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SUMMARY

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Public Transportation Ridership: Implications of Recent Trends for Federal Policy

The Coronavirus Disease 2019 (COVID-19) pandemic had an unprecedented effect on public transportation ridership. Public transportation ridership nationwide in 2020 and 2021 was less than half of what it was before the pandemic—about 4.7 billion and 4.9 billion trips, respectively, compared with about 10.0 billion trips in 2019. Ridership in mid-2022 was about 62% of what it had been pre-pandemic. The decline in ridership resulted from stay-at-home orders, workplace closures, and greater telecommuting, as well as the curtailment of countless other economic and social activities. These factors may have been compounded by population losses in some of America's largest cities, such as New York, Boston, and San Francisco, with the largest public transportation systems.

Transit ridership was hit hard by the disruptions caused by COVID-19, but the number of people riding trains and buses had fallen for several years prior to the pandemic. This pre-pandemic decline occurred despite significant investments in bus and rail systems in many communities. The main causes for the drop in ridership were the growth of "shared mobility," such as bike- and scooter-sharing systems and ridesourcing companies (e.g., Uber and Lyft); a decrease in gasoline prices; a rise in telecommuting; and an increase in transit fares. A countervailing factor was the amount of public transportation service provided, which increased in this period.

Although many activities disrupted by the pandemic have resumed, boosting public transportation ridership to some extent, the future of public transportation ridership is uncertain. There is a widespread sentiment that commuting behavior may have changed. One study estimates that 20% of full workdays will be done from home post-pandemic, compared with 5% pre-pandemic. Population losses in major transit cities may reflect temporary moves or a longer-term trend linked to new living and working patterns. Technological changes on the horizon—such as autonomous highway vehicles—might revolutionize transportation mobility, but it is unclear whether such changes would increase or decrease transit ridership.

The pre-COVID-19 weakness in transit ridership, the pandemic-related changes, and possible future social and technological changes have implications for federal transit policy. There are no national projections of transit ridership, but some individual transit operators have estimated their own ridership for budgeting purposes. These estimates generally predict that ridership and fare revenue will not return to pre-COVID-19 levels for several years, which would cause operating budget deficits. Public transportation agency budgets were supported by federal supplemental appropriations in FY2020 and FY2021, but these funds may be exhausted in calendar year 2023.

In the medium term, public transportation ridership is likely to depend on population growth; the public funding commitment to supplying transit; and factors that make driving more or less attractive, such as the price of parking, the extent of highway congestion, and the implementation of fuel taxes, tolls, and mileage-based user fees. Over the long term, ridership is also likely to depend on the introduction of autonomous vehicle technology, although its timing is uncertain. For example, fleets of driverless taxis that can be hailed by smartphone might be cheaper than current taxi and ridesourcing services. Thus, widespread deployment of driverless taxis could reduce transit ridership, unless road congestion, restrictions, or fees make them an expensive alternative in some areas.

A near-term issue for public transportation funding is the sustained operating deficits that are likely to result from greatly reduced fare revenues. Without new funding, public transportation agencies may have to institute some combination of fare increases, service cuts, and layoffs. Options for Congress include further emergency funding and new ongoing operating support. Longer-term issues may affect the general funding of public transportation, distributed mainly by formula, and the discretionary funding of new large capital projects, such as rail and bus rapid transit systems through the Capital Investment Grant (CIG) Program, also known as New Starts. One option to boost ridership without raising funding would be to create incentives for state and local transit agencies by tying federal formula funds to ridership or fare revenue. If the most consequential uncertainty for transit ridership is believed to be the introduction of autonomous vehicles, federal funding might focus on buses, which last about 10 years, and not new rail systems designed to last 30 years or more. Another option would be to redirect CIG funding from building new rail systems and lines to refurbishing rail transit in the large and dense cities where rail transit currently carries large numbers of riders. Raising day-to-day user fees on automobiles would make transit comparatively more attractive. Although many fees, such as tolls and parking charges, are set at the state and local levels, the federal government can influence those fees through taxation, program funding, and other policies.

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Introduction

The Coronavirus Disease 2019 (COVID-19) pandemic has had an unprecedented effect on public transportation ridership and agency budgets.[1] Public transportation agencies kept many buses and trains running, especially to support the travel of "essential workers," but ridership and fare revenues plummeted. Public transportation agency budgets, including payroll and other operating expenses, were supported by federal supplemental appropriations in FY2020 and FY2021 totaling $69.5 billion—about five times the pre-pandemic $12 billion in annual federal public transportation support and more than three times the $19 billion from fares and other operating revenue annually. Ridership recovered from extremely low levels during the early months of the pandemic, but in mid-2022, it was about 62% of pre-pandemic levels.[2] Some of the largest transit agencies expect the emergency operating support they received from the federal government to be exhausted in 2023.

The COVID-19-related disruptions hit transit ridership hard, but the number of people riding trains and buses had fallen for several years prior to the pandemic despite significant investments in bus and rail in many communities. Some of the factors contributing to ridership decline, such as low gasoline prices and service problems at particular transit systems, may have been transitory; others, such as the growing popularity of telework and the rise of "shared mobility" (e.g., bike- and scooter-sharing systems and ridesourcing services, such as Uber and Lyft), may be longer lasting.

The federal government typically supports public transportation by distributing general funding for capital and operating expenses, mainly by formula, and by providing grants for major capital projects on a discretionary basis. This funding is provided in multiyear authorization bills. In November 2021, the federal public transportation program was reauthorized for FY2022-FY2026 as part of the Infrastructure Investment and Jobs Act (IIJA; P.L. 117-58).[3] As with previous authorization acts, the IIJA provided funding for public transportation from the Highway Trust Fund's mass transit account. Unlike previous authorization acts, the IIJA also provided a multiyear advance appropriation from the U.S. Treasury's general fund.

The IIJA provided about a 67% increase in annual federal funding for public transportation (in nominal dollars) when compared with the annual amount provided in the previous authorization, the Fixing America's Surface Transportation (FAST) Act (P.L. 114-94) of 2015, as extended.[4] Although federal support for public transportation can be used for operating expenses in some circumstances, funding is often limited to capital projects, such as buying buses and trains and building and rehabilitating train lines and stations.

This report discusses the implications of the pre-COVID-19 and post-COVID-19 trends in transit ridership for federal policy, including short-term needs and options for further "emergency" operational support and longer-term options to reverse the decline in public transportation ridership. A longer-term issue is how transit agencies are to adapt if ridership and fare revenues

[1] Congressional Budget Office, *Federal Financial Support for Public Transportation*, March 2022, at https://www.cbo.gov/system/files/2022-03/57636-Transportation.pdf.

[2] Public transportation ridership is measured by the number of unlinked passenger trips, which is "the number of passengers who board public transportation vehicles. Passengers are counted each time they board vehicles no matter how many vehicles they use to travel from their origin to their destination." Federal Transit Administration (FTA), "National Transit Database (NTD) Glossary," at https://www.transit.dot.gov/ntd/national-transit-database-ntd-glossary.

[3] CRS Report R47002, *Federal Public Transportation Program: In Brief*, by William J. Mallett.

