

A Window for Change:
The Pandemic's Opportunity for Transit System Renewal

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ABSTRACT

This paper examines the recovery strategies adopted by 40 US public transit agencies following the COVID-19 pandemic. Typically, prior policy decisions limit the scope of future policy options. However, new solutions became available due to pandemic ridership, farebox, and political challenges. This study considers agencies' pre-pandemic annual ridership as a primary factor in recovery patterns, classified as small (<25 million) and large (>30 million). Using a mixed-methods approach, this study benefits from data culled by the National Transit Database, American Public Transportation Association, and agency announcements. Those include the following variables: similarities between agencies that experienced transit system recovery; impacts of the pandemic on long-term funding patterns; and effects of fare-zero policy on transit recovery. Findings show that small-agency size and fare-zero policy have had positive impacts on ridership recovery. Concurrently, farebox recovery remains low overall, emphasizing the need to further commit to alternative-funding sources as agencies remain far from total recovery.

KEY WORDS: farebox recovery, pandemic, public transit, policy, ridership, zero fare.

The past decade has seen a growing movement for public transit; this support has been strongest among urbanized areas and younger generations. In a pre-pandemic poll, “Americans support expanding public transit by a 77-15 margin” (Mangan, 2020). Later, the pandemic disrupted transit and changed travel behaviors. Despite this, local support for public transit has grown even as ridership and fare revenues both remain low. Funding deficits only threaten to worsen as, “COVID-19 relief funds are expended, and operating costs have increased, but fare revenues have not returned, presenting a budget shortfall” (Dickens, 2023). In Minneapolis, “fares cover about one third of the agency’s budget,” so “ridership and employment trends put the agency in a bad spot” (Hazzard, 2022). This creates an issue where a funding crisis sets off a rolling cycle of public-transit disinvestment, ridership loss, and revenue loss. This was temporarily avoided due to temporary federal funding from the American Rescue Plan Act of 2021, but public-transit disinvestment cycles remain a threat across the US.

Traditional transit-agency policy was quickly upended as agencies were forced to hold virtual meetings while balancing competing priorities such as revenue, service, health, and safety, all without a roadmap. This became a window of opportunity for agencies to reconsider basic assumptions in their standard policies and procedures. As a consequence, a global cascade of various transit innovations and experiments took place. One example was *Pop-Up Cycleways*, when the government of Sydney, Australia used empty road space in the city to create pop-up cycleways that later became permanent bike lanes (Harris & McCue, 2022). This example shows how windows of opportunity, i.e., moments in a crisis that can lead to new policy innovations and experiments, are used to challenge existing path dependencies such as car dependency.

This study seeks to equip both agencies and advocates with an understanding of the factors that influenced the recovery conditions of the 40 transit agencies. By exploring examples of transit recovery, agencies and advocates can work toward these outcomes via informed decision-making. The following questions are thus central: Which types of agencies experienced better transportation recovery? What impacts will the pandemic have on future transit funding patterns? How has zero-fare policy affected transit recovery? Such questions merit attention for widespread public-transit recovery and growth to occur. To this end, I explore transit path dependencies, establish current growth patterns, analyze relevant literature, explain the agency selection methodology, and finally assess the positive or negative results and trends.

Path dependence is a common barrier to new transportation policy solutions, particularly in the United States. Path dependence is the idea that previous decisions in public policy affect the options one has for future policy. Governance structures often prevent policy change, meaning that limited organizational power can make certain policies difficult to implement. This is a common struggle where “Public transit agencies inhabit a unique class of government in the US . . . governed most frequently by single-purpose organizations whose responsibilities are often constrained to a single transit mode, or to a set geographic region that may not correspond with the regional transit shed.” (Fischer, Ray, & King, 2020). Contrast to their status, transit agencies have been tasked with maintaining existing transit infrastructure with little power to adjust and expand this infrastructure when the need arises. This has made transit agencies ineffective change makers and passive actors during a crisis such as the pandemic.

