From App to Table:

Rapid Food Deliveries in Massachusetts

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MAPC

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About MAPC and this Report

The Metropolitan Area Planning Council (MAPC) is the regional planning agency for the 101 cities and towns of Greater Boston. Our mission is to promote smart growth and regional collaboration.

This report concentrates on the transportation, land use, and economic effects of rapid food deliveries from third-party mobile apps such as DoorDash, Grubhub, and Uber Eats, as well as fast delivery of convenience store items from mobile apps including GoPuff and Getir. This report does not include an analysis of larger, same-day deliveries from grocery stores, but instead concentrates on smaller orders of prepared foods and convenience store items typically delivered within 15 to 45 minutes. We put forward potential policies that could help the Commonwealth, municipalities, and the mobile delivery platforms more sustainably manage the growth and impacts of these rapid food deliveries.

This report is a follow-up work to MAPC's 2021 report Hidden and in Plain Sight: Impacts of E-Commerce in Massachusetts, which investigated the effects of online commerce on municipalities in the Commonwealth. It also follows MAPC's Fare Choices research on the impacts of app-based ride-hailing in Massachusetts. Finally, this report is aligned with the recommendations adopted in the regional plan **MetroCommon 2050**, including improving access and regional mobility, reducing vehicle miles traveled, enabling wealth creation and intergenerational wealth transfer, and expanding and promoting the resiliency of small businesses, particularly those owned by people of color. Of note, MetroCommon identifies three actions that closely align with this study:

- Action 4.1: Municipalities should develop flexible curb use policies to accommodate an influx of new mobility options and increased demand for curb space.
- Action 4.2: Require transportation network companies (TNCs) and e-commerce to share trip-related data with government planning entities and establish standards for doing so.
- Action 4.3: Establish a cross-agency task force to consider issues around transportation data ownership and privacy.

MAPC serves as a resource for continued information sharing and findings from e-commerce surveys and pilot programs and will continue to conduct research on how municipalities in Massachusetts are mitigating and managing the impacts of e-commerce. Please email ecommerce@mapc.org with relevant information or to be informed of future initiatives.

Executive Summary

The use of apps to order meals from restaurants, items from convenience stores, and food from grocery stores has seen explosive growth in the last few years. This recent growth in rapid food deliveries can largely be attributed to third-party delivery apps (also known as third-party delivery platforms) such as DoorDash, Grubhub, and Uber Eats, as well as grocery and convenience store apps such as Getir and GoPuff. Spurred by the adoption of smart phones and the pandemic, the number of rapid food delivery app users nationally has almost doubled in the last five years, from 66 million in 2015 to 111 million in 2020. A 2021 survey of U.S. adult consumers found that 6.5% order deliveries from food apps every day, while 42% order at least once a month.

MAPC could find no studies or reports that definitively identify the number of app-based deliveries in the U.S. or Massachusetts. However, based upon Securities and Exchange Commission (SEC) filings and market data, MAPC estimates that in Massachusetts the number of third-party rapid food deliveries now exceed the number of ride-hailing trips from Transportation Network Companies (TNCs, i.e., Uber, Lyft). This estimate does not account for restaurant-provided online deliveries, nor the rapid deliveries of grocery and convenience store items from businesses such as Getir and GoPuff. Thus, the true annual number of app-based rapid food deliveries in Massachusetts is likely much higher.

Online order and delivery platforms are shifting the way many restaurants, convenience stores, and grocery stores market their products and services to grow their businesses. The growing demand for rapid food deliveries creates a new dynamic for municipalities managing parking and street curbs, as well as zoning for downtowns, neighborhood and village centers, and main streets. Like the ride-hailing industry, these rapid food delivery

platforms are struggling to be profitable, and thus will continue to evolve and expand their marketplace as consumers become more accustomed to quick, convenient deliveries of food, snacks, and other items. It is highly likely that rapid food delivery platforms will become a permanent fixture in the delivery landscape.

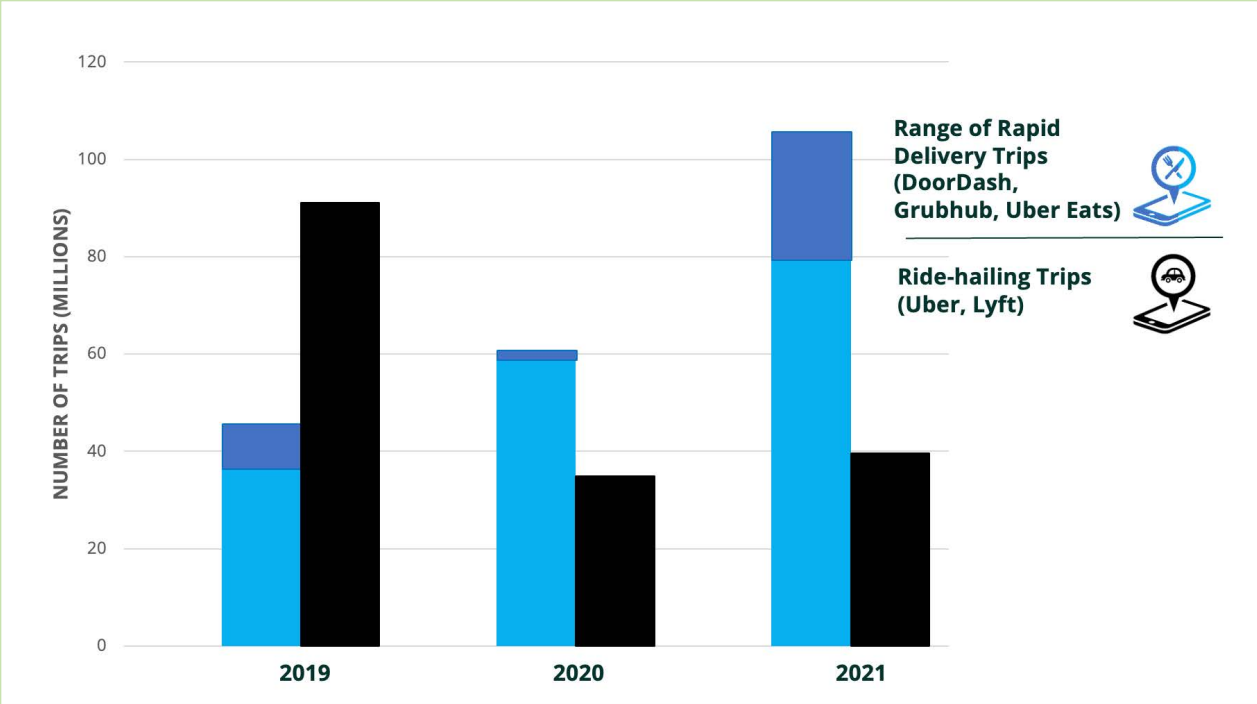
The exponential growth of the rapid food delivery sector has significant transportation, environmental, economic, labor, and land use implications. Based upon the research completed for this paper, our key learnings are as follows.

Key Learnings

The scale of rapid food deliveries in Massachusetts is unknown, but likely exceeds that of ride-hailing (Uber, Lyft) trips.

Data suggest that rapid food deliveries in Massachusetts may now exceed the number of ride-hailing (Uber, Lyft) trips. MAPC estimates that in 2021, Massachusetts may have had between 80 and 105 million rapid food deliveries by third-party platforms – a figure that has more than doubled in the last three years. By comparison, Massachusetts had 91 million ride-hailing trips in 2019, but less than 40 million ride-hailing trips in 2021. It is important to note that the decline in ride-hailing trips is directly related to the pandemic, with fewer people traveling in 2020 and 2021. By contrast, the pandemic accelerated the pace of rapid food deliveries, with more households ordering delivery and doing so more frequently. This trend is highly likely to continue, but perhaps at a slower pace. Consistent and reliable data reporting is needed to monitor the rapid food delivery sector and its impact on public infrastructure.

Estimated Third-Party Food Delivery Trips in Massachusetts



Sources: Uber, DoorDash, Grubhub SEC Filings; Business of Apps; YipitData, compiled by MAPC
See Appendix A for data sources and methods

The transportation impacts of rapid food deliveries may be greater than ride-hailing impacts.

Like ride-hailing, the types of transportation impacts from rapid food deliveries include increased street congestion, idling and associated emissions at the curb, as well as greater competition for parking, resulting in unsafe and illegal practices such as double-parking in bus, bike, and travel lanes. However, data suggest that the impact per trip may be even greater for rapid food deliveries than ride-hailing.

- A study of food deliveries in London determined that the average time occupying the curb or parking area for picking up food at a restaurant was 10 minutes, while delivering a meal to a customer lasted an average of two minutes. In contrast, the typical time for ride-hail curb interactions is one to five minutes for pick-ups and 30 seconds for drop-offs.
- A survey of delivery drivers working for apps such as DoorDash, Grubhub, or Uber Eats found that only 7.5% of drivers are always able to find parking at the curb upon arrival and 25% spend between four and seven minutes searching for parking. One-fourth of survey respondents admitted to parking in spaces not meant for them when unable to find parking.
- When not delivering, many food delivery drivers spend time waiting for their next assignment — time known as deadheading. A study of food deliveries in London found that workers spend nearly 50% of their time waiting for their next delivery assignment. A study of ride-hailing trips in the Boston area determined that one-third of miles driven by drivers were considered deadheading while waiting for a ride request. While these two studies are not apples-to-apples comparisons, the data illustrate the inefficiencies of these services and their associated impacts on streets.
- Most rapid food deliveries are within one to five miles – suggesting more environmentally sustainable delivery methods such as e-bikes or electric mopeds might be feasible.

The proliferation of ghost kitchens and micro-fulfillment centers is directly related to the rapid food delivery industry.