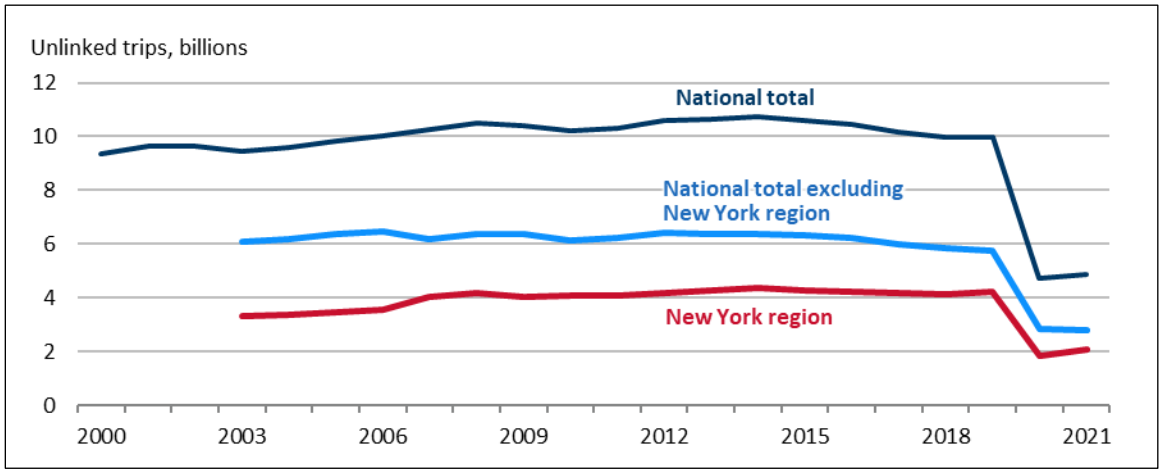
[4] The authorizations in P.L. 114-94 were for FY2016-FY2020; they were extended through FY2021 by the Continuing Appropriations Act, 2021 and Other Extensions Act (P.L. 116-159).

do not return to pre-pandemic levels. One study, for example, estimates that 20% of full workdays will be done from home post-pandemic, compared with 5% pre-pandemic. This outlook poses challenges for subway and commuter rail systems that require long-term capital investments and for the federal programs that fund such investments. The main federal program, the Capital Investment Grant (CIG) program, was created to fund construction of new rail transit projects, but it now funds bus rapid transit and projects to increase the capacity of existing rail and bus rapid transit systems. Another issue is whether future federal funding should focus on buses, which last about 10 years and can be redeployed as demand changes, rather than on rail systems designed to last 30 years or more and are far more efficient at transporting large numbers of passengers in dense corridors but are not easily reconfigured in response to changing travel patterns.

Public Transportation Ridership Trends

COVID-19-related disruptions led to a roughly 50% drop in transit ridership from 2019 to 2020. However, ridership had declined nationally for several years prior to the pandemic. According to data from the American Public Transportation Association (APTA), annual public transportation ridership peaked nationally in 2014 at 10.8 billion trips and then declined by 7% to 10.0 billion trips in 2018 and 2019. A modest increase in national ridership from the early years of the 21st century to 2014 was due mainly to a 30% ridership increase in the New York City region. That region, which includes parts of New York, New Jersey, and Connecticut, accounts for about 40% of national transit ridership (**Figure 1**).

Figure 1. Annual Public Transportation Ridership, 2000-2021



Sources: American Public Transportation Association (APTA), *2021 Public Transportation Fact Book, Appendix A*; and APTA, *Transit Ridership Report*.

Pre-COVID-19 Ridership

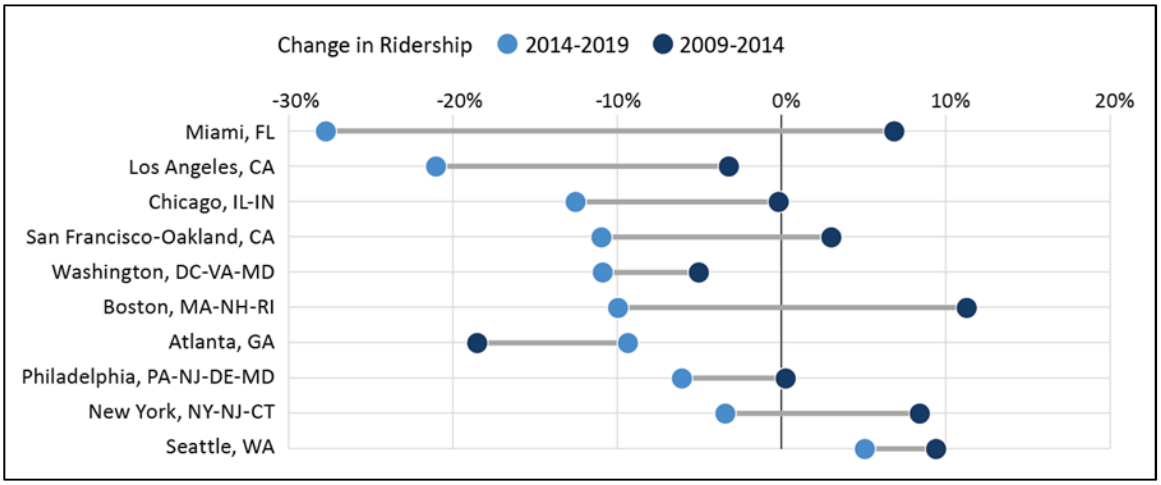
Not every area experienced a drop in transit ridership in the years before the pandemic. However, an analysis published by the Transportation Research Board found that ridership declines in the 2010s were "broad-based—they occurred for both bus and rail and across large, medium, and small cities."[5] For example, ridership declined in 9 of the top 10 public transportation markets in

[5] Transportation Research Board (TRB), *Recent Decline in Public Transportation Ridership: Analysis, Causes, and Responses*, Transit Cooperative Research Report 231, 2022, p. 19 (TRB, *Recent Decline*, 2022).

the country between 2014 and 2019 (**Figure 2**). The exception was Seattle, WA, where ridership grew by 5%. These top markets have a major influence on the overall ridership trends because they account for about 75% of ridership nationwide. Rural transit ridership was also in decline before the pandemic, falling 10% from its peak in 2011-2019.[6]

Figure 2. Ridership Trends in Top 10 Markets, 2009-2019

Unlinked Passenger Trips by Urbanized Area



Source: APTA, *2021 Public Transportation Fact Book, Appendix A.*

Factors Affecting Pre-COVID-19 Ridership

National trends in public transportation ridership are not necessarily reflected at the local level, but a number of factors can be identified as generally responsible for the overall pre-pandemic ridership decline. Many of these factors were outside the control of transit agencies, such as gasoline prices and the growth of ridesourcing companies. Factors that were largely within the control of transit agencies, such as fares, also may have contributed to the drop in riders. Some countervailing factors, such as metropolitan area growth and an increase in bus and rail service supply, may have offset some ridership losses.

Competing Transportation Options

Public transportation ridership is affected by other transportation options, which can be competitive or complementary. In the 2010s, two options emerged that affected transit ridership: ridesourcing companies, such as Uber and Lyft, and micromobility options, such as bike- and electric scooter-sharing systems. Uber, for example, launched in San Francisco in 2010 and grew rapidly in many cities in the second half of the decade. The number of trips provided by Uber in New York City tripled between spring 2015 and fall 2016 and surpassed ridership of the city's

[6] North Dakota State University, Upper Great Plains Transportation Institute, Small Urban and Rural Center on Mobility, *Rural Transit Fact Book*, various years, at https://www.ugpti.org/surcom/resources/transitfactbook/.

yellow cabs from July 2017.[7] Some of this growth can be attributed to the artificially low prices being charged, with investors in ridesourcing companies subsidizing the cost of rides.[8]

Research has found that ridesourcing caused a relatively large drop in bus ridership in all sizes of urban areas and rail ridership in smaller markets. In large rail markets, excluding New York, ridesourcing may have had a small positive relationship.[9] Ridesourcing can substitute for transit, especially where transit service is relatively infrequent and slow, but it may be complementary in certain situations, such as carrying passengers between outlying homes and businesses and transit stations. Ridesourcing may also allow urban dwellers to live without a personal vehicle.[10]

Bike- and electric scooter-sharing systems also substituted for transit use, negatively affecting bus and rail systems in markets of all sizes.[11] According to the National Association of City Transportation Officials (NACTO), bikeshare trips increased from less than 1 million in 2010 to 52 million in 2018. The use of electric scooters rose even faster than bikesharing. Although companies such as Bird and Lime did not introduce them until 2017, NACTO estimates that there were almost 39 million electric scooter trips in 2018.[12]

The availability of a personal vehicle and the cost of driving are other factors that some studies have found important in explaining transit ridership.[13] Compared with other countries, car ownership, licensing, and use, including parking, are relatively cheap in the United States. Consequently, U.S. public transportation ridership is relatively low. For example, compared with people from a number of European countries, Americans take from one-half to one-tenth the number of transit trips per year.[14]

Research shows that gasoline prices are associated with short-term changes in transit ridership, with a drop in the price of gasoline typically resulting in a drop in ridership.[15] In a study of bus demand in metropolitan areas, for example, the price of gasoline was the only factor other than service quality that predicted ridership.[16] Ridership fluctuations from 2000 to 2019 appear to track changes in the average annual price of gasoline with a lag of about a year. Gasoline prices

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[7] Bruce Schaller, *Unsustainable? The Growth of App-Based Ride Services and Traffic, Travel and the Future of New York City*, Schaller Consulting, February 27, 2017, at http://schallerconsult.com/rideservices/unsustainable.htm; and Tanay Warerkar, "Uber Surpasses Yellow Cabs in Average Daily Ridership in NYC," *Curbed*, October 13, 2017, at https://ny.curbed.com/2017/10/13/16468716/uber-yellow-cab-nyc-surpass-ridership.

