# Metropolitan Transportation Authority

2020-2022 revenue impact assessment of COVID-19

December 2020

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# Executive summary

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The midpoint of the May forecast for 2020-21 (net of CARES funding, the loss of congestion charges, and NYS withholds) amounted to $11.9 billion revenue loss

The revised November estimate for the 2020-21 revenue gap of $9.7-12.9 billion is within the May range, with a new midpoint of $11.3 billion—or 5% less. Higher tax collections and toll revenue offset lower than expected fare revenue

In 2022, further revenue shortfalls of $1.8-3.9 billion may occur (midpoint of $2.9 billion), driven largely by fare revenues below plan by $1.0-2.2 billion, while tax revenues could see a decrease of $0.9-1.5 billion

The total 2020-2022 revenue shortfall is expected to be $11.5-16.7 billion (midpoint of $14.1 billion)

The impact of these variables differs by mode:

- Only about two thirds of pre-COVID-19 ridership on LIRR / MNR may recover, while subway and bus may rebound to 80-90% by Q4 2022
- Up to about a third of the revenue impact is driven by the LIRR / MNR despite the fact it only contributes ~7% of the ridership base, due to higher fares and a slower rebound

Beyond 2022, ridership could be ~10-20% below pre-COVID-19 levels, resulting in up to ~$1 billion revenue shortfall annually:

- About half is due to increased work from home
- About a quarter is due to changing consumer preferences for non-work trips
- About a quarter is due to modal shifts away from public transit

Replacing the $12-17 billion gap may translate into a $25-36 billion national GDP impact and 75-109K jobs impact

- ~40% of the impact is experienced outside of the NYMSA, with up to $15 billion of the GDP impact and 43K of those jobs falling outside of the region
- This growth in the economy might lead to an increase in federal receipts of $4-6 billion

# MTA revenue shortfall is estimated to total in the range of $12-17 billion for 2020-22

These estimates are consistent with those made in May 2020 for comparable periods

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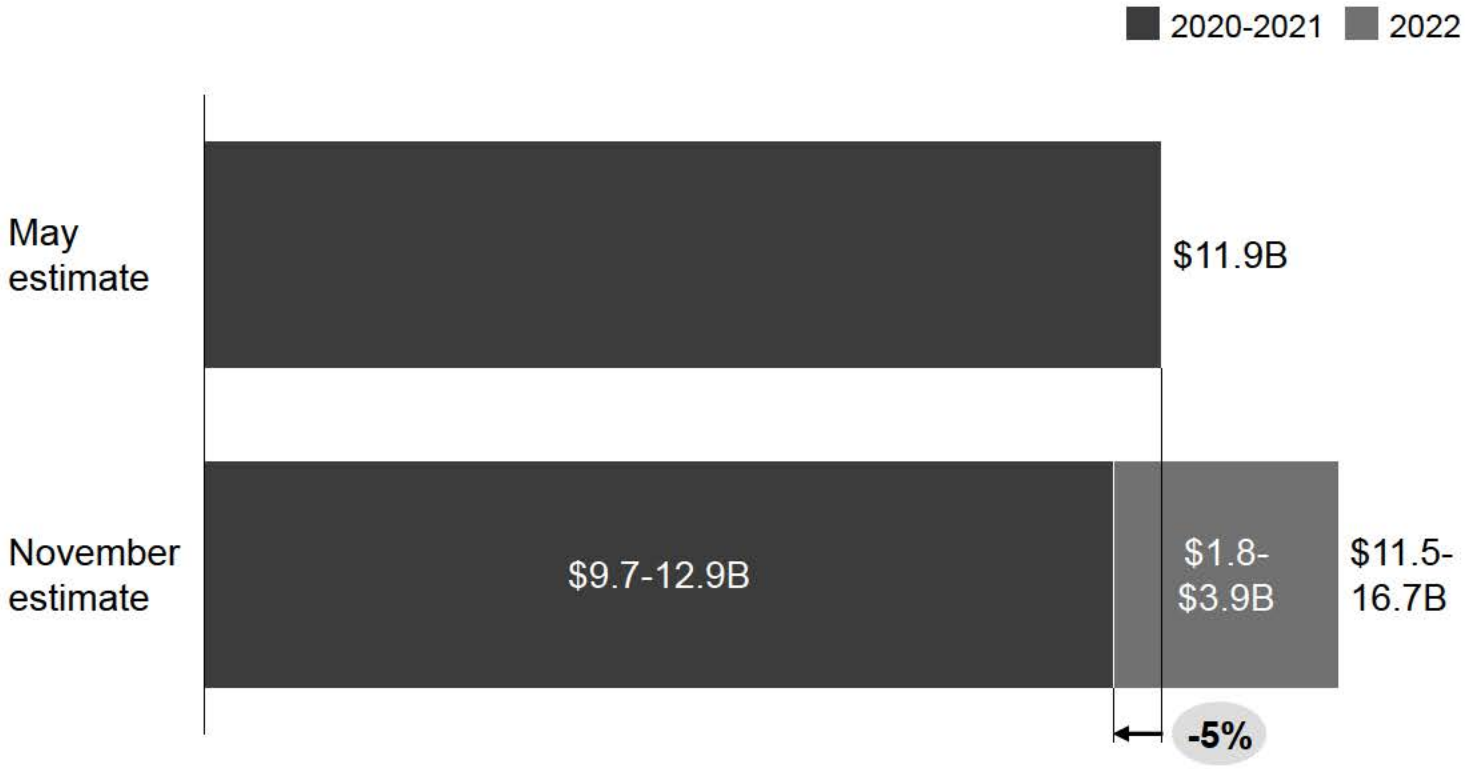
**Estimated revenue loss across the MTA system**

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# Content

# Overview of revenue components and forecasting approach

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Focus of this section

## Fare and toll revenue

Established two different scenarios for fare and toll revenue recovery

Developed assumptions for epidemiological end of the pandemic, future of the workplace, employment, non-work trips, rider shift to auto and non-auto modes, and fare evasion

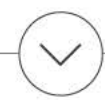
Incorporated estimates by transportation mode, with different average fares

**Ridership and traffic curves**

## Non-fare revenue

Identified six archetypes of non-fare revenue: (1) employment, (2) real estate and mortgages, (3) sales, (4) business income, (5) mobility (6) mix of various revenues ("other")—each with a distinct driver

Created a methodology for each archetype to forecast revenues for 2020-2022 with two different underlying GDP scenarios



**Archetype-specific change profiles**

# Two scenarios were examined for fare and toll revenue analysis

Scenarios were designed to illustrate the range of outcomes possible

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## Scenario 1: Steady recovery to epidemiological end of pandemic

Micro-cluster strategy is effective; major virus resurgences are avoided and meaningful, extended public health restrictions are not required

Economy continues to rebound without major financial stress on corporations[1]; increasing total employment at a steady rate

Confidence and safety perceptions of individuals continue to improve, encouraging individuals to slowly increase use of transit, though a portion of trips is still lost due to economic and behavioral factors

## Scenario 2: Virus resurgence, delayed vaccine impact, and sustained changes to economy

Virus resurgence leads to meaningful restrictions associated with a second wave across New York in early 2021, which impacts ridership similar to March / April 2020

Longer term financial stress leads to a slower economic recovery across several sectors[2]; total employment does not recover to pre-COVID-19 levels by Q4 2022

Changes in rider behavior are both larger and more sustained, given severity of virus resurgence and longer wait until epidemiological end of the pandemic (due to slower vaccine roll-out and adoption)

This analysis examines two viable scenarios—each relying on evolution of 3-4 key variables—showing a range of most likely outcomes

In reality, a different mix of these variables will likely materialize, e.g., severe and extended citywide restrictions (Scenario 2) but also vaccine becomes available rapidly (Scenario 1)

As such, eventual revenue impact may lie between these two scenarios

1. In line with Oxford Economics scenario A3 (details on next page)
2. In line with Oxford Economics scenario A1 (details on next page)

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# COVID-19 remains a dynamic situation and the recovery of the economy is still uncertain

In partnership with Oxford Economics, 9 scenarios have been developed to represent the underlying recovery of the economy

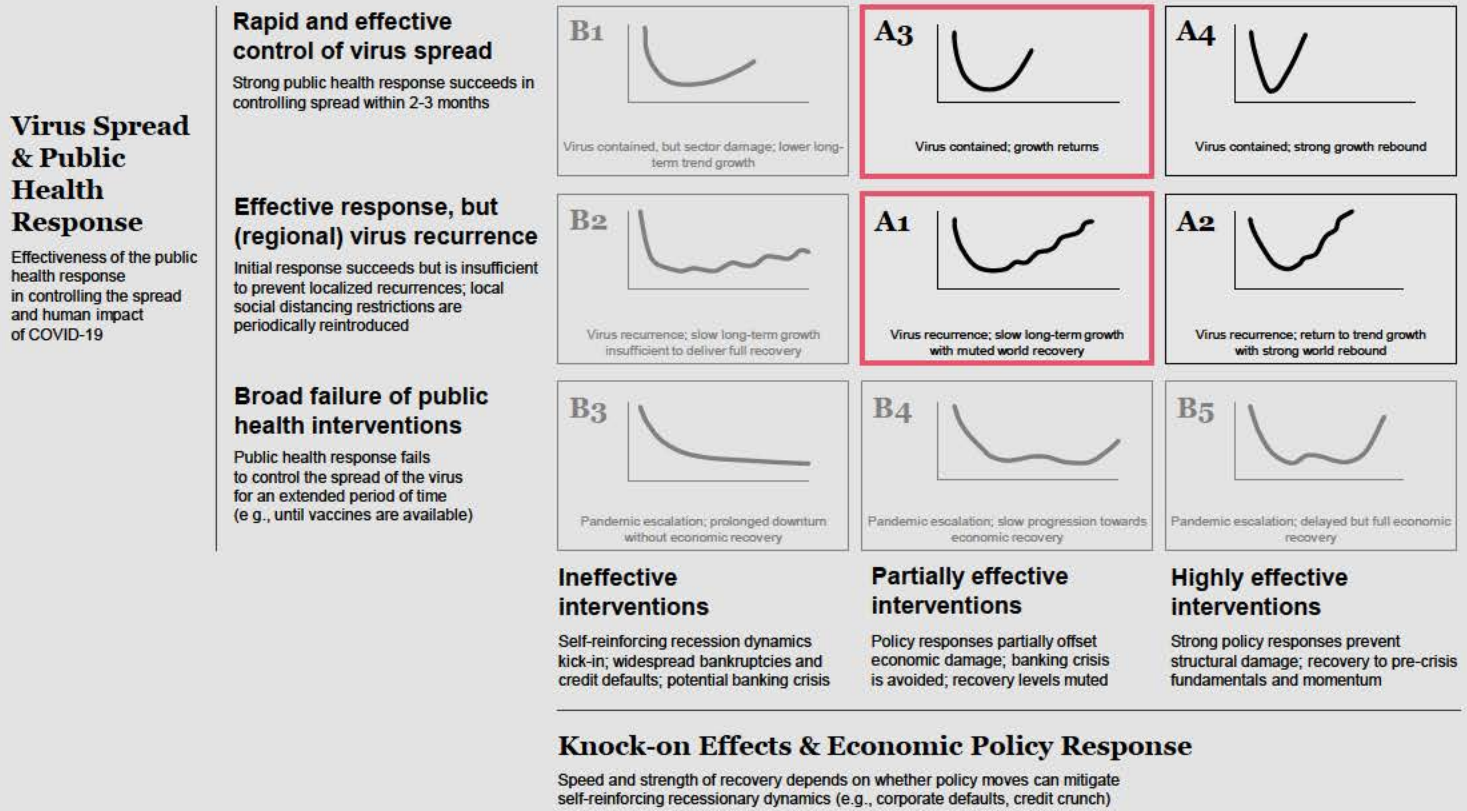
Two scenarios were selected for fare and toll revenue analysis, consistent with:

