



Can New Transportation Technologies Improve Equity and Access to Opportunity?

By Kevin DeGood and Andrew Schwartz April 2016

Public transportation is an essential part of our surface transportation system. For many families, especially those without access to a car, public transportation is that critical link to employment, education, and child care facilities, among other services. In 2014, the last year for which complete data are available, more than 2,100 public transit operators provided 10.5 billion unlinked trips, carrying passengers more than 57 billion miles.¹

Nationwide, 20 percent of households at or below the federal poverty line lack access to a car. The percentages of low-income African American and Latino households without a car are even higher at 33 percent and 25 percent, respectively.² For these families, public transportation provides the only way to meet daily needs. As a result, local leaders and policymakers tend to focus on the role that transportation—especially public transportation—plays in promoting economic opportunity and social equity. Typically, local leaders concentrate their attention on traditional measures of service quality and access such as geographic coverage, frequency, and hours of service of transit providers.

Unfortunately, these core characteristics of service quality tend to overlook the individuals and households that live beyond a reasonable walking distance to the system. After all, transit riders are pedestrians at the start and end of the vast majority of trips. Decades of low-density urban and suburban residential and commercial development have created land use patterns that are exceedingly difficult to serve. Consequently, transit service maps present a somewhat inflated sense of the share of local residents with real access to the system. In effect, many people live in the large gaps between the bus lines that travel up and down a region's major avenues. This points to an important truth about transportation: Distance is often the greatest barrier to access.

New shared-ride providers such as Uber and Lyft offer people the ability to hail a ride using a smartphone application with pricing based on distance and overall demand for service. Unlike traditional taxi services, shared-ride providers exclusively pick up riders through the mobile app and not off the street.³

These new providers offer transit agencies the opportunity to experiment with different ways to overcome the last-mile barriers to connect people with the public transit system. Congress should authorize a pilot program to allow a limited number of public transit agencies with a fixed-guideway rail system to flex a portion of their federal funding to pay a portion of the cost of ridesharing trips that connect qualified low-income residents with the rail system.

The importance of mobility

Transportation policy debates tend to focus on narrow issues, such as the number of deficient bridges or the completion of a particular mega project, as opposed to overall outcomes. In truth, transportation infrastructure and services have value to the extent that they help a society achieve higher-order social, economic, and environmental goals. This is especially the case when considering the role of transportation in addressing poverty.

Decades of research show that access to affordable transportation—either an automobile or public transportation—is an essential part of moving out of poverty. A recent major study by Raj Chetty, a professor of economics at Stanford University, and his colleagues found that geographic isolation—as measured by lengthy commute times—was a significant factor in people’s ability to leave poverty.⁴ The authors concluded that “upward mobility is higher in cities with less sprawl, as measured by commute times to work. These findings lead us to identify segregation as the first of five broad factors that are strongly correlated with [economic] mobility.” Other research demonstrates that the presence of public transit improves access to employment at all levels and that transit reduces the geographic mismatch between households and employment.⁵

Taken together, these findings reinforce the clear economic benefits of access to opportunity provided by transportation mobility—especially affordable public transportation. Yet many low-income individuals and households fall into the geographic gaps between bus and rail lines and are therefore largely excluded from the connections that public transit provides. The result is that jobs, education, and health care services located only a few miles away are often out of reach for low-income families, especially those that lack access to a car.

Historically, transit agencies have been unable to address these geographic gaps—especially because extending traditional fixed-route service into neighborhoods is cost prohibitive. Companies such as Uber and Lyft offer transit agencies a way to bridge last-mile gaps efficiently, allowing eligible residents to connect affordably to the public system.

Of course, people have been taking taxi rides to and from transit stations for a long time. The difference is that new technology platforms allow for the development and administration of programs to subsidize ridesharing that would have been impossible even a few years ago. For instance, the mobile applications developed by ridesharing companies would allow a transit agency to set geographic boundaries, bundle multiple subsidized trips together, and process transactions at a fraction of the cost of traditional reimbursement programs.

Defining transportation equity

Transportation equity is a broad concept. Three important elements of transportation equity are people's ability to pay, the amount of benefit they receive, and their ability to participate fully in society. Importantly, both physical and cost barriers can prevent people from enjoying a meaningful quality of life.

