

# Share of Choices

**Further Evidence of the  
ride-hailing effect in Metro  
Boston and Massachusetts**

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## INTRODUCTION

On May 1, Massachusetts regulators released a first-ever statewide picture of annual ride-hailing activity, through a data set detailing the total number of trips by municipality and average trip length for the state. Mandated by recent state laws and regulations, this data set delivers novel insight into the magnitude of which new on-demand mobility services such as Uber and Lyft are transforming the transportation system in Massachusetts. These data are a complete enumeration of all ride-hailing activity that occurred last year in the Commonwealth, aggregated by the municipalities in which the recorded trips started and finished. In 2017, approximately 64.8 million ride-hailing trips started in Massachusetts, with over 80% of these trips beginning in Suffolk and Middlesex Counties. Coming shortly after the release of MAPC's Fare Choices report on ride-hailing passengers, these statistics provide additional evidence that a travel mode option that did not exist a decade ago is quickly altering travel patterns and choices throughout Metro Boston and Massachusetts.

However, it is necessary to contextualize these statistics in order to begin assessing the ride-hailing effect in our state's communities and existing transportation system. Specifically, MAPC analyzed these statewide data to estimate the share of all trips being made by ride-hailing services, impact of ride-hailing adoption on public transit ridership and its revenue streams, and ride-hailing's contribution to passenger vehicle miles traveled (VMT) in the Commonwealth. We accomplish these research objectives by complementing this new ride-hailing data set with data from the Central Transportation Planning Staff's (CTPS) travel demand model, Massachusetts Vehicle Census, and MAPC's February 2018 ride-hailing report. By using empirical and modeled data, with a set of detailed technical assumptions, we provide the first normalized indicators about of ride-hailing's effect in Metro Boston and Massachusetts: estimates of the overall mode share and VMT of ride-hailing services and their impacts on existing transportation revenue and funding sources.

# RIDE-HAILING IMPACTS

## TRAVEL MODE SHARE

65 million trips seems like a lot, but is it? The answer to that question depends on how many trips Massachusetts travelers are taking each year, a figure that's hard to pin down precisely with current data. There is, unfortunately, no current source of data describing the total count of trips by all passenger travel modes for all trip purposes. Therefore, modeled data are needed to estimate the number and distribution of trips taken in Metro Boston. To estimate ride-hailing's share of all trips, we compare the annualized reported trips to outputs of a regional travel demand model<sup>1</sup>. This model—based on travel surveys, traffic counts, Massachusetts Bay Transportation Authority (MBTA) boardings, and other data— estimates the total number of trips beginning and ending within each municipality, by all modes (e.g., car, transit, walking, biking). At present, these valuable outputs are based on a statewide travel survey conducted in 2011, when ride-hailing services were not available as a travel mode choice. Even though ride-hailing is not simulated in the CTPS model, it can still serve as a valid reference for estimates of total trips and transit ridership.

Enhancing these modeled data with now-available data on ride-hailing, we estimate that ride-hailing trips comprised approximately 1.3% of all trips taken in the 101 municipalities of the MAPC region. The share of trips taken by ride-hailing is even higher in the most densely developed portion of the region (MAPC's **Inner Core Committee** subregion, which includes Boston and 19 other cities and towns), where we estimate ride-hailing to account for over 2.4% of all trips (**Table 1**). **In Boston, approximately one out of every 25 trips ending within the city limits was estimated to be taken using a ride-hailing service.** Meanwhile, in the neighboring communities of Cambridge, Somerville, and Brookline, at least one out of every 50 trips are taken with a travel mode that did not exist in the region a decade ago. **Figure 1** and **Figure 2** illustrate the regional spatial distribution of these travel mode shares for municipalities where ride-hailing trips begin and end, respectively.

We then compared the estimated ride-hailing mode shares to modeled public transit mode shares to offer insight into the relationship between these two transportation choices. The modeled transit mode shares are calibrated to observed boardings and are therefore expected to better mirror existing conditions than the other modeled modes. Focusing again on the Inner Core subregion where transit service is most complete, we computed a 'relative ratio' between mode shares for public transit and ride-hailing (**Table 2**).



