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Federal Investment in U.S. Legacy Transit Systems

There is broad consensus that one of the nation's top priorities should be to rebuild our crumbling infrastructure. The problem is especially dire with the aging public transit infrastructure in the nation's older, more densely populated cities. The American Society of Civil Engineers (ASCE) gave the U.S. public transit infrastructure a D grade.[1] The Department of Transportation reports that 29 percent of our transit infrastructure assets are in "marginal" or "poor" condition,[2] and the cost of replacing all assets that are past their useful life totals $86 billion.[3]

Our failing transit infrastructure places a direct cost on businesses and individuals, puts the United States at a competitive disadvantage compared with other countries and restricts the pace of economic growth. Public transit riders suffer from persistent travel delays due to overcrowding. In addition, breakdowns, derailments and fires have led to injuries and even deaths.[4] Many have been discouraged and turned away from public transit as a result, putting additional stress on already congested roads and highways.[5]

In mass transit systems located in densely populated, older metropolitan areas—often called "legacy systems"[6]—much of the infrastructure was built over a century ago. The estimated cost of needed investment adds up to tens of billions over the next decade.[7] These systems, facing serious challenges from outdated infrastructure and increasing ridership, are in urgent need of expansion. The systems have not kept pace with population changes or maintenance needs.

Expanding the legacy transit systems will generate enormous economic benefits—in the short run by creating jobs and raising demand, and in the long run when the project is completed, by providing essential services that boost productivity, improve job access and reduce congestion and pollution. Legacy transit expansion projects such as the Red and Purple Modernization Program in Chicago,[8] the Green Line Extension in Boston[9] and the new Second Avenue Subway line in New York City[10] are recent examples of investments with significant region-wide benefits.

Unfortunately, there are not enough expansion projects in these legacy transit systems to keep up with the rapid rise in demand and necessary maintenance. Policymakers continue to underinvest in older systems in part because they disagree on how to pay for infrastructure projects. Most conservative proposals to boost infrastructure investments focus primarily on increasing public-private partnerships (P3s).[11] Yet, P3s have not been a significant funding source for rail transit expansions in the U.S. due to challenges with implementation.[12]

Direct federal assistance is essential to getting many valuable projects off the ground. One federal grant program, the Capital Investment Grant (otherwise known as "New Starts") is especially important for legacy transit systems, where expansion projects often require a large amount of

upfront capital. Without federal commitment, states and local governments are often not able to move forward with expansion of legacy transit systems.

This report describes the myriad challenges faced by the nation's legacy transit systems and the need for federal grants like New Starts, using the Second Avenue Subway as a case study.

Infrastructure challenges in U.S. legacy transit systems

The transit legacy cities—New York, Boston, San Francisco, Washington D.C., Chicago, and Philadelphia—are home to a large share of the U.S. population and represent an out-sized share of our nation's total economic activity. The metropolitan areas surrounding these cities have combined populations of over 51 million, about 16 percent of the total U.S. population.[13] Together they produce almost $4 trillion of our national GDP, approximately 22 percent of the entire U.S. economy.[14] In addition, they are a significant source of federal revenue. With individual income tax alone, these metropolitan areas contributed over 26 percent of the total federal receipt in 2014.[15]

For cities with high population density and highly congested roads, well-functioning public transit systems can vastly improve the quality of life for their residents. Much of the infrastructure in transit legacy cities was designed and developed before the automobile, and the metropolitan areas that were built surrounding them are therefore more transit dependent compared with the rest of the country. The transit systems in these urban areas combined account for almost 63 percent of the passenger trips taken in all U.S. urban public transit systems in 2013.[16]

Legacy transit systems face substantial issues in terms of overcrowding, aging infrastructure and underfunding. Tremendous demand growth and aging infrastructure pose serious challenges to these transit systems.