Equity discussions tend to focus heavily on transportation costs and the ability of residents to pay. After all, because low-income individuals already have a reduced ability to pay, even small increases in the cost of fuel or transit fares can have a large negative economic impact. Yet focusing exclusively on transportation costs misses the fact that governments frequently make major investment decisions that deliver greater or lesser benefit to different system users.

For example, a highway improvement project that saves drivers two minutes during both the morning and evening peak periods delivers only modest marginal benefits over and above the current highway system. Additionally, these modest benefits accrue to people who already have access to a car and to employment centers. By comparison, spending an equivalent amount to add late-night bus service that allows an unemployed transit-dependent rider to affordably access a previously inaccessible job with nontraditional hours provides substantial marginal benefits. The decision about which investment to make depends in large measure on the relative weight given to each group of users.

Returning to the above examples, it may be the case that the cumulative value of four minutes of time savings multiplied by thousands of drivers has a higher total economic value than the bus project. However, someone who saves four minutes per day has not experienced a qualitative change of life, whereas someone who is able to obtain employment through extended bus hours has experienced a dramatic change—one that has both personal and social benefits.

For this reason, it is important to evaluate alternative investments through an equity lens that accounts for the scale of impact on beneficiaries that are not captured by a traditional travel-time savings analysis. In effect, elected officials and planners should account

for the difference in the scale of impact by prioritizing projects that deliver benefits to disadvantaged communities. This can be thought of as a weighted cost-benefit analysis, where the benefits that accrue to low-income and other disadvantaged communities are weighted more heavily.

Notably, using a weighted cost-benefit analysis is an explicit rejection of equity concepts that emphasize equality or proportionality. Under an equality approach, transportation equity occurs when each system user pays the same amount of money. Similarly, under a proportionality approach, transportation equity occurs when system users receive a benefit that is commensurate to what they paid into the system.

For low-income individuals, both equality and proportionality approaches are very problematic. First, the cost burden of paying an amount equal to that of other users would be significant, if not untenable. Second, a proportional system would deliver few benefits because low-income individuals tend to take fewer trips and therefore contribute comparatively less in transportation taxes.⁶ For this reason, equality and proportionality approaches are counterproductive because they are likely to lead to investment and operational decisions that exacerbate economic hardship and social isolation rather than redress them.

Transportation investments are a powerful form of policy intervention. Elected officials and planners should not only heavily weigh the benefits that flow to disadvantaged communities but also make improved social equity an explicit goal of transportation policy and investment decisions.

Leveraging technology

Rapid technological change offers transit agencies the opportunity to try novel transportation interventions beyond traditional choices such as changing hours and frequency of service. The widespread adoption of mobile devices, combined with the development of sophisticated applications that facilitate the matching of drivers with riders, is opening up new options.⁷

One possibility is to allow transit agencies to use a portion of their federal formula funding to subsidize ridesharing services for low-income individuals and families. The technology that powers ridesharing services is highly sophisticated and could allow transit agencies to tailor their eligibility criteria to target those individuals who live within the intended service area but beyond a reasonable walking distance.

Research shows, and federal program guidelines reflect, that the average person is typically willing to walk a quarter-mile to access bus service and a half-mile for rail.⁸ When transit agencies design their rail and bus routes, they look to maximize ridership

and travel times by serving the highest-density job and residential areas. And while rail lines often have a separate right of way, buses overwhelmingly run along major avenues, which have more density and offer higher travel speeds. Expanding bus operations beyond major avenues to include collector roadways and neighborhood streets is generally not cost effective. As a result, even metropolitan regions that have substantial transit service still bypass a large share of the population. This means that residents who live beyond the reach of transit face higher overall transportation costs because driving is the only remaining option for reaching employment and other daily needs.

