

Understanding socio-spatial segregation in French cities with mobile phone data

Benjamin Sakarovitch
INSEE, FRANCE

Abstract : This study proposes an original combination of mobile phone data and administrative data to shed light on segregation in urban areas. Mobile phone data, enriched with geocoded administrative data, enable the study of several dimensions of segregation, such as the evolution of spatial segregation across time as well as social segregation, which cannot be studied with more traditional data sources taken alone. Call details records (CDR) contain information on users' contacts and the antennas through which calls or text messages are transmitted. Such mobile phone data are a privileged source for studying both social interactions in terms of contacts of a given person and mobility of that person. These data provide indeed information on who is speaking to who, and on the persons present at the same time in the same place. The different traces left on the mobile network enable us to estimate the place of residence of the subscribers. Furthermore, we combine these information with geocoded fiscal data in order to infer the income levels of locations and of subscribers (approximated by the income levels of their places of residence). And finally, we build indexes of socio-spatial segregation according to that measure of wealth.

Segregation studies generally rely on fiscal information or household surveys. From fiscal data and spatialized income data, only residentially-based segregation can be studied. Surveys allow mobility and network analysis but suffer from omission and imprecision biases due to sample size, and moreover impose burden to the respondents. Thus, mobile phone data enriched with administrative data are likely to provide promising complements.

This study uses anonymized 2007 French CDR from Orange customers as well as household income data from fiscal administrative records. At a fine spatial granularity, individual, social, and spatial segregation indexes are computed for the main three French urban units (Paris, Lyon and Marseille). We measure a higher social segregation in Paris than in Lyon or Marseille. In the three urban units, spatial segregation during night time (which approaches residential segregation) is higher than during working hours. This approach opens new perspectives on segregation studies and on the exploitation of mobile phone data by combining them with other geocoded datasources.