- Economic performance to date (tracking A3, see next page)
- Outcome expectations (nearly 40% of US executives think A1 is most likely to occur)

☐ Used for May and November forecasts

## Scenarios for the Economic Impact of the COVID-19 Crisis

GDP Impact of COVID-19 Spread, Public Health Response, and Economic Policies




Source: Oxford Economics

# In terms of economic performance, the US is currently tracking scenario A3

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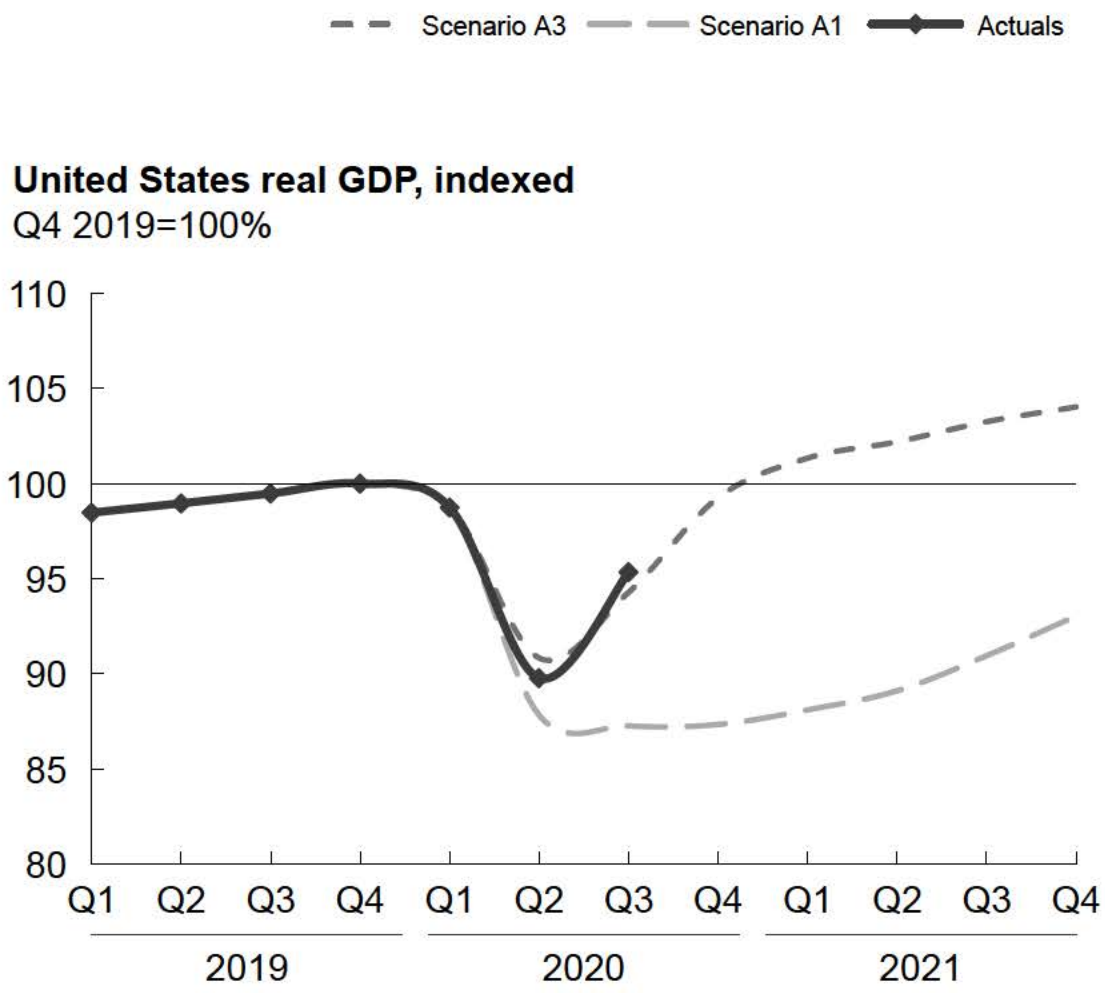


| | Change in real GDP Q4 2019 vs. Q2 2020 | 2020 GDP growth | Return to pre-COVID-19 levels (+/- 1Q) |
|---|---|---|---|
| **Scenario A3** | -9% | -4% | Q1 2021 |
| **Actuals** | -10% | | |
| **Scenario A1** | -12% | -9% | Q2 2023 |

**NOTE: this view pertains to economic recovery (GDP actuals) only—and does not provide a view on the other dimension of the scenario framework, "virus spread & public health response".**

Source: Oxford Economics, U.S. Bureau of Economic Analysis

# Employment outlook is in line with projections from major forecasting services

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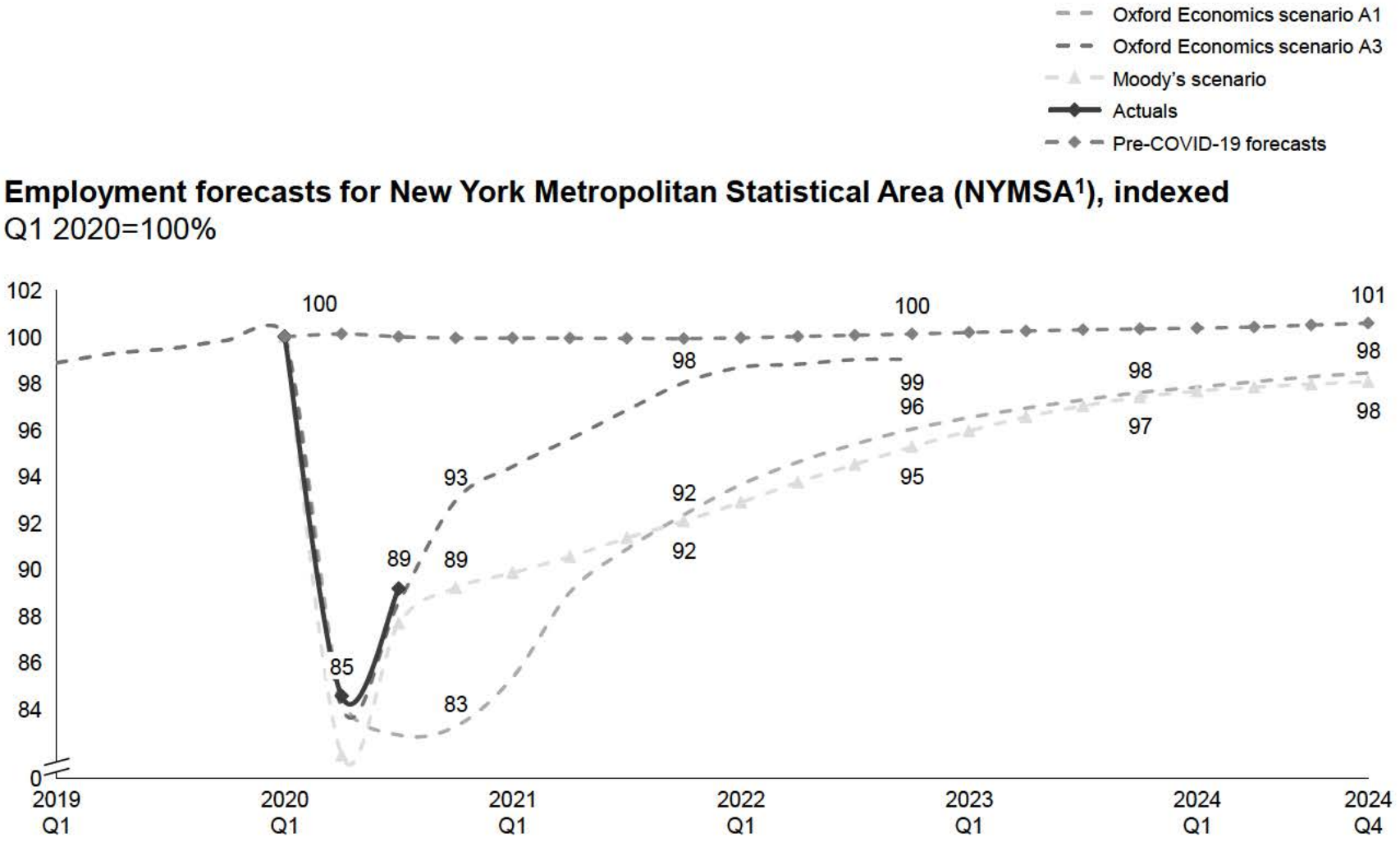
**Employment forecasts for New York Metropolitan Statistical Area (NYMSA[1]), indexed**
Q1 2020=100%




1. NY-NJ-PA Metropolitan Statistical Area (23 counties)

Source: U.S. Bureau of Labor Statistics, Oxford Economics, Moody's, IHS Markit

Q4 2022 NYMSA employment (as a percentage of Q1 2020 levels)