[8] Henry Grabar, "The Decade of Cheap Rides Is Over," *Slate*, May 18, 2022, at https://slate.com/business/2022/05/uber-subsidy-lyft-cheap-rides.html.

[9] "Chapter 3: Multicity Evaluation," in TRB, *Recent Decline*, 2022.

[10] American Public Transportation Association (APTA), *Shared Mobility and the Transformation of Public Transit*, March 2016, at https://www.apta.com/resources/reportsandpublications/Documents/APTA-Shared-Mobility.pdf.

[11] Chapter 3: Multicity Evaluation," in TRB, *Recent Decline*, 2022.

[12] Sarah M. Kaufman and Luke Buttenwieser, *The State of Scooter Sharing in United States Cities*, New York University Robert F. Wagner School for Public Service, Rudin Center for Transportation, August 2018, at https://wagner.nyu.edu/files/faculty/publications/Rudin_ScooterShare_Aug2018_0_0.pdf; and National Association of City Transportation Officials, *Shared Micromobility in the U.S.: 2018*, at https://nacto.org/wp-content/uploads/2019/04/NACTO_Shared-Micromobility-in-2018_Web.pdf.

[13] Brian D. Taylor et al., "Nature and/or Nurture? Analyzing the Determinants of Transit Ridership Across US Urbanized Areas," *Transportation Research Part A*, vol. 43 (2009), pp. 60-77.

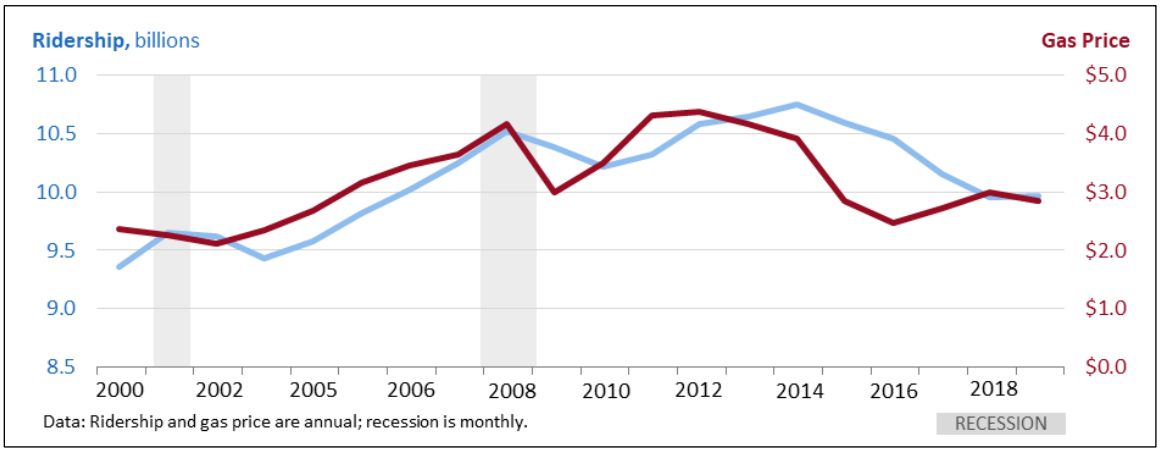
[14] Ralph Buehler and John Pucher, "Demand for Public Transport in Germany and the USA: An Analysis of Rider Characteristics," *Transport Reviews*, vol. 32, no. 5 (September 2012), pp. 541-567.

[15] David Levinson, "On the Predictability of the Decline of Transit Ridership in the U.S.," Transportist Blog, March 20, 2017, at https://transportist.org/2017/03/20/on-the-predictability-of-the-decline-of-transit-ridership-in-the-us/.

[16] Bhuiyan Alam, Hilary Nixon, and Qiong Zhang, *Investigating the Determining Factors for Transit Travel Demand by Bus Mode in US Metropolitan Statistical Areas*, Mineta Transportation Institute, MTI Report 12-30, May 2015, at http://transweb.sjsu.edu/PDFs/research/1101-transit-bus-demand-factors-in-US-metro-areas.pdf.

(inflation-adjusted to 2021 dollars) dropped by 44% between 2012 and 2016, from $4.37 to about $2.47 a gallon, and remained at $3.00 or less through 2019 (**Figure 3**).

Figure 3. Annual Transit Ridership and Average Gasoline Prices, 2000-2019



Sources: APTA, *Transit Ridership Report;* U.S. Energy Information Administration, *Monthly Energy Review,* Table 9.4, August 2022; and Bureau of Economic Analysis, "Implicit Price Deflators for Gross Domestic Product," August 25, 2022.

Vehicle availability has probably played a smaller role in ridership changes since 2014 than in earlier years, partly because by the turn of the century, the vast majority of households owned at least one vehicle. According to the U.S. Department of Transportation (DOT), between 1969 and 1995, the share of households without a vehicle dropped from about 21% to about 8% and then rose to 9% in 2017. From 1969 through 2017, the average number of vehicles available per household increased from 1.16 to 1.88.[17] Researchers studying southern California found that vehicle access, especially among groups that tend to be heavy transit users (such as foreign-born households), may be the largest determinant in declining transit ridership in that region.[18]

Some pre-pandemic transit ridership losses probably resulted from an increase in people working from home. One survey found that 42% of workers reported telecommuting in 2019, up from 37% in 2015. Telework days grew less over this period, however, from 2.3 per month to 2.4 per month.[19] Telework affects all modes of transportation, not just public transportation, but the incentives for working from home, such as travel time saved, may be greatest in major urban areas where shares of commuting by transit are the largest.

Public Transportation Service Supply

Service supply variables—such as service frequency, speed, and reliability; geographic coverage; hours of service; fares; and safety and security—are typically some of the most important factors affecting public transportation ridership. Greater transit service supply is usually accompanied by

[17] Federal Highway Administration (FHWA), *Summary of Travel Trends: 2017 National Household Travel Survey*, Table 17, at https://nhts.ornl.gov/assets/2017_nhts_summary_travel_trends.pdf.

[18] Michael Manville, Brian D. Taylor, and Evelyn Blumenberg, *Falling Transit Ridership: California and Southern California*, UCLA Institute of Transportation Studies, January 2018, at http://www.scag.ca.gov/Documents/ITS_SCAG_Transit_Ridership.pdf.

[19] Jeffrey M. Jones, "U.S. Remote Workdays Have Doubled During Pandemic," *Gallup*, August 31, 2020, at https://news.gallup.com/poll/318173/remote-workdays-doubled-during-pandemic.aspx.

greater demand.[20] Better service speed and reliability, often measured by schedule adherence, is associated with greater ridership.[21] Although access to transit—such as distance to a transit stop, hours of service, and service frequency (the time between trains or buses)—is associated with transit usage, some efforts to improve usage have found the best way to attract riders is to reduce travel times by increasing service frequencies rather than by improving access to stations and stops.[22] Fares are another important supply factor. Higher-income residents typically weigh the fare against the cost of other travel options, particularly driving, whereas lower-income residents might not travel if the fare is too high or might choose a slower but cheaper option, such as a bus instead of a train.