Ghost kitchens are commercial facilities that house one or more restaurant operators who prepare food exclusively to fulfill online orders. While some ghost kitchens are stand-alone facilities, others operate out of existing restaurants delivering food under virtual brands that exist only online.

Based on MAPC's research, most Massachusetts ghost kitchens currently operate as virtual brands from existing restaurants. Over time, ghost kitchens and virtual brands may appropriate business from traditional brick-and-mortar restaurants, a pattern comparable to ride-hailing companies disrupting the taxi industry. Often located in densely populated areas, micro-fulfillment centers (MFCs, sometimes referred to as dark stores) primarily fulfill online grocery and convenience item orders. Because ghost kitchens and MFCs do not bring in the foot traffic of traditional stores and restaurants, they have the potential to diminish the vibrancy and economic vitality of neighborhoods and main streets.

Deliveries by third-party platforms are increasingly critical to the viability of restaurants, yet restaurants are encumbered by high commission or service fees.

While third-party rapid food delivery platforms can play a role in expanding a restaurant's customer reach, they also charge high commission or service fees and generate competition between in-person restaurants and delivery-only ghost kitchens. Commission or service fees typically range between 15-30%, which is a significant added expense for restaurants that already operate on slim profit margins. It is particularly challenging for small, independent, or neighborhood restaurants that lack the power to negotiate fees and commissions.

Most delivery workers are independent contractors and many earn less than $16 per hour after expenses.

It is difficult to estimate the number of workers who provide rapid food deliveries. Most rapid food delivery apps consider their delivery workers to be independent contractors, who are more likely to be non-white, younger, immigrants, and lower-income. As independent contractors, they face confusing rules and options on liability insurance, whether delivering by car or other means. Frequently referred to as gig workers, these employees consider the money they earn from these jobs as essential or important for meeting basic needs, yet many earn less than $16 per hour after expenses such as transportation and insurance.

Recommendations

The following recommendations are proposed to manage this evolving and growing sector of the Massachusetts economy in a sustainable manner. Advancing these recommendations will require collaboration among the Administration, the Legislature, municipalities, the delivery platforms, and restaurants. The Commonwealth should consider identifying an existing agency, creating a new agency, or forming an inter-agency partnership to oversee implementing the recommendations.

Our recommendations, which are divided into legslative actions, state actions, regional and local actions, and emerging best practices should all be undertaken now. Many of the recommendations include obtaining and collecting data to better understand the scale and geographic reach of rapid food deliveries in Massachusetts. Consistent and reliable data collection is essential, as it will inform and refine policies, regulations, and guidelines to mitigate the impacts of this expanding and evolving component of the economy.

Legislative Actions:

- *Require rapid food delivery platforms to report data to the Commonwealth, similar to the requirements that are in place for ride-hailing services*. Legislation should be developed for data sharing requirements that, at a minimum, include data on precise trip origins, destinations, time spent at the curb, and time of day. The Massachusetts Department of Public Utilities and MassDOT should maintain, manage, and publish the data.
- *Require the state meals tax to be collected and remitted by rapid food delivery platforms*. Short of obtaining data directly from rapid food delivery platforms, meals tax data is another means to understand the scale and growth of app-based food deliveries in the Commonwealth. Currently, thousands of individual restaurants and stores in Massachusetts are required to

report on meals tax collection for rapid food delivery platforms. The majority of states require the collection and remittance of state-administered meals taxes by rapid food delivery businesses. Having the rapid food delivery businesses collect and remit the state meals tax would be more efficient and remove this reporting burden from multiple entities. The Massachusetts Department of Revenue should oversee the implementation of this adjustment to meals tax collection and remittance.

- *Require an assessment for trips made by delivery vehicles proportional to their impacts on the transportation network*. Currently, the existing statute governing the fees on ride-hailing trips by TNCs in Massachusetts does not include trips for deliveries made by rapid food delivery platforms. Legislation should be developed to require a delivery assessment for trips made by rapid food deliverers, similar to the existing assessment on ride-hailing trips by TNCs. This assessment should be designed to encourage more sustainable travel options that yield fewer greenhouse gas emissions and have less detrimental impacts on curb access and safety (e.g., a lower assessment or no assessment if deliveries are made by electric cars, electric mopeds, electric bicycles, or traditional bicycles). This assessment could also be applied to reduce congestion (e.g., a lower assessment for deliveries made during off-peak times or for deliveries of multiple orders made in one trip). This fee structure should hold customers and restaurants harmless.

- *Require revenue from the delivery assessment to mitigate local impacts on streets and support locally owned businesses*. Like the current assessment on ride-hailing trips, similar legislation should be enacted that requires revenue from an assessment on rapid food deliveries be used to address local impacts on businesses and streets. Revenue from a delivery assessment would be administered by MassDOT and municipalities to mitigate impacts to the curb, traffic congestion, and vehicle emissions (e.g., installing dedicated cycle lanes and charging infrastructure, designating areas where bicycles and mopeds

can be left safely at restaurants and properties with high delivery activity, supporting local e-bike share programs, generating revenue for public transit, and/or planting street trees). Additionally, revenue should be designated for a program that would support locally owned restaurants and convenience stores, which could be managed by one of the Commonwealth's economic development agencies. This would help such businesses to cope with the impacts of rapid food delivery platforms and transition to an economy in which such deliveries are more common.

- *Ensure that delivery workers receive fair compensation and operate in a safe working environment*. Legislation should be developed that requires fair compensation to gig workers on rapid food delivery platforms, similar to the efforts that have been made to ensure that ride-hailing drivers receive fair compensation.

- *Require delivery platforms to insure delivery workers, similar to the Massachusetts requirements for ride-hailing platforms.* The Legislature should require rapid food delivery platforms to provide clear information to workers on insurance coverage when engaged in the platform, as well as information on optional coverage that might be available for purchase. Required coverage should apply to delivery workers whether they use their own personal vehicle, walk, or use a personal mobility device such as a bicycle or e-scooter. These insurance requirements should apply to rapid food delivery platforms such as DoorDash, Uber Eats, and Grubhub, and other delivery platforms such as Amazon and Instacart.

- *Require rapid food delivery platforms to provide safety training for delivery workers.* Legislation should be developed that requires rapid food delivery platforms to provide safety training as part of onboarding new delivery workers and on an annual basis for existing delivery workers. Safety training can reduce dangerous driving and biking behaviors and increase adherence to roadway regulations.

State Regulations:

- *Ensure that delivery workers receive fair compensation and operate in a safe working environment*. State agencies should regularly survey app-based delivery workers in Massachusetts to monitor wages, tips, and benefits received, particularly for workers who rely on delivery work as a major source of income for their households. The surveys should also monitor worker safety, such as harassment, insurance requirements, and crashes. This data will help the Commonwealth determine whether delivery workers are earning the applicable minimum wage after expenses such as transportation, liability and health insurance, and self-employment taxes. The survey data can be used to ensure delivery workers are fairly compensated and are operating in a safe working environment. The Massachusetts Attorney General's Public Protection and Advocacy Bureau Fair Labor Division and its Consumer Protection Division should be responsible for conducting surveys and enforcing possible legislation on compensation and safety for app-based delivery workers.

- *Require rapid food delivery platforms to implement programs that make it easier for delivery workers to access e-bikes and adopt electric vehicles*. The Department of Public Utilities or MassDOT should work with rapid food delivery platforms to implement programs similar to DoorDash's partnership with e-bike company Zoomo, which provides access to e-bikes at reduced rates and offers cash bonuses for bicyclists who deliver via bike or e-bike in select cities. These state agencies should also work with rapid food delivery platforms to develop programs that advance the adoption of electric vehicles, such as DoorDash's low-cost electric vehicle subscription leasing program in California, which also includes cash bonuses for drivers. It is important to note that the clean energy and offshore wind legislation passed in 2022 requires the Massachusetts Department of Public Utilities to create a plan to electrify ride-hailing vehicles.

Municipal and RPA Actions:

- *Regional Planning Agencies (RPAs) should analyze data collected by the state and work with municipalities to develop curb management policies*. Data analysis would enable local officials to understand the scale of traffic and curb usage in local areas, given that most delivery trips are less than five miles.

- *Conduct local and regional surveys of restaurants, ghost kitchens, MFCs, grocery stores, and convenience stores to understand the impacts of rapid food delivery platforms*. Continuous surveys conducted by the Commonwealth (through the Massachusetts Office of Consumer Affairs and Business Regulation or similar agency) would be critical as part of monitoring the impacts of policy recommendations and changes in the rapid delivery marketplace. MassDOT, RPAs, and/or municipalities could also conduct regional or local studies to understand delivery patterns.

- *Implement curb management strategies, particularly in areas with multiple restaurants or high delivery activity*. Curb management strategies municipalities can implement include designating spaces for rapid-delivery vehicles (including e-cargo bikes), evaluating loading requirements, creating dynamic curbside pricing, and continuous study and re-evaluation of curb uses and policies. Where needed, municipalities should adjust zoning, curbside management policies, and loading zone requirements to minimize negative impacts.

- *Establish zoning, design, operational, and development standards for ghost kitchens and MFCs*. Standards for municipalities to consider include zoning requirements that regulate parking for delivery vehicles, loading zones, and hours of operation to minimize impacts to neighbors (especially residential).

- *Strengthen placemaking around local restaurants and retailers to create more positive in-person experiences*. This can be accomplished by creating more outdoor dining and pedestrian areas (for example, via MassDOT's Shared Streets and Spaces program) and requiring parking and deliveries to be behind the building rather than on the street front. RPAs can assist municipalities in planning and implementing such place-making and place-enhancing programs and policies.

