Research Working Papers

Productivity, Congested Commuting, and Metro Size

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January 31, 2016

A model of metropolitan areas shows that traffic congestion is the most important force constraining population.

RWP 16-03, January 2016

The monocentric city model is generalized to a fully structural form with leisure in utility, congested commuting, and the equalizing of utility and perimeter land price across metros. Exogenous and agglomerative differences in total factor productivity (TFP) drive differences in metro population, radius, land use, commute time, and home prices. Quantitative results approximate observed correspondences among these outcomes across U.S. metros. Traffic congestion proves the critical force constraining population. Self-driving cars significantly increase the sensitivity of metro population to productivity. Population becomes less responsive to increases in productivity as metros become larger. Correspondingly, the productivity "cost" of metro population—the TFP required to support a given population—increases convexly with size. Benchmark estimates suggest that agglomerative productivity suffices to support increases in population from low levels, allowing chance to play a significant role in determining which locations with sufficient exogenous TFP develop into small metros. But agglomerative productivity falls considerably short of supporting increases in population from high levels, suggesting that large metros arise from strong "fundamentals" such as high exogenous TFP.

JEL Classification: R12, R41, J22

Article Citations

- Rappaport, Jordan. 2016. "Productivity, Congested Commuting, and Metro Size," Federal Reserve Bank of Kansas City, working paper no. 16-03, January. Available at https://doi.org/10.18651/RWP2016-03

Related Research

- Rappaport, Jordan. 2014. "Monocentric City Redux," Federal Reserve Bank of Kansas City Research Working Paper, no. 14-09, November.

- Rappaport, Jordan. 2008. "A Productivity Model of City Crowdedness," Journal of Urban Economics, 63, 715-722. Available at http://doi.org/10.1016/j.jue.2007.04.008
- Rappaport, Jordan. 2008."Consumption Amenities and City Population Density," Regional Science and Urban Economics, 38, 533-552. Available at http://doi.org/10.1016/j.regsciurbeco.2008.02.001

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Jordan Rappaport is a senior economist at the Federal Reserve Bank of Kansas City. He joined the Bank in 1999 following completing his Ph.D. in economics at Harvard University. Jordan also holds a bachelors' degree from Brown University, from which he graduated in 1990. Jordan's research focuses on issues related to local growth. His articles for the Bank's *Economic Review* primarily focus on U.S. metropolitan area growth and on housing. His empirical research published in peer-reviewed journals has documented the persistence and causes of long run local population growth. His published theoretical research shows that even small costs associated with moving are sufficient to cause high persistence in net population flows and that small productivity and amenity differences can cause very large differences in local population density. Jordan is an associate editor of *Regional Science and Urban Economics* and the *Journal of Regional Science.*