Evidence of the effect of public transportation service supply variables, such as service capacity and fares, on ridership prior to the pandemic is mixed. Nationally, the amount of transit service supplied, as measured in terms of the total mileage traveled by transit vehicles adjusted for their passenger-carrying capacity, has increased over time. Between 2014 and 2019, vehicle miles grew by 5% for buses and by 7% for rail.[23] These increases appear to have contributed to ridership gains when other factors are held constant. Bus route restructuring, undertaken by transit systems in Seattle, Houston, and elsewhere, has had minor positive effects on ridership.[24] Major rail maintenance events, when service is curtailed or halted altogether, have discouraged riders in some places, such as Washington, DC, but have had little effect on ridership nationally.[25]

Public transportation fares per unlinked trip, particularly rail fares, have generally risen faster than inflation in recent years (**Table 1**). Although the negative effect on ridership of these fare increases is widespread, the effects appear to be particularly severe in large rail systems and small bus systems.[26]

Economics, Population, and Urban Geography

Some factors that may or may not support transit ridership are largely outside the control of transit agencies, including economic and population growth and decline, and the distribution of businesses and people across regions. It is well established that economic activity leads to more travel as employment and income grow. Therefore, the prolonged economic expansion from the end of the deep recession in June 2009 to the economic disruptions associated with COVID-19

[20] Bhuiyan Alam, Hilary Nixon, and Qiong Zhang, *Investigating the Determining Factors for Transit Travel Demand by Bus Mode in U.S. Metropolitan Statistical Areas*, San Jose State University, Mineta Transportation Institute, Report 12-30, May 2015, at http://transweb.sjsu.edu/PDFs/research/1101-transit-bus-demand-factors-in-US-metro-areas.pdf.

[21] Ibid.; and Ian Thistle and Alissa Zimmer, *Location, Location, Location: A Neighborhood-Level Analysis of Changes in MBTA Ridership*, Massachusetts Bay Transportation Authority, Office of Performance Management and Innovation, 2019, at https://massdot.box.com/v/busridershipreport.

[22] Tom Reinhold, "More Passengers and Reduced Costs—The Optimization of the Berlin Public Transport Network," *Journal of Public Transportation*, vol. 11, no. 3 (2008), pp. 57-76, at http://www.nctr.usf.edu/jpt/pdf/JPT11-3Reinhold.pdf; and TransitCenter, *Who's On Board 2016*, at http://transitcenter.org/wp-content/uploads/2016/07/TransitCenter-WOB-2016.pdf.

[23] Capacity-adjusted vehicle miles calculation by CRS based on APTA, *2021 Public Transportation Fact Book, Appendix A*, Table 11; and U.S. Department of Transportation (DOT), *Status of the Nation's Highways, Bridges, and Transit Conditions and Performance Report*, 24th ed., Exhibit 4-32, 2021.

[24] Angie Schmitt, "Transit Ridership Falling Everywhere—But Not in Cities With Redesigned Bus Networks," *Streetsblog USA*, February 24, 2017, at http://usa.streetsblog.org/2017/02/24/transit-ridership-falling-everywhere-but-not-in-cities-with-redesigned-bus-networks; and TransitCenter, "Seattle: America's Next Top Transit City," at http://transitcenter.org/2017/01/03/seattle-americas-next-top-transit-city/.

[25] "Chapter 3: Multicity Evaluation," in TRB, *Recent Decline*, 2022.

[26] Ibid.

might have been expected to lead to higher transit ridership. However, research has shown that many individuals consider transit to be inferior to driving.[27] Consequently, the *share* of travel taken by transit decreases as household incomes increase, unemployment falls, and the cost of buying and operating a car becomes more manageable. On balance, it appears that the decline in transit's share of trips more than offset overall urban travel growth, leading to a drop in ridership during periods of economic growth.

Table 1. Public Transportation Fares, 2009 and 2019

Average Price per Unlinked Trip (inflation-adjusted 2021 dollars)

Transit Mode	2009	2019	% change
Bus	$1.13	$1.24	9.8
Commuter rail	$5.84	$6.94	18.7
Subway	$1.36	$1.58	16.3
Light rail and streetcar	$1.05	$1.20	15.0

Sources: APTA, *2021 Public Transportation Fact Book Appendix A*, Table 93, at https://www.apta.com/research-technical-resources/transit-statistics/public-transportation-fact-book/; and Bureau of Economic Analysis, "Implicit Price Deflators for Gross Domestic Product" at https://apps.bea.gov/iTable/index_nipa.cfm.

High residential and employment density are generally associated with higher transit ridership. Consequently, the long-term growth of low-density suburban and exurban areas has been a major impediment to gaining transit riders. Some communities, encouraged by federal policy, have therefore promoted transit-oriented development as a way to support transit ridership.[28] However, urban density changes slowly and is not likely to reverse the recent decline of transit ridership in the near term.[29] In addition, the relationship between density and transit use or the longer-term increase in transit ridership is complicated by other related variables, such as household income growth, vehicle availability, and free parking.

Overall, the 2010s was a decade of growth in metropolitan areas, particularly major metropolitan areas (i.e., those with 1 million people or more). Population in major metropolitan areas grew nearly 10% between 2010 and 2020, whereas small metropolitan areas grew 7% and nonmetropolitan areas declined slightly. Within major metropolitan areas, central cities grew faster than the suburbs in the early part of the decade, but "in most metro areas, suburban growth began to re-emerge as the economy picked up in the latter half of the 2010s."[30] Some cities with

[27] Brian D. Taylor and Camille N.Y. Fink, *The Factors Influencing Transit Ridership: A Review and Analysis of the Ridership Literature*, UCLA Department of Urban Planning, Working Paper, 2003; and Jose Gomez-Ibanez, "Big-City Transit, Ridership, Deficits, and Politics," *Journal of the American Planning Association*, vol. 62, no. 1 (1996), pp. 30-50.

[28] FTA, "Transit-Oriented Development," at https://www.transit.dot.gov/TOD.

[29] For example, after the Washington Metropolitan Area Transit Authority's (WMATA's) Navy Yard-Ballpark Metro station opened in December 1991, the population of Census Tract 72, which encompasses the area, declined, in part due to demolition of low-income housing in preparation for future development. By 2010, the tract's population was 33% above the 1990 level. More than two decades after the station opened, growth accelerated, such that in 2020, tracts 72.01, 72.02, and 72.03, which replaced the previous Tract 72, had a combined population of 11,072, more than five times the 1990 level. See "Census Tract 72, Navy Yard, Washington, D.C.," at https://storymaps.arcgis.com/stories/b6843312f4c145efbef65a8942fb987b; and District of Columbia Office of Planning, "2020 Census Population by Census Tract," at https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/Map%202%20-%202020%20Census%20Population%20by%20Census%20Tract%20with%20Ward%20Table.pdf.

[30] William H. Frey, *A 2020 Census Portrait of America's Largest Metro Areas: Population Growth, Diversity, Segregation, and Youth*, Brookings Institution, April 21, 2022.

major transit systems, such as New York, NY, and San Francisco, CA, lost population before the pandemic. Many with populations that continued to grow throughout the decade were cities in the South and West, such as Jacksonville, FL, and Las Vegas, NV, where public transportation is traditionally less important.[31]

Population characteristics, such as race and ethnicity, age, and immigrant status, also have been examined as factors affecting transit ridership. Of these factors, immigration trends seem to have received the most attention recently.[32] Recent immigrants typically travel much more by transit than native-born residents, but this difference declines the longer an immigrant lives in the country. This longevity effect has been posited as a reason for the transit ridership decline in Los Angeles and may also apply nationwide.[33] Nationally, net international migration to the United States between 2010 and 2021 peaked in 2016 and then rapidly declined.[34] These changes may be associated with declining use of public transportation.

