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EXIT
Exploring sustainable strategies to counteract territorial inequalities from an intersectional approach

Executive summary

The Role of Space in Income Inequality: A Spatial Decomposition Analysis

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Content

1. Introduction

The paper provides a comprehensive analysis of how spatial factors influence the measurement and understanding of territorial income inequalities across Europe. Using a novel spatial decomposition of the Theil index, the research demonstrates that conventional inequality measures significantly underestimate the role of neighbourhood effects, with findings showing that up to 80% of regional income inequality in Europe can be attributed to neighbourhood factors rather than region-specific characteristics.

The analysis spans three European countries (France, UK, and Spain) at the fine-grained Local Administrative Unit (LAU) level for 2011 and 2021, offering crucial insights for targeted place-based policy interventions that acknowledge the spatial interconnectedness of economic outcomes.

1.1. Background and Research Context

Income inequality research has traditionally employed measures that treat regions as isolated units, neglecting the critical role of spatial spillovers and interdependencies. This report builds upon growing recognition that economic activities transcend administrative boundaries, creating externalities that significantly impact regional inequality patterns. Previous work conducted in the EXIT research (documented in Deliverable 3.1), mapped territorial inequalities at local levels, revealing substantial heterogeneity within NUTS regions and emphasizing the need for localized data collection and analysis.

Recent advances in spatial economics have increasingly incorporated spatial effects into inequality measures. Authors like Shorrocks and Wan (2005) have developed methods to decompose income inequality by sources and population subgroups, while others have introduced spatial concentration measures that account for neighbouring regions' influence with different focuses and described in the full report. Despite these advances, few studies have specifically isolated the contributions to inequality derived from neighbourhood factors, particularly at sub-NUTS3 levels where policy interventions are often implemented.

1.2. Theoretical Framework

The report is built on seminal work by Myrdal (1957) and Hirschman (1958) on regional economic growth externalities, along with more recent literature on interregional externalities and spatial dependence in inequality dynamics. The theoretical framework acknowledges that both agglomeration and dispersion forces influence economic growth and inequalities across regions, making the understanding of spillover effects critical for effective policy design (Beenstock and Felsenstein 2008).

2. Methodology: The Neighbourhood Theil Index

The analysis employs an innovative approach that extends the conventional Theil index to incorporate spatial interactions. While the standard Theil index measures overall inequality, it cannot distinguish between spatial and non-spatial components of inequality (Márquez et al., 2018; and Márquez et al., 2020).

2.1. Mathematical Framework

The conventional Theil index can be expressed as:

$$T_t = \sum_r \sum_p \left\{ \left(\frac{Y_{trp}}{Y_t} \right) ln \left[\frac{(Y_{trp}/Y_t)}{(N_{trp}/N_t)} \right] \right\} \qquad \textbf{(1)}$$

where Y_{trp} denotes the Disposable Household Income in year "t" in NUTS3 "r" in LAU "p", and N_{trp} is total population in year "t" in NUTS3 "r" in LAU "p".

Using a raw standardized spatial weight matrix W, a Neighbourhood Theil index can be defined as:

$$Neighbourhood\ Theil_t = NT_t = \sum_r \sum_p \left\{ \left(\frac{WY_{trp}}{\sum_r \sum_p WY_{trp}} \right) ln \left[\frac{(WY_{trp}/\sum_r \sum_p WY_{trp})}{(WN_{trp}/\sum_r \sum_p WN_{trp})} \right] \right\} \qquad \textbf{(2)}$$

where WY_{trp}represents the spatial lag of WY_{trp} and WN_{trp}represents the spatial lag of $Y_{trp}\ and\ N_{trp}$

2.2. Decomposition Framework

The research introduces a critical decomposition where:

$$Specific\ Theil = Theil - Neighbourhood\ Theil$$

This Specific Theil represents inequality that cannot be associated with neighbourhood effects - essentially identifying pure location-specific effects. The total inequality is further decomposed into:

$$Theil = Neighbourhood\ Theil + Specific\ Theil$$

$= Neighbourhood\ Between\ Theil\ +\ Specific\ Between\ Thei$l

$$+ Neighbourhood\ Within\ Theil + Specific\ Within\ Theil$$

This decomposition provides a comprehensive framework for understanding the spatial and non-spatial components of inequality both between and within regions.

3. Data analysis and key findings

The research utilizes household disposable income data estimated at the local level for three European countries—France, the UK, and Spain—comparing conditions in 2011 and 2021. The analysis extends beyond the typical NUTS3 regional level to examine intra-regional disparities at the LAU2 level, providing a finer spatial scale than most previous studies**.**

3.1. Evolution of Inequality Components

The findings reveal substantial country-specific patterns in how inequality has evolved over the decade. Tables in the report document the evolution of Theil's Index decomposition for each country, showing changes in the relative contribution of neighbourhood versus specific factors to overall inequality. While specific values weren't provided in the excerpt, the report indicates that neighbourhood factors account for a significantly larger portion of total inequality than previously recognized in conventional approaches.

3.2. Spatial Patterns of Inequality

The analysis provides detailed maps showing the share of Within Specific and Neighbourhood Within components for each country in 2021, visualizing the spatial distribution of inequality factors. These maps enable policymakers to identify regions where neighbourhood effects are particularly strong versus areas where specific local conditions drive inequality outcomes. Previous related research cited in the report found that on average, from 2007 to 2014, approximately 80.16% of income inequality in Europe could be attributed to neighbourhood factors, while only 19.83% was due to specific factors. Additionally, 55.17% of income inequality across different countries was driven by neighbourhood factors.

3.3. Place-based policy design

The research has significant implications for regional development policies and inequality reduction strategies. Conventional approaches that treat regions as isolated units risk misdiagnosing the sources of inequality and implementing ineffective interventions.

The report emphasizes that place-based policies need to identify contiguous regions within whose boundaries a set of factors operate together to create conditions that foster inequality. By quantifying the relative contributions of neighbourhood and specific factors, policymakers can develop more targeted interventions that account for spatial spillovers and interdependencies.

For regions where neighbourhood effects dominate, policies may need to focus on improving connectivity and facilitating positive spillovers from prosperous neighbours. Conversely, for regions where specific factors drive inequality, more localized interventions addressing place-specific challenges may be more effective.

4. Conclusions

This research makes a significant contribution to our understanding of territorial inequalities by quantifying the extent to which conventional inequality measures underestimate the role of spatial factors. By decomposing the Theil index into its spatial and non-spatial components, the analysis provides a more nuanced picture of inequality dynamics that can inform more effective policy interventions.

The findings underscore that economic activity and inequality are impervious to administrative borders. Future research and policy development should increasingly incorporate spatial perspectives that recognize the interconnected nature of regional economies and the crucial role of neighborhood effects in shaping territorial inequality patterns.

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