**TABLE 1: ESTIMATED MODE SHARES OF RIDE-HAILING ACTIVITY FOR INNER CORE SUBREGION MUNICIPALITIES**

Municipality	ANNUAL TRIPS		ANNUAL RIDE-HAILING TRIPS		RIDE-HAILING MODE SHARE	
	Origin	Destination	Origin	Destination	Origin	Destination
Boston	967,288,818	895,499,530	34,911,476	35,221,885	3.61%	3.93%
Cambridge	189,847,847	179,109,006	6,782,366	6,454,440	3.57%	3.60%
Somerville	87,268,870	88,633,826	2,727,951	2,637,115	3.13%	2.98%
Brookline	70,797,608	76,026,259	2,074,425	1,963,570	2.93%	2.58%
Chelsea	43,285,073	42,986,266	656,686	632,627	1.52%	1.47%
Medford	66,409,699	67,903,947	966,710	966,364	1.46%	1.42%
Malden	62,232,358	64,944,230	906,043	867,169	1.46%	1.34%
Revere	54,481,061	57,125,847	722,136	714,901	1.33%	1.25%
Everett	61,619,596	56,293,077	775,773	753,268	1.26%	1.34%
Watertown	47,959,601	46,679,180	469,122	480,161	0.98%	1.03%
Newton	122,452,446	125,034,672	1,051,030	1,073,900	0.86%	0.86%
Quincy	118,837,779	116,245,809	957,311	963,069	0.81%	0.83%
Waltham	102,810,459	94,488,201	711,420	723,227	0.69%	0.77%
Belmont	29,546,032	30,494,233	195,807	201,636	0.66%	0.66%
Winthrop	16,736,781	17,819,225	103,750	103,862	0.62%	0.58%
Arlington	47,519,338	50,888,290	258,133	273,416	0.54%	0.54%
Lynn	106,210,599	104,907,612	549,822	511,532	0.52%	0.49%
Milton	29,705,413	33,198,745	138,761	142,492	0.47%	0.43%
Melrose	30,007,776	31,644,455	129,355	143,475	0.43%	0.45%
Saugus	40,654,204	39,434,253	147,714	162,887	0.36%	0.41%
<b>INNER CORE</b>	<b>2,295,671,360</b>	<b>2,219,356,655</b>	<b>55,235,791</b>	<b>54,990,996</b>	<b>2.41%</b>	<b>2.48%</b>

This ratio ranges from 0.06 in Lynn (six reported ride-hailing trips per 100 estimated public transit trips) to 0.38 in Somerville. Notably, the highest ratios are observed in Somerville and Everett, two densely developed cities closely located to the core of the region that are primarily served by local bus routes rather than the MBTA rapid transit system (**Figure 3**). **Table 2** provides further overview of these calculations, which point to the rising competition for riders between these two modes that was described in our [Fare Choices report](#).

**TABLE 2: ESTIMATED MODE SHARES OF RIDE-HAILING ACTIVITY AND PUBLIC TRANSIT FOR INNER CORE SUBREGION MUNICIPALITIES**

Municipality	TRAVEL ORIGIN			TRAVEL DESTINATION		
	Overall Mode Share		Relative Ratio	Overall Mode Share		Relative Ratio
	Ride-hailing	Public Transit		Ride-hailing	Public Transit	
Somerville	3.13%	8.27%	0.38	2.98%	8.18%	0.36
Everett	1.26%	3.47%	0.36	1.34%	3.81%	0.35
Cambridge	3.57%	12.65%	0.28	3.60%	13.31%	0.27
Chelsea	1.52%	5.98%	0.25	1.47%	5.95%	0.25
Medford	1.46%	5.80%	0.25	1.42%	5.66%	0.25
Brookline	2.93%	13.06%	0.22	2.58%	12.21%	0.21
Malden	1.46%	6.59%	0.22	1.34%	6.31%	0.21
Boston	3.61%	18.19%	0.20	3.93%	19.54%	0.20
Winthrop	0.62%	3.47%	0.18	0.58%	3.24%	0.18
Arlington	0.54%	3.12%	0.17	0.54%	3.01%	0.18
Watertown	0.98%	5.65%	0.17	1.03%	5.82%	0.18
Waltham	0.69%	4.24%	0.16	0.77%	4.60%	0.17
Melrose	0.43%	2.68%	0.16	0.45%	2.56%	0.18
Revere	1.33%	8.80%	0.15	1.25%	8.44%	0.15
Quincy	0.81%	5.57%	0.14	0.83%	5.68%	0.15
Newton	0.86%	6.41%	0.13	0.86%	6.29%	0.14
Belmont	0.66%	5.17%	0.13	0.66%	5.00%	0.13
Milton	0.47%	3.80%	0.12	0.43%	3.44%	0.12
Saugus	0.36%	3.45%	0.11	0.41%	3.61%	0.11
<b>INNER CORE</b>	<b>2.41%</b>	<b>11.78%</b>	<b>.20</b>	<b>2.48%</b>	<b>12.14%</b>	<b>.20</b>