Ridership Since COVID-19

Nationally, public transportation ridership in 2020 and 2021 was less than half of what it was before the pandemic—about 4.7 billion and 4.9 billion trips, respectively, compared with about 10.0 billion trips in 2019. Subway and commuter rail ridership declined more than bus ridership, particularly early in the pandemic. Patronage of all three public transportation modes has recovered to some extent, but in the second quarter of 2022, ridership was far lower than in the final pre-pandemic quarter at the end of 2019: commuter rail ridership has been slowest to recover at 52%; bus ridership the fastest at 66%; and subway ridership at 59% (**Figure 4**).

The unprecedented drop in public transportation ridership during the pandemic resulted from the closure of offices and other employment locations, an increase in telecommuting, and the curtailment of many other economic and social activities. Subway and commuter rail lines tend to be oriented to the downtowns of large metropolitan areas, thus office closures had a larger effect on subway and commuter rail ridership than on bus ridership. Buses tend to serve more diffuse and diverse destinations and trip purposes. The effect of greater telecommuting and other changes in activities on ridership may have been compounded by population losses in some of America's largest cities, such as New York, Boston, and San Francisco, between July 2020 and July 2021.[35]

[31] William H. Frey, "Big Cities Saw Historic Population Losses While Suburban Growth Declined During the Pandemic," Brookings Institution, July 11, 2022, at https://www.brookings.edu/research/big-cities-saw-historic-population-losses-while-suburban-growth-declined-during-the-pandemic/.

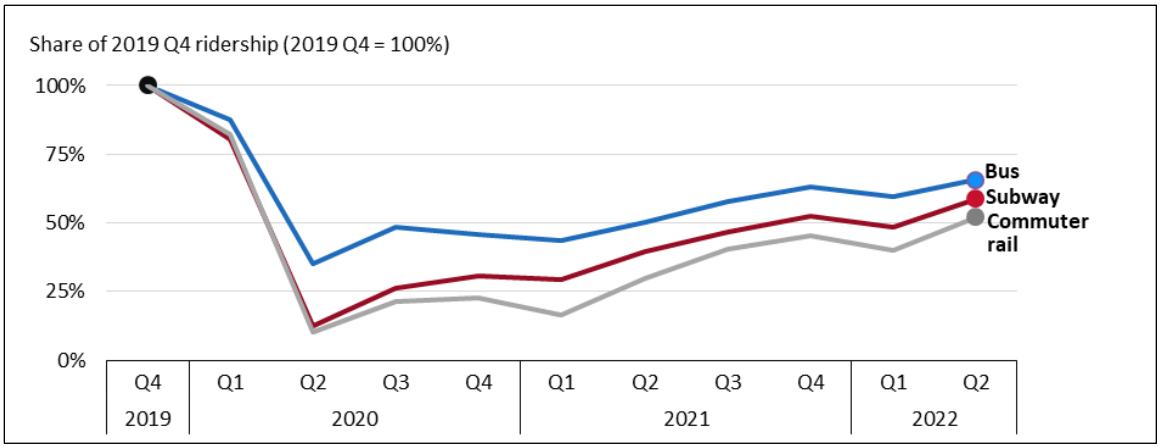
[32] Brian D. Taylor et al., "Nature and/or Nurture? Analyzing the Determinants of Transit Ridership Across US Urbanized Areas," *Transportation Research Part A*, vol. 43 (2009), pp. 60-77.

[33] Jason Schachter, Pete Borsella, and Anthony Knapp, "Net International Migration at Lowest Levels in Decades," U.S. Census Bureau, December 21, 2021, at https://www.census.gov/library/stories/2021/12/net-international-migration-at-lowest-levels-in-decades.html; and Laura J. Nelson, "The Metro Can Take You Farther than Ever. Here's Why Ridership Dropped—Again," *Los Angeles Times*, February 13, 2017, at http://www.latimes.com/local/lanow/la-me-ln-2016-metro-ridership-decline-20170209-story.html.

[34] Jeffrey S. Passel and D'Vera Cohn, "As Mexican Share Declined, U.S. Unauthorized Immigrant Population Fell in 2015 Below Recession Level," Pew Research Center, April 25, 2017, at http://www.pewresearch.org/fact-tank/2017/04/25/as-mexican-share-declined-u-s-unauthorized-immigrant-population-fell-in-2015-below-recession-level/.

[35] Amel Toukabri and Crystal Delbe, "New Data Reveal Most Populous Cities Experienced Some of the Largest Decreases," U.S. Census Bureau, May 26, 2022, at https://www.census.gov/library/stories/2022/05/population-shifts-in-cities-and-towns-one-year-into-pandemic.html.

Figure 4. Quarterly Public Transportation Ridership by Mode



Source: APTA, *Public Transportation Ridership Report.*

The Future of Public Transportation Ridership

It is unclear if pandemic-related changes will persist. Many activities outside of the home, such as restaurant dining, are at pre-pandemic levels.[36] There is a widespread sentiment, however, that commuting behavior is unlikely to revert to pre-pandemic trends. One study, for example, estimates that 20% of full workdays will be done from home post-pandemic, compared with 5% pre-pandemic.[37] It is unclear whether population losses in cities with major transit systems reflect temporary moves, such as young professionals moving to their parents' homes, or a longer-term trend linked to new work patterns.

There are no national projections of transit ridership. However, some of the country's largest transit operators, including New York's Metropolitan Transportation Authority (MTA), the Washington Metropolitan Area Transit Authority (WMATA), and the Bay Area Rapid Transit (BART) in San Francisco, have forecast their own ridership for budgeting purposes. These forecasts generally predict that ridership and fare revenue will not return to pre-COVID-19 levels for several years, which would cause relatively large operating budget deficits (**Table 2**).[38]

Based in part on these ridership estimates, MTA estimates that federal COVID-19 relief would be exhausted in 2024. MTA estimated its fiscal deficit in 2025 to be about $2.5 billion but noted that its actions in the near term could affect this amount. However, MTA also noted that "new dedicated funding is necessary to avoid large fare increases, service cuts and layoffs."[39] WMATA estimated that its budget deficit would be $185 million for FY2024.[40] BART also estimated that

[36] Opportunity Insights, "Time Outside Home," at https://www.tracktherecovery.org/; and Emily Peck, "More People are Dining Out Now Than Before the Pandemic," *Axios*, September 9, 2022, at https://www.axios.com/2022/09/08/restaurant-reservations-pandemic-covid.

[37] Jose Maria Barrero, Nicholas Bloom, and Steven J. Davis, *Why Working from Home Will Stick*, National Bureau of Economic Research, Working Paper no. 28731, April 2021, at https://www.nber.org/papers/w28731.

[38] Philip Plotch, "Transit Ridership: Not Expected to Return to Pre-Pandemic Levels This Decade," *Eno Transportation Weekly*, July 1, 2022, at https://www.enotrans.org/article/transit-ridership-not-expected-to-return-to-pre-pandemic-levels-this-decade/.

[39] *Wall Street Journal*, "New York Mass Transit Would Need Until 2035 to Hit Prepandemic Levels" July 26, 2022, at https://www.wsj.com/articles/new-york-mass-transit-ridership-may-not-rebound-anytime-soon-11658845011?page=1.

[40] WMATA, Finance and Capital Committee, "FY2024 Budget Outlook," September 22, 2022, at

its federal COVID-19 relief funding would be exhausted in its FY2024 and that the operating deficit would be about $195 million in its FY2025 beginning July 2024.[41]

Table 2. Ridership Forecasts by Selected Major Public Transportation Agencies

Agency	Ridership Forecast Compared with Pre-COVID-19
New York Metropolitan Transportation Authority	CY2023: 69% CY2024: 74% CY2025: 77% CY2026: 79%
Washington Metropolitan Area Transit Authority	End of FY2023: 53% End of FY2024: 65%-70% End of FY2025: 75%
Bay Area Rapid Transit	End of FY2023: 52% End of FY2024: 59%

Sources: Metropolitan Transportation Authority, "MTA 2023 Preliminary Budget, July Financial Plan 2023-2026, Volume 1," July 2022, p. 1-3, at https://new.mta.info/document/91776; Washington Metropolitan Area Transit Authority, Finance and Capital Committee, "FY2024 Budget Outlook," September 22, 2022, at https://www.wmata.com/about/calendar/events/Finance-and-Capital-Committee-September-22-2022.cfm; and Bay Area Rapid Transit, *FY23 & FY24 Adopted Budget Manual*, September 2022, p. 19, at https://www.bart.gov/sites/default/files/docs/FY23%20FY24%20Adopted%20Budget%20Manual_FINAL.pdf.