Financial structures are another barrier to change, where the upfront infrastructure cost can limit capacity. This makes agencies court capital investment in order to pursue new transit projects while the federal government increasingly evaluates new transit projects by local

financial commitment and local funding matches (Welch, 2013). As the need for outside transit investment increases, these same sources ask local agencies to provide higher shares of the initial cost. This limits the scope of necessary transit projects by forcing local municipalities to see non-extant funding. As a result, large agencies with financial capital get support while, counterintuitively, smaller agencies which can benefit most from federal grants struggle.

While path dependencies are barriers to change, windows of opportunity are a chance to challenge the status quo. The American Rescue Plan Act of 2021 provided \$30.5 billion of guaranteed funding to support agencies in the pandemic (H.R.1319 117th Congress, 2021). In doing so, financial barriers were alleviated as the pandemic also sparked local advocacy, thus reducing governance barriers. This is why identifying policy windows is so important.

Another factor in post-pandemic policy change has been agency response, where the goal has been ridership recovery. Transit agencies have struggled to meet pre-pandemic ridership levels, and those become concerning for areas facing a growing population and demand for transit infrastructure. For example, in a 2024 poll of Nashville priorities, 84% supported a referendum providing a local fund for public transit (Geer & Clinton, 2024). Despite reduced transit usage post-pandemic, public demand is focused on public-transit growth. Consequently, transit agencies will have to adjust their priorities from mere recovery to growth.

Especially since the pandemic, transit agencies have faced external pressure to be self-sustaining. This has made agencies primarily focused on transit recovery as emergency federal-funding interventions diminish. Though, this can take many forms, such as regaining ridership lost during the pandemic and, by proxy, the funding gap that fare collection revenues had once covered. In fact, the pandemic funding gap also created an opportunity for policy to shift away from farebox ratios, “an urgent problem, a preplanned policy solution, and political expediency

[has] created a policy window” (Harris & McCue, 2022, p. 241). Rather than view the pandemic as an obstacle to overcome, some agencies have used the pandemic’s resulting policy windows to experiment with emerging policy solutions that emphasize growth over recovery.

Despite efforts made to understand the path toward “total transit recovery,” no single metric entirely reflects the condition of a transit network. Still, two metrics are key to this study: funding (i.e., farebox recovery) and ridership. Previously, farebox recovery, the ratio between revenue from rider fares and operation cost, has been useful in understanding an agency’s ability to conduct long-term funded operations. Since the pandemic, other funding sources have at least temporarily addressed the gap in funding. Currently, ridership has become a preferred metric to understand the number of people served by a transit system, though, neither metric is superior since they measure different concerns which public-transit agencies engage with.

To address these concerns, this study evaluates 25 peer-reviewed journal articles from venues such as *Journal of the American Planning Association* and *Transport Findings*. These studies were located via Google Scholar by using relevant terms (i.e., public transit, recovery, pandemic, transit agency, etc.) then by finding recent studies that cite them. These papers were published between June 2020 to December 2023 and analyzed transit behavior and outcomes during the virus’ peak, immediate impact, and long-term change. This topic has been written by many disciplines and geographical perspectives with varied conclusions. Global perspectives are generalized and fail to apply beyond large transit systems. Non-US perspectives focus on implementation and policy windows as a tool for change. Lastly, US perspectives lack input from academic fields such as geography. These differences in background have led to no engagement with policy windows and lack of consideration for local contexts in the US literature space.

Figure 1: Pandemic Transit Literature by Analysis Periods

Analysis Periods	Totals	Hamidi 20	DeWeese 20	Triachini & Cats 20	Gutierrez 20	Fischer & Winters 21	Van Wee & Witlox 21	Monahan & Lamb 21	Wang 22	He 22	Kellermann 22	Xiao 22	Kutela 22	Palm 22	Anwar 22	Jiao 23	Burris 23	Ciuffini 21	Harris & McCue 22	Batomen 22	Nikolaidou 23	Soria 23	(A) Karner 23	Stanesby 23	Mahmoudzadeh 23	(B) Karner 23
Virus Peak	6																									
Impact Analysis	10																									
Change Analysis	9																									

Figure 1 organizes the literature by period of time the analysis focused on, identified by the article subject and the relationship between transit and the pandemic. These analysis periods are categorized by six papers focused on the pandemic’s “Virus Peak,” ten papers on initial agency impact from the pandemic “Impact Analysis,” and nine papers on future agency strategy should change beyond the pandemic “Change Analysis.” Though the specific article topic can vary, such as when related to the author’s geographical perspective, empirical focus, etc.