## REVENUE AND FUNDS

This adoption of privately-operated ride-hailing services adversely impacts the revenue collected by public transit operators, as well as the infrastructure created and maintained by public agencies to support their continued use by the residents, workers, and visitors of these municipalities. In our [Fare Choices report](#), MAPC previously estimated that as ride-hailing services attract passengers who would otherwise pay cash or stored value for a transit trip, the MBTA loses \$0.35 in revenue per ride-hailing trip. Applying this cost to the approximately 55 million ride-hailing trips originating in Inner Core

communities in 2017, **we estimate that the MBTA has lost approximately \$19.3 million in revenue as a direct result of ride-hailing.** After accounting for the five-cent portion of the ride-hailing trip assessment directed to the Commonwealth Transportation Fund (\$3.25 million), we estimate the net revenue impact to the state's transportation system is a loss of at least \$16.5 million.

Legislation (**M.G.L. c159A½**) also mandates that municipalities where a ride-hailing trip originates receive an additional 10-cent per ride assessment. These funds may be used to address the impact of ride-hailing services on local transportation infrastructure or programs in support of more sustainable transportation modes. Statewide, the municipal portion of the assessment totals approximately \$6.4 million. The 20 Inner Core municipalities will receive about \$5.5 million of this revenue. In comparison, for fiscal year 2019, \$200 million in Chapter 90 funds, which are provided annually to municipalities for capital improvement projects that create new or extend the life of roadway facilities and include complete streets programs, will be distributed throughout the Commonwealth, with nearly \$34.8 million allocated to the Inner Core communities. From this we can conclude that while the per-ride surcharge provides welcome new revenue to some municipalities, it remains a relatively small amount when compared to existing direct aid to localities.

## **VEHICLE MILES TRAVELED**

Another outcome of declining public transit ridership attributed to increased ride-hailing adoption is more vehicles on our local streets and a subsequent increase in regional totals of vehicle miles traveled (VMT). The state reports that the average ride-hailing trip is approximately 4.5 miles, resulting in a total ride-hailing VMT of 291 million miles. This is likely a lower bound estimate for ride-hailing VMT since this figure does not account for non-revenue travel. To put this figure into greater context, we compare these data to information from MAPC's **Massachusetts Vehicle Census**, a catalog of registrations and inspection records for nearly every passenger vehicle garaged in the state<sup>2</sup>. With that, **we estimate that ride-hailing travel amounted to just over half a percent of all passenger VMT for vehicles garaged within the Commonwealth.** While this share is likely higher in Inner Core communities, a municipal-by-municipal summary may only be accurately provided with a more detailed reporting of ride-hailing trip lengths.

## CONCLUSIONS

By uniting this first-ever statewide inventory of ride-hailing data with existing modeled and empirical data on travel options and outcomes, this research brief provides new evidence as to how ride-hailing utilization compares to traditional travel options, affects revenue and funding streams, and contributes to statewide VMT totals. Of note, **our analysis concludes that for every five public transit trips starting in the Inner Core, one ride-hailing trip is performed**; a remarkable testament to the popularity of a mobility option that was nonexistent less than ten years ago. In fact, we approximate that at least one out of every 50 trips ending in the Inner Core are performed using a ride-hailing vehicle and that ride-hailing now accounts for at least half a percent of all passenger VMT in Massachusetts.

While this work extends the utility of this first-in-the-nation census of municipal-level ride-hailing data and complements previous analyses of ride-hailing activity in Metro Boston, such as MAPC's **Fare Choices** report, finer-scaled data on travel patterns and routes are still needed to best inform evidence-based policies. These aggregate data are helpful for establishing a statewide snapshot of ride-hailing adoption, but are limited by their inability to guide traffic management and operations strategies that require more nuanced assertions of how ride-hailing-related VMT is divided between revenue and non-revenue miles traveled. If these new on-demand mobility options are indeed competing with more sustainable travel modes, then new data sets and further analyses are essential toward recognizing the myriad environmental, economic, and social impacts of this acceleration in ride-hailing adoption and utilization.