Emerging Best Practices:

- *Monitor emerging practices in other states that apply automated enforcement to prevent the occurrence of roadway violations, including parking violations at the curb*. The application of cameras and other types of automated enforcement can serve to reduce speeding, running red lights, and other dangerous driver behaviors for all roadway users, not just those of delivery workers. At a minimum, automated enforcement programs must be transparent and open to the public, motivated by safety, and equitable to lower-income drivers such as rapid food delivery workers.

- *Monitor other state and municipal actions on regulating agreements between restaurants and third-party delivery businesses,* such as New York City's delivery fee and purchase price caps and California's cost breakdown disclosure requirements. It is highly recommended that an annual report be issued to summarize key legislative actions nationwide. An economic development agency such as the Office of Consumer Affairs and Business Regulation should be responsible for authoring and releasing the annual report. If the report finds that regulations in other states and municipalities are successful in protecting small businesses, the Legislature should implement similar requirements in Massachusetts or encourage municipalities to adopt their own local requirements for agreements between restaurants and third-party delivery platforms.

- *Encourage restaurants to review contract terms deliberately when they enter agreements to run on a third-party delivery platform*. The Massachusetts Restaurant Association and local Chambers of Commerce can work closely with restaurants to ensure they are equipped to navigate these agreements, especially with regard to commission fees, marketing practices, anonymized data on orders, and other guidelines identified by the National Restaurant Association's Public Policy Principles for Third-Party Delivery.

- *Monitor labor-related legislative changes outside Massachusetts, including new Federal rulemaking on classifying independent contractors*. The Massachusetts Attorney General's Public Protection and Advocacy Bureau Fair Labor Division can assist in reviewing emerging polices and new legislation that might assist and support app-based delivery workers. Examples include new requirements in New York City and the National Safety Principles signed by delivery platforms in Australia, as well as the Biden Administration's proposed rules on classifying employees and independent contractors.

Contents

Frequently Used Terms

App: A mobile or web-based application for ordering. See also **platform**.

Dark store: A retail establishment not open to the public for walk-up business. See also **micro-fulfillment center**.

Ghost kitchen: A single commercial facility that houses one or more restaurant operators who prepare food for takeout or delivery, exclusively to fulfill online orders. Also referred to as cloud kitchen, dark kitchen, or virtual food hall. See also **virtual brand**.

Micro-fulfillment center (MFC): A store that stocks items for rapid order fulfillment and delivery but may not be open to the public for walk-up retail business. Also referred to as neighborhood fulfillment center or fulfillment center. See also **dark store**.

Platform: Software or operating system that runs applications (apps) and webpages. For food deliveries, a single platform operates multiple apps for the same transaction: apps for consumers to make orders, apps for restaurants or stores to fulfill orders, and apps for workers delivering orders. *For the purposes of this paper, the terms "app" and "platform" are used interchangeably.*

Platform-to-consumer: Meals or food ordered online, where the order and delivery are both carried out by a third-party platform.

Restaurant-to-consumer: Meals ordered online that are directly delivered by the restaurant, regardless if ordered via a third-party platform or restaurant platform/website.

Rapid food delivery app/platform: A mobile application or online platform to order prepared meals for delivery, or to order convenience and grocery items for delivery, with orders often delivered within 15 to 45 minutes. *For the purposes of this paper, this term encompasses any mobile or online platform for ordering meals or groceries for quick delivery, including third-party food delivery services by third-party platforms, food deliveries from ghost kitchens, and deliveries from micro-fulfillment centers.*

Third-party food delivery platform: The online or mobile platform of the **third-party food delivery service** on which a customer can view items for sale and place an online order from a food service establishment.

Third-party food delivery service: A website or mobile application that offers the sale of food prepared by, and the delivery or same-day pick-up of food from, a food service establishment, which is operated by a party that does not own the food service establishment.

Virtual brand: Restaurants that exist only online, with no physical presence. Orders are prepared for delivery at other restaurant kitchens or ghost kitchens.

Background

The use of apps to order meals from restaurants, items from convenience stores, and food from grocery stores has seen explosive growth in the last few years. Spurred by the adoption of smart phones and the pandemic, these rapid food delivery* apps for prepared meals (DoorDash, Grubhub, Uber Eats) and items that can be purchased from convenience and grocery stores (GoPuff, Getir) now advertise contactless, convenient transport of nearly every type of food, drink, snack, and other items within 45 minutes, with some apps advertising deliveries in as little as 15 minutes.

The adoption of these rapid food delivery services helped provide households with access to food and other key goods throughout the pandemic and enabled many restaurants to stay in business during a time when in-person dining was eliminated or reduced. The ability to order food, convenience store items, and groceries with deliveries within 15 to 45 minutes can help many people, including persons with disabilities, households with people who are sick or in quarantine, and individuals who are unable to drive, walk, or cycle to a store or restaurant. Moreover, food delivery apps enable restaurants and stores to expand their customer base.

Nevertheless, there are significant multidimensional impacts from the adoption of these services. These impacts include: vehicular traffic congestion; idling and curb management challenges; associated increases in safety issues and greenhouse gas emissions; the increasing number of "gig economy" delivery jobs where workers at times earn less than minimum wage and lack benefits such as health insurance; and fees charged to local businesses and restaurants. The growth of micro-fulfillment centers (MFCs, sometimes known as dark stores) and ghost

* For this paper, we use the term "rapid food delivery" to mean any online order and delivery of prepared meals or convenience and grocery items within 15 to 45 minutes, primarily by third-party delivery platforms/apps, as well as online orders and deliveries from ghost kitchens and from micro-fulfillment centers (which may not always be from a third-party platform). See Frequently Used Terms for more information.

kitchens that do not provide in-person shopping or dining for the neighborhoods where they are located are also part of these impacts.

MAPC began research on app-based food deliveries as follow up to investigations on the impacts of e-commerce in Massachusetts and as an extension of MAPC's previous research on the transportation impacts of ride-hailing from Transportation Network Companies (TNCs), such as Uber and Lyft. MAPC's analysis of the impacts of ride-hailing led to legislation in Massachusetts requiring TNCs to report data on passenger trips and the addition of a small fee on ride-hailing trips to help offset the transportation impacts of TNCs on local streets. Annual reports from companies such as Uber and DoorDash suggest that the number of rapid food deliveries may be greater than the number of ride-hailing trips, yet Massachusetts does not collect data and fees for rapid food deliveries. The Commonwealth must develop ways to sustainably manage this new form of e-commerce, including collecting data consistently and reliably to further understand the scale and impact of rapid food deliveries on the region's streets, small businesses, and workers.

This paper explores the impacts of app-based rapid food deliveries in Massachusetts, and attempts to address these questions:

- What is the scale and projected growth of these rapid food deliveries in the Commonwealth, including adoption by businesses and residents?
- What are the potential effects of the growing number of deliveries, including impacts to the roadway network, emissions, local retail and streetscape activity, small businesses, restaurants, and the workforce?
- What actions should be considered by the public and private sectors to minimize the negative impacts while supporting the positive impacts of this new technology?

The Growth of App-Based Rapid Deliveries

The number of customers who have used apps to order rapid food deliveries has almost doubled in the last five years, from 66 million in 2015 to 111 million in 2020.[1] Deliveries to customers who use apps to order rapid food deliveries falls broadly into two business models:

- Delivery of prepared foods from restaurants by companies that provide both the order and delivery logistics for restaurants and customers. Referred to as third-party food delivery platforms, examples of these companies [†] include DoorDash, Grubhub, and Uber Eats.[2]
- Delivery of groceries and convenience store items from companies that store goods for delivery in facilities. These facilities are referred to as dark stores or micro-fulfillment centers (MFCs) and are not open to the public for walk-up business. These companies also provide the delivery logistics for customers. Examples of these companies include Getir and GoPuff.

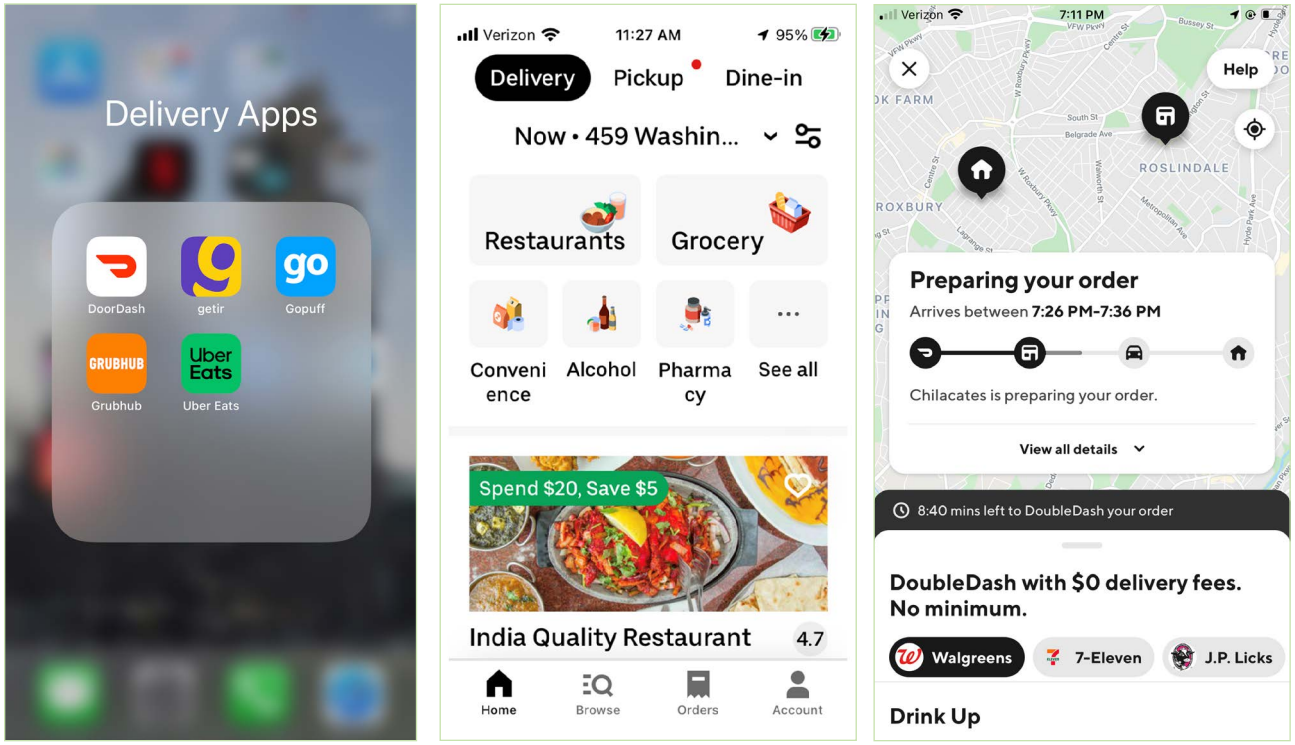
As the rapid food delivery marketplace continues to evolve, companies that were primarily known for providing one type of delivery have expanded to other markets. For example, companies that traditionally served prepared food such as DoorDash, Grubhub, and Uber Eats now offer deliveries of groceries, alcohol, and snacks.[3] Moreover, business models are evolving, and there are more deliveries originating from ghost kitchens — locations that have no in-person retail or dining.[4] While there is no definitive, comprehensive data on who's using rapid food deliveries, an industry report by Statista from 2021 indicates that the use of these services spans all incomes, ages, and genders.[5]

