What Drives Shared Micromobility Ridership?

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August 2023

Issue

Shared micromobility (e.g., e-scooters, bikes, e-bikes) offers moderate-speed, space-efficient, and "carbon-light" mobility, promoting environmental sustainability and healthy travel. While the popularity and use of shared micromobility has grown significantly over the past decade, it represents a small share of total trips in urban areas. To better understand shared micromobility ridership, researchers from across the U.S. and the world have analyzed statistical associations between shared micromobility usage and various explanatory factors, including socio-demographic and -economic attributes, land use and built environment characteristics, surrounding transportation options (e.g., public transit stations), geography (e.g., elevation), and micromobility system characteristics (e.g., station capacity). To understand what these studies collectively mean in terms of expanding shared micromobility usage, we conducted a meta-analysis of 30 empirical studies and then developed robust estimates of factors that encourage ridership across different markets.

Key Research Findings

As the number of nearby transit stations and/or bus stops increases, so does shared micromobility ridership. We found that as the number of rail stations nearby doubles from one to two, shared micromobility ridership increases by around 20%. However, the effect is weaker for nearby bus stops, with a doubling of bus stops only increasing shared micromobility ridership by 12%. Furthermore, the type of shared micromobility system also has an effect. For example, station-based bikeshare (i.e., bikes can be found, used, and returned to specific locations or "stations") increases ridership, whereas dockless bikeshare or dockless e-scooter (i.e., bikes or scooters can be found, used, and returned anywhere within a city or designated area) has a negative effect. This result is consistent with the design intentions of station-based bikeshare systems aimed at connecting travelers to public transit systems, which was a primary design goal in many cities. Conversely, most dockless systems were not designed to support public transit.

Bikeshare station elevation strongly influences ridership. Two studies in our meta-analysis measured the association between station elevation and shared micromobility bikeshare ridership (note that these studies evaluated standard "human-powered" bikes, not e-bikes) and found that for every 1% increase in elevation there is a wide range of negative effects on ridership (-0.2% to – 1.81%). The range of negative effects possibly reflects differences in local willingness to climb hills, as well as the steepness of those hills. The introduction of e-bikes should help negate the impact of elevation, given this technology makes riding up hills more manageable.

The prevalence of bike lanes increases shared micromobility ridership, but effects vary widely. Five cities in our meta-analysis (Washington DC, New York City, Chicago, Singapore, and Beijing) found a positive correlation between the miles of bike lanes in a shared micromobility zone and shared micromobility ridership; however, the impacts varied widely. The New York City study showed the greatest effect (+0.9 elasticity), while the Beijing study showed a less strong effect (+0.4). Two studies conducted in DC showed even more tepid effects (range: +0.07 to +0.15) and the same for Chicago (range: +0.07 to +0.09). Singapore showed the weakest effect (+0.02) of miles of bike lanes on ridership. Investigating explanations for these differences will require additional research, but could be evaluated by bike lane type, or presence of a broader connected bike network.

Residential density drives shared micromobility ridership, but employment density less so. Population density is significantly related to shared micromobility ridership, with a 1% increase in population density resulting in a 0.16% to 0.28% increase in shared micromobility use. We also find a positive relationship between shared micromobility and employment density, with elasticity measures between 0.07 and 0.24. This speaks to several potential takeaways for policy makers. Market pressures may yield high micromobility supply in higher density job centers and residential areas. However, if policy makers want to incentivize shared micromobility providers to expand where density is lower, this may require additional incentives.

High-income areas produce higher shared micromobility ridership than low-income areas. Ten empirical studies identified a positive correlation between local household income and shared micromobility use, such that for every 1% increase in the median household income for areas spatially close to a shared micromobility station (or zone), there is an approximately 0.4% increase in shared micromobility ridership. From a practical perspective, this positive elasticity suggests that higher-income areas generate significantly more ridership than low-income areas, which has a couple of implications. The market alone will yield higher profitability potential in higher-income areas, which may suggest the need for policy intervention to ensure equitable access to shared micromobility. This might include subsidizing private companies to operate in low-income areas or programs that apply cross-subsidies from high-income to low-income areas, to address this market gap.

More Information

This policy brief is drawn from the research project “What Drives Success in Public Bikeshare Programs?” led by Michael Hyland at the University of California, Irvine. For more information about the findings presented in this brief, please contact Professor Michael Hyland at hylandm@uci.edu. More information about the research project is available at www.ucits.org/research-project/2021-38.

References

Ghaffar, Arash, Michael Hyland, and Jean-Daniel Saphores. “Meta-analysis of shared micromobility ridership determinants.” Transportation Research Part D: Transport and Environment 121 (2023): 103847.

Research presented in this policy brief was made possible through funding received by the University of California Institute of Transportation Studies (UC ITS) from the State of California through the Public Transportation Account and the Road Repair and Accountability Act of 2017 (Senate Bill 1). The UC ITS is a network of faculty, research and administrative staff, and students dedicated to advancing the state of the art in transportation engineering, planning, and policy for the people of California. Established by the Legislature in 1947, the UC ITS has branches at UC Berkeley, UC Davis, UC Irvine, and UCLA.

Project ID UC-ITS-2021-38 | DOI: 10.7922/G2V40SKK