Ecological Economics 130 (2016) 37–52

Contents lists available at ScienceDirect

Ecological Economics

journal homepage: www.elsevier.com/locate/ecolecon

Natural amenity-driven segregation: Evidence from location choices in French metropolitan areas

Y. Schaeffer *,[1], D. Cremer-Schulte [1], C. Tartiu, M. Tivadar

Université Grenoble Alpes, Irstea, UR DTGR, 2 rue de la Papeterie-BP 76, F-38402 St-Martin-d'Hères, France

ARTICLE INFO

Article history:
Received 29 April 2015
Received in revised form 28 April 2016
Accepted 15 May 2016
Available online 6 July 2016

Keywords:
Environmental amenities
Residential segregation
Residential choice
Mixed logit model
Counterfactual simulations
Monte Carlo simulations

ABSTRACT

Casual observation and numerous studies in economics and psychology suggest that households care about the natural environment of their living places. This paper investigates the role played by natural amenities in the formation of segregated residential patterns with respect to household size and socio-professional status. We estimate residential location choice models for large household samples in two metropolitan areas in France: Grenoble in the Alps, and Marseille on the Mediterranean coast. In a second step, we perform counterfactual segregation analysis using Monte Carlo simulations, to compare segregation outcomes "with" and "without" preferences for natural amenities. Our main result is that households' search for natural amenities has significant impacts on residential segregation. It most often contributes to strengthening segregation, but can also be a factor attenuating segregation.

1. Introduction

In Western Europe, residential segregation - defined as inequality in the spatial distribution of socio-economic, demographic or ethnic population groups in a residential area - has been on the rise since the turn of the millennium (Cassiers and Kesteloot, 2012; Musterd, 2005). This evolution is generally thought problematic for economic efficiency, social equity and cohesion (Korsu and Wenglenski, 2010; Bygren and Szulkin, 2010; Cassiers and Kesteloot, 2012; van Ham et al., 2014; Musterd et al., 2012). It is presumed to bring additional economic disadvantages to the most disadvantaged groups, and make intergenerational dialogue and solidarity less likely (Hagestad and Uhlenberg, 2005, 2006). Across Europe over recent decades, political agendas have set objectives and introduced measures to promote social diversity at the municipality and neighbourhood levels.

In this context, research on residential segregation is needed to better understand its mechanisms and its resolution through public policies. Scholars have pointed to several factors likely to influence segregation. In the economics literature, residential segregation is considered mostly as the outcome of households' selective migrations into an urban region based on their location preferences, which differ according to their socio-economic, demographic and ethnic attributes. The most influential explanatory frameworks are Tiebout-type models, urban economic models and social interaction models. Tiebout's (1956) seminal work suggests that households "vote with their feet" and move into the community that maximizes their utility with regard to taxes and local public goods. The association of an unequal ability to pay for public goods, and varying patterns of preferences leads to the segregation of similar households across local jurisdictions. Standard urban economics models analyse households' trade-offs between two main location factors: job accessibility and land consumption. Segregation by income and size is expected to occur in a pattern of concentric circles around a central business district (Fujita, 1989). Lastly, Schelling-type social interaction models assume a process of segregation where the ethnic or social composition of the neighbourhood enters the household utility function (Schelling, 1971; Grauwin et al., 2012).

Using insights from these theoretical models, a body of empirical studies analyses residential location behaviours in urban and metropolitan areas around the globe. Based on data on stated or revealed preferences, and applying especially discrete choice models, this work confirms the importance of these factors in location decisions, and provides evidence of differences in location preferences across population groups (see Guo, 2004 and Schirmer et al., 2014 for reviews). Also, recent studies show the impacts of some of these factors on aggregate segregation outcomes (Bayer and McMillan, 2012; Goffette-Nagot and Schaeffer, 2013).

Some theoretical and empirical studies question the role of the natural environment on residential segregation. Scholars have defined natural amenities as location-specific features of the natural environment which make a locality more attractive as a place to live (Power, 2005). For instance, Banzhaf and Walsh (2008) extend a Tiebout-type model to analyse households' reactions to changes in local environmental

* Corresponding author.
E-mail address: yves.schaeffer@irstea.fr (Y. Schaeffer).
[1] The first two authors shared the lead authorship.

http://dx.doi.org/10.1016/j.ecolecon.2016.05.018
0921-8009/

quality (air pollution), while Wu (2006) shows that patterns of segregation may be better explained using an urban economic framework that takes account of the spatial distribution of natural amenities. Discrete choice analyses (e.g. van Duijn and Rouwendal, 2013; de Palma et al., 2007) confirm that environmental amenities and disamenities affect households' location choices at the municipality or neighbourhood level.

However, to our knowledge there are no empirical studies that explicitly link households' natural amenity preferences with outcomes in terms of residential segregation levels. This is the main contribution of this paper. In the absence of insights on this link, urban policies aimed at countering segregation could overlook the importance of the natural environment and, thus, might fail to address its mechanisms or become self-defeating.

Our research questions are the following: (1) do natural amenities have a significant impact on residential segregation processes? and, if yes, (2) does this impact reinforce or attenuate the other segregation dynamics stressed by urban economics, Tiebout-type and social interaction models? We investigate these questions with the help of two French cases with specific sets of natural amenities: the mountainous metropolitan area of Grenoble and the coastal metropolitan area of Marseille. We focus specifically on supposedly attractive natural amenities: green amenities (e.g. forest areas), blue amenities (e.g. lakes) and case-specific amenities related to mountains and coastline. We investigate segregation mechanisms according to household size and socio-professional status.