Figure 2: Pandemic Transit Literature by Geographical Perspective

Geo Perspectives	Totals	Hamidi 20	DeWeese 20	Triachini & Cats 20	Gutierrez 20	Fischer & Winters 21	Van Wee & Witlox 21	Monahan & Lamb 21	Wang 22	He 22	Kellermann 22	Xiao 22	Kutela 22	Palm 22	Anwar 22	Jiao 23	Burris 23	Ciuffini 21	Harris & McCue 22	Batomen 22	Nikolaidou 23	Soria 23	(A) Karner 23	Stanesby 23	Mahmoudzadeh 23	(B) Karner 23
Global	6																									
United States	7																									
Non-US	12																									

Figure 2 organizes the literature from a geographical perspective which changes how they engage with the topic. Global perspectives were focused on the largest global population centers, US perspectives had a similar focus on largest US cities, while non-US perspectives used various population sizes. These differences were clear in the Change Analysis period where only non-US perspectives considered how lessons could transfer across geography or agency size. Still, the particular topic is best described through the empirical focus, (i.e., the core issue of the paper).

Figure 3: Pandemic Transit Literature by Empirical Focus

Empirical Focus	Totals	Hamidi 20	DeWeese 20	Triachini & Cats 20	Gutierrez 20	Fischer & Winters 21	Van Wee & Witlox 21	Monahan & Lamb 21	Wang 22	He 22	Kellermann 22	Xiao 22	Kutela 22	Palm 22	Anwar 22	Jiao 23	Burris 23	Ciuffini 21	Harris & McCue 22	Batomen 22	Nikolaïdou 23	Soria 23	(A) Karner 23	Stanesby 23	Mahmoudzadeh 23	(B) Karner 23
Ridership Change	12																									
Agency Response	8																									
Transit/Alternatives	5																									

Figure 3 organizes the literature by the issue the paper engages with: change in ridership, agency response to the pandemic's effect on transit, or how the pandemic led to investment into public transit and its alternatives. While most articles focus on change in ridership, as time has passed, papers have increasingly focused on agency response. Articles on investment into transit and its alternatives are least common with four non-US, and one global perspective. Without a way to understand the US perspective on this issue, many questions are left unanswered.

US articles on public transit usually evaluate the highest ridership agencies. Literature, in this limited scope, has portrayed agencies as slow to adapt. This limited sample has created a research gap which cannot answer how small agencies reacted to the pandemic. Without this insight, these studies' results are treated as one-size-fits-all. Researchers must combat these agency misconceptions and consider how ridership and capacity affect agency behavior.

Zero Fare is an overlooked policy in post-pandemic transit literature. Zero-fare or fare-free is a policy to shift away from user-fees, such as fares, entirely. Despite fare free's popularity as a term, "zero-fare" clarifies that these agencies do not charge users but still incur costs to operate. Despite challenges in farebox revenue, a policy window has opened for agencies to explore zero-fare and rely more on other funding sources. The agencies who went zero-fare were motivated by the climate, social justice, affordability, and more (Kropp, 2023). These diverse motivations have allowed grassroots proposals to address an agency's individual priorities.

One category of literature is also aimed at justifying zero-fare adoption. Some argue that college students are a zero-fare entry point. Though they warn that zero-fare alone is not enough to attract riders that collaboration between universities and transit agencies is needed (Del Conte, 2022). Still, another adds that low farebox-recovery agencies can best transition to zero-fare but that there are barriers such as California's farebox recovery minimum (King & Taylor, 2023). A further category addresses the implications of zero-fare adoption. The main concern is establishing reliable alternative funds such as tax revenue, local general funds, fee revenue (i.e. utilities or real estate), and partnerships (VanGuilder, 2021). Studies also warn that zero-fare must be complimented by service improvements to attract long-term riders (Fielbaum, 2024).