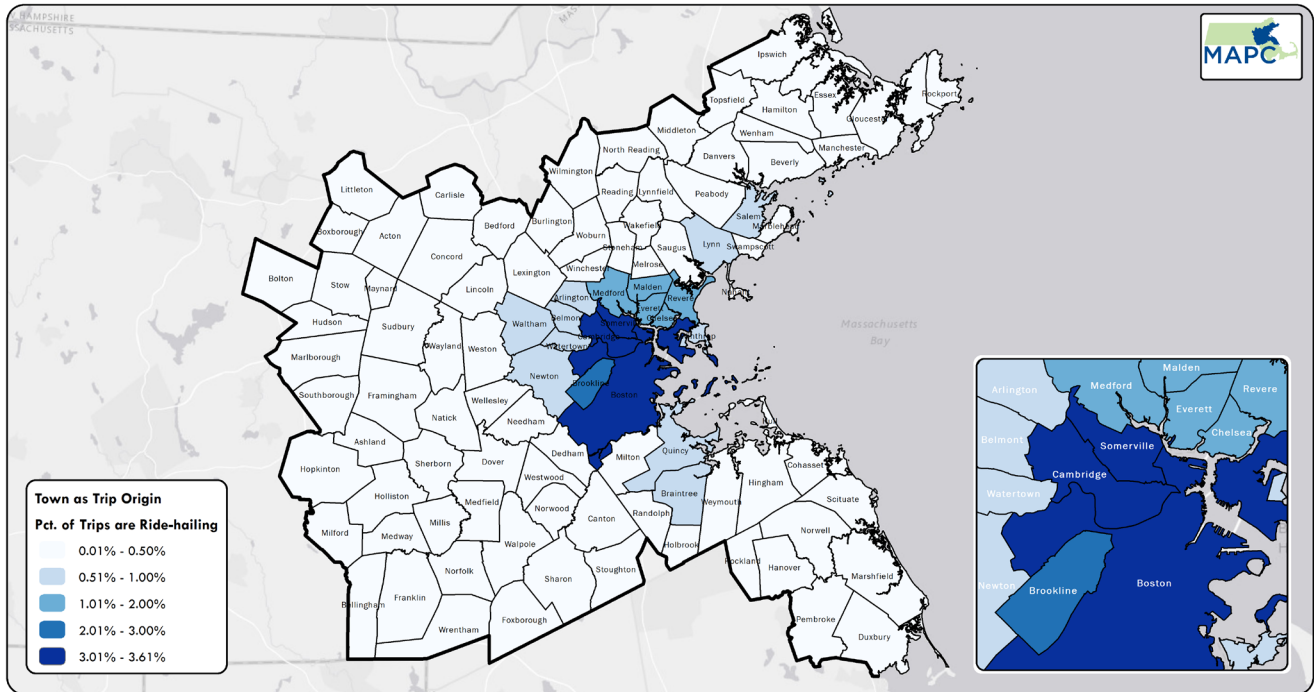
## TECHNICAL ASSUMPTIONS

<sup>1</sup> Travel mode shares were derived by aggregating tables of trip origins and destinations for traffic analysis zones in the Greater Boston region created for the [North-South Rail Link Feasibility Reassessment study](#) to the municipal geography. Trip tables for active travel modes (walk/bike) were not available, so a summarized mode split of 13-percent produced for the [Lower Mystic Regional Working Group study](#) was used to generate a full spectrum of modeled mode shares. These mode splits are intended to reflect travel on a typical weekday in the spring; therefore, the following set of seasonal and temporal adjustments were applied to produce an annual estimate of private vehicle, public transit, and walk/bike trips. First, the forecasted transit ridership statistic was adjusted with a weekday/weekend factor calculated from trends summarized in a [presentation](#) by MassDOT's Office of Performance Management & Innovation. Similarly, annual auto trips were adjusted based on findings from a [traffic and revenue study](#) prepared for MassDOT. The weekly-adjusted transit and auto figures were subsequently adjusted based on monthly ridership variations noted in the MBTA's [performance dashboard](#); a factor assuming that month-to-month travel fluctuations in trip-making are constant across all modeled travel modes. Finally, ride-hailing mode share, which has not been previously forecasted in the CTPS four-step travel demand model, was determined by dividing the sum of annual auto, transit, and walk/bike trips by the number of ride-hailing trips for each municipality in the Greater Boston region. An assumption being that ride-hailing travel substituted existing travel modes and was not responsible for creating new travel.