Increased ridership and overcrowding create an urgent need for rail expansion

The transit systems in these legacy urban areas have experienced a significant increase in ridership over the past decade. With steady population growth and higher transit dependency, the number of public transit trips taken in these systems increased by 14.4 percent from 2005 to 2015, twice as large an increase as in all U.S. urban areas during that period.[17] The growth in ridership in heavy rail transit (i.e. subway or metro) is staggering—the six major transit authorities faced an almost 40 percent increase in heavy rail ridership over the past decade (see **Table 1**).[18]

Table 1. Heavy Rail Ridership in Annual Unlinked Passenger Trips (UPT), 2005 and 2015

	UPT in 2015	UPT in 2005	Change from 2005 to 2015
	(in millions)		
MTA New York City Transit	2,662	1,804	48%
Washington Metropolitan Area Transit Authority	270	259	4%
Chicago Transit Authority	242	187	29%
Massachusetts Bay Transportation Authority	175	142	23%
San Francisco Bay Area Rapid Transit District	135	99	36%
Southeastern Pennsylvania Transportation Authority	101	88	14%
Total	3,585	2,580	39%

Source: Federal Transit Administration National Transit Database

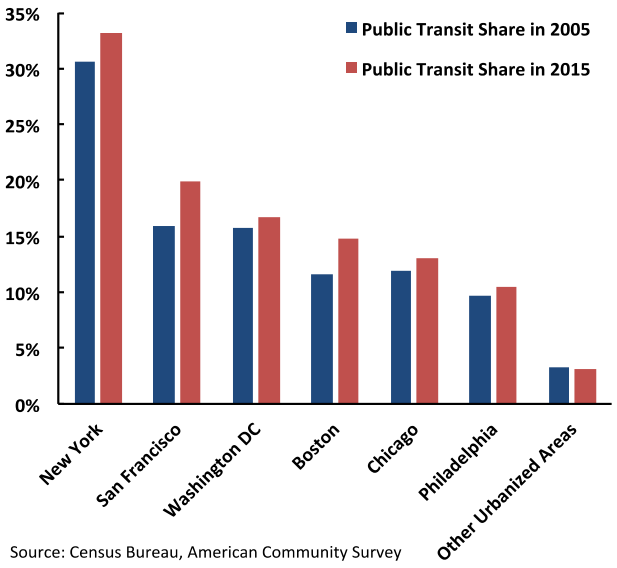
Public transit systems are vital to labor mobility and productivity in these urban areas. Because workers and workplaces are more geographically concentrated in these areas, the share of the population using public transit for work commuting is significantly higher. For example, 33 percent of New York urban area work commuters use public transit, compared with only 3 percent of work commuters in U.S. urban areas other than the six legacy cities.[19] These urban areas also saw a sizable growth in the share of work commuters using public transit over the past decade, while in other urban areas, that share actually moderately declined (see **Figure 1**).

Older mass transit systems, such as those in Chicago and New York, often have urgent needs for transit expansion as settlement patterns change and the population grows over time. With capacity built to serve much lower ridership, these transit systems face serious overcrowding and are prone to major service disruptions that affect a large share of commuters in their regions.[20]

These urban areas also suffer from severe traffic congestion—accounting for 22 of the nation's top 50 highway bottlenecks in 2014.[21] The high population density in these areas means that congestion cannot be reduced easily through new road construction, and severe road congestion also renders bus transit expansion less effective. This makes expansion of existing rail systems the prime candidate for increasing transportation capacity in these metro areas.

Figure 1. Share of Workers Using Public Transit as Principal Mode of Transportation

As a share of all workers 16 years old and over, by urbanized area



Source: Census Bureau, American Community Survey

Note: The principal mode of transportation is that which is used most often; for workers using multiple modes in a single trip, it is the mode used for the longest distance

High maintenance needs due to a large share of rail transit use and aging infrastructure

Rail transit makes up a larger share of transit usage in the legacy urban areas than in most other urban areas,[22] where the population is often more decentralized and bus rapid transits (BRTs) can be more cost effective.[23] More reliance on rail transit leads to much higher capital expenses for these legacy transit systems, since rails are much more costly to maintain. The legacy systems spend about 4.4 times more on capital expenses for their rail than buses; while the overall U.S. urban transit systems spend about 2.7 times more on rail than buses.[24]

Maintenance needs are also higher in legacy systems because much of the system was built many decades ago—four of the six legacy rail systems are over 100 years old.[25] The aging infrastructure in these systems create enormous rebuild and replacement needs.