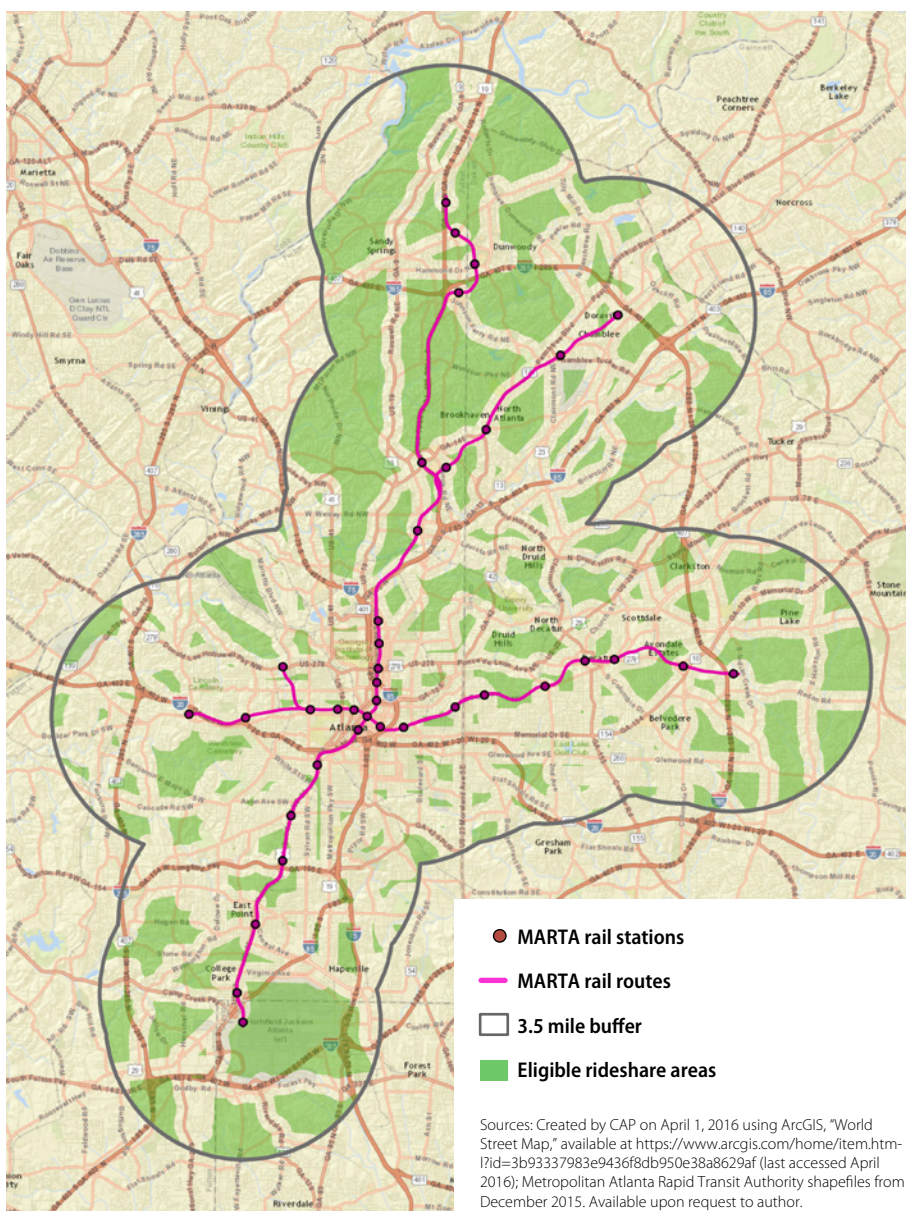
3 steps to a solution: MARTA case study

New shared ride transportation providers offer a potential solution that could bridge this geographic barrier in an affordable manner. The process would involve three components: geographic coverage; eligibility; and subsidy level. To better understand how such a program could be structured, consider the Metropolitan Atlanta Rapid Transit Authority, or MARTA, in the Atlanta region as a theoretical test case.

Define the boundaries

The first step in the process would be to define the geographic boundaries of the program because no transit authority can serve everyone. For instance, the Atlanta metropolitan statistical area covers more than 8,300 square miles.⁹ One approach to determining geographic coverage for subsidized Uber or Lyft service would be to look at those areas that fall beyond a reasonable walking distance—often referred to as the walkshed—but that are still clearly within the intended transit service areas. In other words, a transit authority could exclude households within the traditional half-mile radius of a rail station or a quarter-mile of a bus line that connected to the rail system. For an outer limit, the authority might limit trips to not more than three-and-a-half miles beyond a rail transit stop. Furthermore, the authority could require that all subsidized trips originate or terminate at a rail transit stop, ensuring that limited funds support travel that feeds into the public system as opposed to more expensive door-to-door rides. The areas shaded in green on the map below indicate those geographical areas that fall outside the quarter- or half-mile walk area but within three-and-a-half miles of a rail stop.