- Oxford Economics scenario A1: 96%
- Oxford Economics scenario A3: 99%
- Moody's scenario: 95%
- IHS Markit forecasts suggest overall U.S. employment might return to 99% of pre-COVID-19 levels by 2022

# Major drivers of change for each scenario

These drivers were identified as potentially having the largest impact on revenues

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| | Drivers of change | Description |
|---|---|---|
| A | **Epidemiological end of the pandemic** | Availability, accessibility and adoption of a vaccine that allows for COVID-19 pandemic end |
| B | **Future of office work** | Number of workers that can work from home (WFH), their return to the office (at their original location), and how many days a week they return to the office |
| C | **Long term behaviors for non-work trips** | Consumer preferences changing the number of trips that are not work-related, by trip type (e.g., shift to e-commerce reduces shopping trips, slow recovery of international tourism in particular reduces tourist trips) |
| D | **Employment decline** | Number of individuals employed within NYMSA |
| E | **Rider shift to auto** | The number of transit rides that are replaced with auto modes (e.g., personal vehicle, TNC, taxi) |
| F | **Rider shift to non-auto** | The number of transit rides that are replaced by non-auto modes (e.g., walking, cycling) on intra-borough trips |
| G | **Incremental fare evasion** | Riders not paying fares over and above the baseline expectations from 2019 |

# Detailed assumptions were evaluated for each scenario

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| Assumption | Scenario 1: Steady recovery to epidemiological end of pandemic | Scenario 2: Virus resurgence, delayed vaccine impact, and sustained changes to economy | Sources / case studies |
|---|---|---|---|
| A **Epidemiological end of pandemic** | Epidemiological end in Q3 2021<br>Steady recovery | Epidemiological end in Q1 2022<br>Slow and prolonged recovery | New York State micro-cluster strategy<br>NYS Effective Reproduction Number (Rt) and Positivity Rates<br>Ridership recovery in other systems (e.g., WMATA, BART) |
| B **Future of office work (for those who can work remotely)** | 1-1.5 days total work from home (0.5-1 additional days on top of today's 0.5) by Q4 2022 | 3 days total work from home (2.5 additional days on top of today's 0.5) by Q4 2022 | Cross-referenced multiple external reports including MTA-led "Partnership for NYC" employer survey<br>Additional employer survey |
| C **Long term behaviors for non-work trips** | 100% of school trips, 80% of leisure trips (including tourism), and 90% of retail trips recovered by Q4 2022 | 100% of school trips, 70% of leisure trips (including tourism), and 80% of retail trips recovered by Q4 2022 | Latest projections and development of school reopening, leisure and tourism trends, online shopping and retail trends |
| D **Employment decline** | NYMSA employment at 99% of pre-COVID-19 levels by Q4 2022 | NYMSA employment at 96% of pre-COVID-19 levels by Q4 2022 | Oxford Economics forecasts<br>Moody's and IHS Markit forecasts |
| E **Rider shift to auto** | Up to ~6% shift in suburb to Manhattan transit commutes, depending on year<br>~7% increase in TNC Mode share on borough to borough trips | Up to ~10% shift in suburb to Manhattan transit commutes, depending on year<br>~15% increase in TNC Mode share on borough to borough trips | Manhattan parking availability<br>Office space vacancy in NYC vs suburbs<br>Global Auto Consumer Insights survey |
| F **Rider shift to non-auto** | 10% increase in total intra-borough walk/bike trips | 15% increase in total intra-borough walk/bike trips | Perception of safety from crime via ridership surveys<br>MTA trip distance data<br>Micromobility trends<br>Historical movements after 'shock events'<br>Global Auto Consumer Insights survey<br>NYPD COMPStat report; NYPD MTA report |
| G **Incremental fare evasion** | Incremental 4-8% fare evasion on subway (reduces as ridership recovers), 3-8% incremental fare evasion on bus | Incremental 5-8% fare evasion on subway (reduces as ridership recovers), 3-10% incremental fare evasion on bus | Historical fare evasion data |

# B: Future of office work assumptions are informed by the share of commuters able to work from home

Office based workers are more likely to be able to work from home

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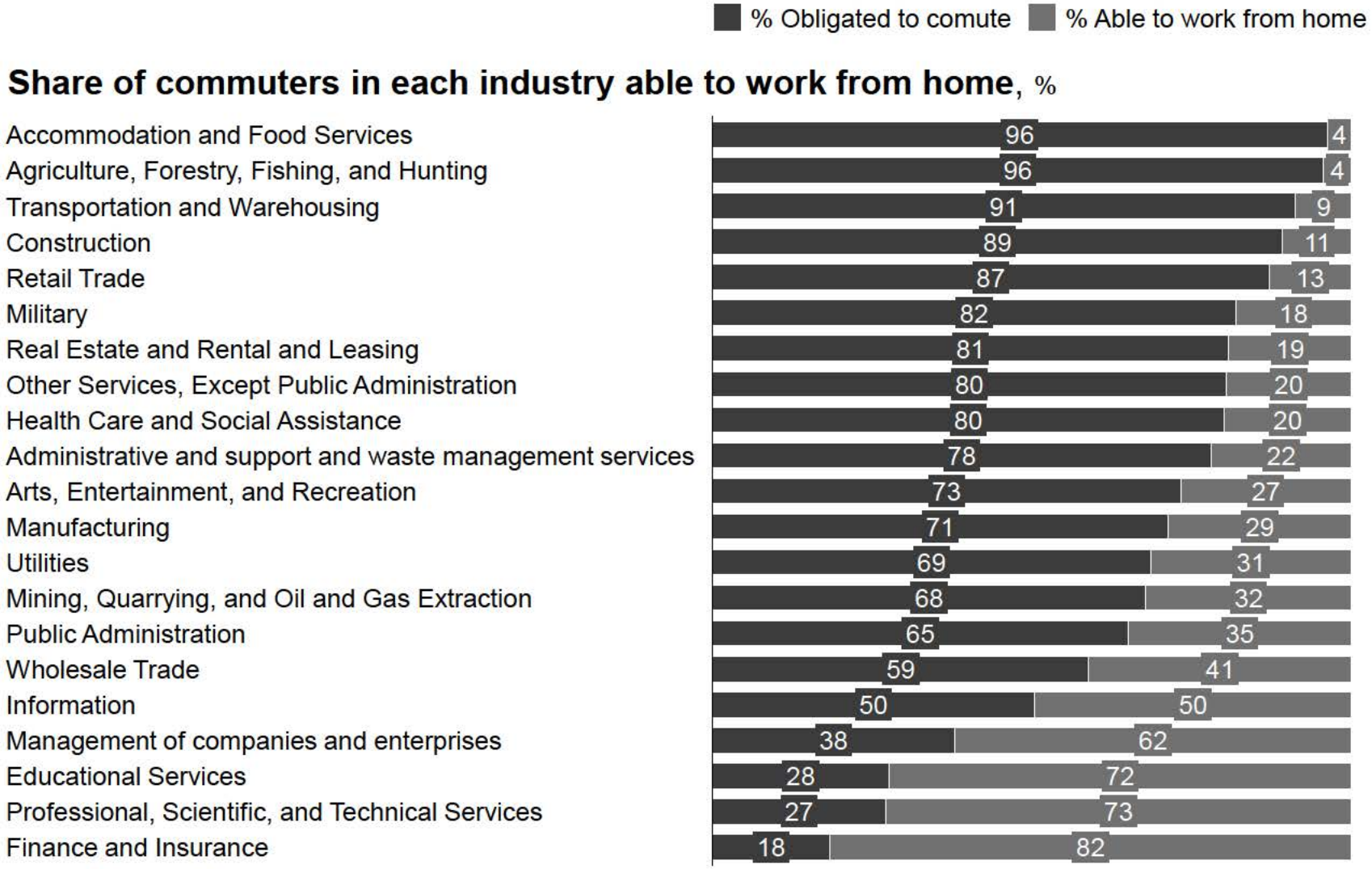


## Assumptions for ridership scenarios

Assumed the percentage that were obliged to commute were required to go to the place of work

For those that can work from home, used survey data to build a profile of which of those would go to work

Source: US Census American Community Survey (ACS), Oxford Economics

# B: Work from home ability was assessed at the market/modal pair level

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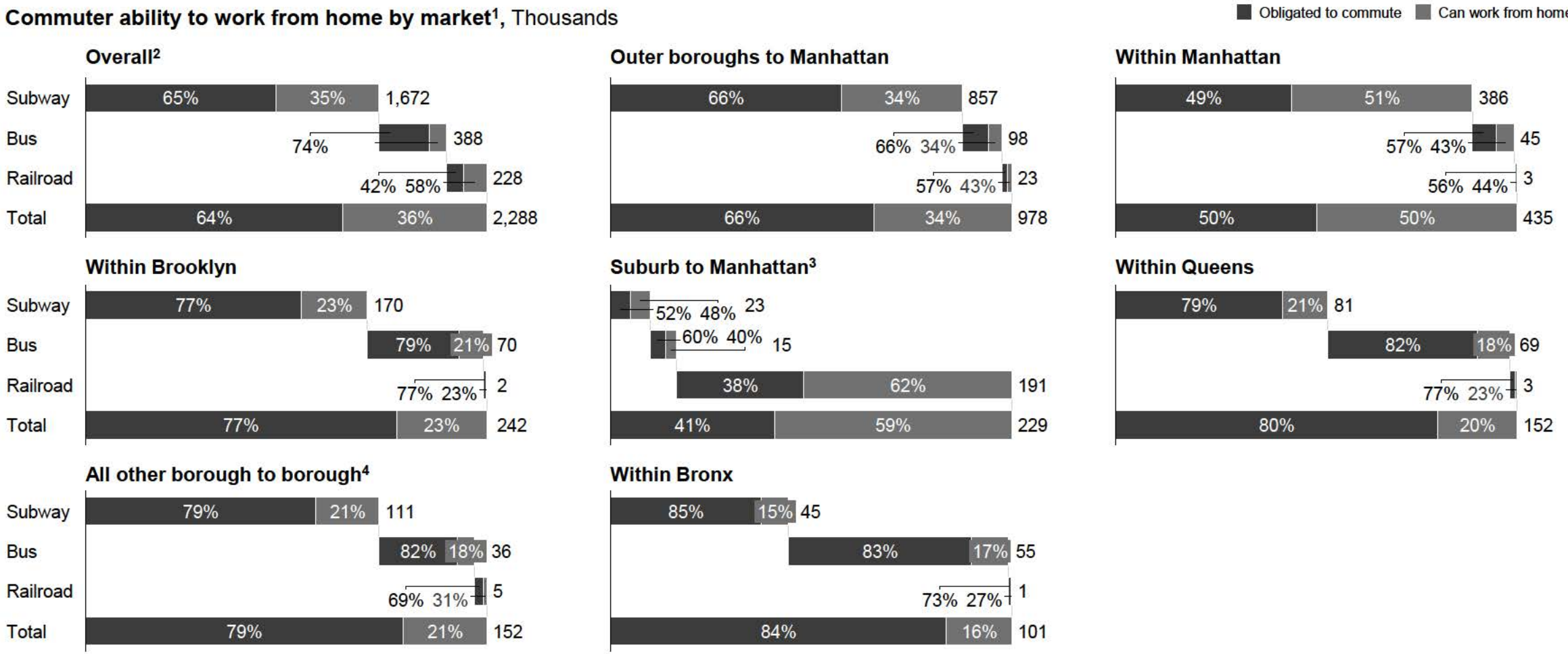
**Commuter ability to work from home by market[1]**, Thousands