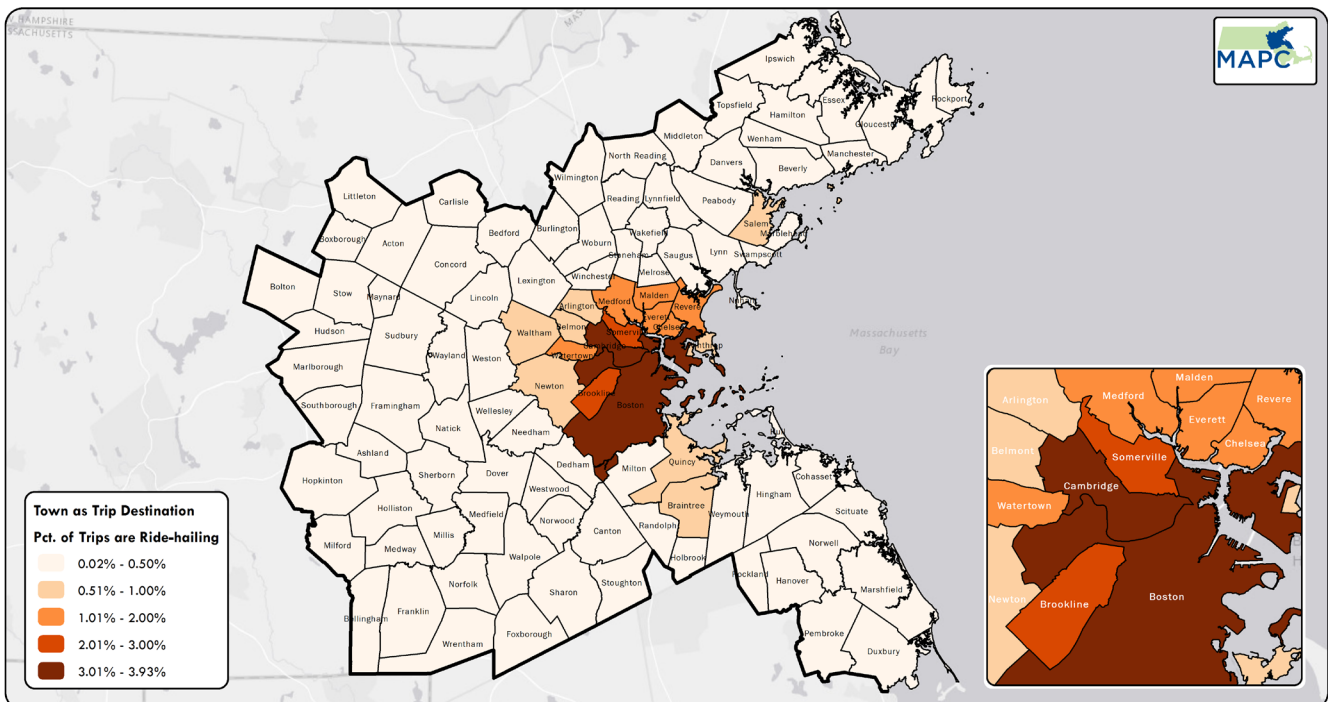
<sup>2</sup> Statewide vehicle miles traveled (VMT) estimates are derived using the statewide total of passenger VMT reported in quarter 4 of calendar year 2014. Two inherent assumptions of using these data are that driving trends and totals have remained more or less constant over the past three years and that our VMT estimates also include travel conducted outside of the Commonwealth. In 2014, passenger vehicles garaged within Massachusetts were driven over 46.4 billion miles.

# LIST OF FIGURES

**FIGURE 1: OVERALL TRAVEL MODE SHARE OF RIDE-HAILING TRIPS STARTING IN GREATER BOSTON REGION MUNICIPALITIES**



**FIGURE 2: OVERALL TRAVEL MODE SHARE OF RIDE-HAILING TRIPS CONCLUDING IN GREATER BOSTON REGION MUNICIPALITIES**



**FIGURE 3: RIDE-HAILING AND PUBLIC TRANSIT COMPETITION FOR TRIPS STARTING IN INNER CORE SUBREGION MUNICIPALITIES**