To address these questions, the use of secondary data was central for this analysis due to the scale and time needed to collect public transit data. These data sources include the National Transit Database (NTD) and American Public Transportation Association (APTA). NTD is the largest data repository for public transportation statistics such as annual unlinked passenger trips, referred to as ridership in this paper, farebox revenue, and operating expenses. Each statistic is key to the future of transit and reflects their impact, operations, and future funding. The database has self-reported transit agency data which follows the NTD sampling manual's specifications for required collection frequency and methods including route level analysis (NTD, 2009).

The 40 US agencies in this study are from (Fischer, Ray, & King, 2020) and (DeWeese, et al., 2020). Still, Los Angeles CA, Baltimore MA, and New York NY were removed due to massive ridership populations that doubled the 4th highest Houston, TX. While not in the studies, Albuquerque NM and Olympia WA were added for their zero-fare programs, and Denton TX, Eugene OR, and Buffalo NY were added due to their sizeable university-student/transit-reliant populations.

Figure 4: Table of Agencies Included in the Study by Source

Both Articles			DeWeese 2020	Fischer 2020	Added Cities
AZ Phoenix	IL Chicago	OR Portland	CA Riverside	CA Sacramento	MN Minneapolis
CA San Diego	IN Indianapolis	PA Philadelphia	FL Miami	FL Jacksonville	NY Buffalo
CA San Francisco	MA Boston	TX Austin	FL Tampa	KY Louisville	OR Eugene
CA San Jose	MO Kansas City	TX Dallas	MO St. Louis	NM Albuquerque	TX Denton
CO Denver	NC Charlotte	TX Houston	OH Cincinnati	OK Oklahoma City	WA Olympia
DC Washington	NV Las Vegas	TX San Antonio	OH Cleveland	TN Nashville	
GA Atlanta	OH Columbus	WA Seattle		TX El Paso	
				TX Fort Worth	

● - Small Agency
● - Large Agency

This study uses transit agencies' pre-pandemic ridership as the fundamental mode of analysis. Agencies are divided into small, with an annual 2019 ridership below 25 million, and large, with an annual 2019 ridership above 30 million. This study included twenty-one small agencies which range between 2.9 and 24 million and nineteen large agencies which range between 31 and 445 million. This distinction is used to explore questions about the relationship between agency size, outcomes, capacity, and zero-fare policies between 2019 and 2023. As suggested by the literature and agency policy, ridership was a top priority. To understand agency outcomes, I rank agencies with a change-over-time formula to calculate the change in their annual unlinked passenger trips between 2019 and after 2020-2023. On average, small agencies retained more of their 2019 ridership, challenging literature which did not consider agency size or suggested otherwise.

Figure 5 reflects the largest pandemic ridership decline, or valleys, and has a 3:7 small and large agency ratio. Each had their ridership drop to 42.4% or lower. San Francisco CA had its ridership fall to 21.3% of its 2019 ridership by 2021, the farthest decline, and its ridership remains at 42% in 2023. Comparatively, the agency with the second furthest ridership decline was Washington DC at 33.8% of its 2019 ridership but has recovered to just over 70% in 2023.

Figure 5: Agency Ridership Decline – Detailed

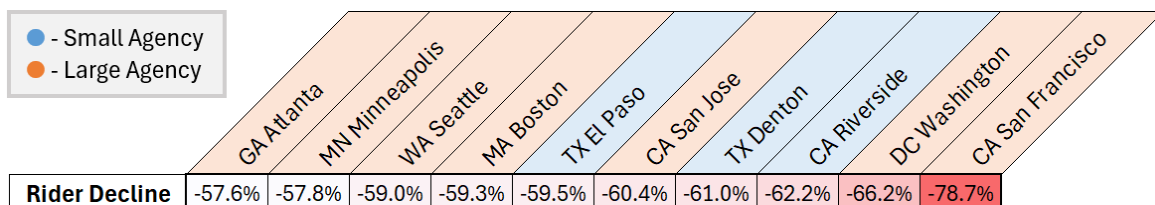


Figure 6 reflects the largest post-pandemic ridership recovery, or peaks, and has a 9:1 small to large agency ratio. Each regained over 80% of their 2019 ridership with two distinct examples. First, Denton TX went from a drop to 39%, the fourth largest decline in Figure 7, to being the only agency with positive growth since 2019 at 7.73% by 2023. Second, Kansas City MO experienced the smallest decline, keeping 76.3% of its ridership at its lowest.