New York City subway's aging infrastructure causes overcrowding and travel delays

The New York City subway ridership is at a historic high, with almost 1.8 billion trips taken in 2015.[26] This surge in ridership has led to overcrowding on many lines. Among the most crowded lines are the No. 4, 5, and 6—the stations along the line account for 5 of the 10 busiest New York City subway stations in 2015.[27]

The overcrowding is more than just an inconvenience – New York City's Metropolitan Transit Authority (MTA) estimates that almost 24,000 delays were caused by overcrowding in October 2016 alone, substantially increasing safety risks.[28] This causes many travelers that would otherwise ride the subway to use other options including cars, taxis and buses. Thus, the underground congestion spills aboveground and worsens congestion on city roads.

Overall, 10 out of 12 asset categories in the New York City subway system are not in good repair. One in five elevators and escalators are "beyond their useful lives." Forty percent of high-priority tunnel segments do not have adequate ventilation plants that meets current standards for fire protection. Parts of the system still rely on signal equipment that dates back to the 1930s.[29]

Underfunding has caused a large investment backlog

Lacking funding support from governments, transit authorities have delayed capital investments in order to cover the operating costs required to keep transit systems running. This has created a significant backlog of deferred maintenance and rehabilitation.[30] As of 2013, the deferred maintenance backlog of the entire U.S. public transportation system was valued at $86 billion,[31] with more than 40 percent of buses and 25 percent of rail transit assets in marginal or poor condition.[32] The six legacy systems alone face tens of billion dollars of capital needs in the coming decade (see **Table 2**).[33] An excessive backlog of deferred maintenance makes transit systems vulnerable to major disruptions and delays and compromises public safety.[34]

Table 2: Total Capital Needs and Investment Backlogs

	Total Capital Needs (in billions)	Investment Backlogs (in billions)	Time period in years
MTA New York City Transit	$32.9*	$10.5	2015-2024
Washington Metropolitan Area Transit Authority	$25.2	$16.0**	2017-2026
Chicago Transit Authority	$22.2	$12.9	2014-2023
Massachusetts Bay Transportation Authority	$24.8	$7.3***	2015-2040
San Francisco Bay Area Rapid Transit District	$9.6	$4.8	2015-2024
Southeastern Pennsylvania Transportation Authority	$9.3	$5.0	2014-2025

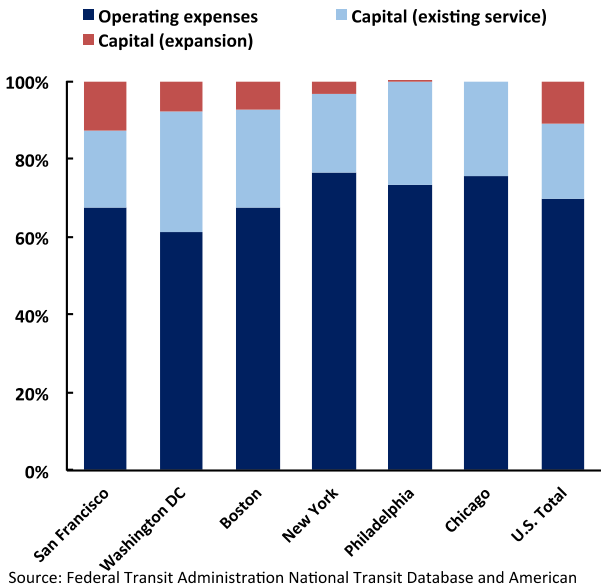
Source: See Endnote 33
Notes: * NYC MTA total capital needs is understated as it does not account for all unmet state of good repair needs; **Figure represents funding gap in 2015-2024 estimated by Metropolitan Washington Council of Governments; ***Figure represents investment backlog as of 2015, assumed to be reduced to zero by 2040.

