) define shrinkage as population loss above -2% over the period 2001-2011. Grasland et al. (2008) define a region as shrinking if it loses a significant proportion of its population over a period equal to or more than one generation (20-30 years).

A common theoretical framework for understanding the movement of people from one region to another is the disequilibrium and equilibrium neoclassical theories of migration (Arango, 2000; Lewis, 1954). The disequilibrium theory states that labour migration stems from the uneven geographical distribution of regional labour demand and supply functions (Abreu, 2012). Population decline is often associated with decline in employment (Delfmann *et al.*, 2014). People tend to move from high unemployment to low-unemployment regions, where the demand for labour is relatively higher (Runge et al., 2020; McCann, P., 2013). Based on this, the following hypothesis is proposed:

H1: Regions experiencing higher unemployment rates are more likely to experience shrinkage

Population decline at the regional level can also be influenced by the educational level of the population (Ubarevičiene et al., 2016). Selective migration of young and higher educated people seeking higher education, and improved career opportunities elsewhere can cause or add to population loss (Bontje and Musterd, 2012). Research shows that outmigration endangers region's quality of human capital as the best-educated and best-motivated people are the individuals who leave (Raagmaa, 2015). Population is likely to increase in areas with higher share of higher educated individuals (Ubarevičiene et al., 2016). When higher educated people move away, this can result in a brain drain for the region (Kazlauskiene & Rinkevicius, 2006). Shrinking areas need innovative approaches to overcome shrinkage, which the loss of higher educated individuals limits (Batunova & Perucca, 2020). Hypothesis 2 is:

H2: Regions with higher percentage of population with third level education are less likely to experience shrinkage.

Shrinkage's effects and causes can vary greatly depending on whether the region is an urban or rural region (Ubarevičienė et al., 2016). Dividing areas into either urban or rural overlooks the diversity of natural, social, and cultural characteristics in rural regions (Leibert et al., 2015). Regions classified as just 'rural' may face stronger population declines and faster ageing processes in more remote rural regions (Brezzi et al., 2011). This distinction between just urban and rural creates significant issues as the 'rural' EDs vary significantly with the average population density of a 'rural' ED being 29 persons per km2; but there are 171 EDs with over 74 persons per km2 and 564 EDs with fewer than 13 persons per km2 (Meredith, 2016). Of these only 680 are classified as urban with the remaining 'rural' EDs A typology from Meredith (2016) divides Irish EDs into categories based on their population density. A typology such as this may be valuable in differentiating between EDs in a manner that the urban-rural divide does not allow for. Based on the reviewed literature, the following hypothesis is proposed.

H3: Regions with a higher population density are less likely to experience shrinkage.

Control Variables

Several control variables are also included in the model. Research has shown that population is likely to increase in areas with high percentage of employment in the service sector but will decrease in areas with a high percentage of employment in the primary – agriculture – sector (Ubarevičiene et al., 2016). Selective migration of specific age groups often results in an ageing population and intense population decline (Walford and Kurek, 2008; Burholt and Dobbs, 2012). Population age structure is one of the most widely discussed factors which influences uneven population change (Ubarevičiene et al., 2016). Young people leaving for mainly educational purposes, tends to result in fewer births, and the ageing population is left with fewer employment opportunities, and fewer retail and care facilities (Haartsen and Venhorst, 2010). Higher proportions of households with children have been found to reduce population loss (Ubarevičiene et al., 2016).

Data and methodology

Irish Census of Population data is used here. Seven censuses were carried out in Ireland during this period, in 1986, 1991, 1996, 2002, 2006, 2011, and 2016. In total, there are 3,440 legally defined EDs in Ireland. Each Census has several EDs with populations so low that the CSO amalgamated them with one or more neighbouring EDs for confidentiality[1]. The definition of a small number of EDs, and the associated SAPS data, changed between the 1996 and 2002 censuses. These changes consisted of splitting or amalgamation of areas, not boundary movements. This resulted in inconsistencies with a small number of EDs over time, e.g., the urban-rural definition between some EDs (such as Carlow Urban and Carlow Rural) changed between 1996 and 2002. Additionally, some EDs were split or amalgamated differently by the CSO due to low population, e.g., Aghalateeve and Aghavoghill were merged as one ED by the CSO in 2002. In 2006 Aghalateeve was merged with Aghnalish, while Aghavoghill was merged with Melvin. To ensure the EDs were comparable across time, the affected EDs were amalgamated into a single unit, e.g., combining Carlow Urban and Carlow Rural into a single unit referred to as Carlow Urban. This method does ensure that the EDs are comparable across time and space, while keeping the population figures accurate. With the amalgamations, the dataset comprises of 3,384 EDs which are consistent from 1986 to 2016. This leaves us with a very significant amount of EDs (3,384 out of a possible 3,440).