† According to Statista, third-party platforms/apps (also known as platform-to-consumer) currently account for approximately 50% of the online restaurant delivery marketplace, with restaurant-operated app-based deliveries (also known as restaurant-to-consumer) accounting for the remainder. This paper concentrates on the impacts of third-party apps since they are growing at a faster rate than direct online restaurant orders, are more likely to be delivery versus pick-up, have greater impacts to local restaurants with delivery fees, are more likely to hire delivery persons as independent contractors, and have expanded the rapid delivery marketplace with ability to provide fast delivery of other products from grocery and convenience stores.

Online Restaurant Deliveries

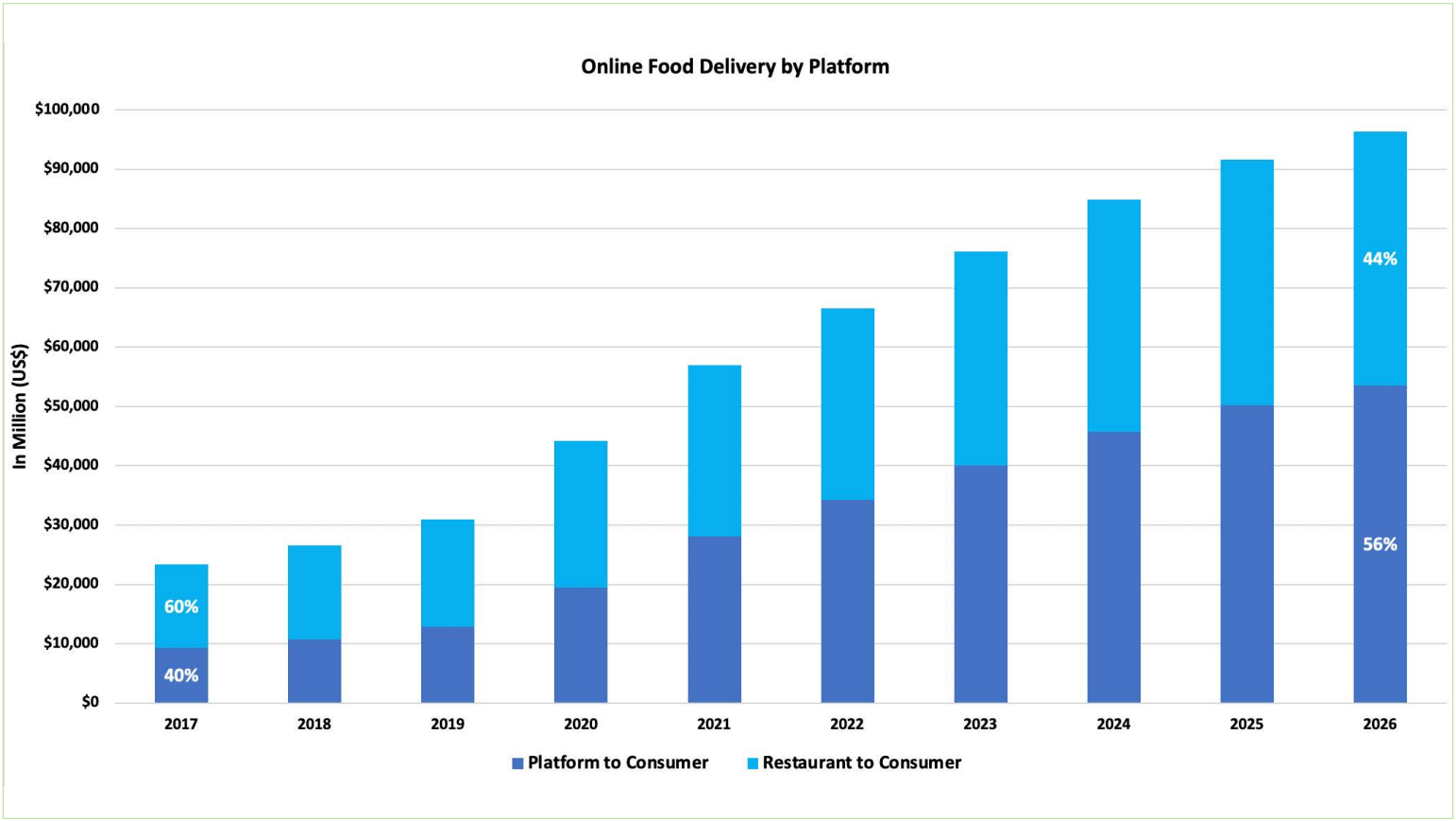
Nationwide, the percentage of restaurant purchases done online grew from 8% in 2019 to 14% in 2022 and is projected to grow to be one-fifth of all restaurant purchases by 2025.[6] A 2021 survey of U.S. adults found that 6.5% order delivery from apps like DoorDash, Grubhub, Uber Eats, and GoPuff *every day*, while 42% order at least once a month.[7]

Prior to the pandemic, most online delivery orders were done "restaurant to consumer" via proprietary restaurant platforms (e.g., Domino's app or restaurant website). During the pandemic, the demand for online food orders grew, with more consumers turning to third-party apps for those orders (also known as "platform to consumer"). Between 2019 and 2021, revenue for third-party food delivery apps in the U.S. more than doubled from $13 billion to $28 billion and is projected to double again to more than $53 billion by 2026. Within five years, third-party apps are forecast to become the dominant sector of the online food delivery marketplace, bringing in more than 56% of revenue (see Figure 1).[8]



Suite of Rapid Delivery Apps; UberEats Order; DoorDash Order Underway.

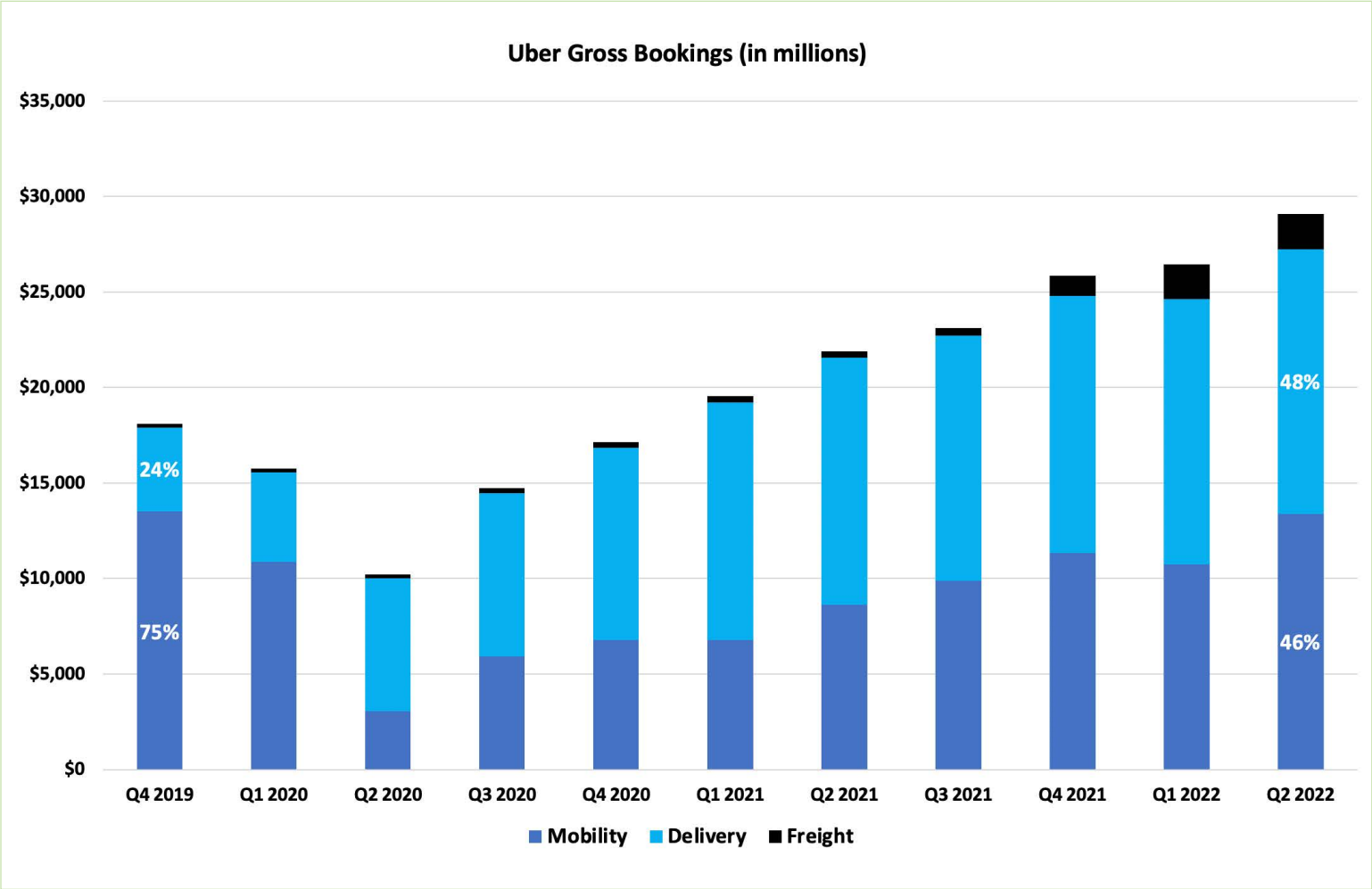
Figure 1. Online Food Delivery by Platform