1. Analysis considers subway, bus, and railroad work commuters as identified by the US Census American Community Survey (ACS); i.e., not number of trips
2. Inclusive of the following commuters: borough to Manhattan, within Manhattan, suburb to Manhattan, and all inter- and intra- borough transit
3. Represents commutes originating in Hudson Valley (Dutchess, Orange, Putnam, Rockland, Westchester counties), Long Island (Nassau, Suffolk counties), and Connecticut (Fairfield, New Haven counties) suburbs
4. Represents all inter- and intra- borough travel, excluding: Brooklyn to Brooklyn, Queens to Queens, and Bronx to Bronx transit

Source: US Census American Community Survey (ACS)

# B: Due to occupational mix on commuter rail, work from home ability has a large impact on MNR and LIRR ridership

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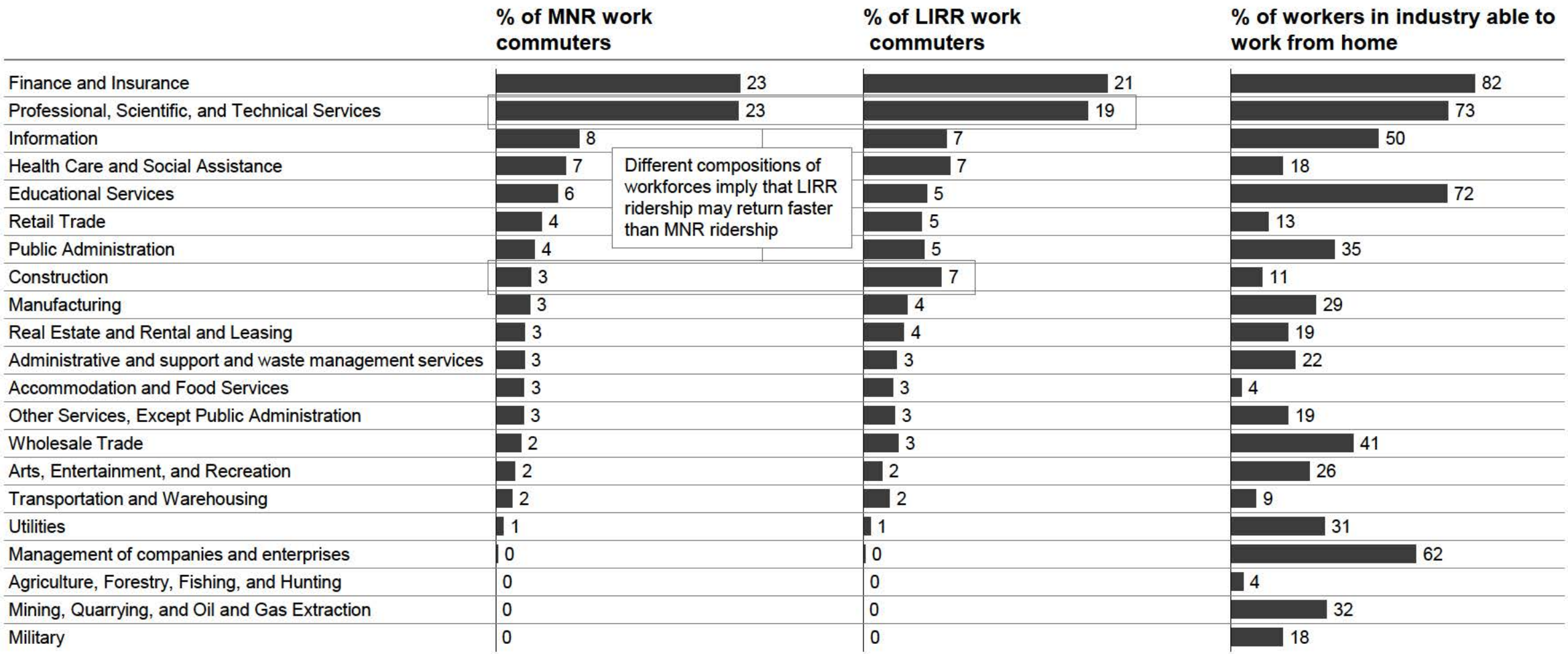


Source: US Census American Community Survey (ACS)

# Scenario 1: Overall ridership could recover to ~90% by Q4 2022

## Ridership recovery is likely to be slow until the end of the pandemic

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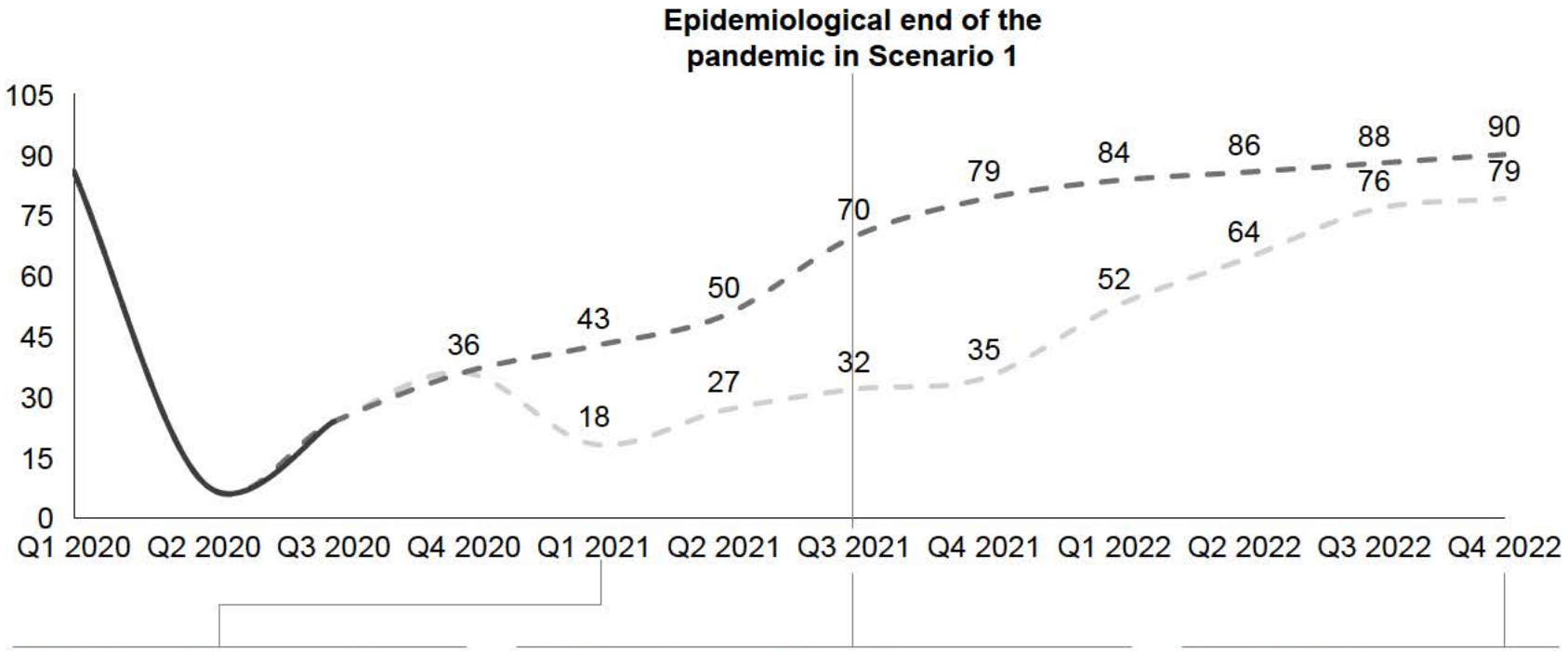
**Illustrative**

**Ridership scenario forecasts,** as a percentage of pre-COVID-19 ridership[1]




**Q1 2021:** Current ridership levels are maintained through end of winter through micro-cluster strategy: resurgences are managed, do not lead to full city or state-wide restrictions

**Q3 2021:** Epidemiological end of the pandemic drives ridership recovery to ~80% of pre-COVID-19 ridership by Q4 2021; while in-person working returns, working from home still occurs an incremental 0.5-1 days a week

**Q2-Q4 2022:** Ridership recovery slows due to sustained employment declines in some industries, modal shifts, and non-work trip behavior

Decreased ridership in scenario 1 may result in a $2.8 billion fare revenue loss in 2021 ($1.0 billion in 2022) compared to February 2020 financial plan

Epidemiological end of the pandemic (including managed virus resurgence without severe public health restrictions) could drive ridership recovery, however sustained behavioral changes may limit this recovery to ~80% of pre-COVID-19 levels by Q4 2021

Q4 2022 ridership may return to ~90% levels, due to adoption of hybrid in-person and remote work models, enduring reduction in non-work trips due to shifts in consumer behaviors, and lasting employment reduction in certain industries

1. Ridership values reflect represent a percentage of current service

Source: U.S. Census American Community Survey (ACS), Oxford Economics, press search, expert interviews

