

[SUMMARY]

The Impact of Improvement in Public Transportation: Evidence from the Tokyo Metropolitan Area

ADACHI Yusuke *

* Faculty of Economics, Kokugakuin University

I. Introduction

Improving the transportation system is one of the largest public investments, and this investment has long-term impacts on urban structure, such as the location choices of households and businesses. Since the transportation system plays an important role in urban structure, it is vital to provide evidence for the appropriateness of the policy. In order to provide such evidence, how investment in transportation system affect the urban structure has been studied by theoretical and empirical methods of microeconomics. For instance, some studies focus on suburbanization, the phenomenon of population or employment decline from the central city of metropolitan area.

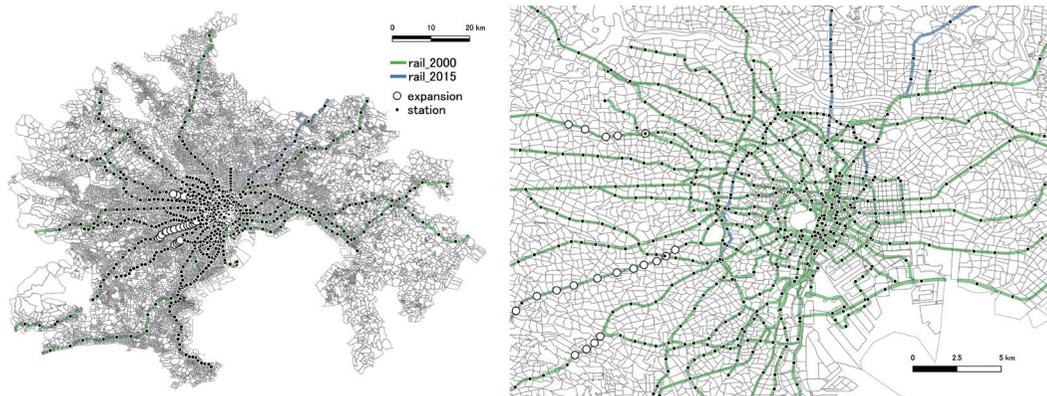
Some studies examine the mechanism of population and employment suburbanization¹⁾. Baum-Snow (2020) shows that highway rays decrease population and employment in some sectors in the central city of a metropolitan area, and agglomeration spillover plays an important role in employment suburbanization. Contrarily, Adachi (2019) indicates that congestion in a central city fosters population and employment suburbanization. Hou (2016) analyzes traffic congestion on the location choice of firms, and find that the tradeoff between congestion and agglomeration is difference by industry. For example, industries with weak agglomeration

externalities, such as retail stores, change their location to the suburbs if there is no congestion, but remain near the central area of metropolitan area if congestion is high. However, Hou (2016) only analyzed the location factors of firms, and did not analyze the impact of investment in infrastructure on firms and employers. Therefore, this study analyzes the impact of infrastructure development on the distribution of the number of employees within a city. In particular, we will test whether the results are consistent with the results of Baum-Snow (2020), which assumes no congestion.

II. Data and Estimation methodology

The primary goal is to find the treatment effects of improving the TMA railroad network on the distribution of population and employment in some industry categories. My analysis only focuses on the railroad that connects the central area to the subcenter or the suburban area. My main explanatory variable includes transportation improvements to the train network between 2000 and 2015, especially, passenger-only improvements. Some issues from 2000 that the TMA railroad network needs to address are i) relieving congestion and ii) improving accessibility to the central area. The duplex line aims to relieve congestion and the new line will improve accessibility. Figure 1 shows the TMA with the duplex line and the new line.

