Examining the Geography of Opportunity through a New Public Transit Opportunity Index

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Project Objective

The objective of this project is to develop a new index of geographic opportunity that improves upon existing measures to analyze the spatial relationship between the location of jobs and populations in urban settings. We develop a job accessibility measure based on Generalized Transit Feed Specification data which can be used to replace measures of actual commute times of workers and linear distance measures of job access to produce better estimates for job accessibility for the most vulnerable populations. We then test this new measure of the Geography of Opportunity in regression models to determine how job accessibility is associated with employment outcomes. This study has important implications for understanding patterns of unemployment, underemployment, and access to labor markets, especially for populations with employment barriers.

Problem Statement

Past measures of job accessibility have relied on measures of linear distance between populations and jobs, actual commute times for those working, or much simpler regional approaches that simply focus on the city or county. These past measures suffer from combinations of measurement error and endogeneity due to the fact that linear distance is most relevant if someone has a car and if commute times derived from a working population subsume well represent a set of job market and residential choices. Past measures are most problematic for the most disadvantaged populations that are unlikely to have a car. This research highlights the need to develop an exogenous measure of job access that does not require car ownership.

Research Methodology

This job accessibility measure in this study is created using Generalized Transit Feed Specification (GTFS) data. Using Remix (a commercially available tool), we constructed travel time isochrones at 15, 30, 45, and 60-minute thresholds. By way of comparison (Figure 1), we also construct walking and auto access isochrones based on linear distance and average speeds that someone of each commute type would travel. Jobs are then counted within each isochrone to obtain the total number of jobs that can be accessed via each mode. We compare these three alternative measures of job accessibility in nine large metropolitan areas to determine the association between job accessibility and employment outcomes at the Census tract level using a regression-based framework.
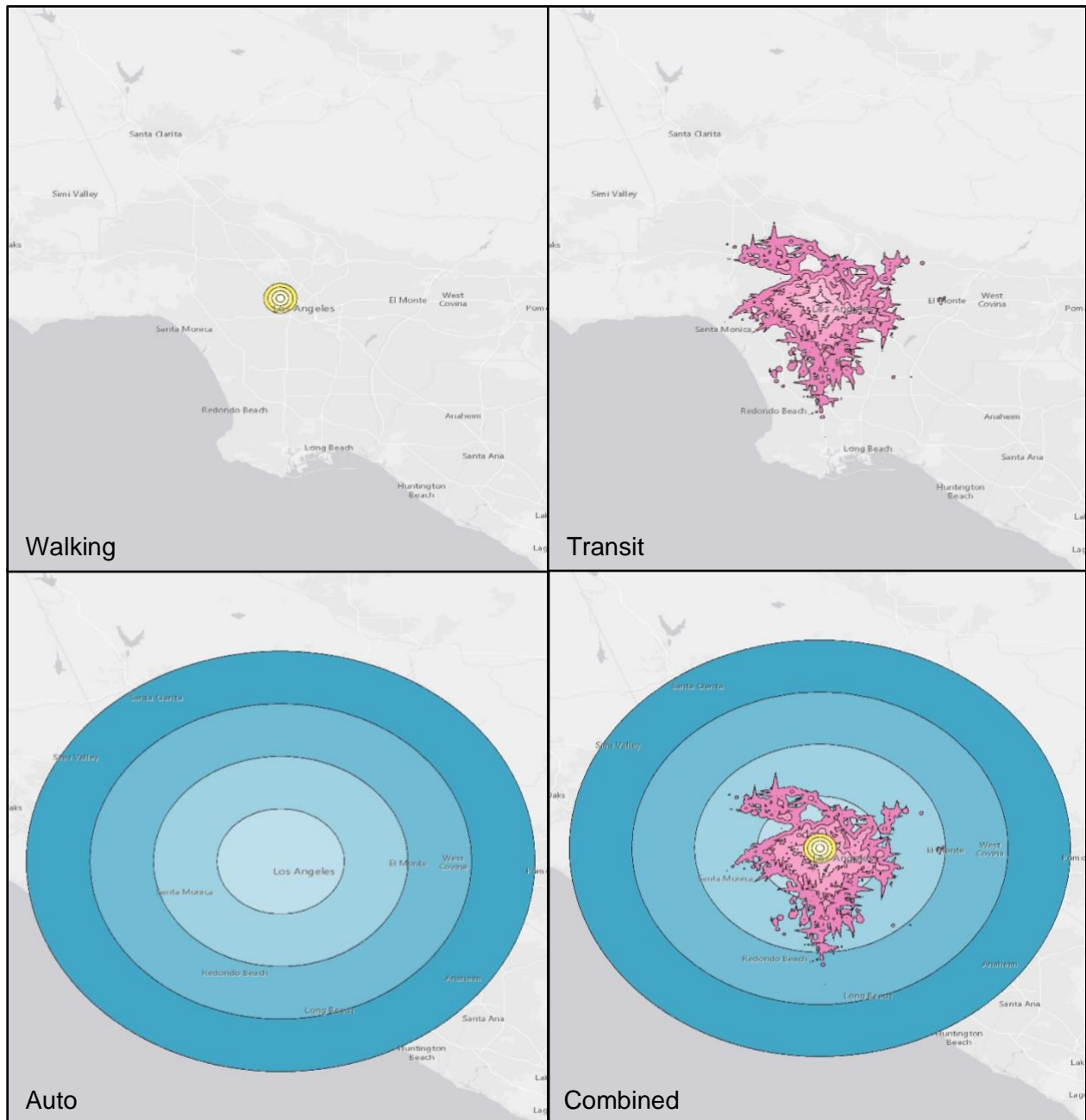
Figure 1. Example Travel Time Isochrones for Each Access Mode