FIGURE 1
Potential eligible ridesharing areas for the metropolitan Atlanta area



Determine eligibility

The second step for the transit authority would be to determine who is eligible to receive subsidized ridesharing trips. For many authorities, answering this question will come by working backwards from a budget number. In effect, the amount of funding set aside to cover ridesharing will determine the breadth of eligibility. Transit agencies have a number of options for targeting limited funds to those individuals for whom the subsidy would have the greatest impact.

One option would be to make eligible all adults who fall below the federal poverty line. Unfortunately, given the large number of people living in poverty, the budget numbers quickly become daunting. According to data from the Bureau of the Census, there are 53,611 people living below the federal poverty line within the eligible geographic boundary of three-and-a-half miles of a MARTA rail station but beyond the walking distance of a rail station or connecting bus line.¹⁰ Providing subsidized rides for all of the working-age adults within this population would quickly consume MARTA's entire federal allocation. For this reason, eligibility would need to be more circumscribed.

Another possibility would be to make all recipients of public assistance income, such as the Temporary Assistance for Needy Families, or TANF, program, eligible to participate. According to the Census Bureau, there are 2,241 households within the eligible geographic boundary that receive some form of public assistance income.¹¹ Beyond public assistance recipients, MARTA could expand eligibility to support low-income households with three or more children. Under federal guidelines, a family of five lives below the poverty line if its members earn less than \$28,410 per year.¹² Within the eligible geographic boundary, there are 3,324 adults heading households with three or more children living below the poverty line.¹³

Finally, MARTA could focus on low-income individuals who do not have access to a vehicle. Census data reveal that 8,319 individuals of working age within the eligible geographic area do not have access to a car.¹⁴ While Census Bureau data do not break out vehicle access by income, research shows a high correlation between poverty and a lack of access to a vehicle.¹⁵ Census data, therefore, offer a rough but useful picture of the number of households struggling with the isolation of living without a vehicle beyond the traditional walkshed of transit service. As these examples show, transit agencies have a number of options for expanding or contracting eligibility to meet budgetary constraints.

Setting subsidies

Third, the authority would need to set a subsidy level, as well as a total number of trips eligible for subsidy each month. Given the need to keep the program cost manageable, one option would be to focus on commuting. A full-time employee commutes to and from work approximately 20 days per month, for a total of 40 trips.

According to the National Transit Database, MARTA provided 1.86 million hours of revenue bus service in 2014, the most recent year for which data are available.¹⁶ The database also shows that the fully allocated cost of providing one hour of revenue bus service is \$123.¹⁷ Assuming a per ride subsidy of \$3, MARTA could provide 40 subsidized rides to and from its rail stations for every one-hour reduction in revenue bus service.¹⁸ Put another way, a 1 percent reduction in the total amount of revenue bus service would translate to a cost savings of \$2.3 million, which is sufficient to cover 744,000 ridesharing trips.¹⁹ This total would allow MARTA to subsidize a full year of commuting—480 rides—for 1,550 people.²⁰

After application of the MARTA subsidy, a full year of commuting would translate to a cost of approximately \$2,150 for the eligible participant.²¹ This result is based on Uber’s current pricing for trips within the Atlanta region. The total cost of a trip depends on two fixed and two variable factors. The two fixed costs include a base fare of \$1 and a safety fee of \$1.75.²² In addition, the cost of a trip is based on distance and time in the vehicle. Each minute in the vehicle costs \$0.12, and each mile of travel costs \$0.75.²³ Assuming a maximum trip of 3.5 miles and a conservative average speed of 12 miles per hour, a standard subsidized trip would cost \$7.48, assuming no surge pricing.²⁴ After application of the \$3 subsidy, the participant would be responsible for a charge of approximately \$4.48.²⁵ Assuming that a participant used the full allotment of 480 commuting trips per year, the cost for the participant comes to \$2,150.²⁶