Figure 6: Ridership Recovery – Detailed

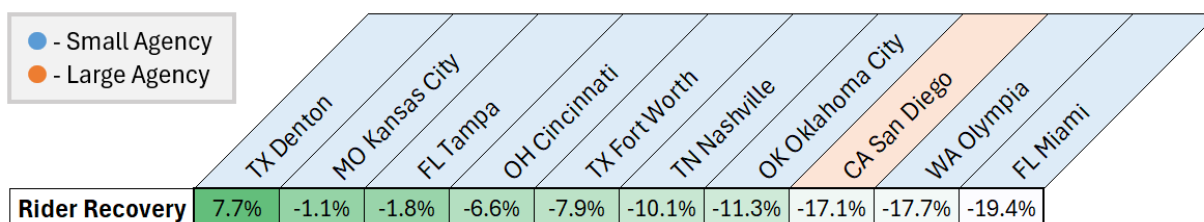
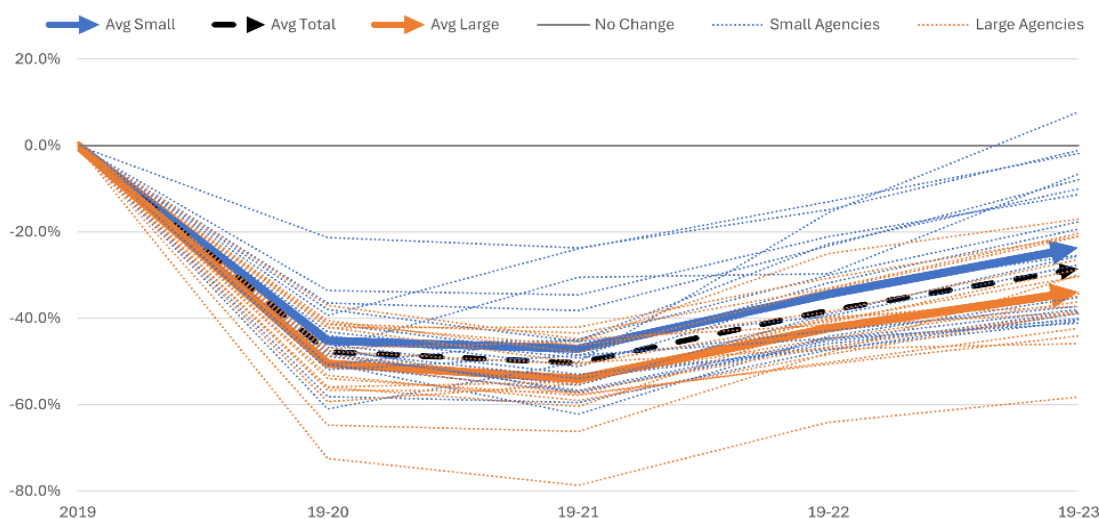


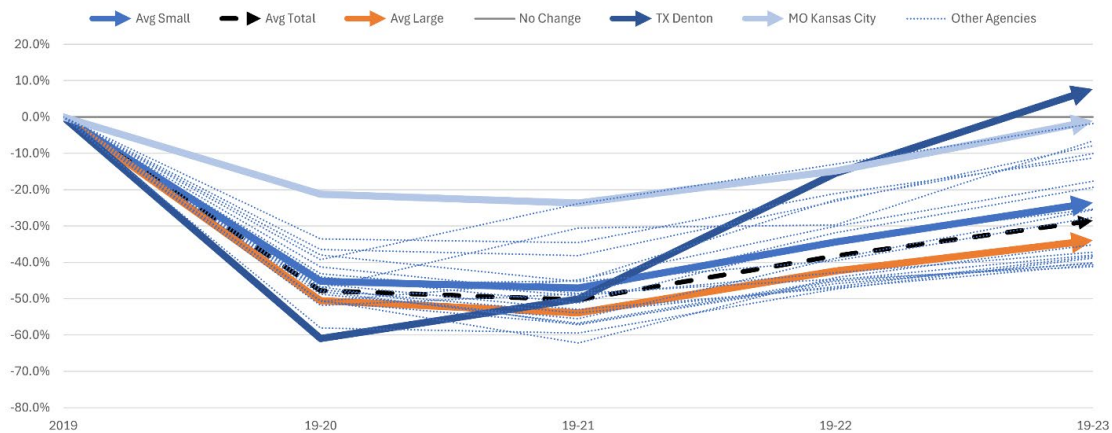
Figure 7 compares the average change in ridership between small and large agencies. By 2023, the mean change in ridership since 2019 for small agencies was 10.3% higher than their large agency counterparts. A similar trend is found with the median, where the small agency: Sacramento CA and the large agency: Boston MA maintain a gap of 9.3%. This difference in recovery may suggest that small agencies can better adapt to a crisis such as the pandemic.