Results

The results suggest that greater job accessibility by transit within 15-45 minute travel time isochrones increases the likelihood of being in the labor force (Table 1). In contrast, additional jobs accessible via automobile are only predictive of higher labor force participation rates if those jobs can be reached within a 15-minute commute. These contrasting results suggest at least two important distinctions. First, except for 15-minute commute-time isochrones, additional job access by transit has a larger magnitude of association with labor force participation than does additional access by cars. Second, because access by transit is highly connected to having a rail station or rapid bus station nearby, these accessibility gains are

currently localized.   Both of these facts suggest that a more robust transit system would improve accessibility for transit dependent populations.

While this study did not establish causality in the relationship between job accessibility and labor market outcomes, it does provide insights into future work. The public transit job accessibility measure derived here could be used to determine how the most vulnerable and transit dependent populations benefit from better accessibility. While it is true that endogeneity is an important obstacle to overcome in studies of the geography of opportunity, it is also true that the vulnerable populations have the fewest choices on where to live based on housing quality and affordability. Transit agencies can increase frequencies to places where transit population reside and improve network accessibility at intervals up to 45 minutes to improve accessibility from these communities.

Table 1. Regression Results: Labor Force Participation with Census Controls

VARIABLES	Public Transit	Automobile
Jobs accessible with 15 minutes	-1.16×10^{-5}***	3.14×10^{-6}***
	(4.29×10^{-6})	(3.16×10^{-7})
Additional jobs accessible between 15 and 30 minutes	1.11×10^{-5}***	-1.62×10^{-6}***
	(1.10×10^{-6})	(2.03×10^{-7})
Additional jobs accessible between 30 to 45 minutes	3.24×10^{-6}***	-1.76×10^{-6}***
	(6.68×10^{-7})	(1.74×10^{-7})
Additional jobs accessible between 45 and 60 minutes	-1.11×10^{-6}**	-3.10×10^{-7}**
	(4.74×10^{-7})	(1.36×10^{-7})
Observations	11,554	11,554
R-squared	0.285	0.295