Source: Statista Digital Market Outlook, eServices Report 2021 - Online Food Delivery[9] Platform-to-Consumer Delivery includes delivery services that provide customers with meals from partner restaurants where the platform (e.g., Uber Eats) handles the delivery process. The Restaurant-to-Consumer Delivery segment includes the delivery of meals carried out directly by the restaurants, regardless if the order was made via third-party platforms (e.g., Uber Eats) or directly through a restaurant website (e.g., Domino's). (Adopted from Statista)

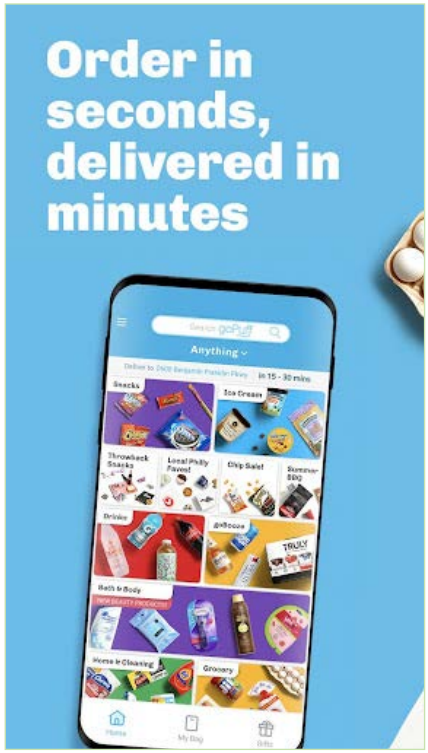
An analysis of available data from Uber illustrates both the company's growth in the rapid food delivery marketplace and trends in ride-hailing during the same period. Uber's gross bookings[10] for deliveries (i.e., Uber Eats) now slightly exceed "mobility" bookings for passengers, representing a major change in just two years. Figure 2 shows only 24% of Uber's gross bookings were in the delivery sector and 75% were in the mobility sector as of the fourth quarter 2019. This pivot to deliveries, first recorded in the second quarter of 2020 and spurred by the pandemic, has been rapid. As of the second quarter 2022, 48% of Uber's gross bookings were in the delivery sector and 46% were in the mobility sector. This figure also illustrates the steady rebound of the mobility sector from the impacts of the pandemic.

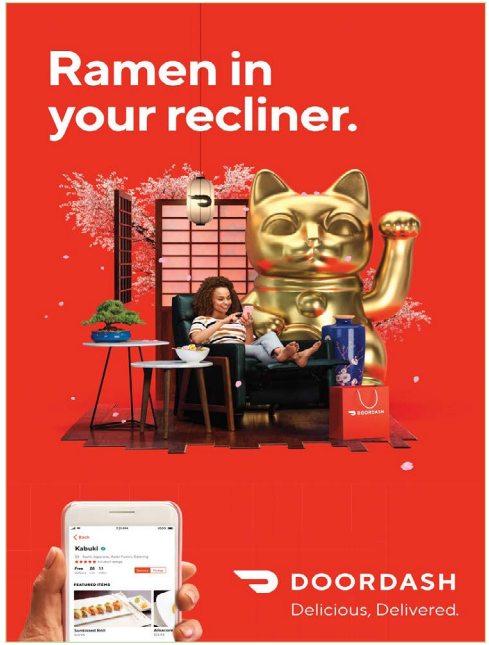
Figure 2. Uber Gross Bookings, Q4 2019 to Q2 2022



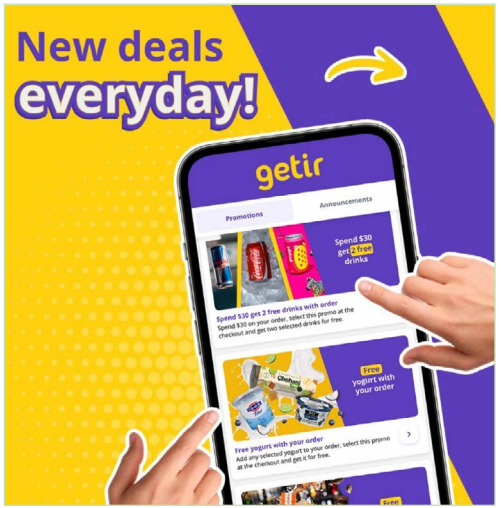
Sources: U.S. Securities and Exchange Commission, Uber Technologies, Form 10-K, Annual Report for Period Ended 12/31/21.[11]
U.S. Securities and Exchange Commission, Uber Technologies, Form 10-Q, Quarterly Report for Period Ended 6/30/22

Online Convenience Store Deliveries





Over the last two years, the rapid delivery marketplace has expanded. This sector advertises deliveries of convenience store items and a limited range of groceries. While online spending for restaurants and groceries doubled from 2019 to 2021, online spending on convenience stores grew nearly five-fold.[12] Apps such as GoPuff and Getir have been the main players in this market, but third-party restaurant apps such as DoorDash, Grubhub and Uber Eats, and grocery delivery apps such as Instacart have now expanded to include rapid delivery of convenience store items.



Ads for DoorDash, Getir, GoPuff, Grubhub, UberEats

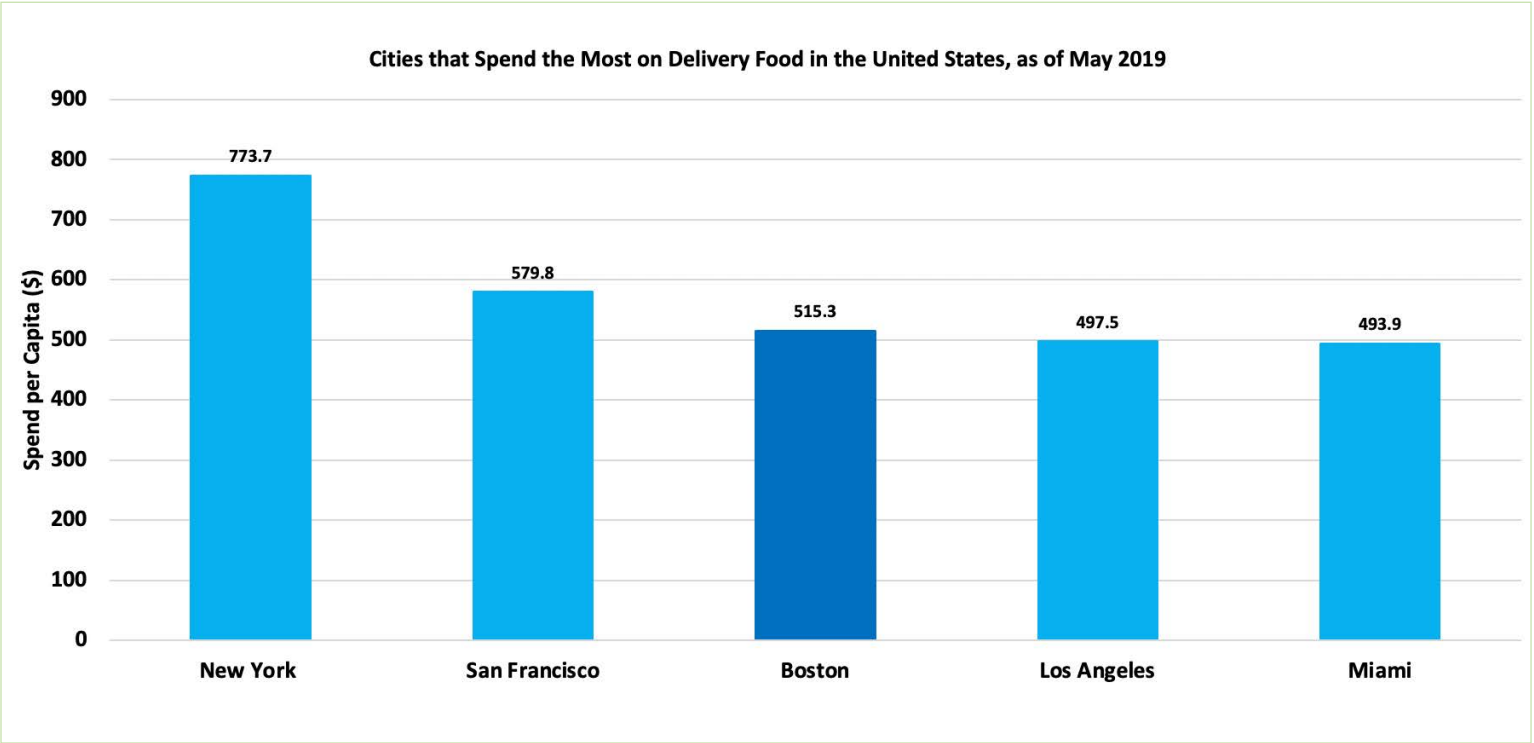
This growth in convenience store deliveries is in part spurred by the growth of micro-fulfillment centers (MFCs, sometimes known as dark stores), which are smaller warehouses often with little or no in-person shopping. (For more on MFCs, see Micro-Fulfillment Center section below.) How much these rapid deliveries compete with traditional convenience stores, gas stations, and neighborhood bodegas is unknown.[13]