Not enough capital is available to meet expansion needs

For the legacy transit systems, the spending needed to maintain existing services has crowded out capital investment for system expansions. The share of capital for expansion in these transit systems is much lower than in the U.S. total. The extreme case is in Chicago, where no capital expenses were devoted to expansion in 2015 (see **Figure 2**). With ridership increasing especially quickly in these urban areas, these legacy transit systems are challenged to improve both service and capacity with limited funds for operating and capital expenses.

Figure 2. Legacy Transit City Expenses in 2015

By type of expense, as percent of total expenses



Source: Federal Transit Administration National Transit Database and American Public Transportation Association

Notes: Data are aggregated by urbanized areas; U.S. total includes all data reported to FTA, including those from rural areas

New York City's MTA: underfunded and over-leveraged

After a severe budget crisis and decades of neglect, the New York City subway system was in a state of disrepair by the early 1980s.[35] In response, the city launched the MTA capital program, which identified maintenance and investment needs throughout the transit system. Since then, the city has invested billions into the transit system and made great progress in improving conditions.[36] However, the capital program is often underfunded—for instance, the 2010-2014 program was funded at only 57 percent of the estimated need.[37]

Inadequate capital investment has left the city with a sizeable maintenance backlog. In 2013, the MTA estimated a need for $106 billion in investment in maintenance and expansions over the next 20 years, including nearly $60 billion for the subway system.[38]

Increasing ridership and an improved economy have helped the MTA balance its operating budget, but the revenues that the agency collects are not nearly enough to reduce the capital investment shortfall.[39] Therefore, the city has relied heavily on debt to fund its capital needs. In the 2010-2014 capital plan, the MTA funded roughly 60 percent of capital investments with debt. The city plans to fund $8 billion of $29 billion in the 2015-2019 plan with bonds.[40]

While debt is an important source of funding for local infrastructure investments, over-reliance on debt can leave transit agencies cash-strapped later. The cost of debt servicing is projected to rise to over $3 billion annually by 2018.[41] This large debt burden, combined with a large backlog of maintenance needs, makes it difficult for the city to fund new capital investments.

The New Starts program

Finding enough financing sources for large transit infrastructure projects is extremely challenging and often requires contributions from all levels of government. Already over-committed for maintenance capital, transit authorities in legacy systems often cannot gather enough upfront capital for large-scale transit expansion projects. In these cases, federal grant programs like New Starts are often crucial for closing the funding gap.

New Starts, formally known as the Capital Investment Grant (CIG) program,[42] is a discretionary federal grant program that provides funding support for the construction of new rail,[43] BRT, and ferry systems, as well as expansion of existing systems. The CIG program is a part of the federal public transportation program administered by the Federal Transit Administration (FTA). In FY 2017, the CIG program is expected to fund 10 transit projects, with total investment costs of over $20.3 billion.[44]

Public transit expansion projects in legacy systems are especially dependent on federal support because a) rail expansion projects often come with huge price tags; b) state and local governments have tight budget constraints; c) P3 is often not a viable option for these projects.

Legacy transit expansion projects require large capital investment

Infrastructure in the legacy systems requires repair and maintenance expenses that take up a substantial share of capital budgets, leaving little room for expansion projects that require significant upfront capital. Because of high population density and serious road congestion, rail transit expansion is often the most sensible option in legacy systems. But the upfront costs for rail expansion projects are much greater than for other forms of transportation. A cost study on bus versus rail transit concludes that BRT costs $10 million per mile to build, compared with about $128 million per mile for metro rail transit.[45] In addition, costs of labor and construction materials tend to be higher in these large urban areas.

