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Bus Transit Operational Efficiency Resulting from Passenger Boardings at Park-and-Ride Facilities

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...availability of parking near bus stops is overall a stronger influence region-wide on transit ridership than residential housing near bus stops.

In some urban corridors in North America, park-and-ride lots provide collection points for public transit riders from sparsely populated areas. They are often very popular with transit customers. In theory, park-and-ride (P&R) lots contribute to the efficiency of bus transit by aggregating commuters who would otherwise wait in smaller numbers at dispersed bus stops. The size of the impact of P&R availability on ridership is critical to determining the efficiency and fiscal impact of park-and-ride in comparison to alternative means of collecting passengers. Ridership and service hour data on five bus transit systems in the western U.S. are examined in this study, those serving San Jose and Los Angeles in California, and three from the Seattle, Washington region.

Study Methods

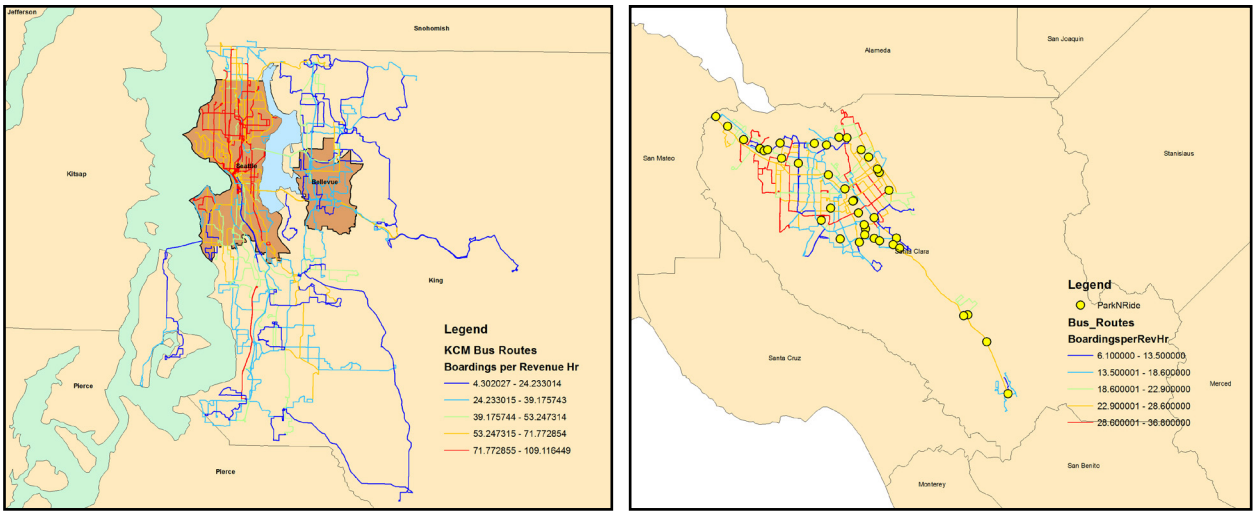
The study develops regression models of ridership that permit a quantitative assessment of the significance of P&R on transit efficiency. The regression models are estimated using ridership and other readily-available data.

Ridership is viewed in two ways: at the stop-level or aggregated at the route-level. Using stop-level data allows consideration of the impact of neighborhood variables such as median income or population density within the quarter mile walkable service area around a given stop. Aggregating to the route-level allows making a direct connection to a commonly used measure of bus transit efficiency, boardings per revenue hour.

For the two case studies for which the most detailed boarding data were available, King County Metro (Seattle area) and Santa Clara Valley Transportation Authority (VTA), regression estimates are presented for both stop-level and route-level formulations.

Two regression techniques, Ordinary Least Squares (OLS) and Poisson Regression are employed where appropriate. Poisson regression is very robust and most appropriate for count data, such as boardings at a stop.

P&R influence is measured in several ways, depending on whether the analysis is stop-level or route-level. For route-level analysis, the authors count the total capacity of P&R lots along the route. For stop-level analysis several variables are used: a quarter-mile dummy variable (whether there is a P&R lot within a quarter-mile of a given stop), a quarter-mile capacity variable (the quarter-mile dummy times the capacity of the closest P&R lot), and distance-decay variables which account for both distance to the nearest P&R lot and the capacity of the nearest P&R lot.



High and Low Boardings-per-Revenue-Hour Routes for King County Metro and Valley Transportation Authority

Findings

For both route-level and stop-level analyses, and for both OLS and Poisson regressions, using any of the alternative P&R influence measures mentioned above, P&R influence is strongly statistically significant in the expected direction – namely, P&R availability has a positive impact on boardings – in all cases except one. For route-level analysis of the VTA bus system serving San Jose metro area, the P&R variable is not statistically significant in determining boardings per revenue hour. Another quantitative result shown in the regression coefficients from both the San Jose and Seattle metro area is that the availability of parking near bus stops is overall a stronger influence region-wide on transit ridership than residential housing near bus stops.

Policy Recommendations

Results from the Seattle area and Los Angeles County suggest that expanding parking facilities near suburban park-and-ride lots would increase the productivity of bus operations as measured by ridership per service hour. To answer a typical objection about the high cost of providing new parking for suburban bus customers, the authors also illustrate that reasonable daily parking charges (compared to the cost of driving to much more expensive parking locations downtown) would provide sufficient capital to build and operate new P&R capacity without subsidy from other revenue sources.

About the Authors

John Niles is President of Global Telematics, a transportation analysis consultancy based in Seattle, Washington. Mike Pogodzinski is Professor of Economics at San Jose State University. Both authors are Research Associates at Mineta Transportation Institute.

To Learn More

For more details about the study, download the full report at ***transweb.sjsu.edu/project/1401.html***

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