Rapid Food Deliveries in Greater Boston

Greater Boston in 2019 was ranked third in the nation for per-capita spending on food deliveries with residents on average spending more than $500 per year on restaurant deliveries pre-pandemic (Figure 3).[14]

Similarly, Greater Boston has become an early adopter of rapid convenience store deliveries, including deliveries from MFCs via companies such as GoPuff and Getir.[15] Including Boston, Getir currently operates in Chicago and New York. GoPuff is available in more than 650 cities nationwide, serviced by an estimated 250 MFCs as well as via delivery partnerships with local stores.[16] According to a February 2022 Boston Globe article, there could be more than 20 MFCs in the Boston area, with most opening within the last two years.[17] As most MFC locations are not open to the public and sites are not clearly disclosed, it is difficult to quantify the number of these facilities in Massachusetts or identify their locations. As noted previously, platforms such as DoorDash, Grubhub, and Uber Eats also offer rapid deliveries of convenience store and grocery items in Greater Boston.

Figure 3. Top Cities for Spending on Food Delivery in the U.S.



Source: https://www.statista.com/statistics/1051250/us-food-delivery-cities-spending-per-capita-2019/

Given the growth nationally in online food delivery and Greater Boston being a top marketplace for online orders, Massachusetts residents and businesses are likely experiencing a greater impact of these rapid food deliveries than other states. The next sections of this report will examine the scale and impacts of these rapid food deliveries in the Commonwealth.

Estimating Delivery Trips in Massachusetts

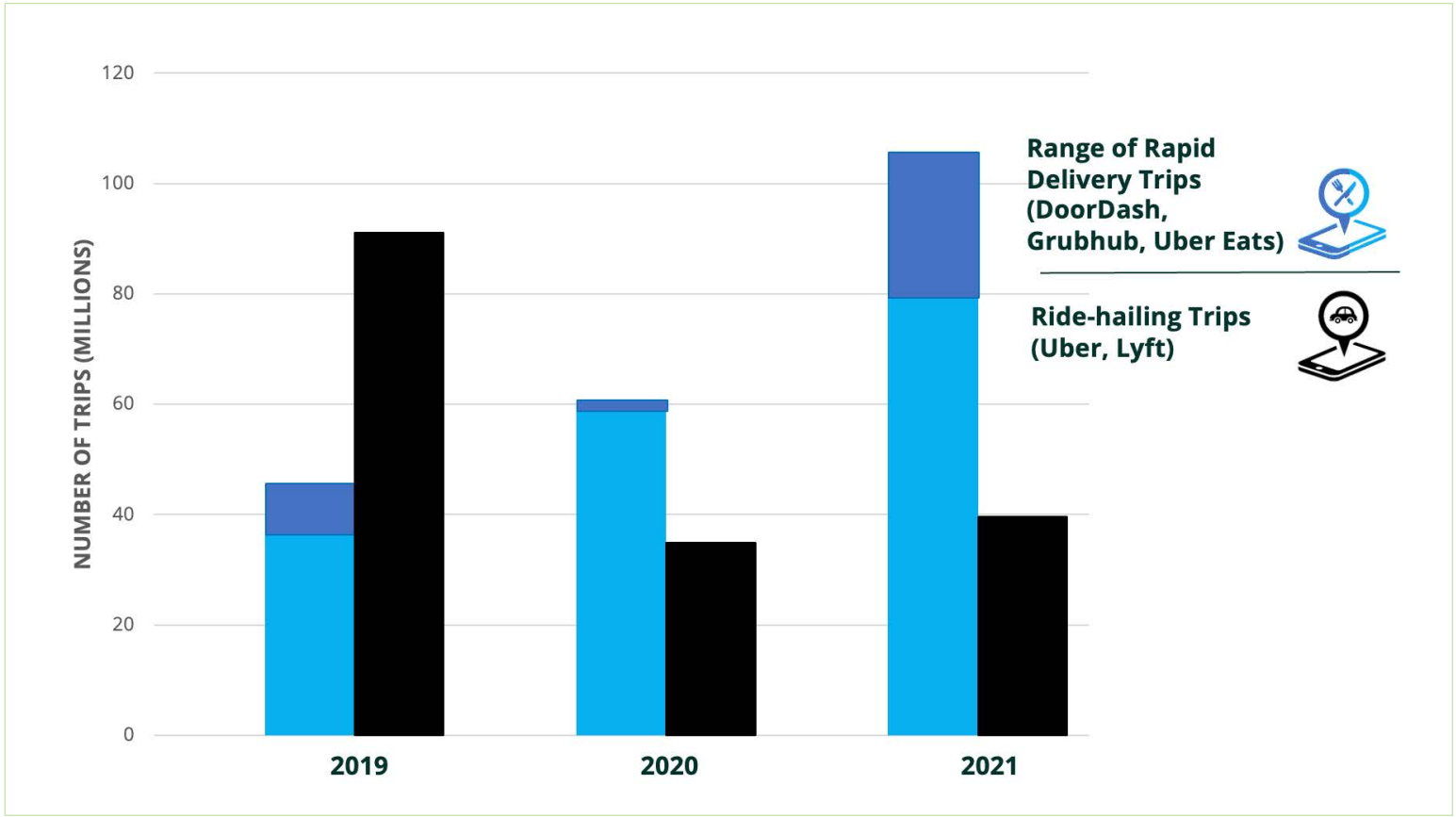
As a result of a state law passed in 2016, the Massachusetts Department of Public Utilities enacted regulations that require annual reporting for ride-hailing companies like Uber and Lyft. In 2022, data reporting requirements for ride-hailing companies was further strengthened with additional requirements for more granular data reporting on a more frequent basis for the purposes of congestion management. There are no similar reporting requirements for rapid food deliveries in Massachusetts. Additionally, there are no studies or reports that definitively identify the number of app-based deliveries in Massachusetts. However, by reviewing U.S. Securities and Exchange Commission (SEC) filings, market and consumer data, and ride-hailing data reporting in Massachusetts, MAPC estimated the number of third-party rapid food delivery trips in Massachusetts for 2019, 2020, and 2021 and determined that third-party platform rapid food deliveries exceeded the number of ride-hailing trips in the Commonwealth (e.g., Uber and Lyft) in 2020 and 2021. MAPC estimates that there were between 79 to 106 million third-party app delivery trips in Massachusetts in 2021. This estimate equates to between 11-15 deliveries for each Massachusetts resident. By comparison, there were a reported 39.7 million ride-hailing trips in Massachusetts that same year.[18] Collectively, these trips further increase greenhouse gas (GHG) emissions, traffic congestion, and demands on curb usage.

Figure 4 provides comparative estimates for third-party rapid food delivery trips in Massachusetts. While there may be annual differences, the data follow a similar trend and show that the estimated number of third-party delivery trips in Massachusetts has increased in the past two years. Appendix A outlines the steps that were applied to arrive at the delivery trip estimates.

It is worth nothing that this analysis does not account for restaurant-provided online deliveries, which are estimated in the U.S. to comprise around half of the on-demand food delivery sector (see Figure 1). These estimates also do not include rapid deliveries of grocery and convenience

store items by companies such as GoPuff and Getir. The lack of available data on online orders and deliveries makes it difficult to assess this marketplace. Thus, the true annual number of app-based rapid food deliveries in Massachusetts is likely much higher than the estimates shown in Figure 4.

Figure 4. Estimated Third-Party Rapid Food Delivery Trips in Massachusetts



Sources: Uber, DoorDash, Grubhub SEC Filings; Business of Apps; YipitData, compiled by MAPC. See Appendix A for data sources and methods.

Transportation Impacts

There has been little research on the transportation impacts of rapid food deliveries, and it is unknown how many of these deliveries are done by automobile, moped, bicycle, or e-bike. While both ride-hailing (e.g., Uber, Lyft) and rapid delivery trips impact the curb and travel lanes, contribute to traffic, and have GHG emissions, the degree of these impacts are greater with rapid deliveries, as described below.

Safety Concerns

Rapid food delivery workers earn payment for each delivery in two main ways — a fee from the delivery platform and tips from the customer. Delivery workers can increase their earnings by reducing delivery times, handling multiple orders at a time, and improving customer satisfaction with quick and accurate deliveries to earn higher tips.[19] With pressure to deliver orders to customers in a short period of time, delivery workers may be prone to speeding or assuming dangerous behaviors (e.g., weaving in and out of traffic or riding the wrong way down a one-way street), regardless of whether a delivery is made by car, moped, or bicycle. If they break traffic laws, delivery workers put themselves and others at risk.

Rapid food deliveries also increase competition with other curbside uses, such as on-street parking, transit stops and bus lanes, as well as passenger pick-ups and drop-offs for taxis and ride-hailing companies. Delivery vehicles double parked (particularly in bike and bus lanes) can be a frequent hazard.

