Association between Facility Location Agglomeration and Car Dependency: A Case of Japanese Cities

Maya SAFIRA and Makoto CHIKARAISHI
Graduate School for International Development and Cooperation, Hiroshima University, Higashi-Hiroshima,739-8529, Japan

E-mail: d185311@hiroshima-u.ac.jp / safira.msa@gmail.com

Keywords: Agglomeration, Modal Share, Japan, Commercial Facilities, Car Dependency

Abstract

One of the negative impacts of urban agglomeration is traffic congestion. Its level of impacts would depend on car dependency, while little empirical evidence has been provided in the literature. To fill in this gap, this study empirically examines the association between urban agglomeration and car dependency in 67 Japanese cities. Urban agglomeration index is developed based on the ratio of average distance among public facilities (i.e. schools and hospitals) and that among commercial facilities in each city. We assume that there are no agglomeration effects for public facilities, i.e., the index is considered to show the agglomeration level of commercial facilities. In other words, the distribution of public facilities is assumed to be a counterfactual. Another effort we made is that, while most existing studies have used the Euclidian distance, the road network distance is used in this study. This is because of the geographical characteristics of Japanese cities, i.e., most cities are in coastal or mountainous areas, causing an unignorable difference between Euclidian-based and network-based distances. Finally, the regression analysis is conducted to identify the association between the agglomeration index and car dependency. Empirical analysis is conducted by using the commercial facility location data from the Ministry of Economy, Trade, and Industry in Japan in 2014, the public facility data from the Ministry of Land, Infrastructure and Transport in 2015 and the modal share data by the Ministry of Land, Infrastructure, Transport, and Tourism in 2008. There are two main findings. First, we find that there is a significant negative relationship between agglomeration of commercial facilities and car dependency, implying that people may shift from car to other modes with the progress of urban agglomeration. Second, such a significant impact of car dependency on urban agglomeration is observed only when we use network-based distance, indicating that the choice distance metric does really matter in such empirical works. We also explore geographic characteristics of cities which show the larger differences between the Euclidian and network distance.