Figure 7: Average Change in Ridership – Small vs Large Agencies



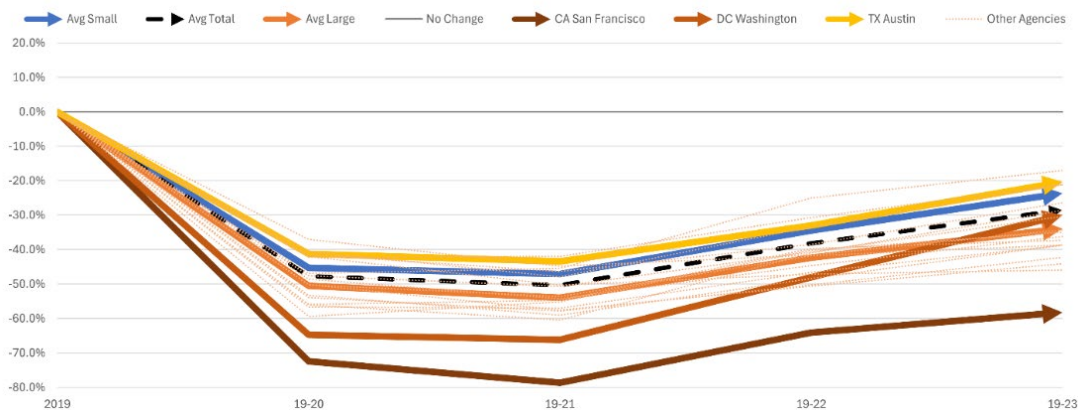
Although small agencies' average was high, with a majority in the top ten, variance was noticeable. While Denton TX had a 7.7% increase in ridership by 2023, other examples included Kansas City MO and Tampa Bay FL who had just a 1% and 2% decline by 2023. Meanwhile, in 2023 Jacksonville FL remained at 41% below total recovery, the lowest among small agencies.

Figure 8: Change in Ridership – Small Agencies



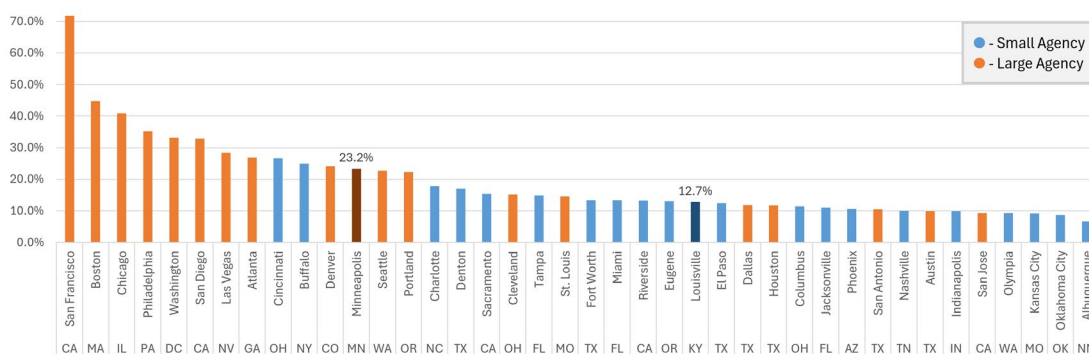
Comparatively, large agencies had more consistent ridership recoveries. The lowest decline for large agencies was San Diego CA at 17.1% by 2023. Austin TX, Las Vegas NV, and Houston TX were close behind with declines below 22%. However, San Francisco remains the lowest at a 58.3% decline, 12.4% lower than the next agency: St. Louis MO. The pandemic's sharp decline in rail-use likely created this gap, affecting San Francisco's rail-exclusive BART.