Curb and Traffic Impacts

The curbside and traffic impacts from rapid food deliveries are similar to those for ride-hailing: both rapid food delivery and ride-hailing drivers occupy space at the curb and spend time driving and waiting for their next assignment, known as "deadheading." There are, however, key differences between the two types of trips in time spent at the curb.

At least one study of ride-hailing trips in San Francisco found that the average dwell time for ride-hailing is between one and five minutes for pick-ups, and 30 seconds for drop-offs.[20]

In comparison, a study of food deliveries in London suggests that the time occupying the curb or parking area is longer — the average time for picking up food at a restaurant was 10 minutes, while delivering a meal to a customer lasted an average of two minutes.[21] Although these are only two studies in two separate urban areas, the findings are intuitive: a rapid food delivery driver is more likely to park and exit the vehicle at both pick-up and drop-off than a ride-hailing driver, leading to greater curb, parking, and travel lane impacts.

Furthermore, the need to make the food delivery as quickly as possible places added pressure on the delivery worker to immediately park and walk to complete the transaction. A survey of delivery drivers working for DoorDash, Grubhub, or Uber Eats conducted by curb management company Automotus found that only 7.5% of drivers are always able to find parking at the curb upon arrival and 25% spend between four and seven minutes searching for parking. One-fourth of survey respondents admitted to parking in spaces not meant for them and parking in paid zones without paying when they are unable to find parking. The challenge of finding parking can add to roadway congestion, hurt efficiency, raise costs, and potentially hinder the ability to attract new drivers.[22]

When not delivering, many rapid food delivery workers spend time waiting for their next assignment, time known as deadheading. The 2021 study of London food deliveries found that workers spend nearly 50% of their time waiting for their next delivery assignment. [23] A study of ride-hailing trips in the Boston area determined that one-third of miles driven by drivers were considered deadheading while waiting for a ride request. [24] While these two studies are not apples-to-apples comparisons, the data illustrate the inefficiencies of these services and their associated impacts on streets.‡ It is clear that cumulative impacts on curb use and local streets are significant, making it harder for other drivers to find parking on busy main streets and creating a more dangerous environment for pedestrians and bicyclists.

Unlike ride-hailing, app-based rapid food orders are not always delivered by car and thus have the potential to be delivered in more sustainable ways. The 2021 study of London food deliveries found that most deliveries are by moped, with 10% by car. Some rapid food delivery services like Getir use e-bikes to conduct most of their deliveries in many locations. A 2020 survey of San Francisco workers for Amazon Fresh, Door Dash, and Instacart found that one-quarter used bicycles as their primary travel mode for deliveries.[25] However, we could find few other details on the share of food deliveries in the U.S. that are done by automobile, bike, e-bike, etc. Ultimately, the lack of detailed trip data in the U.S. for rapid food deliveries makes it difficult to determine the full scale of curbside and traffic impacts.

‡ The 2021 London study was based on comparing the time spent making deliveries with the total work session length. The 2019 study of ride-hailing trips was based on the distribution of vehicle miles traveled (VMT) across three service phases (P1 – driver waiting for a ride request, P2 – driver heading to pick up a passenger, and P3 – when a passenger is in a vehicle).

Automated Enforcement

Not surprisingly, moving and parking violations by those in the delivery sector have been documented in various studies. For example, a 2022 study by the University of North Carolina found that Amazon, FedEx, and UPS delivery drivers reported that parking enforcement personnel rarely issued tickets or other reprimands.[26] A 2018 study in Paris, France that observed more than 400 bicyclists determined that 50 percent of non-delivery cyclists stopped at red lights, whereas approximately three-fourths of delivery cyclists did not stop.[27]

Approximately half of the states in the U.S. allow for automated enforcement for red-light running, speeding, and for cameras to be placed on school bus stop arms.[28] The current environment in Massachusetts does not support the use of automated enforcement technologies. There are no state laws that permit the use of automated enforcement for speeding, red-light running, or placement of cameras on school buses. It is worth noting that "An Act Relative to Automated Enforcement" was recently proposed in Massachusetts, but ultimately did not pass. This bill would have enabled municipalities to install cameras for the purpose of enforcing motor vehicle violations that include speeding, failure to stop at a red light, failure to stop at a school bus stop arm, blocking the box, and parking or driving in a dedicated bus lane.[29]

While we could find no examples of pilots that used cameras or other types of automated enforcement to cite drivers for misuse of the curb, there are a growing number of pilots that are using cameras and/or mobile devices to manage the curb via reservations and payment.[30] Aspen, Colorado is part of a pilot program that requires delivery drivers to use mobile devices to locate and reserve available curbside loading spaces in the city's downtown and pay for the time they are using them. It was determined that this pilot reduced illegal parking by 23 percent.[31]

Columbus, Ohio tested a loading management zone platform at curb locations experiencing high congestion. Through this program, drivers used an app to check into a loading management zone for either delivery pickup or drop-off. This program also enables law enforcement to view loading management zone activity in real time to ensure vehicle compliance. Merchants near the loading management zones experienced faster pick-ups and drop-offs and reduced illegal parking.[32]

Curbside management technologies (e.g., cameras or mobile phones) that monitor curb usage could be deployed to better understand the usage of curb space and provide insight into when curbs are used, where vehicles are parked, how long they are parked, and what type of vehicles are parked. With a comprehensive picture of curb demand, municipalities would be able to modify and enforce curbside regulations in addition to implementing dynamic curb use and flexible pricing models. In turn, these modifications can decrease congestion and vehicle emissions while advancing safety and supporting economic activity.[33]

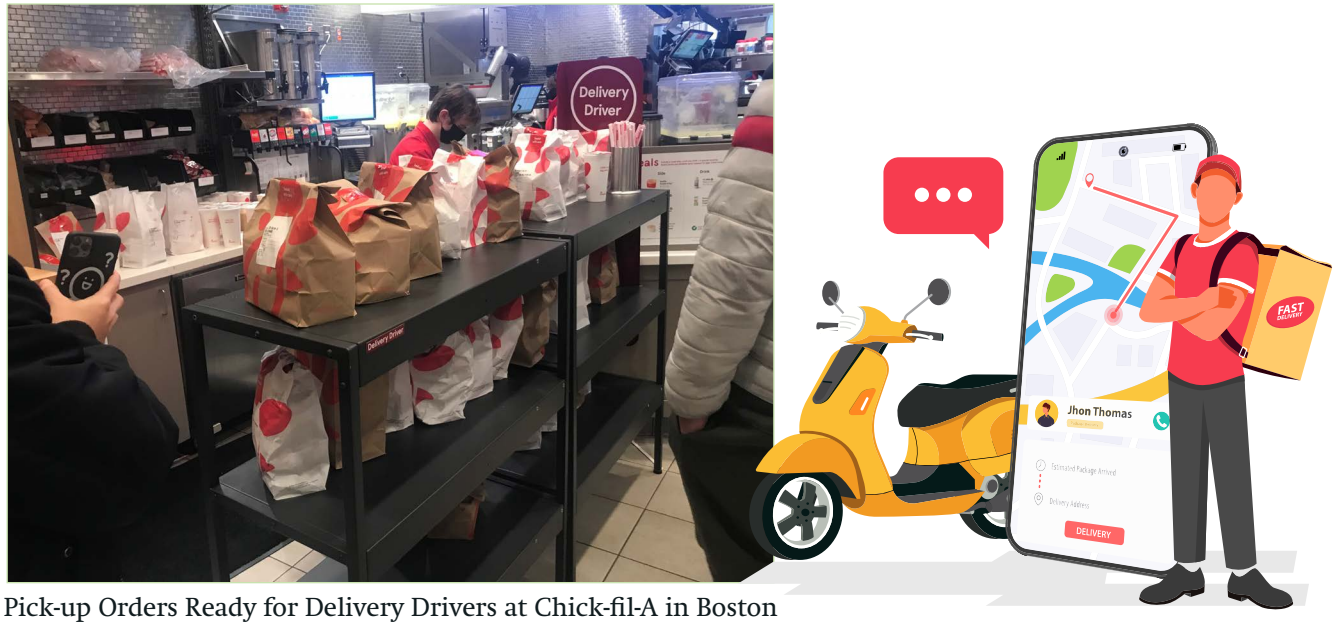
Getir Deliveries by Bicycle and Moped in Boston

GrubHub Delivery by Moped in Boston

DoorDash Driver in Dedham

DoorDash Delivery by Bicycle in Boston

Getir Deliveries by Bicycle in Brookline



Pick-up Orders Ready for Delivery Drivers at Chick-fil-A in Boston

Studies from Other Cities

Although few resources are available, a 2021 study in London conducted by several academic institutions[34] provides insights into the transportation and operational impacts of rapid food deliveries, described as "on-demand meal delivery services" in the study. By analyzing a database [35] of deliveries by a meal delivery platform provider in Greater London, this study looked at distances travelled, evaluated curb usage, and quantified transportation impacts and GHG emissions by vehicle type (car, moped, and bicycle). Of the deliveries made, 83% of delivery workers used a moped, 10% drove a car, and 7% used a bicycle.

▷ The following is a summary of key findings from this London study:

Trip Lengths are Short:
The average trip length, from restaurant to customer, is 1.4 miles. The average distance a delivery driver travels in a day was 25.7 miles, not including commuting to and from home. A delivery worker makes an average number of 9.6 deliveries in a day, with each job averaging 25 minutes from pick-up to delivery.

Time Spent at the Curb is Long:
Unlike person trips, delivery drivers need to leave their vehicles to pick up a meal and again to deliver the meal. As a result, they occupy the curb space longer. For their analysis, the London study determined an average pick-up time of ten minutes at a restaurant and two minutes delivering a meal to a customer.