State and local governments face serious budget challenges

The U.S. public transit system as a whole does not have a self-sustaining budget and depends heavily on government grants. Fares and other operating revenues cover only 38 percent of the total cost, with the remainder provided by federal, state and local governments.[46] While state and local governments divide the burden of operating expenses somewhat equally, in 2015 about 43 percent of the capital budget came from federal funds.[47] In contrast, in the late 1980s federal assistance covered over 60 percent of capital expenses (see **Figure 3**).[48] This highlights the room to ramp up federal support in order to boost public transit investments.

The American Public Transit Association (APTA) estimates that an additional $25.3 billion of capital investment annually over six years is needed to meet the current national demand for public transit.[49] If the investment needs are to be met by all levels of government taking on their current share of capital expenses, the federal government would have to increase funding by about $11 billion; state governments would have to increase funding by $3.7 billion; while local governments would have to increase their contribution by about $5.3 billion annually over six years.[50] Given the current tight budget environment in state and local governments, with some states looking to cut rather than increase funding for transport programs,[51] it is highly unlikely that additional

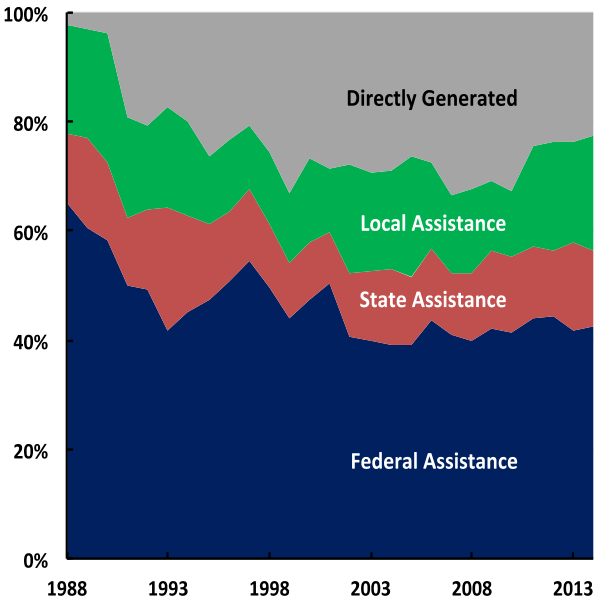
investments would be made without incentives and support from the federal government, even if the investments are extremely cost-beneficial.

According to a Government Accountability Office (GAO) study[52] on the funding sources for New Starts projects between 2004 and 2012, the federal government contributed 45 percent of total New Starts projects funding while local government provided 48 percent and state government added 7 percent. Local funds came from a variety of sources, with local sales taxes being the largest single source, accounting for over a quarter of local funds. Only about 3 percent of the local funding came from private investments or P3s.

Federal contributions become even more crucial when the amount of upfront capital required for a project is large. GAO points out that while local funds paid for almost half of the costs of New Starts projects, many local governments still face financial pressure from the lingering effects of the Great Recession. The low sales tax receipts from slow growth and local political pressure against tax hikes make it very difficult for local governments to secure enough funding for large projects without federal support.

Figure 3. Capital Funding Sources

For entire transit industry, 1988 to 2014



Source: American Public Transportation Association, using data from the Federal Transit Administration National Transit Database

Notes: Capital expenses are purchases of non-expendable tangible property with a useful life of over one year; directly generated funds are those generated by or donated to the transit agency, and include user fees, bond proceeds and other sources.