Data from 1986 is used to prevent potential endogeneity within the model. The education variable is taken from 1991, the earliest year that variable is available within the Census. Data from 1986 – 2016 is used in this paper, which meets Grasland et al.'s (2008) 'one generation' criteria. There are many potential thresholds that could be adopted to judge what should be considered as shrinkage (Sepp & Veemaa, 2017). An approach similar to Meredith (2016) and Batunova & Perucca (2020) is implemented where a distinction between above average and below average population loss is made. Thus, shrinking regions are defined as regions experience above average population loss during one generation (30 years).

A probit model reporting marginal effects is specified. The resulting model contains theory guided variables measuring economic, sociodemographic, and locational characteristics of regions. The dependent variable in the model is shrinkage. This is specified as a binary variable where 1 if the ED has experienced above average population loss between 1986 and 2016, while it is coded as 0 if the ED has not experienced above average population loss. The

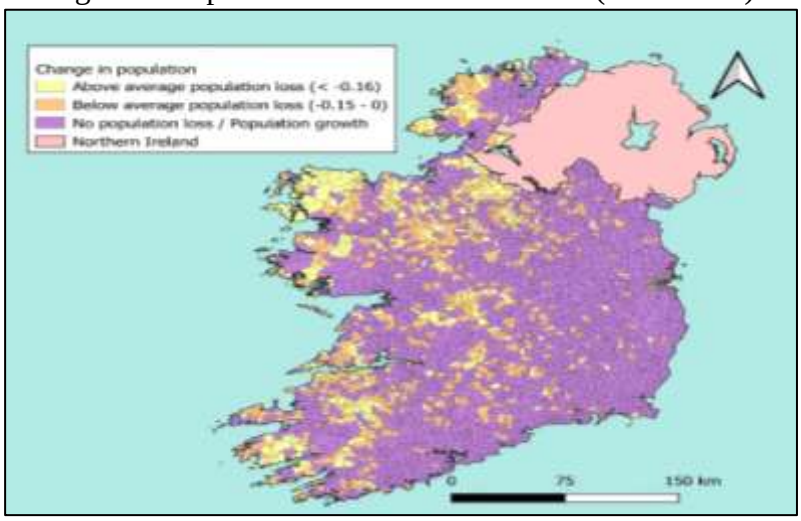
[1] https://data.gov.ie/dataset/cso-electoral-divisions-generalised-100m-osi-national-statistical-boundaries-20151

unemployment rate is included in the model. This is the number of people unemployed from the active population. EDs are divided into categories based on their population density, using the typology of Meredith (2016). Due to the data limitations a distinction between population loss caused by natural change and by net migration cannot be made. More detailed data would enable a better understanding of the drivers of change and the role of various local factors.

Preliminary Results

The preliminary results are presented on the accompanying poster and in the appendix below. The model generates interesting results. Unemployment has a significant positive impact on population shrinkage. This is in line with the neo-classical views on population change. Essentially, that people follow jobs. A higher proportion of males in the ED also had a positive effect on shrinkage. When examining the industry shares in EDs, several patterns were found. Higher proportions of individuals employed in manufacturing, building and construction, commerce, and other industries had negative effects on shrinkage, relative to agricultural industry. Electric & gas, and transport & communications had positive effects on shrinkage relative to agriculture. A higher proportion of individuals with higher education and families with children had negative effects on shrinkage. Households and families with children are less likely to move according to existing literature. EDs with population densities of between 13 and 21, 22 and 29, and 44 and 73 persons per km2 had negative effects on shrinkage, relative to areas with less than 13 persons per km2. The urban population density (150+ persons per km2) has a positive effect on shrinkage relative to the lowest category (less than 13 persons per km2). This is capturing the urban shrinkage that is occurring and which can be seen in figure 1. Higher proportions of individuals in the 23-34 and 34-44 age categories had negatives effects on shrinkage relative to the proportion of the population aged below 15 years old. Higher proportion of individuals aged 64-74 years old had a positive effect on shrinkage.