Figure 9: Change in Ridership – Large Agencies



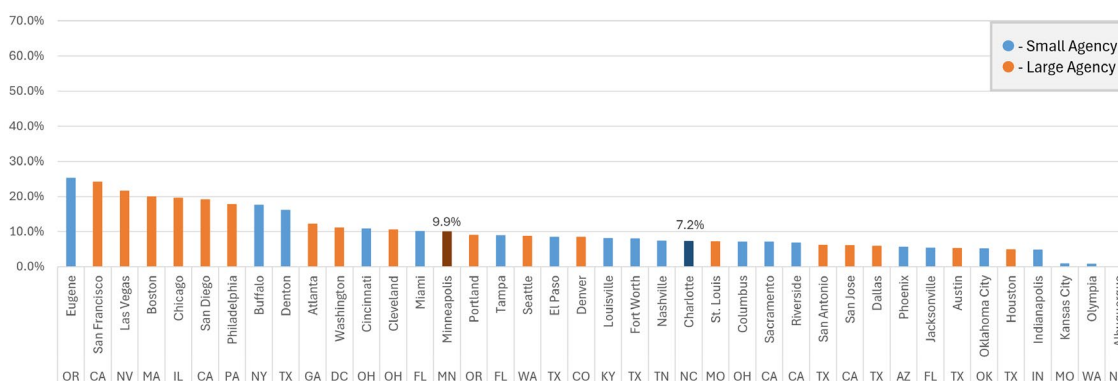
Another agency priority is funding via the farebox ratio (i.e., cost to operate covered by fare revenue). Before the pandemic, the median farebox recovery ratio in the US was about 35% (Taylor, 2009). In 2019, for this study, median farebox was 12.7% for small and 23.2% for large, explained by their distinct service types. Rail, with higher fares and rider capacity, had a higher farebox recovery than buses. For example, in 2019, the 76% farebox recovery of San Francisco CA's rail-exclusive BART. Large agencies with the fiscal capacity to invest in rail benefit most.

Figure 10: Farebox Ratio by Agency in the 2019 Fiscal Year



The pandemic saw farebox ratios plummet along ridership. Despite success in ridership recovery, farebox ratios remain low. In 2023, for this study, median farebox was 7.2% for small and 9.9% for large. Surprisingly, only Eugene OR faced growth, and though the farebox ratios of Buffalo NY and Denton TX decreased, they also became more competitive. Still, other funding sources have expanded as both agencies and scholars question the future of farebox funding.

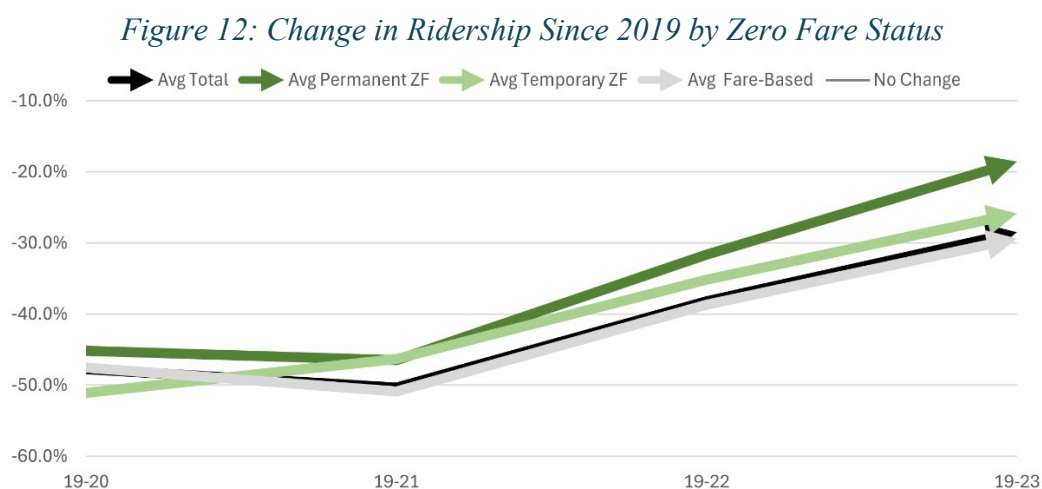
Figure 11: Farebox Ratio by Agency in the 2023 Fiscal Year