Note: CY = calendar year.

In the medium term, approximately 10-20 years, urban population growth, the relative cost of driving, and the public commitment to supplying transit are likely to determine transit demand. Ridership is likely to vary as gasoline prices rise and fall and as other factors make driving more or less attractive, including the extent, duration, and intensity of highway congestion; the price of parking; and the implementation of fuel taxes, tolls, and mileage-based user fees. Some of the most important factors are likely to be whether providers can make public transportation more attractive in terms of fares, speed, reliability, and coverage. Public transportation providers' ability to achieve such service improvements will depend, in part, on how they utilize federal funding.

Part of the calculus for funding and service improvements is likely to be linked to attempts to decarbonize transportation. The U.S. Environmental Protection Agency estimates that since 2017, transportation has emitted more greenhouse gases (GHG) than any other sector of the U.S. economy.[42] GHG emissions from the transportation sector come mainly from passenger cars and light trucks. Public transportation might contribute to a reduction of GHG emissions if trips made in personal vehicles, particularly single-occupant trips, were made by train or bus instead.

Public transportation efficiency in terms of GHG emissions depends, in part, on whether transit vehicles are heavily loaded or mostly empty. GHG emissions from public transportation are also dependent on the sources of fuel used to power trains and buses, including the way in which

https://www.wmata.com/about/calendar/events/Finance-and-Capital-Committee-September-22-2022.cfm.

[41] Bay Area Rapid Transit, "Fiscal Outlook," Board Workshop, February 10, 2022, at https://s3.documentcloud.org/documents/21199224/bart-fiscal-outlook-february-2022-presentation.pdf.

[42] CRS In Focus IF11921, *Surface Transportation and Climate Change: Provisions in the Infrastructure Investment and Jobs Act (P.L. 117-58)*, by William J. Mallett.

electricity is generated.[43] The IIJA provided about $1.1 billion per year specifically for purchasing low- and no-emission vehicles and related infrastructure, a large increase over the $55 million per year provided in the previous surface transportation act.

Service improvements can be made by changes that are not necessarily dependent on funding increases. Some transit agencies have recently sought to reconfigure antiquated bus routes to better serve current demand, despite local political pressure to protect the status quo.[44] In some instances, this involves eliminating lightly used bus routes while increasing frequency on busier routes. Reconfiguration can also involve making bus travel faster by having buses make fewer stops on less circuitous routes, designing streets with dedicated bus lanes and priority for buses at traffic signals, and using technology to enable riders to pay their fares before boarding.[45]

According to the Census Bureau, the U.S. resident population is expected to increase by about 22 million from 2020 to 2030 (a 7% increase) and about 41 million from 2020 to 2040 (a 12% increase).[46] Southern and western metropolitan areas with low population densities and relatively low transit ridership relative to their populations, such as Atlanta, Dallas, Houston, and Phoenix, are likely to move up the rankings of the largest population centers over the coming years. The fastest growing urban areas are likely to be small and medium-sized places in the South and West where transit use is modest.[47] There is some evidence that in larger metropolitan areas, major employers are seeking out locations that are well served by transit, but in most parts of the country, new jobs are widely dispersed across suburbs with low employment density. The combination of relatively low-density residential growth and low-density employment growth may limit the extent to which population growth brings higher transit ridership.

Although ridesourcing seems likely to depress overall transit demand, that outcome is not a certainty. For much of the last decade, ridesourcing companies and their investors appeared to be subsidizing their services. One estimate suggested that the amount riders paid from 2012 through the first half of 2016 may have been 60% of the cost of providing the service.[48] An end to investor subsidization, in addition to other factors, may be leading to higher prices.[49] These other factors

[43] FTA, *Greenhouse Gas Emissions from Transit Projects: Programmatic Assessment*, Report 0097, January 2017, at https://www.transit.dot.gov/research-innovation/greenhouse-gas-emissions-transit-projects-programmatic-assessment-report-0097.

[44] Daniel Vock, "Buses, Yes Buses, Are 'the Hottest Trend in Transit,'" *Governing*, September 18, 2017, at http://www.governing.com/topics/transportation-infrastructure/gov-big-city-bus-systems.html.

[45] TransitCenter, *Turnaround: Fixing New York City's Buses*, 2016, at http://transitcenter.org/publications/turnaround-fixing-new-york-citys-buses/#download-the-report.

[46] U.S. Census Bureau, "2017 National Population Projections Tables: Main Series," Table 1, at https://www.census.gov/data/tables/2017/demo/popproj/2017-summary-tables.html.

[47] The United States Conference of Mayors, *U.S. Metro Economies: Past and Future Employment Levels*, May 2017, at http://www.usmayors.org/wp-content/uploads/2017/05/Metro-Economies-Past-and-Future-Employment-12.pdf; and Wendell Cox, "UN Projects 2030 U.S. Urban Area Population," Figure 3, New Geography, at http://www.newgeography.com/content/004464-un-projects-2030-us-urban-area-populations.

[48] Riley McDermid, "Uber is Losing $2 Billion a Year, New Report Says, With Passengers Paying for Only 41% of Each Ride," *San Francisco Business Times*, December 2, 2016, at https://www.bizjournals.com/sanfrancisco/news/2016/12/02/uber-losses.html; and Jarrett Walker, "Sounding the Alarm about Uber's Impacts on Transit, and on Cities," Human Transit Blog, December 15, 2016, at http://humantransit.org/2016/12/sounding-the-alarm-about-ubers-impacts-on-transit.html. Some of the reported costs may involve one-time expenditures. See also Heather Somerville, "True Price of an Uber Ride in Question as Investors Assess Firm's Value," *Reuters*, August 23, 2017, at https://www.reuters.com/article/us-uber-profitability/true-price-of-an-uber-ride-in-question-as-investors-assess-firms-value-idUSKCN1B3103.

[49] Riley de Leon, "Uber's Money-losing Ride May Be Nearing An End, But the Road To a Long-term Win Remains Uncertain," *CNBC*, July 7, 2022, at https://www.cnbc.com/2022/07/07/is-ubers-money-losing-ride-finally-nearing-an-

include disruptions to passenger demand and driver supply from COVID-19, relatively high fuel prices, and challenges to classifying drivers as independent contractors instead of as employees.[50] More costly trips would likely make ridesourcing a less attractive alternative to public transportation. Although some transit agencies have begun cooperating with ridesourcing companies to provide the first mile/last mile of a transit trip,[51] decisions about transit service supply made on the assumption that these types of service will always be available at a relatively cheap price might cause problems in the future.

The introduction of driverless vehicle technology is perhaps the biggest unknown but potentially most disruptive factor for future public transportation ridership. Estimates of when fully autonomous vehicles will be in use in urban environments vary from a few years to a few decades.[52] Widespread deployment of autonomous vehicles and driverless taxis could lead to a greater number of vehicle trips and a decline in traditional transit ridership. It is possible that their widespread use would increase traffic congestion in the largest cities, thereby creating a need for some form of shared ride service. Traditional transit buses may be able to adopt the same driverless technology to cut costs, but in many places, this is likely to be on-demand service provided by small buses, vans, and other types of "microtransit." On-demand microtransit pilot projects with drivers are being run by transit agencies in Los Angeles; Austin, TX; Kansas City, MO; Santa Clara County, CA; and the Alameda-Contra Costa Transit District near San Francisco.