Figure 1: Population loss across Irish EDs (1986-2016)



Source: CSO (1986; 1991; 1996; 2002; 2006; 2011; 2016)

Preliminary conclusion

Ireland is experiencing regional disparities when it comes to population loss (see figure 1). This loss is primarily concentrated in the west and midlands of the country. The preliminary results generated identifying the drivers of regional shrinkage (defined as above average population loss) across Irish Electoral Divisions. Results show the impact that levels of unemployment, levels of education, and industry share have on shrinkage within an ED.

Reference List

Abreu, A. (2012) April. The new economics of labor migration: Beware of neoclassicals bearing gifts. *In Forum for social economics* (Vol. 41, No. 1, pp. 46-67). Routledge.

Arango, J., 2000. Explaining migration: a critical view. *International Social Science Journal*, vol. 52, no. 165, pp. 283–296.

Batunova, E. and Perucca, G. (2020) 'Population shrinkage and economic growth in Russian regions 1998–2012', *Regional Science Policy and Practice*, 12(4), pp. 595–609. doi: 10.1111/rsp3.12262.

Bontje, M. (2004) 'Facing the challenge of shrinking cities in East Germany: The case of Leipzig', *GeoJournal*, 61(1), pp. 13–21. doi: 10.1007/s10708-005-0843-2.

Bontje, M. and Musterd, S. (2012) 'Understanding Shrinkage in European Regions', *Built Environment*, 38(2), pp. 152–161.

Brezzi, M., Dijkstra, L. and Ruiz, V. (2011) 'OECD Extended Regional Typology: The Economic Performance of Remote Rural Regions', *OECD Regional Development Working Papers*, (December 2014). doi: dx.doi.org/10.1787/5kg6z83tw7f4-en.

Burholt, V. and Dobbs, C. (2012) 'Research on rural ageing: Where have we got to and where are we going in Europe?', *Journal of Rural Studies*, 28(4), pp. 432–446. doi: 10.1016/j.jrurstud.2012.01.009.

Copus, A., Kahila, P., Dax, T., Kovács, K., Tagai, G., Weber, R., Grunfelder, J., Meredith, D., Ortega-Reig, M., Piras, S. and Löfving, L. (2021) 'European shrinking rural areas: key messages for a refreshed long-term European policy vision', *Terra: Revista De Desarollo Loca*, 8, pp. 280–309. doi: 10.7203/terra.8.20366.

Delfmann, H., Koster, S., McCann, P. and Van Dijk, J. (2014) 'Population Change and New Firm Formation in Urban and Rural Regions', *Regional Studies*, 48(6), pp. 1034–1050. doi: 10.1080/00343404.2013.867430.

ESPON (2019) *Inception Report ESCAPE European Shrinking Rural Areas: Challenges, Actions and Perspectives for Territorial Governance*.

ESPON (2020) *ESCAPE European Shrinking Rural Areas: Challenges, Actions and Perspectives for Territorial Governance, Final Report – Annex 2 Measuring, Mapping and Classifying Simple and Complex Shrinking*.

Grasland, C., Ysebaert, R. and Corminboeuf, B. (2008) *Shrinking Regions: A Paradigm Shift in Demography and Territorial Development*.

Haartsen, T. and Venhorst, V. (2010) 'Planning for decline: Anticipating on population decline in the Netherlands', *Tijdschrift voor Economische en Sociale Geografie*, 101(2), pp. 218–227. doi: 10.1111/j.1467-9663.2010.00597.x.

Haase, A., Rink, D., Grossmann, K., Bernt, M. and Mykhnenko, V. (2014) 'Conceptualizing urban shrinkage', *Environment and Planning A*, 46(7), pp. 1519–1534. doi: 10.1068/a46269.

Hollander, J. B., Pallagst, K., Schwarz, T. and Popper, F. (2009) 'Planning Shrinking Cities', *Progress in Planning*, 72(4), pp. 223–232.

Kotilainen, J., Eisto, I. and Vatanen, E. (2015) 'Uncovering Mechanisms for Resilience: Strategies to Counter Shrinkage in a Peripheral City in Finland', *European Planning Studies*, 23(1), pp. 53–68. doi: 10.1080/09654313.2013.820086.

Leibert, T., Montanari, G. and Wiest, K. (2015) 'Polarization? The Significance of Gendered Mobility in Central Germany', in *Understanding Geographies of Polarization and Peripheralization*. London: Palgrave Macmillan, pp. 115–134.

McCann, P. (2013) Modern urban and regional economics. *Oxford University Press*.

Meredith, D. (2016) *The challenges facing rural communities*.