# Scenario 1: MNR and LIRR may lag overall ridership because of higher proportion of work trips

## Bus and subway ridership will likely be more resilient

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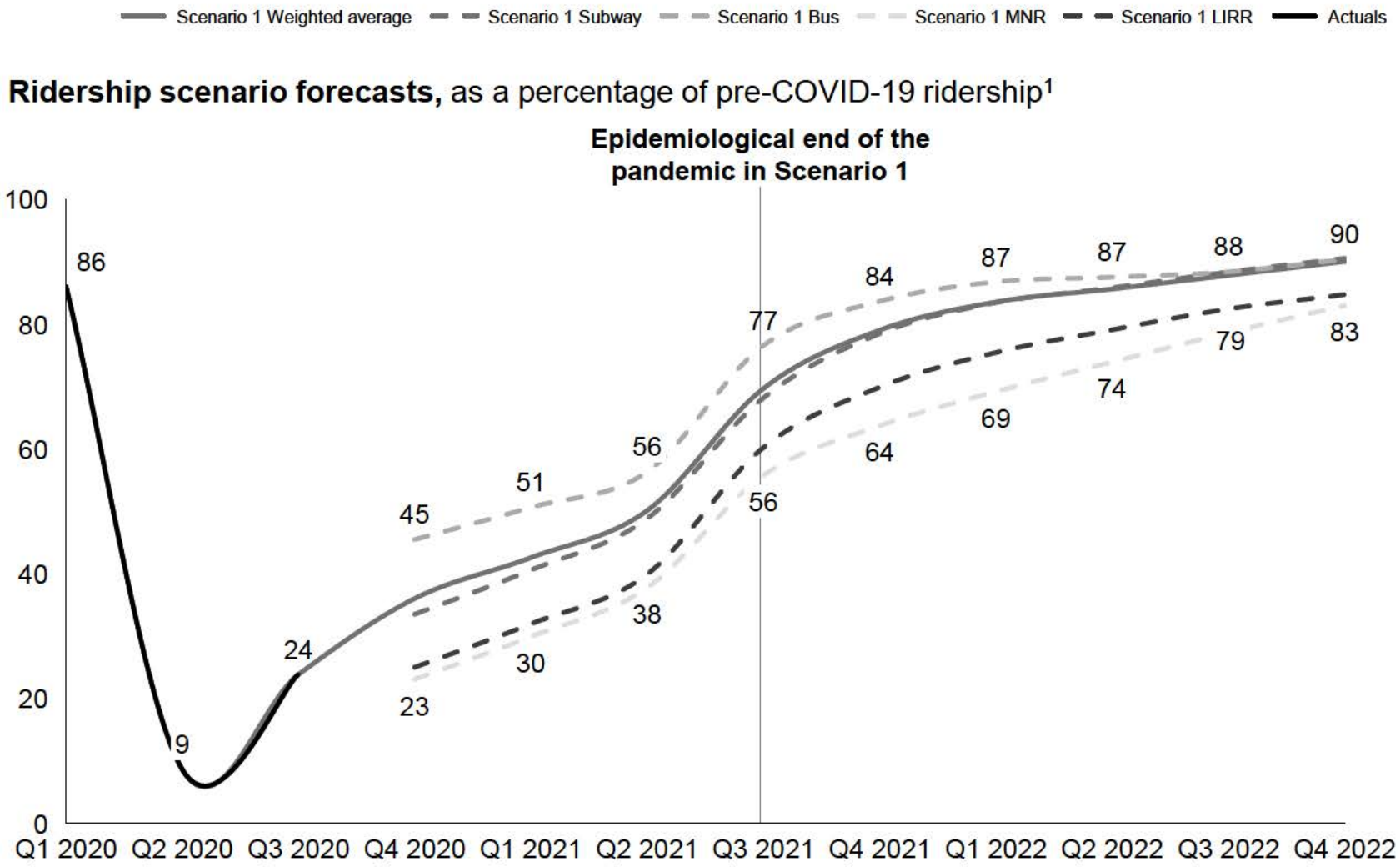


MNR and LIRR may recover slower as they are disproportionately affected by lasting work from home models due to the large share of work trips in these modes (85% and 64% respectively, compared to 59% on subway and 35% on bus)

Consistent with current ridership behavior and recent MTA actuals, bus and subway ridership remains higher than that of commuter rail

Subway and bus ridership recovery driven by return of some non-work and work trips, and converge as scenario 1 approaches the “next normal” in Q4 2022, reaching ~90% of pre-COVID-19 ridership levels due to lasting customer behavior shifts

Source: U.S. Census American Community Survey (ACS), Oxford Economics, press search, expert interviews

# Scenario 2: Ridership may only recover to ~79% of pre-COVID-19 levels by Q4 2022

## Worse public health situation drives a slower ridership recovery

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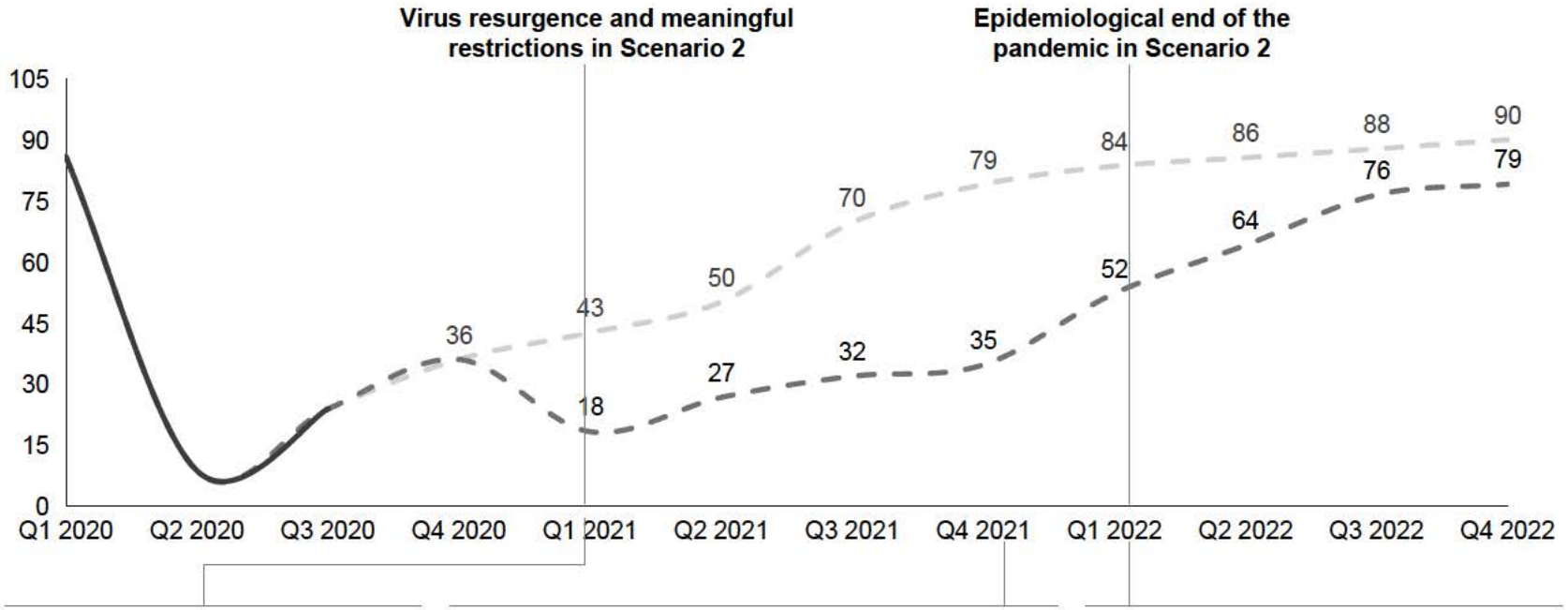
**Illustrative**

Scenario 1 — Scenario 2 — Actuals

**Ridership scenario forecasts,** as a percentage of pre-COVID-19 ridership[1]




**Q1 2021:** NYS COVID-19 Rt continues to increase (1.02 on Sep 25, 1.15 on Nov 30), leading to meaningful restrictions associated with a second wave, similar to March / April 2020

**Q4 2021:** Ridership recovers to Q4 2020 levels, though recovery is prolonged and recovers at a rate slower than in 2020; permanent behavioral shifts are joined by economic implications that accompany meaningful restrictions (e.g., business closures, employment decline)

**Q1 2022:** epidemiological end of the pandemic drives ridership recovery, though growth slows through Q3 and Q4 2022

Meaningful restrictions associated with a second wave and more prolonged recovery may result in $4.7 billion revenue loss in 2021 and ($2.2 billion in 2022) compared to February 2020 financial plan

Increasing Rt and positivity rates may result in meaningful, extended restrictions in NYS/NYC

This second wave may reduce ridership to levels seen in March and April 2020, mirroring early trends in European countries currently experiencing new restrictions, and may be followed by a slower ramp-up in ridership as seen in transit systems slower to recover in 2020 (e.g., WMATA, BART)