Because road space is severely limited in the largest and most dense cities, rail transit service will likely remain important in those places, and autonomous vehicles may provide a relatively cheap and easy way to access rail service. In many situations, however, autonomous vehicles would significantly reduce the costs of traveling by automobile, shifting demand to road from rail.[53] It is possible that travel time would become less of a concern to motorists, as fully autonomous vehicles may allow riders to engage in other activities while traveling, such as working, eating, and sleeping. Consequently, autonomous vehicles could make it more attractive, at least in transportation terms, to live in low-density places that are distant from other activity centers. Transit, particularly rail transit, is unlikely to thrive in such places.

Implications for Federal Policy

The federal government is involved in providing public transportation in three main ways. First, prior to the pandemic, it provided about 15%, on average, of the capital and operating funds spent

end.html; and Henry Grabar, "The Decade of Cheap Rides Is Over," *Slate*, May 18, 2022, at https://slate.com/business/2022/05/uber-subsidy-lyft-cheap-rides.html.

[50] Dain Evans, "Uber and Lyft Rides are More Expensive than Ever Because of a Driver Shortage," *CNBC*, August 31, 2021, at https://www.cnbc.com/2021/08/31/why-uber-and-lyft-rides-are-more-expensive-than-ever.html.

[51] "Some Cities Are Subsidizing Uber Rides to Cut Public Transportation Costs," *Business Insider*, December 15, 2016, at http://www.businessinsider.com/some-cities-are-subsidizing-uber-rides-to-cut-public-transportation-costs-2016-12; Henry Grabar, "They Can Just Take an Uber: Cities Across the Country are Cutting Public Transportation Because They Think Ride-hailing Services Will Fill the Gap. They'll Regret It," *Slate*, December 14, 2016, at http://www.slate.com/articles/business/metropolis/2016/12/cities_are_cutting_transportation_service_because_they_think_uber_will_fill.html.

[52] CRS Report R44940, *Issues in Autonomous Vehicle Deployment*, by Bill Canis; and Todd Litman, *Autonomous Vehicle Implementation Predictions: Implications for Transport Planning*, Victoria Transport Policy Institute, September 8, 2017, p. 13, at http://www.vtpi.org/avip.pdf.

[53] Joel Hazan et al., "Will Autonomous Vehicles Derail Trains?," Boston Consulting Group, September 30, 2016, at https://www.bcg.com/publications/2016/transportation-travel-tourism-automotive-will-autonomous-vehicles-derail-trains.aspx.

by public transportation agencies throughout the country. Fares and other revenues made up about 24%, local funding about 38%, and state funding about 23%. The share of fares and other revenues has declined over the past 20 years from about a third of total funds to about a quarter.[54] Second, through the CIG program (also known as the New Starts program), the federal government plays a significant role in building new transit rail and bus rapid transit systems and in extending and expanding existing systems.[55] Third, the federal government provides funding in emergencies that are beyond the capabilities of state and local government, such as natural disasters and pandemics. Public transportation agency budgets were supported beyond regular federal authorizations and appropriations by supplemental appropriations in FY2020 and FY2021 totaling $69.5 billion. The future of public transportation ridership has implications for general funding, CIG program funding, and emergency funding.

Federal Public Transportation Funding

Post-COVID-19 Emergency Funding

According to some limited information, several major transit operators estimate that without new sources of federal, state, and local funding, or a combination of these, they would face large and sustained operating deficits. If new funding is not forthcoming, it is likely that agencies would have to institute some combination of fare increases, service cuts, and layoffs. Reduced and possibly more expensive service could lead to falling ridership, all else being equal, requiring further fare hikes and service cuts.

Small bus-oriented systems may have seen less change than the large systems that operate rail lines. Moreover, small bus-oriented systems received proportionally more emergency COVID-19 relief funding than larger systems, which may carry them further into the future.

One option would be for Congress to provide additional ongoing operating support. Issues regarding the timing of this support, the annual amount, and its distribution would have to be resolved; anecdotally, some major transit systems have indicated they would need to begin making major operational changes in calendar year 2023 unless additional federal support is forthcoming.

Operations Funding

Federal operating support has been an ongoing issue since the creation of the federal public transportation program in the 1960s. Currently, although small transit agencies frequently receive federal operating assistance, most transit operators in urbanized areas with populations above 200,000 or with more than 100 buses can use federal funds only for capital expenses or maintenance. Greater federal support for transit operations could increase the quantity of transit service offered by local transit agencies, potentially expanding ridership.[56]

There are three main issues with federal operating support: its effects on service, productivity, and asset condition. Research on the rapid expansion of operating support in the 1970s generally concluded that it allowed transit agencies to maintain a higher level of transit service than would

[54] APTA, *2021 Public Transportation Fact Book Appendix A*, Table 95.

[55] CRS Report R42706, *Federal Public Transportation Program: In Brief*, by William J. Mallett.

[56] Yonah Freemark, "Expanding Federal Transit Operations Funding Could Help Achieve Equitable Access to Public Transportation," Urban Institute, *Urban Wire*, August 26, 2021, at https://www.urban.org/urban-wire/expanding-federal-transit-operations-funding-could-help-achieve-equitable-access-public-transportation.

have prevailed without it, but such support also caused productivity to decline. Much of the decline was related to the increased supply-side cost of providing service, particularly in wages and fringe benefits.[57] Some productivity decline comes from providing service on routes with less demand, a problem that a focus on incentive funding might mitigate.

The effects of operating support on asset condition are less clear. It is possible that transit systems able to use federal funding for operating expenses may neglect bus and rail replacement. However, existing flexibility to use capital funds for maintenance may help agencies to preserve equipment and facilities.

Incentive Funding

Less federal funding would likely lead to less total spending on public transportation, at least for a time as state and local governments adjust, and thus would likely lead to less service and lower ridership. Conversely, more federal outlays in the short term would likely stimulate ridership, unless they result in state and local governments cutting back on their own spending for transit purposes.

Currently, more than three-quarters of federal public transportation funding is distributed by a set of formulas that are tenuously related to ridership. An alternative approach might tie federal funding to changes in ridership, such as the number of revenue passengers, or to productivity, such as the average number of passengers per bus-mile. Such an approach would provide transit agencies an incentive to improve their performance while allowing them to innovate by redesigning their bus networks, introducing technology to speed up boarding, or adjusting service levels. A possible downside is that encouraging transit agencies to focus exclusively on ridership may discourage them from serving isolated areas with transit-dependent populations.

Bus Funding Versus Rail Funding

Uncertainties about urban growth, commuting behavior, and the potential introduction of autonomous vehicles make it increasingly difficult to forecast the ridership of rail systems designed to operate for many decades. It is possible that major cities may remain attractive for work and recreation, and that telecommuting may plateau or decline. Autonomous vehicles, if they become viable, could be widely used to shuttle passengers to and from rail transit stations in areas with low residential or employment density, potentially increasing demand for rail transit. These factors also could reduce the demand for rail transit by making it more attractive for people to live in distant suburbs, small cities, and rural areas; to travel less often for work and recreation; and, if autonomous vehicles become available, to travel considerable distances by car and without parking concerns.

These uncertainties pose challenges for transit systems considering long-term capital investments and for the federal programs that fund such investments. The main federal program supporting capital expenditures by transit agencies, the CIG program, was originally developed to fund construction of new rail transit and commuter rail projects; in recent years, a growing proportion of its outlays have gone for bus rapid transit projects. A key policy issue is whether future federal funding should focus more on buses than rail. Buses last about 10 years and can be redeployed as

[57] Douglass B. Lee, *Evaluation of Federal Transit Operating Subsidies, Staff Study* (Cambridge, MA: Department of Transportation, Transportation Systems Center, September 1987); and John Pucher, Anders Markstedt, and Ira Hirshman, "Impacts of Subsidies on the Costs of Urban Public Transport," *Journal of Transport Economics and Policy*, vol. 17, no. 2 (May 1983), pp. 155-176.

demand changes, whereas rail systems are designed to last 30 years or more and are inflexible but are far more efficient than buses at transporting large numbers of passengers in dense corridors.