Private financing for legacy expansion projects tends to be limited

Public-private partnerships could take pressure off state and local governments' budgets and bring innovation that could potentially lower project costs. However, P3 is often not a viable option for rail expansion projects, as these projects often have economic and other benefits that while large are too diffuse to be captured in a P3. Also, breaking out and privatizing the operations of a new rail line from an existing public system would be a complicated and inefficient way to run a rail transit system. This could explain why many P3 transit projects in the United States so far have been for entirely new systems instead of expansion projects.[53]

Access to private capital for public transit projects is often provided in P3s via value capture, such as joint public-private developments around new stations that raise revenue from new developments or higher real estate values in existing developments.[54] But many valuable expansion projects are within very well-developed metro areas that would not create new space for development, or their development impacts are not geographically concentrated enough to be monetized to finance much of the cost. In such cases, tax credit incentives (such as those included in President-elect Trump's infrastructure plan) would not be an effective substitute for federal grants like New Starts.

Second Avenue Subway made possible by New Starts funding

There has been talk of a Second Avenue Subway line in New York City since the 1920s, but for decades the project has faced numerous roadblocks.[55] The New York City Board of Transportation first proposed the new line in 1929. The stock market crash and Great Depression put the project on hold. Construction began in the 1970s, but the city soon faced a budget crisis and nearly went bankrupt, forcing it to dedicate scarce funds to more pressing maintenance needs.[56]

The most recent effort at expanding the subway started in the 1990s, and Phase 1 of the project broke ground in 2007. There were multiple reasons why the project moved forward this time, but a major driver was the commitment of $1.3 billion in federal funds through the New Starts program. The New Starts funds supplemented $3 billion from state and local sources and $450 million from the 2005 State Transportation Bond.[57] The federal funds helped bridge the gap between state and local funds and the sizable project cost, which would have been tough to accomplish without the grant.

Opponents of federal grants often argue that the money crowds out alternative funding streams. But there were no other financing sources that would have been sufficient to move the project forward. The MTA was already highly debt-leveraged, and much of the budget had to go toward maintenance projects, limiting its ability to fully finance the project with more debt.

New York City has used value capture financing strategies to fund other transit expansion projects. For example, the 7 Line Extension project raised additional capital by selling development rights for land near the new subway line.[58] However, such a plan would not be feasible in an already highly developed neighborhood like the Upper East Side. Finally, political pressures make it difficult to fund large capital investments by raising existing user fees. It would have required at least a 26 percent increase on all subway fares to fully cover the New Starts funding.[59]

The benefits of legacy transit expansion projects

Benefits from expansion projects in legacy cities areas tend to be much higher than those from other transit infrastructure projects because legacy cities have larger transit ridership and the potential for huge efficiency gains.[60]

An improved transportation system

High transit dependence in legacy cities means that transit expansions will generate greater benefits from travel time savings and increased operational reliability. Expansion projects cut travel time by improving connectivity, which reduces overcrowding and the associated travel delays.[61] Expansions also improve operational reliability by building resiliency and providing critical redundancy for existing systems when service diversion is required for maintenance or major incidents.[62]

High population density in these urban areas means congestion cannot be reduced easily by new road projects. Transit expansions can provide greater congestion relief. The road congestion in the

six legacy urban areas causes an annual total travel delay of about 1.6 billion hours combined—meaning that the potential for congestion relief in these areas is enormous.[63]

Furthermore, public transit expansion encourages continued concentration of development within these urban areas, thereby reducing urban sprawl and the need for new roads to accommodate it.[64] The overall reduction in commute time significantly improves commuters' quality of life.

Second Avenue Subway expansion will reduce overcrowding and improve reliability of the New York City subway

The Second Avenue Subway expansion will greatly improve transportation for New York City residents, workers and businesses. By adding a second line, the existing Lexington line will be able to run more smoothly and the subway system on the Upper East Side will be able to handle more travelers. This will cut down on travel time by reducing overcrowding and the associated travel delays. One study estimated that the expansion would cut travel time by an average of 20 minutes per day for commuters that switch from the Lexington line to the new line.[65]

Having a second line will also improve the reliability of the subway system for travelers. When either track needs maintenance or an emergency stoppage, having two lines near each other will provide redundancy, allowing passengers to move over to the operating line and avoid delays. In a city that often experiences major disruptions such as extreme weather and large public events, redundancy is especially important for system reliability.