Pužulis, A. and Kūle, L. (2016) 'Shrinking of Rural Territories in Latvia', *European Integration Studies*, 0(10), pp. 90–105. doi: 10.5755/j01.eis.0.10.14988.

Raagmaa, G. (2015) Territorial governance and core-periphery relations: The implications of European policy concepts for Central and Eastern Europe. In Understanding Geographies of Polarization and Peripheralization (pp. 287-308). Palgrave Macmillan, London.

Reckien, D. and Martinez-Fernandez, C. (2011) 'Why do cities shrink?', *European Planning Studies*, 19(8), pp. 1375–1397. doi: 10.1080/09654313.2011.593333.

Rink, D. and Kabisch, S. (2009) 'Introduction: The ecology of shrinkage', *Nature and Culture*, 4(3), pp. 223–230. doi: 10.3167/nc.2009.040301.

Runge, A., Runge, J., Kantor-Pietraga, I., & Krzysztofik, R. (2020). Does urban shrinkage require urban policy? The case of a post-industrial region in Poland. *Regional Studies, Regional Science*, 7(1), 476-494.

Sepp, V. and Veemaa, J. (2017) *Shrinking regions and innovative solutions : entrepreneurship, employment and the accessibility of services*.

Šimon, M. and Mikešová, R. (2014) *Population Development and Policy in Shrinking Regions: the Case of Central Europe*.

Tong, Y. *et al.* (2020) 'Small towns shrinkage in the Jilin Province: A comparison between China and developed countries', *PLoS ONE*, 15(4), pp. 1–17. doi: 10.1371/journal.pone.0231159.

Ubarevičiene, R., Van Ham, M. and Burneika, D. (2016) 'Shrinking regions in a shrinking country: The geography of population decline in Lithuania 2001-2011', *Urban Studies Research*. doi: 10.1155/2016/5395379.

Walford, N. S. and Kurek, S. (2008) 'A comparative analysis of population ageing in urban and rural areas of England and Wales, and Poland over the last three census intervals', *Population, Space and Place*, 14(5), pp. 365–386. doi: 10.1002/psp.488.

Wang, J., Yang, Z. and Qian, X. (2020) 'Driving factors of urban shrinkage: Examining the role of local industrial diversity', *Cities*, 99(January), p. 102646. doi: 10.1016/j.cities.2020.102646.

Appendix:

Figure 2: Probit model reporting marginal effect

VARIABLES	Population Shrinkage 1986-2016	VARIABLES	Population Shrinkage 1986-2016	VARIABLES	Population Shrinkage 1986-2016	VARIABLES	Population Shrinkage 1986-2016
Unemployment rate	0.3018*** (0.0703)	Prop. Employed Transport and Communications	0.2613* (0.1520)	Population Density between 22 and 29	-0.0439*** (0.0106)	Prop. Population Aged 34-44 years old	-0.4798* (0.2874)
Prop. male	0.4488** (0.1766)	Prop. Employed Public Admin	-0.1425 (0.1843)	Population Density between 30 and 43	-0.0176 (0.0163)	Prop. Population Aged 44-54 years old	0.2646 (0.2468)
Prop. Employed Mining	-0.1126 (0.1087)	Prop. Employed Professional Services	-0.0469 (0.0956)	Population Density between 44 and 73	-0.0434** (0.0173)	Prop. Population Aged 54-64 years old	-0.0647 (0.1898)
Prop. Employed Manufacturing	-0.2757*** (0.0705)	Prop. Employed Other	-0.5315*** (0.1727)	Population Density between 74 and 150	0.0627 (0.0543)	Prop. Population Aged 64-74 years old	0.5645*** (0.1881)
Prop. Employed Building and Construction	-0.4535*** (0.1318)	Prop. with higher education	-1.3459*** (0.2023)	Urban Population Density	0.5112*** (0.0702)	Prop. Population Aged 74 years old and over	-0.2648 (0.2498)
Prop. Employed Electric and Gas	0.8538*** (0.2065)	Prop. of households with children	-0.4847*** (0.1449)	Prop. Population Aged 15-24 years old	-0.0451 (0.1638)	Prop. Population Aged 64-74 years old	0.5645*** (0.1881)
Prop. Employed Commerce	-0.2457** (0.0982)	Population Density between 13 and 21	-0.0278*** (0.0099)	Prop. Population Aged 24-34 years old	-1.0603*** (0.2360)	Prop. Population Aged 74 years old and over	-0.2648 (0.2498)