Shared-Ride Services Funding

If demand for traditional transit service were to decline, there may be increased demand for other types of shared-ride services.[58] In that case, there may be pressure to shift public subsidies from traditional transit services, such as buses, to on-demand vehicle services, whether operated publicly or privately, including, if available, autonomous vehicles. Doing so could mitigate the congestion and emissions attributable to individually provided on-demand service and individually owned autonomous vehicles. It might be possible to subsidize more generally shared ride services for particular groups with limited mobility, such as disabled, elderly, and low-income populations, reducing the need for distinct transit services, such as paratransit, which tend to be expensive to provide.[59]

While federal funding of on-demand shared-ride services provided publicly is not necessarily prohibited, it could raise some issues, including competition with private providers, access by disadvantaged groups, and the provision of operating support. Federal support of privately operated shared-mobility services is currently permissible in certain limited circumstances.[60] One possibility would be to broaden the circumstances where federal funds can be used to support these types of services. Another longer-term possibility would be to allow tax-subsidized commuter benefits to cover on-demand shared autonomous vehicle services.[61]

Capital Investment Grant Program

The CIG program provides funding to support the construction of new fixed-guideway transit systems and add to existing systems. Funding is also permitted for investments in existing fixed-guideway systems that increase the capacity by 10% of a corridor that is at or will be at capacity in 10 years. Fixed-guideway services include transit rail, bus rapid transit, and ferry systems. The IIJA appropriated $1.6 billion per year from the general fund and authorized another $3.0 billion per year from the general fund, subject to appropriation.

The CIG program has been considered controversial at times. FTA contends the program "is needed because it allows transit agencies to undertake major capital projects that would otherwise be infeasible for local governments and transit agencies to finance alone."[62] Supporters insist that growing demand for CIG funds is evidence of its success.[63] Critics have contended that CIG

[58] APTA, *Mobility Innovation: The Case for Federal Investment and Support*, 2021, at https://www.apta.com/wp-content/uploads/APTA-Mobility-Innovation-Case-Studies-Final-Report-07.28.21.pdf.

[59] Johanna Zmud et al., *Advancing Automated and Connected Vehicles: Policy and Planning Strategies for State and Local Transportation Agencies*, TRB, NCHRP Research Report 845, 2017, p. 41, at http://www.trb.org/Main/Blurbs/176418.aspx (Zmud et al., *Advancing Automated*).

[60] FTA, "Shared Mobility FAQs: Eligibility Under FTA Grant Programs," at https://www.transit.dot.gov/regulations-and-guidance/shared-mobility-faqs-eligibility-under-fta-grant-programs.

[61] Zmud et al., *Advancing Automated*, pp. 45-49.

[62] FTA, *Budget Estimates FY2017*, CIG-10, at https://www.transportation.gov/sites/dot.gov/files/docs/FTA-FY-2017-CJ.pdf.

[63] APTA, *APTA Recommendations on Federal Public Transportation Authorizing Law*, December 2013, at http://www.apta.com/gap/legissues/authorization/Documents/APTA%20Authorizing%20Law%20Recommendations_FINAL_adopted%206Dec2013.pdf.

funding encourages communities to build expensive fixed-guideway infrastructure rather than invest lesser sums in improving bus service.[64]

No comprehensive benefit-cost studies of completed CIG projects have been conducted to evaluate the CIG program as federal policy. Research has shown that some rail transit lines built at great cost with federal support have low ridership, but there are significant differences in benefit/cost ratios among systems. According to one study, two of the systems with the largest net benefits include the subway systems in San Francisco and New York City, while the rail systems in Charlotte, NC, Buffalo, NY, and San Jose, CA, have some of the largest net costs.[65]

If the full promise of autonomous vehicles is realized, the benefits of rail in all but the largest and most dense cities are likely to decline dramatically. In this scenario, one policy option would be to eliminate the CIG program and redirect the funding through the formula programs, possibly using formulas that have been changed to encourage ridership. Another option would be to redirect CIG funding from building rail and perhaps bus rapid transit in relatively small and dispersed urban areas to the large and dense cities where rail transit currently carries large numbers of riders, such as New York, Chicago, and Washington, DC. With new funds to refurbish old infrastructure and add new capacity in congested areas, it might be possible to increase national transit ridership in the short to medium term.[66]

Raising User Fees on Automobiles

The costs of car ownership and use are low in the United States compared with most other highly developed countries, a contributing factor to the comparatively low transit use in the United States. For example, according to the Federal Highway Administration, the average tax per gallon on gasoline in this country was $0.48 in December 2020, including federal and state taxes, compared with $2.59 in Japan, $3.85 in Germany, and $4.57 in Italy.[67]

Highway user fees, including fuels tax, tolls, and vehicle registration fees, cover about 50% of the cost of highway infrastructure in 2020, with the other 50% coming from general funds, property taxes, and bond issuance, among other things.[68] As a share of highway expenditures, user fees have generally declined over the past decade.[69] Additionally, many economists note that there are external costs of driving, such as congestion, air pollution, and publicly borne costs of crashes.[70]

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[64] Nathaniel Baum-Snow and Matthew E. Kahn, "Effects of Urban Rail Transit Expansions: Evidence from Sixteen Cities, 1970–2000," Brookings Institution, *Brookings-Wharton Papers on Urban Affairs*, 2005, pp. 147-197, at https://muse.jhu.edu/article/192572/pdf.

[65] Robert Cervero and Erick Guerra, "To T or Not to T: A Ballpark Assessment of the Costs and Benefits of Urban Rail Transportation," *Public Works Management & Policy*, vol. 16, no. 2 (2011), pp. 111-128. For a more critical assessment, see Peter Gordon and Paige Elise Kolesar, "A Note on Rail Transit Cost-Benefit Analysis: Do Nonuser Benefits Make a Difference?," *Public Works Management & Policy*, vol. 16, no. 2 (2011), pp. 100-110; and Lisa Schweitzer, "Benefit-Cost Analysis of Rail Projects: A Commentary," *Public Works Management & Policy*, vol. 16, no. 2 (2011), pp. 129-131.

[66] Aaron Renn, "Does America Need More Urban Rail Transit?," Manhattan Institute, May 3, 2017, at https://www.manhattan-institute.org/sites/default/files/IB-AR-0517.pdf.

[67] FHWA, *Highway Statistics 2020*, Table IN-1, at https://www.fhwa.dot.gov/policyinformation/statistics/2020/in1.cfm.

[68] This calculation includes highway user revenue diverted to nonhighway uses. FHWA, *Highway Statistics 2020*, Table HF-10, at https://www.fhwa.dot.gov/policyinformation/statistics/2020/hf10.cfm.

[69] DOT, *Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance Report to Congress*, 24th ed., Exhibit 2-6, 2021, at https://www.fhwa.dot.gov/policy/24cpr/pdf/Chapter2.pdf.

[70] Todd Litman, *Socially Optimal Transport Prices and Markets*, Victoria Transport Policy Institute, July 18, 2017, at http://www.vtpi.org/sotpm.pdf.

Raising day-to-day user fees on automobiles would make transit comparatively more attractive. Many fees, such as tolls and parking charges, are set at the state and local levels, but the federal government can influence those fees. For example, the federal tax code provides an income tax exclusion for employer-provided and employer-paid commuter parking. The federal tax code also provides an income tax exclusion for commuter transit benefits (26 U.S.C. §132(f)). Options at the federal level include ending or modifying the income tax exclusion for commuter parking, raising the federal fuels tax, implementing a mileage-based user charge at a level above today's fuels tax, and encouraging greater use of tolling, including congestion pricing.[71]

Some bills introduced in the 117th Congress that address these options include H.R. 8555, which would require employers that provide subsidized parking to offer employees the choice of an equivalent amount in cash; H.R. 1089, which would provide funding to deploy advanced transportation technologies, including electronic pricing, toll collection, and payment systems; and H.R. 2476, which would prohibit DOT from implementing a congestion pricing program until an economic impact analysis is completed and made available to the public.

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[71] CRS Report R44674, *Funding and Financing Highways and Public Transportation*, by Robert S. Kirk and William J. Mallett.