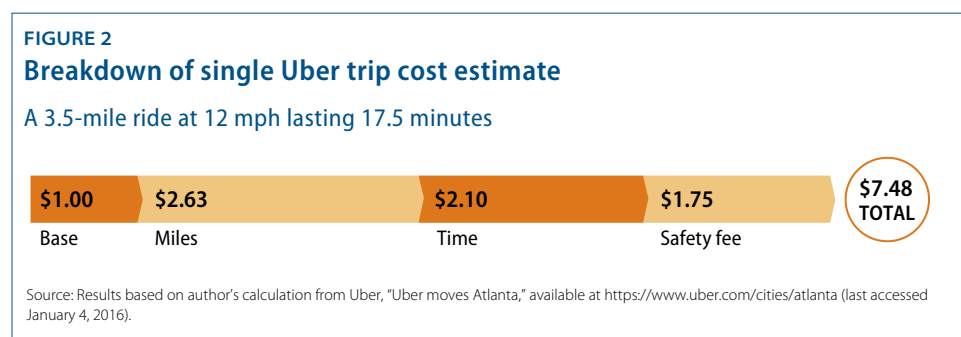


TABLE 1
Cost of yearly subsidy for MARTA, by eligibility category

Eligibility	Subsidy cost
Households with public assistance income	\$3,227,040
Households in poverty with 3 or more children	\$4,656,960
Individuals without vehicle access	\$11,979,360
Total	\$19,863,360

Sources: Results based on author’s calculations from Bureau of the Census, *2015 American Community Survey 5-Year Estimates* (U.S. Department of Commerce, 2015), table B17012; Bureau of the Census, *2015 American Community Survey 5-Year Estimates* (U.S. Department of Commerce, 2015), table B08141; Bureau of the Census, *2015 American Community Survey 5-Year Estimates* (U.S. Department of Commerce, 2015), table B19057.

Data from the large-sample Consumer Expenditure Survey conducted by the Bureau of Labor Statistics show that households living below the federal poverty line spend \$495 per quarter, or roughly \$2,000 per year, to own and operate a vehicle.²⁷ The story does not end there. The data also show that the standard deviation, which is a measure of dispersion or spread, in quarterly expenditures is \$1,280.²⁸ This indicates that poor families experience a great deal of variability in their vehicle costs. This strongly suggests that older vehicles are more likely to have unexpected major repairs or need to be replaced, leading to a large variation in quarterly expenditures. Thus, while the average cost of vehicle ownership is roughly equivalent to the costs of participating in the program, the difference is that ridesharing costs are highly stable and predictable.

The downside risk of unpredictability suggests that transit agencies such as MARTA could decide to use this information to tailor the program design further. For instance, if a low-income individual has access to a car, the agency might decide to offer 80 to 100 subsidized trips per year rather than providing the full 480. These trips would function as a sort of employment safety net that would cover people when their car was being serviced or while they saved up to purchase another vehicle. This approach would save the agency money while providing a way for qualified individuals to cover potential mobility gaps that could lead to a loss of employment.

Weighing the value of service

Each year, the Metropolitan Atlanta Rapid Transit Authority receives approximately \$42 million from the Federal Transit Administration.²⁹ Under federal law, MARTA must use these funds to pay for capital needs such as bus acquisition and ongoing maintenance.

Like all transit service providers in metropolitan regions with a population of more than 200,000 people, MARTA is prohibited from using federal formula funds to cover operating expenses or subsidize third-party ridesharing providers.³⁰ For MARTA or any other transit agency to implement the program discussed in this issue brief, Congress would have to reform federal law to allow formula funds to support a ridesharing subsidy.

Beyond this technical limitation, there is the more complex and thorny question of whether a ridesharing subsidy is a beneficial or appropriate use of limited fiscal resources.

Federal formula funds, by almost any account, are insufficient to meet the true ongoing capital needs of MARTA. Furthermore, MARTA—unlike most other large providers—does not receive an annual operating subsidy from the state of Georgia. Instead, operations rely on revenue from fares and local tax revenues. Therefore, it might seem imprudent to even consider using a portion of federal capital assistance to subsidize ridesharing for low-income individuals. This is a reasonable contention. MARTA cannot be all things to all people.