Overall, the concepts of agency size, ridership, and farebox in the pandemic did not align with the literature. Small agencies were more resilient in ridership and farebox as large agencies faced significant losses in both categories. In ridership recovery, small agencies kept 10.3% more of their 2019 ridership by 2023. While for farebox recovery, small agencies had a 5.1% decrease in their farebox ratios compared to large agencies which faced a staggering 13.7% loss.

Thankfully, temporary federal funds provided stability for transit agencies. In response, some agencies used this to explore zero-fare: where riders were the highest priority. In this study, four agencies had permanent zero-fare programs while six were temporary. Among the four is Washington DC, the only large agency, Kansas City MO, Albuquerque NM, and Olympia WA. Of the six temporary programs, four are small agencies: Denver CO, Miami FL, Tampa FL, and Cincinnati OH, while two are large agencies: Boston MA and Minneapolis MN.

Figure 12 compares the ridership recovery rates between permanent, temporary, and non-zero-fare programs. Once adopted, there is a clear acceleration in ridership recovery, especially for permanent programs. Long-term ridership data in 2024 and 2025 will likely continue this as temporary programs are explored in the US. However, permanent zero-fare programs seem to be best-suited for attracting long-term ridership with a clear 7.2% recovery difference by 2023.



These permanent zero-fare agencies serve as a model for others to replicate their success in ridership recovery. Washington DC decided to maintain its rail-based fares which served as a consistent revenue source pre-pandemic. In Figure 11, on rail-fares alone, Washington DC is eleventh overall for farebox recovery, at 11.1%. Despite these revenues, they have considered zero-fare rail for residents, to benefit from tourism while not burdening daily commuters.

These agencies, by removing bus fares, cut out an unreliable revenue source, reducing the cost of fare infrastructure while increasing transit access, usage, and speed. In the case of Albuquerque, its agency discovered that “in the year prior to the Zero Fare pilot program, fare revenue wasn’t even enough to cover the collection costs” (Crisan, 2023). While this study does not have access to agency fare collection infrastructure costs, it is likely that other agencies have experienced this issue. So, if agencies hope to replicate the success of zero-fare programs, logical first steps are fare collection cost audits followed by the removal of bus fares.

Previously, conventional belief in transit literature was that agencies with higher ridership had more capacity and were more resilient. When pandemic transit research began, many would examine the behavior of the largest US transit agencies such as Austin, Los Angeles, and New York. When small agencies were studied, size was not considered to be a potential factor. However, this analysis shows that small agencies experienced a better recovery compared to large agencies, thought to be better equipped and resilient. While many explanations exist for the differences in recovery patterns, it is likely that temporary funding stability was pivotal.

Interestingly, in the pandemic, agencies sought to maintain operations, prioritizing riders’ access. As farebox revenue plummeted with ridership, emergency funding enabled agencies to continue providing service. These funds—without conventional application or local match requirements—were available regardless of agency size. Agency policy and zero-fare reflect

agencies' desire to choose access and equity over revenue. That said, gaps must be bridged between the financial need of transit agencies without federal intervention and their ability to meet rider needs, and so future funding should consider non-user-based funding models.

Going forward, it is important to note that policy windows are not exclusive to the pandemic and remain open on a national scale. As ridership and farebox challenges remain, agencies have not settled back into restrictive path dependencies. By identifying policy windows, scholars and communities can use these opportunities to overcome barriers and increase transit equity, quality, and access. As argued above, zero-fare is a compelling opportunity to let go of farebox funding to address the current ridership shortages. Since both small agencies and zero-fare agencies have found success in courting ridership, future research should analyze these cases to understand how its implementation can be replicated. It is these considerations that enable agencies that struggle with regaining lost ridership to pursue programs that initiate recovery.

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