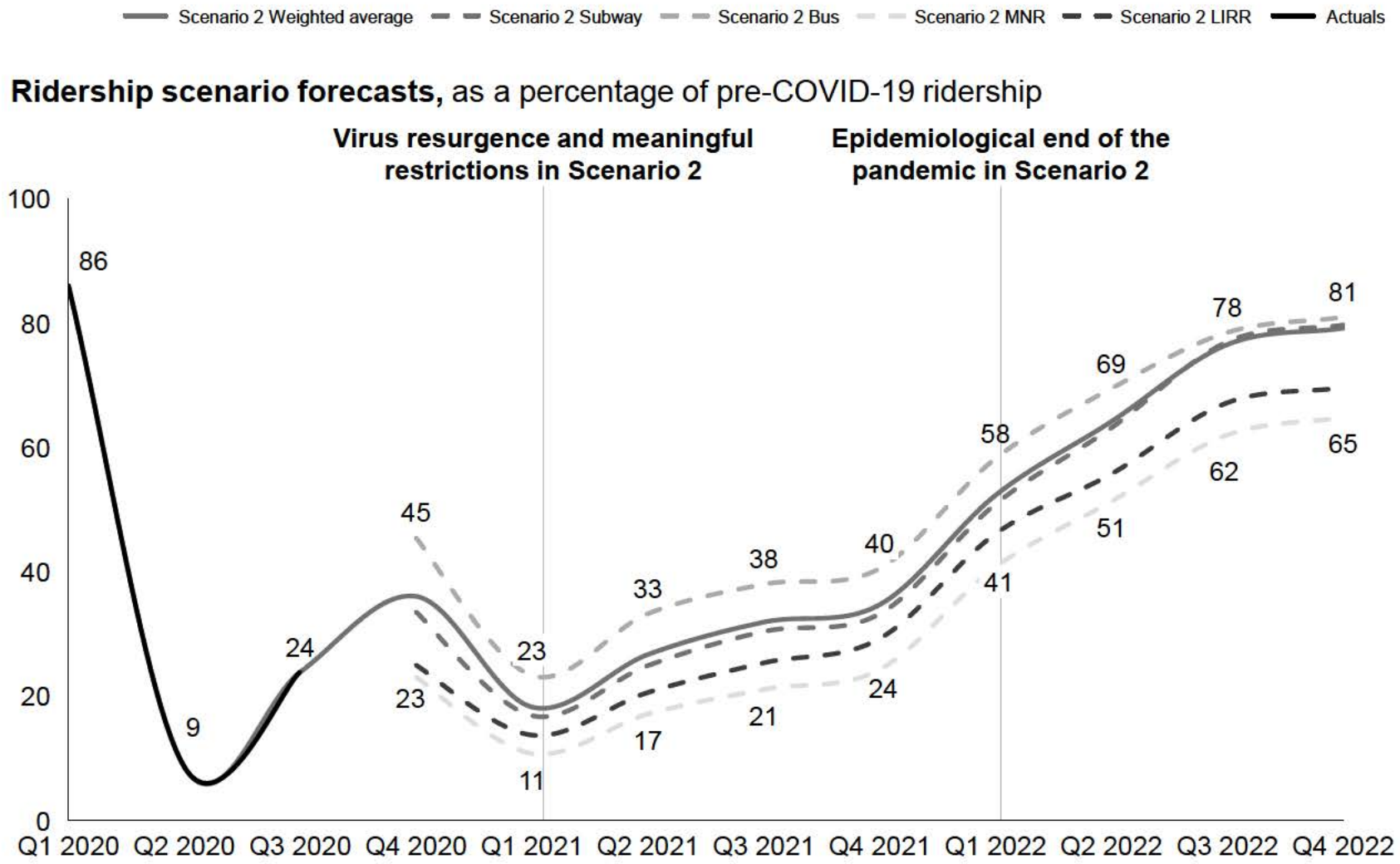
Similarly, Q4 2022 ridership may not recover to 100% given sustained shift to working from home (3 days a week at home), enduring reduction in non-work trips, and lasting employment reduction

1. Ridership values reflect represent a percentage of current service

Source: U.S. Census American Community Survey (ACS), Oxford Economics, rt.live, Apple mobility data, press search, expert interviews

# Scenario 2: Greater work from home further slows recovery of MNR and LIRR relative to bus and subway

## "Next Normal" ridership may be as low as 80%




Source: U.S. Census American Community Survey (ACS), Oxford Economics, rt.live, Apple mobility data, press search, expert interviews



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Ridership may not return to the "next normal" by Q4 2022 given the assumption of virus resurgence leading to meaningful, extended restrictions in NYS/NYC in Q1 2021

Subway and bus ridership recovery driven by return of some non-work and work trips. Compared to scenario 1, sustained difference between subway and bus ridership results from relatively more work trips on the subway, which therefore is affected more by more aggressive work from home (WFH) assumptions

MNR and LIRR are disproportionately affected by lasting WFH models (scenario 2 assumes 2 incremental days per week at home)

Ridership may recover beyond 2022, as some work and non-work trips return and employment decline slightly decreases; however, overall ridership might not exceed 80% of pre-COVID-19 ridership given lasting behavioral changes (driven by WFH models)

# Changes in commuter rail patterns may have disproportionate impact due to higher fares and proportion of work-related trips

Commuter rail represents 27% of revenue impact despite accounting for 7% of ridership

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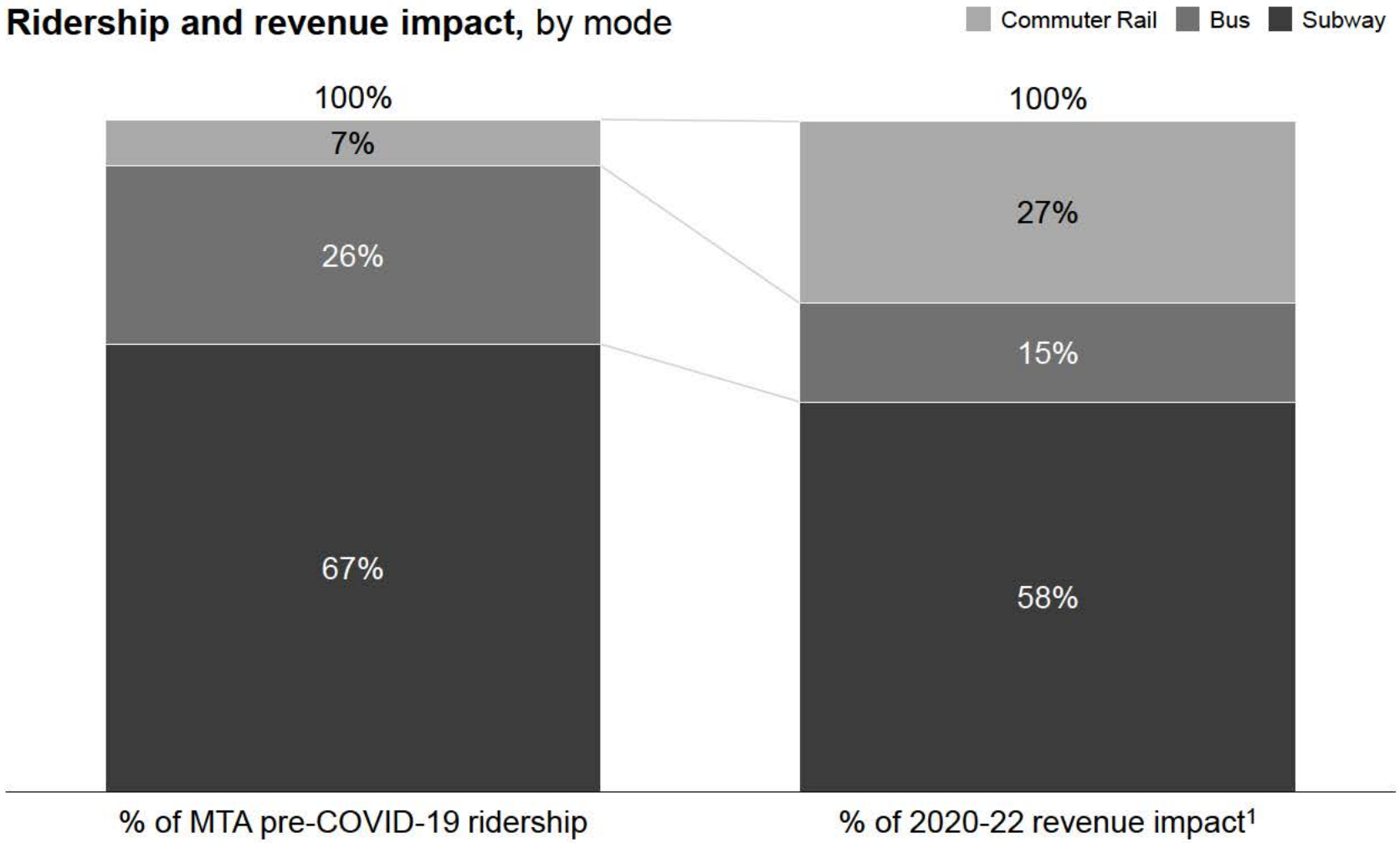
**Ridership and revenue impact,** by mode




Decreased subway ridership may drive majority of the 2020-2022 revenue impact as it accounts for the greatest portion of total MTA ridership

Though MNR and LIRR only account for 7% of pre-COVID-19 ridership, ridership decrease in commuter rail may account for ~30% of revenue impact

Bus may drive a disproportionately low revenue impact due to accelerated recovery in scenarios 1 and 2 relative to other modes, consistent with observed MTA actuals

1. Compared to farebox revenue from February 2020 financial plan

Source: U.S. Census American Community Survey (ACS), Oxford Economics, rt.live, Apple mobility data, press search, expert interviews

# Public health assumptions are the major drivers of how ridership evolves through 2022

~50% of the potential revenue gap is determined by epidemiological assumptions

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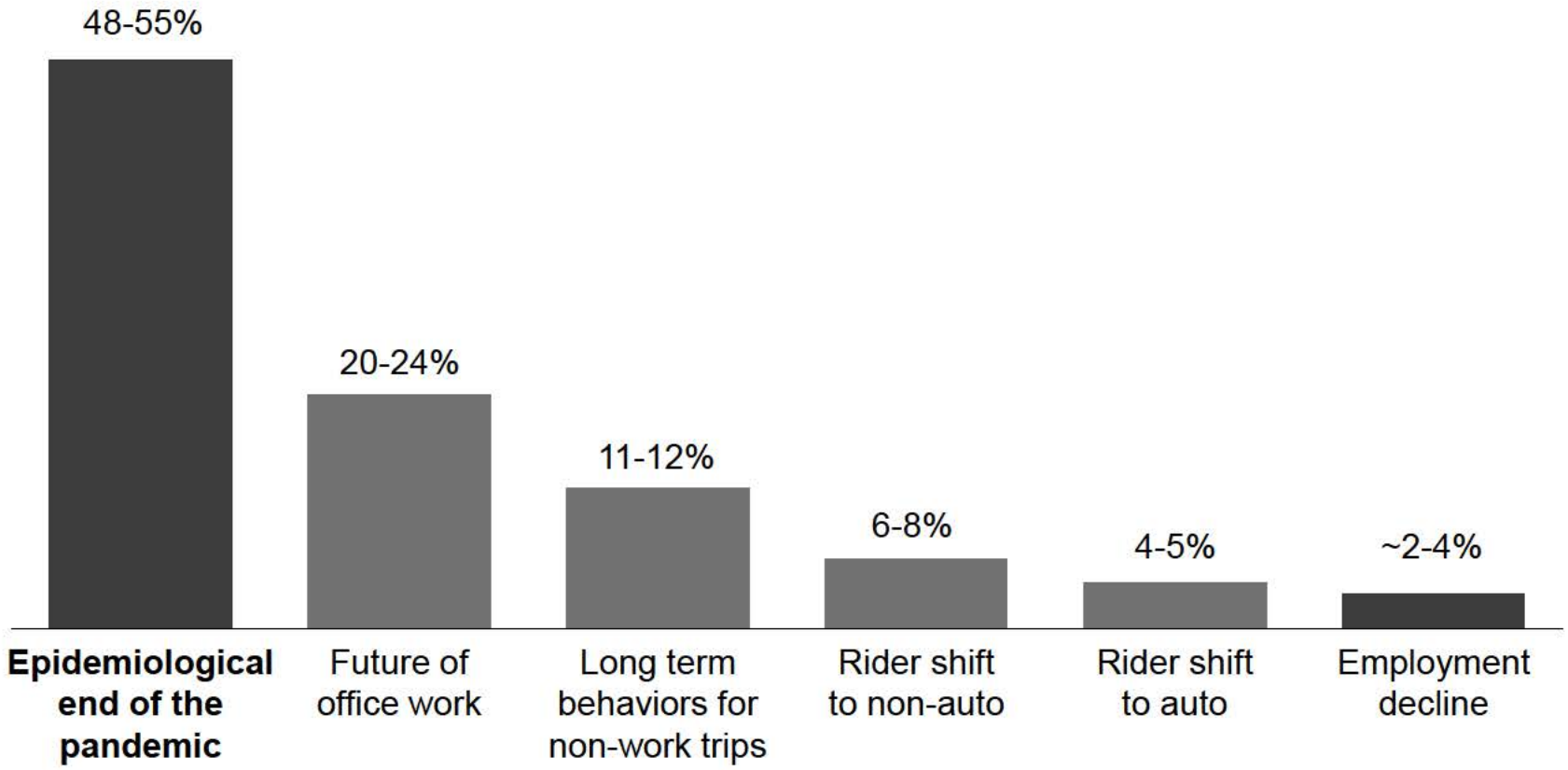
Primary impact after 2022 (details follow)