The data on households' residential mobility comes from the 2008 French population census, provided by the National Institute of Statistics and Economic Studies (hereafter Insee). The methodology is based on a two-step approach adapted from Goffette-Nagot and Schaeffer (2013). In the first step, we estimate conditional and mixed logit models (Train, 2009) for the two regions, to analyse the determinants of households' location choices. Our explanatory variables include standard location factors such as job accessibility, local public services and housing prices, and variables for natural amenities. The second step is a counterfactual segregation analysis. Households' choice probabilities are computed using the models estimated in the first step (realistic scenario), and partial models where estimates corresponding to preferences for natural amenities are set to zero (counterfactual scenario). Then, Monte Carlo simulations of households' location choices allow us to compute distributions of segregation indices for each scenario, and to compare the segregation patterns with and without preferences for natural amenities.

The estimation results confirm that preferences for natural amenities differ significantly by household size and socio-professional status. The counterfactual analysis shows that they most often contribute to strengthening segregation dynamics. However, in some cases, they act as a factor attenuating segregation.

Section 2 provides an overview of the literature; Section 3 describes the model, the data and the methods employed; Section 4 presents the model estimates and the results of the counterfactual segregation analysis. Section 5 concludes the paper.

2. Related Literature

This empirical paper is about natural amenity preferences and their impact on location choices and segregation processes at the metropolitan scale. Here, we briefly review several strands of the economic literature connected with this topic. The fact that households care about the natural environment of their living places is well documented by hedonic price studies. The view that natural amenities can play a role in (socially selective) residential migration and the formation of spatial economic disparities is supported by migration and regional development studies. The households' preferences for natural amenities are also investigated at the metropolitan scale by a few residential location choice studies. And theoretical urban and public economic models encompassing environmental amenities show they matter to urban segregation dynamics.

2.1. Preferences for Environmental Amenities

The hedonic price framework statistically disaggregates housing prices into a schedule of implicit marginal prices for housing, neighbourhood and the property's locational attributes (Baranzini et al., 2008; Munroe, 2007). Various studies show positive impacts of environmental amenities on housing prices, e.g. for natural zones (Baranzini and Schaerer, 2011), environmentally sensitive areas (Costanza et al., 2006), land use such as open spaces, agricultural land and forests, land cover diversity, proximity to lakes and rivers (Baranzini and Schaerer, 2011; Cavailhès et al., 2009; Cho et al., 2008; Costanza et al., 2006; Geoghegan et al., 1997; Luttik, 2000; Nilsson, 2014), beaches or proximity to the coast (Blomquist et al., 1988; Costanza et al., 2006), and urban green spaces and parks (Travers et al., 2013; see Waltert and Schläpfer, 2010 for an extensive review). Research shows also that altitude (Nilsson, 2014; Wu et al., 2004), scenery and views over specific natural amenities can have positive impacts on land and house prices (Baranzini and Schaerer, 2011; Bastian et al., 2002; Cavailhès et al., 2009). Some scholars study environmental disamenities, showing that poor air and water quality, noise and proximity to transport infrastructure, harmful land uses and polluted sites have negative impacts on house prices (see Boyle and Kiel, 2001 for a review).

The literature on migration and regional development examines the preferences related to environmental amenities and the link with population flows and spatial inequalities. This research emphasizes the capacity of environmental amenities to attract migrants and human capital, and to stimulate regional economic growth (Knapp and Graves, 1989; Waltert and Schläpfer, 2010). The influence of climate, topography, protected areas, scenic views, open spaces, forests and water areas on population flows and employment growth, has been identified, especially for the US. Several studies show that environmental factors attract specific population groups (e.g. retirees - Duncombe et al., 2001; Poudyal et al., 2008, higher income households - Hand et al., 2008, or members of the creative classes - McGranahan et al., 2011; van Oort et al., 2003).

These work thus suggest that households care about the spatial proximity of environmental amenities and, also, that differences in preferences among households might influence the formation of regional disparities. But it does not explain the role of environmental amenities in the segregation processes observed within many metropolitan regions.

2.2. Residential Segregation and the Environment

Tiebout's (1956) seminal work in public economics suggests that households "vote with their feet" and select the community that maximizes their utility with regard to taxes and local public goods and services. The association between an unequal ability to pay for public goods and varying patterns of preferences leads to (at least partial) segregation of similar households across jurisdictions. This fundamental idea has been formalized (Ellickson, 1973; Epple and Platt, 1998) and extended to many sources of local externalities (Benabou, 1993; Durlauf, 1994, 1996). Tiebout (1956, p. 418) states that this behaviour holds also for non-economic location features not captured by taxes, such as social composition and environmental quality. Drawing on Tiebout, Banzhaf and Walsh (2008) devise a locational equilibrium model and test for environmentally motivated migration decisions in response to exogenous changes in air pollution. They find robust evidence that increased pollution in a given location leads to emigration of richer households and immigration of poorer households.

Another canonical setting for explaining segregation is the monocentric city model (Alonso, 1964; Fujita, 1989). Households'