Figure 1: The TMA railroad system



[Note.] The left hand side of this picture shows the TMA and the railroad systems. The right hand side shows the railroad system in the central city of the TMA. Source: own elaboration

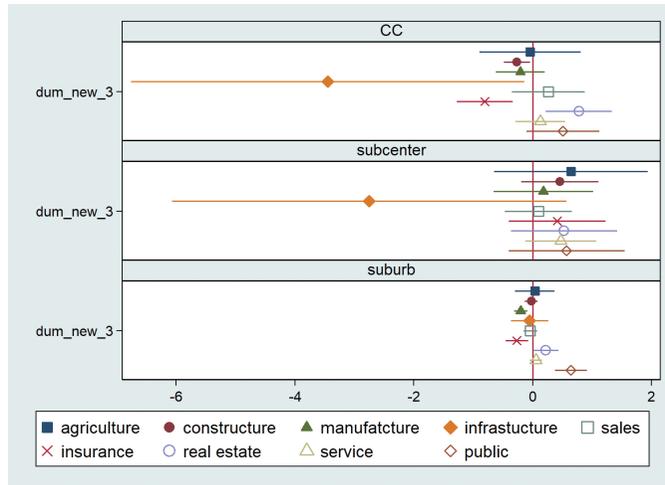
Since transportation infrastructure is not randomly assigned, there is endogenous problem to estimate the impact of improvement in public transportation. To carefully establishing the causal relationship, this paper uses an instrumental variable which is the planned route network of Tokyo metropolitan area.

III. Results

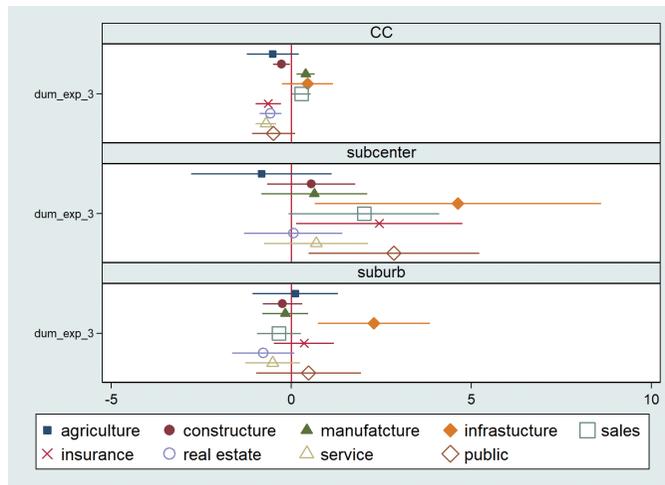
The analysis in this paper reveals the effect of improving in transportation system on employment distribution in the metropolitan area, and figure 2

shows the results of our analysis. in a central city, there is employment in some sectors, such as insurance, real estate, services, construction, and transport, which suburbanize due to capacity expansion. According to Baum-Snow (2020), localized agglomeration spillover is the key to suburbanization, and a sector with strong spillover, such as insurance and real estate, remains a central area. Conversely, firms in weak spillover sectors, such as wholesale and retail, move to suburban areas with improvement in transportation. My results differ from those of Baum-Snow (2020). One possible reason for this difference is congestion.

Figure 2: The results of estimation



(a) the effect of new station on employment by sector



(b) the effect of expansion on employment by sector

Adachi (2019) indicates that improvement in transportation increases congestion in central city, and Hou (2016) indicates that regional congestion has a positive effect on the location choice of wholesale industry, and negative effect on high office related activity, interpreted as a strong spillover sector. My results suggest that although duplex lines were meant to relieve congestion, they might have been ineffective.

Notes

1) Lucas and Rossi-Hansberg (2002) and Ahlfeldt et al. (2015) indicate that reduction in commuting cost causes the suburbanization of population and employment centralization. However, these findings are slightly different from recent empirical evidence, such as employment suburbanization.

References

- Adachi, Y. (2019), "Why did highways cause suburbanization? The role of highway congestion," *SSRN Working Paper Series*, No. 3247032.
- Baum-Snow, N. (2020), "Urban transport expansions and changes in the spatial structure of US cities: Implications for productivity and welfare," *Review of Economics and Statistics*, forthcoming.
- Hou, Y. (2016), "Traffic congestion, polycentricity, and intraurban firm location choices: A nested logit model for the Los Angeles metropolitan area," *Journal of Regional Science*, Vol. 56, pp.683-716.