**Drivers of total gap from pre-COVID-19 ridership 2020-2022**

As percentage of total ridership impact




Epidemiological end of the pandemic, future of the workplace, and non-work trip behavior assumptions drive majority of impact as these affect a large commuter base

Modal shift behaviors drive a small portion of impact due to ridership reductions affecting a smaller base (e.g., short intra-borough trips)

Fare evasion effect is not shown here, as this impacts revenue (rather than ridership) levels

Perceptions of crime and safety are considered in modal shift assumptions

Source: U.S. Census American Community Survey (ACS), Oxford Economics, press search, expert interviews

# Looking beyond 2022, ridership may remain at ~82-91% of pre-COVID-19 levels

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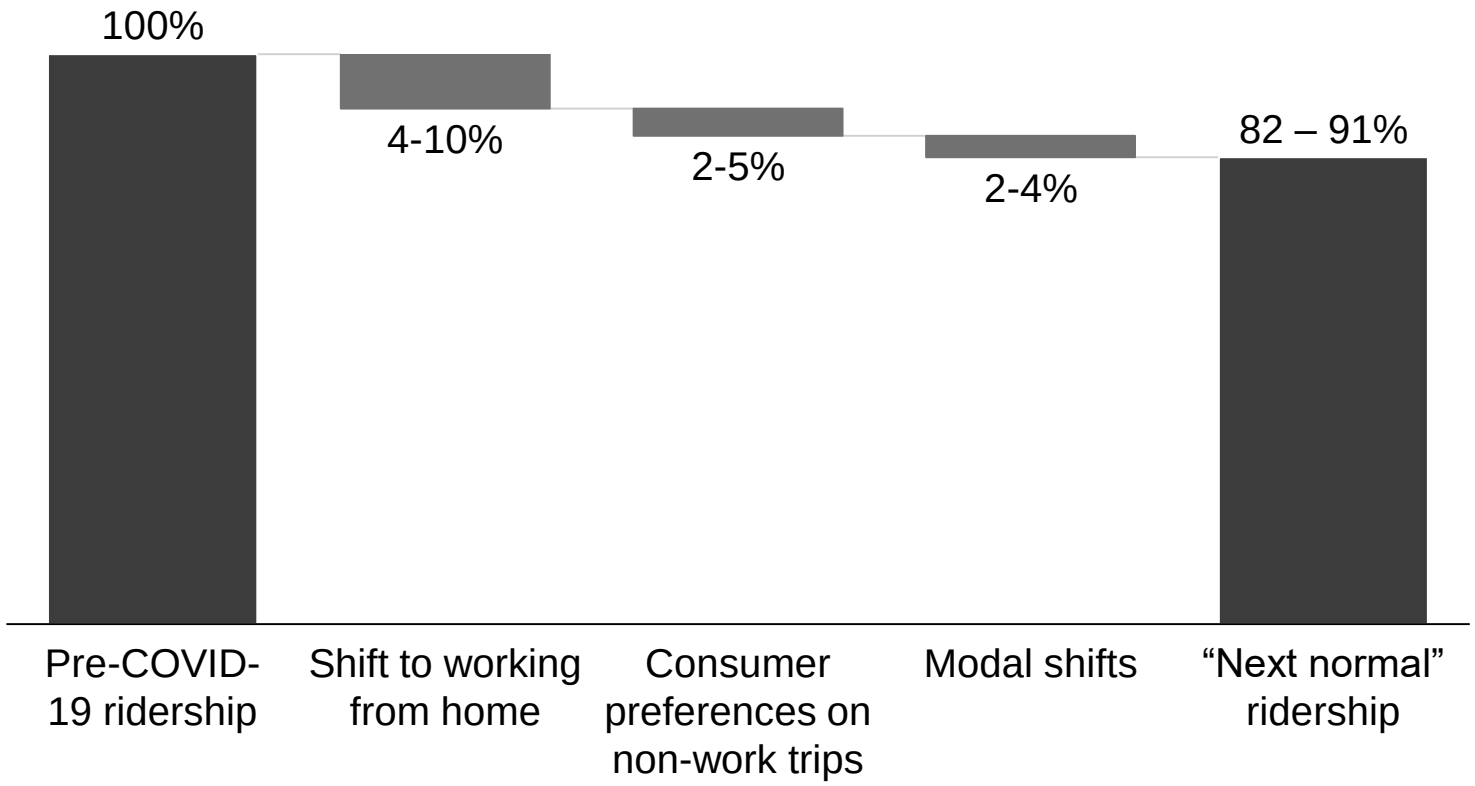
**Q4 2024 ridership estimates**
As percentage of pre-COVID-19 ridership




Transit ridership may only recover to ~82-91% of pre-COVID-19 levels by the mid-2020s

If transit riders who are able to work from home continue to do so for an average of 1-3 days per week, this could drive a 4-10% ridership decrease

Decrease in non-work trips (e.g., 10-20% reduction in shopping trips due to e-commerce trends, 20-30% reduction in leisure trips in line with forecasted tourism recovery) accounts for an additional 2-5% estimated reduction

Permanent mode shifts (e.g., 6-10% shift in suburb-to-Manhattan commutes to auto, 10-15% increase in intra-borough walking / biking trips) result in an additional 2-4% decrease on the overall ridership base

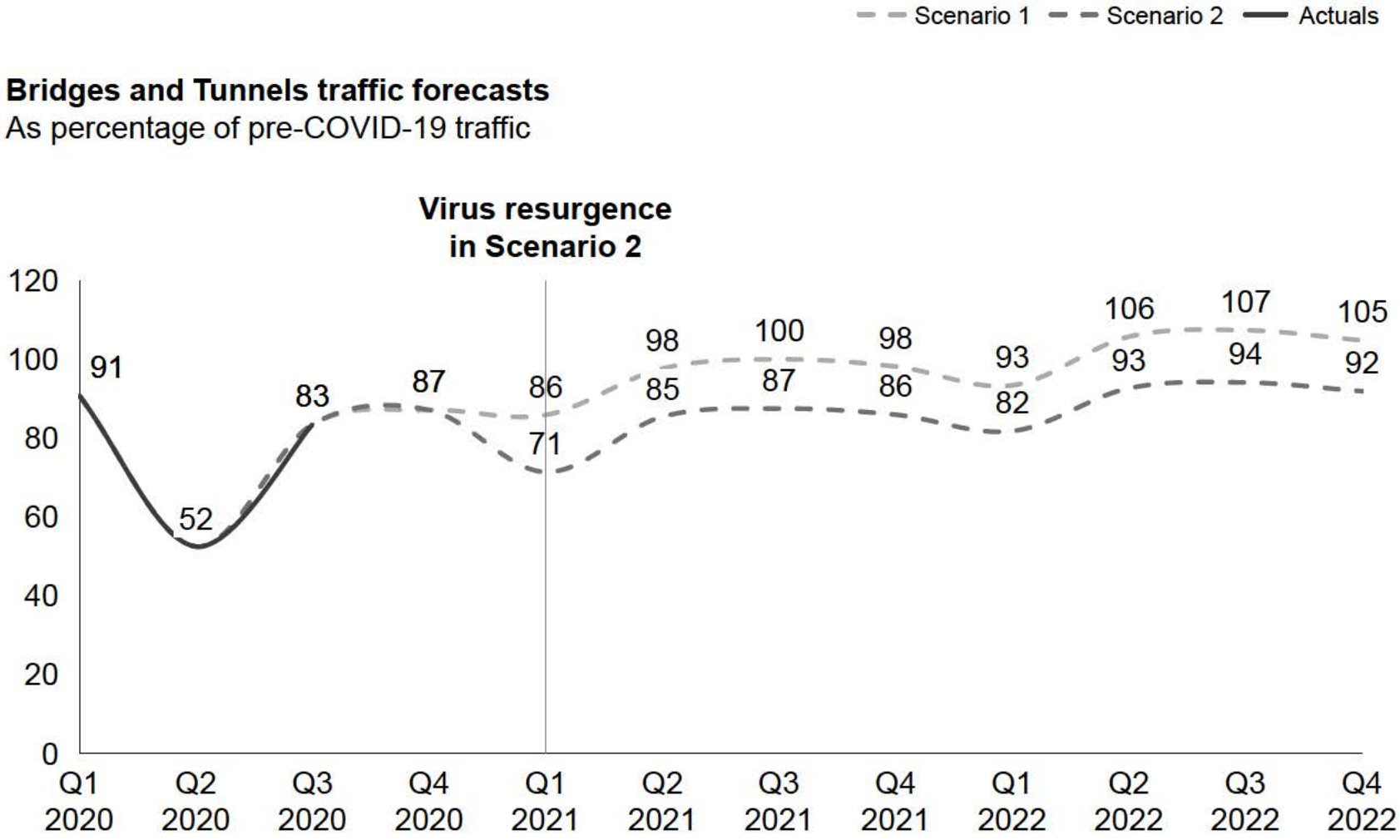
Source: U.S. Census American Community Survey (ACS), Oxford Economics, press search, expert interviews

# Toll revenue has been more resilient and may exceed pre-COVID-19 levels by Q4 2022

## Toll revenue has recovered faster through Q3 2020

(11/30/20) Please see disclaimer on page 4. These analyses represent only potential scenarios based on discrete data from one point in time. They are not intended as a prediction or forecast, and the situation is changing daily.