The additional capacity and increased reliability will provide an incentive for travelers using alternative modes of transportation to switch to the subway, thereby relieving above-ground congestion and cutting overall commute and travel times.[66] One study estimated that the expansion would reduce auto trips in the city by about 30,000 per day.[67]

Shorter traveling time, reduced congestion and more reliable service will benefit New Yorkers in multiple ways. Less time spent commuting means more time that individuals can spend in more productive activities. It also improves quality of life and reduces stress for travelers and commuters.[68]

Economic benefits

Productive transit investments in legacy cities will have enormous positive impacts on employment, wages, and business investment in some of the biggest economic centers of the United States and the world. The positive impacts are both long term and short term. Long-term growth stems from the economic efficiencies and productivity gains generated by a better run mass transit system that reduces travel times, lowers costs and expands access for both workers and businesses. Meanwhile, significant short-term growth results from direct spending on the projects, which boosts employment, wages, and construction spending. In addition, the direct spending ripples through the economy, generating indirect, secondary output growth from the investment, or the so called "multiplier effect."

A study by the APTA finds that, after taking both short-term and long-term effects into account, one billion dollars of annual spending on public transportation (capital and operation combined) supports an average of 36,000 jobs for a year in the United States, which translates to $3.6 billion of additional business output, $1.8 billion of GDP, $1.6 billion in wages, and $200 million in corporate revenue.[69] These activities in turn generate nearly $500 million in tax revenues for federal, state and local governments.

Long-term economic effects

Public transit expansion in legacy metro areas provides additional transit capacity to facilitate economic development and improve labor mobility where the workforce is large and concentrated. As a result, productivity gains from this type of investment also tend to be higher. Productivity gains from improved mobility especially benefit low-income workers, who tend to depend more on public transit.[70]

Congestion relief from transit expansion has commercial impacts as well. Commercial deliveries will require less fuel consumption and shorter travel time. Research has shown that carriers value an hour of transit time at somewhere between $25 and $200, depending on the value of the cargo. Unexpected delays can increase costs by 20 to 250 percent;[71] therefore, even a small reduction in congestion can lead to substantial cost savings for businesses.

Expansion projects also tend to increase real estate values, which boosts tax revenue for local governments.[72] In addition, when the construction is completed, they support longer-term jobs and spending related to operations.[73]

Short-term economic effects

Spending on legacy transit expansion generates immediate, direct effects on the economy through hiring construction workers and purchasing equipment and facilities for the project. These workers spend their wages, indirectly creating more jobs at restaurants, stores and other businesses—thus generating additional employment and revenue.[74] The spending on machinery, materials and various construction-related services used in the project also creates more jobs. The income derived from these jobs generates still more activity and jobs via the "multiplier effect" as that income is spent.

The size of the multiplier varies by project and time period, and it generally depends on the extent to which 1) both direct and indirect effects go to local workers and businesses (or the "demand leakage" to other regions); 2) workers employed directly or indirectly (as well as other inputs) would have otherwise been idle; and 3) the project's financing may have "crowded out" other public or private investment.[75]

A review of literature on the multiplier effect of transportation spending in the United States reports a wide range of estimates—with short-term multipliers ranging from 0 to 2.7—which could be attributed to methodological challenges.[76] The estimates also depend largely on the time period studied. For example, the study on highway construction that yields the high-end of the short-term multiplier estimate (at 2.7) also finds the multiplier to be statistically insignificant and slightly negative when the spending occurs during an economic expansion.[77]

Second Avenue Subway boosts economic growth in both short run and long run

The Second Avenue Subway expansion will benefit the New York economy in the long run and has already benefited the economy in the short run. In the long run, improved transit reliability and decreased transit times will increase the productivity of workers and businesses.