Yet to a certain extent, the answer to this question comes down to the priority given to competing agency goals. For instance, MARTA might wish to improve traditional service quality by reducing bus wait times. To reduce wait times, the agency would need to add buses and drivers—each of which come with a substantial cost. Currently, weekday wait times for a MARTA bus vary greatly depending on the route and the time of day, extending from 30 minutes to more than 50.³¹ Let's assume the average peak-period wait is 35 minutes and that adding buses and drivers would reduce this average to around 30 minutes. The five-minute reduction would represent a 14 percent wait time improvement.

However, just as with the theoretical highway project mentioned previously that shaved a few minutes off driving times, the bus wait time reduction likely would not deliver a make-or-break difference to transit riders. In effect, people who already take MARTA buses would save a few minutes on their daily commute.

By comparison, extending a targeted ridesharing subsidy to individuals and families living below the federal poverty line who meet certain family size or vehicle requirements would deliver a qualitatively different level of daily mobility. Directing limited resources to a ridesharing program would represent a conception of equity that valued the degree of impact and expanded social participation of beneficiaries over one focused on equality or proportionality. Choosing to uniformly reduce bus wait times by two minutes would represent a conception of equity focused on equality—specifically ensuring that all system users received an equivalent level of service improvement.

To be clear, both investments are legitimate and have sound arguments in their favor. The difference is who is likely to benefit and the scale of impact resulting from the investment. Reducing wait times would produce a marginal and broad-based benefit to riders who already have access to the system. Subsidizing ridesharing would expand access to people who are largely excluded and would provide a major improvement in their ability to access employment and other essential services—a change that could prove transformational to a qualified individual or family.

Conclusion

The rise of mobile computing and ridesharing services offers transit authorities opportunities to experiment with alternative ways to expand transportation equity and mobility that would have been impossible even a few years ago. For the most economically disadvantaged individuals and families, gaining access to subsidized rides that connect with the larger public transit system could prove to be an enormous benefit. Congress should establish a pilot program to allow agencies to try different approaches to leveraging these new technologies, platforms, and providers.

As with any public investment, subsidizing ridesharing to expand access to employment comes with difficult trade-offs. To set aside the funding needed to carry out a pilot program, transit agencies likely would have to reduce unproductive services or pare back capital expansion projects. Yet the ability to deliver mobility benefits that have a major impact on people and families—especially those that struggle to find and maintain employment due to a lack of affordable, dependable transportation options—may prove worth the trade-off.

*Kevin DeGood is the Director of Infrastructure Policy at the Center for American Progress.
Andrew Schwartz is a Research Associate on the Economic Policy team at the Center.*

Endnotes

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- 3 More recently, a few companies—such as asterRIDE and Flywheel—have developed mobile ridesharing applications to allow participating taxi companies to compete with established shared-ride providers such as Uber and Lyft. To date, these services are available in a much smaller number of cities. As more and more taxi companies sign agreements to offer their services through these and other applications, transit providers will have a greater range of potential partners with whom to experiment with last-mile ride subsidies. See asterRide, "Cities," available at <http://www.asterride.com/cities/> (last accessed April 2016); Flywheel, "Where can I use Flywheel?," available at <https://flywheel.zendesk.com/hc/en-us/articles/204626820-Where-can-I-use-Flywheel-> (last accessed April 2016).
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- 6 Federal Highway Administration, *The Next Generation of Travel: Research, Analysis and Scenario Development* (U.S. Department of Transportation, 2014), available at https://www.fhwa.dot.gov/policy/otps/nextgen_finalreport.cfm.
- 7 For many low-income individuals and families, owning a smartphone is not economically possible. For others, voice and data plans are an easy expense to cut when money is tight, making it impossible to participate in a ridesharing subsidy program available through a mobile application. Research by the Pew Research Center shows that half of U.S. adults with an annual income below \$30,000 own smartphones, compared with 64 percent of adults overall. While beyond the scope of this issue brief, the digital divide is yet another barrier to employment for many low-income people. See Aaron Smith, "U.S. Smartphone Use in 2015: Chapter One: A Portrait of Smartphone Ownership" (Washington: Pew Research Center, 2015), available at <http://www.pewinternet.org/2015/04/01/chapter-one-a-portrait-of-smartphone-ownership/>.
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