**Bridges and Tunnels traffic forecasts**
As percentage of pre-COVID-19 traffic




Overall, decreased toll revenue may result in up to $600M revenue loss compared to the February 2020 financial plan[1]

Toll revenues have been fairly robust, down ~20% today

Major drivers of differences between scenarios:

- Virus resurgence in scenario 2 causes drop, though smaller than March / April 2020 given evidence seen in U.S. cities that experienced a second wave in summer 2020 (e.g., Houston, Phoenix)
- Mode shift to auto is stronger in scenario 2

1. Assumes a 4% increase in fares across modes (including tolls) beginning in 2021 Q2

Source: MTA, U.S. Department of Transportation, Apple mobility data

# Content

Fare and toll revenue methodology and impact

**Non-fare revenue methodology and impact**

# Overview of revenue components and forecasting approach

(11/30/20) Please see disclaimer on page 4. These analyses represent only potential scenarios based on discrete data from one point in time. They are not intended as a prediction or forecast, and the situation is changing daily.

Focus of this section

## Fare and toll revenue

Established two different scenarios for fare and toll revenue recovery

Developed assumptions for epidemiological end of the pandemic, future of the workplace, employment, non-work trips, rider shift to auto and non-auto modes, and fare evasion

Incorporated estimates by transportation mode, with different average fares

**Ridership and traffic curves**

## Non-fare revenue

Identified six archetypes of non-fare revenue: (1) employment, (2) real estate and mortgages, (3) sales, (4) business income, (5) mobility (6) mix of various revenues ("other")—each with a distinct driver

Created a methodology for each archetype to forecast revenues for 2020-2022 with two different underlying GDP scenarios

**Archetype-specific change profiles**

# Approach to forecasting tax and subsidy revenue

Seven different archetypes of taxes were identified

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Details follow

| Archetype | Methodology for multiplier calculation | Applicable MTA taxes |
|---|---|---|
| **Employment** | Projected changes in employment for NYMSA | Payroll Mobility Tax |
| **Real Estate + Mortgages** | Application of historical percentage change of MRT and Urban tax (40%) during Great Recession | MRT 1 + 2; Urban tax (MRT, Real Property Transfer Tax), Mansion Tax |
| **Sales** | Percentage drop of projected 2020 GDP vs. 2019 actuals for sales tax relevant industries (retail and leisure and hospitality) | MMTOA (MTA District Sales Tax, Hold Harmless for Clothing) |
| **Business Income** | Corporate income tax elasticity during the Great Recession applied to percentage change between forecasted 2020 GDP and 2019 actual GDP | MMTOA (Corp franchise tax, both Corp & utilities taxes, insurance and bank taxes) |
| **Mobility** | Based on expected traffic volume, linked to the toll revenue model | MMTOA (Petroleum business tax, Motor fuel tax, MCTD taxicab tax, MTA passenger car rentals); FHV surcharge |
| **Other** | Average of all other tax multipliers | MMTOA (investment income), <1% of 2020 budget |
| ***No or minimal anticipated change*** | *Not determined by underlying policy or economic driver* | *PBT (Motor vehicle fees); MRT adjustments; CBD Tolling ; Internet marketplace tax; State and local subsidies (Local and State operating assistance, Station maintenance); other funding agreements (for MTA bus, SI Railway, Metro-North), PMT replacement fund; B&T operating surplus transfer*[1] |

1. Non-fare revenue loss does not include the impact of reduced transfers from toll revenue; these are accounted for in the toll revenue losses

# Detailed methodology was created for five priority archetypes

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| Archetype | Considerations for analysis / methodology | Key assumptions |
|---|---|---|
| **Employment**  | Based on overall employment changes by quarter tied to macroeconomic modeling by industry for NYMSA<br>Value of collections is directly proportional to the number of individuals in employment | Employment projections accurately predict outcomes of the two scenarios<br>Limited structural change in the economy means tax revenues collected per employee is constant |
| **Real estate + Mortgages**  | Saw ~40% y.o.y. drop in real estate and mortgage-related taxes 2007-2008, with further declines in 2008-2009<br>Applying initial decline of 40% to each relevant tax, given the forecasting starts with the first year of COVID-19 impact (2020)<br>Start of recovery is further lagged by one quarter in scenario 2 | The recovery in the Great Recession is a predictor of how real estate transactions will evolve |
| **Sales**  | Apply the % change y.o.y. for the 2020 GDP forecast (inflation adjusted) for NYMSA vs. 2019 data for each quarter to the 2019 tax<br>Since ~20% of the tax base is from B2B, used weighted average of GDP change for Retail and Leisure/Hospitality (80%) + GDP of remaining industries (20%, proxy for B2B) to reflect underlying tax base<br>Relationship remains through subsequent years | Sales tax will closely track GDP<br>Retail and hospitality are the largest driver of sales tax and the main driver of the change in sales tax |
| **Business Income**  | Assume that the elasticity of corporate income tax to GDP is the same as in the Great Recession and apply that factor to project 2020 data<br>Many of the considered taxes are surcharges on the state corporate income tax, so apply the same logic as to the tax itself<br>Business income taxes stay flat between 2021 and 2022 as carry forward losses offset any increase in profitability | Great Recession is a good model for what is happening to the economy right now, i.e., that the elasticity between change in tax and change in GDP during times of crises is constant or very similar |
| **Mobility**[1]  | Based on projected decrease in toll revenue by month (see details in toll revenue projection and methodology) | Fuel taxes will track toll revenue changes as a proxy for vehicle traffic |

1. Mobility assumptions explained in further detail in Fare revenue section

# Cumulative non-fare revenue may decrease by $3.1-4.6 billion from initial February budget

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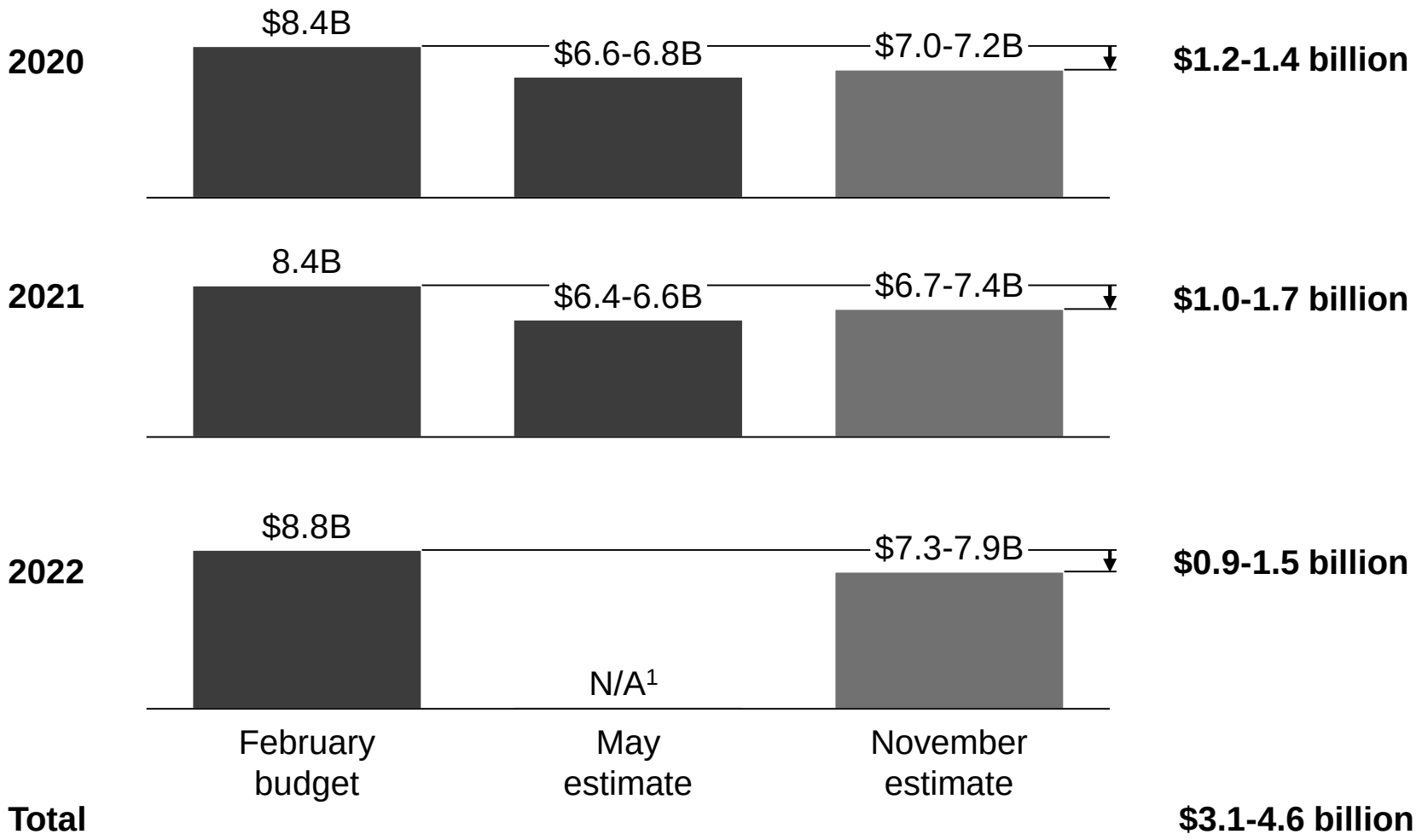


Loss in non-fare revenue 2020-2022 could be up to $3.1-4.6 billion

5-12% reduction of the revenue gap versus May estimates is driven by improvement in GDP forecasts and higher tax collections actuals in Q2 and Q3 2020

1. No 2022 estimate was made in May

Source: Oxford Economics, Bureau of Economic Analysis, MTA