Phase 2 of the project will increase the mobility of the lower-income workers in the city by better connecting East Harlem's empowerment zone with job opportunities on the East Side and other major business districts in the city.[78] When the Phase 2 expansion is completed, residents of East Harlem will be able to ride one train down to the Upper East Side and West Midtown, cutting their travel time substantially. These residents will have easier access to jobs, schools, hospitals, museums and parks in these areas.[79]

Property owners near the new stations will likely see increases in their property value—some expect rent prices to go up by 20 percent because of the new subway access.[80] Over the long run, subway access will lead to more real estate development in the neighborhoods along the Second Avenue line.[81] More foot traffic will create more jobs and further increase demand for commercial space in the area.

In addition to these long-run economic benefits, New York City has already benefited from a decade of economic activity generated by the Second Avenue Subway construction. MTA estimated that Phase 1 of the project directly created more than 16,000 jobs and paid $842 million in wages to those workers.[82] The wages and construction-related spending from the project then generated additional economic activity via the "multiplier effect."

There are reasons to believe that the multiplier for the Second Avenue Subway project might have been particularly large. Although construction employment—both nationally and in the New York City metropolitan area—was close to its pre-recession peak when construction began in 2007, the Great Recession happened soon thereafter and construction employment in the New York metropolitan area did not return to the pre-recession level until 2015.[83] Meanwhile, the project was mostly financed through debt in a period where interest rates were low by historic standards. In other words, financing the project was unusually cheap, suggesting little or no crowding-out of private investment.

Environmental benefits

Congestion relief and reduction of urban sprawl from public transit expansion reduce driving time as well as pollution in legacy urban areas, where road congestion tends to be severe. The road congestion in these urban areas leads to over 743 million gallons of wasted fuel annually,[84] which translates to over 6.6 million metric ton of carbon dioxide emission.[85] Reducing congestion and driving time is crucial for improving air quality in these areas.

Second Avenue Subway will reduce greenhouse gas emissions and improve air quality

New York City is one of the lowest CO2 emitters, on a per capita basis, of any U.S. metro area.[86] One of the main drivers of this is the subway system, which is heavily used by residents, commuters and tourists. On average, a single rider taking the subway rather than driving reduces greenhouse gas emissions by over ten pounds.[87] If the Second Avenue Subway diverts 30,000 drivers to the subway per day as expected, the new line would save over 300,000 pounds of greenhouse gas emission per day, or almost 50,000 metric ton per year.[88] Furthermore, an environmental analysis on the project concluded that the expansion had the potential to improve air quality in the city through these reductions in driving and congestion.[89]

Conclusion

The nation's aging public transit infrastructure has not kept up with population growth and increasing ridership. Commuters face overcrowding and delays, especially in the densely populated, older urban areas. Failing public transit imposes costs on both individuals and businesses and constrains economic growth overall. Many commuters become frustrated with the unreliability of public transit and switch to other forms of transportation. This, in turn, increases congestion on roads and highways, increasing air pollution and driving up the overall costs of transportation.

The results of decades of underinvestment in maintenance, repair and expansion of public transit are most pronounced in legacy transit systems in densely populated cities, where much of the infrastructure was built more than 100 years ago. Significant investments are needed to update and expand these transit systems.

Expanding the older systems will create significant benefits by simultaneously reducing overcrowding and relieving road congestion. In addition, these expansions will deliver immediate and long-term economic benefits, including more jobs, higher productivity, increased income and reduced congestion and pollution. Notably, these economic benefits tend to be higher in expansion projects for legacy systems than for other transportation infrastructure projects.

A challenge to getting transit expansion projects off the ground is the significant amount of upfront capital required. Direct federal investment is often needed to attract state and local funding. Without a federal commitment, many valuable projects would not go forward. The New Starts program has proven to be especially important for the legacy transit systems, where the public transit infrastructure investment gap tends to be bigger and the return to investments higher.

The Second Avenue Subway is a prime example of a legacy transit expansion that was funded in part by New Starts and will generate significant transportation and economic benefits in the region. For cities with legacy transit systems badly in need of expansion to meet the needs of a larger population, New Starts is vital.

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