There are Significant Times in-between Delivery Assignments:
When comparing the time spent making deliveries with the total work session length, 49% of time was found to be making deliveries with remaining time waiting for the next delivery assignment.

Meal Deliveries Have Intensive GHG Emissions:
Not surprisingly, mopeds and cars emit, respectively, five and 11 times more GHGs per meal delivered than bicycles.[36]

Sharp Peaks in Delivery Demand:
The study observed sharp peaks in delivery demand coinciding with lunch and dinner times. This pattern can conflict with existing traffic, especially in the evening, and creates a logistical challenge because more delivery workers are in demand during meal-times but only a few are required at other times.

The Meal Delivery Sector is Inefficient:
In addition to placing additional pressure on curbside infrastructure and the transportation network, the study determined that on-demand meal deliveries are inefficient in terms of distance traveled, GHG emissions, and curb occupancy — particularly when mopeds and cars are used. Overall, this study found the food delivery sector to be "highly fragmented and relatively inefficient compared to consolidated parcel delivery services."[38]

Bicycle Deliveries are Most Efficient:
Bicycles are more efficient in terms of road space and curb space occupied and GHG emissions than vehicles. However, delivery workers using bicycles may also create potential conflicts with pedestrians when picking up or delivering a meal, similar to other types of deliveries.

Challenges with Pick-Up at Restaurants:
On-demand meal deliveries can generate substantial vehicle activity at the restau-rants from which the deliveries originate due to the time delivery drivers spend waiting to pick up meals.[37] Depending on where restaurants are located, this can generate traffic and noise disturbances for residents.

If similar localized data were readily available in Greater Boston, a better understanding of the delivery ecosystem could be attained. In turn, decisions to better manage the curb, traffic, and advance sustainability could be made.

Both the London study, which analyzed a database of actual deliveries, and a study that modeled restaurant meal deliveries by researchers at the University of Illinois Chicago[39] determined that the rapid growth in the provision of, and demand for, these services raise critical policy issues particularly regarding transportation and GHG emissions. However, planning for and managing rapid food delivery services is challenging given the limited availability of data on this rapidly evolving industry. The studies offered the following opportunities to potentially reduce traffic impacts and GHG emissions:

- Promote the use of both conventional and electric bicycles and electric mopeds while discouraging the use of cars to make deliveries.
- Promote delivery of multiple orders in one trip and promote common customer pick-up locations (instead of door-to-door service).
- Work with platform providers to ensure adequate training for delivery workers.
- Incentivize customers willing to accommodate longer delivery times.

Advancing policies for the rapid food delivery services sector is essential to sustainably managing transportation and environmental impacts. However, making informed policy decisions will require additional data and developing metrics to monitor and better understand this rapidly evolving sector. Neighborhood characteristics, such as restaurant densities, customer demand, availability of vehicle types, and associated infrastructure can all affect delivery services and need to be further studied.[40]

Impacts of Ghost Kitchens and Micro-fulfillment Centers

The growth in rapid food deliveries has spawned the proliferation of ghost kitchens and micro-fulfillment centers (MFCs) to meet demand. As these sites increasingly serve as distribution centers for online orders for food and convenience store items, their growth will impact communities, especially in downtowns and commercial centers, and will require thoughtful management through zoning and regulations.

Ghost Kitchens

Ghost kitchens are food establishments[41] that typically prepare fast-casual meals. Ranging in size from a few hundred to a few thousand square feet,[42] a ghost kitchen can share both equipment and staff to supply multiple restaurants and reduce overhead costs for traditional brick-and-mortar restaurants. While some ghost kitchens are stand-alone facilities, others operate out of existing restaurants delivering food under virtual brands that exist only online. While there are various types of ghost kitchens, they all solely focus on food delivery to fulfill online orders and do not provide orders for in-person dining or customer takeout. Based on MAPC's research, most ghost kitchens in Massachusetts currently operate as virtual brands from existing restaurants (e.g., Guy Fieri's Flavortown Kitchen operating out of Bertucci's)[43] or as shared kitchens for small businesses (e.g., Foundation Kitchen).

The ghost kitchen model has a large potential market opportunity, and technology is enabling the restaurant industry to rapidly change. [44] Ghost kitchens can serve as opportunities for traditional restaurants that may decide to move to a ghost kitchen model or for start-up businesses looking

to enter the restaurant industry.[45] While the total number of ghost kitchens is under debate, nationwide estimates have ranged between 100,000 to 185,000.[46]

Third-party rapid food delivery apps such as DoorDash, Grubhub, and Uber Eats have an increasingly important role in the digital marketplace for restaurants as they provide both the ordering and delivery infrastructure for restaurants.[47] As of mid-2020, Uber Eats had more than 10,000 ghost kitchens on its platform nationwide, an increase of more than 230% from when it had 3,000 in 2019.[48] Some delivery companies, such as DoorDash, have created ghost kitchens of their own, subsequentially controlling the meal delivery process from beginning to end.[49]

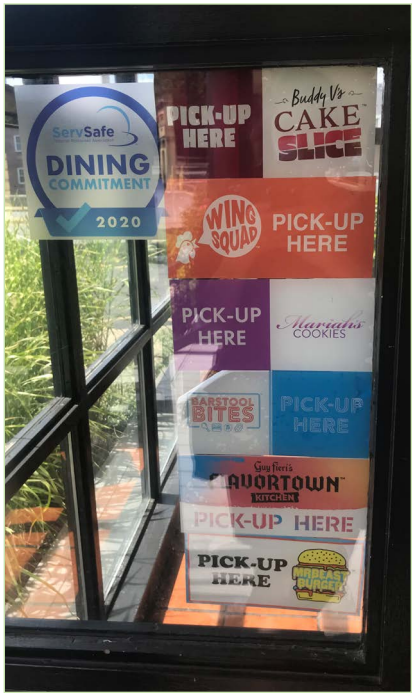
The ghost kitchen model is also influencing the fast food and fast casual restaurant industries with design changes that emphasize pick up for both customers and delivery services. Burger King recently released plans for restaurants with building footprints that are 60% smaller than their traditional establishments and with features designed to support to-go orders, including pick-up lockers and dedicated curbside-delivery parking spaces.[50] Panera Bread is piloting "Panera To Go," locations designed only for picking up orders made from the company's website or app. Orders are retrieved from locations with designated pick-up and delivery shelves and have no seating options.[51]

As ghost kitchens become more widespread and people increasingly use delivery apps to order meals, there has been speculation that they may appropriate business from traditional brick-and-mortar restaurants, a pattern comparable to ride-hailing companies like Uber and Lyft disrupting the taxi industry.[52]

Some municipalities have defined commercial kitchens or shared-use kitchens in their zoning codes, but few have identified ghost kitchens as a distinct use. If a municipality is considering updating use definitions and adopting zoning standards, it is recommended to not place "unnecessary limits on innovation or evolution of the concept"[53] or hinder existing small businesses, such as caterers or food start-ups, using shared-kitchen spaces.

To be viable, ghost kitchens need to be sited at locations that allow for efficient deliveries to a large population of potential customers. However, to efficiently operate, ghost kitchens require safe and reliable access for delivery workers/drivers picking up meals, as well as loading spaces for commercial vehicles delivering food and supplies. Ideal locations for ghost kitchens include light industrial areas or vacant restaurant spaces along auto-oriented commercial corridors. If ghost kitchens are sited in pedestrian-oriented business districts or in residential areas, the potential for conflicts between delivery operations and pedestrians can increase.[54]

DoorDash ghost kitchen in Redwood City, California.
Photo Source: Shutterstock



Virtual brands available at
Bertucci's in North Andover

Micro-Fulfillment Centers

Often located in densely populated areas, micro-fulfillment centers (MFCs), sometimes referred to as dark stores, primarily are designed to fulfill online orders. The majority are not open to the public, and if there is an in-person shopping component, it is completed via a transaction where employees fill the order and hand items over the counter to the customer. Heavily funded by venture capital investments, the largest startup companies operating in this sector are Getir and GoPuff. Primarily offering groceries and convenience store items, a MFC typically carries between 1,500 and 5,000 products. For comparison, a supermarket stocks an estimated 35,000 products.[55]

Getir Storefront in Boston

Getir Storefront in Brookline

A criticism of these types of rapid food delivery services is that they may cause customers to place smaller and more frequent orders, further increasing delivery trips, congestion, GHG emissions, and requiring additional truck deliveries to restock MFCs.[56] Other key criticisms of ghost kitchens and MFCs is that they do not bring in foot traffic that a traditional store would bring. In turn, this has the potential to diminish the vibrancy of a community and impact economic vitality of neighborhoods and main streets. The number of vehicles required to deliver goods can also negatively impact roadways and sidewalks with traffic congestion and conflicts between pedestrians, cyclists, and vehicles making deliveries from MFCs.

As ghost kitchens and MFCs are likely to contribute to an absence of street vitality and social energy, increase traffic congestion, and create conflicts with pedestrians on main streets and commercial areas municipalities should proactively think about their tradeoffs.[57]

Zoning and Regulatory Considerations

While ghost kitchens and MFCs are generally allowed without the passage of new zoning bylaws, a cursory review of municipalities in Massachusetts indicates that most have no concrete framework for managing these land use types.

In May 2022, the Newton City Council voted to amend the Zoning Code to regulate "last mile" delivery services. This amendment includes the addition of a definition for a MFC and allows their use in areas zoned for business, mixed use, and manufacturing subject to standards. The update to the zoning code also includes size, parking, and design standards for MFCs.[58]

Outside of Massachusetts, a handful of cities and counites have adopted new zoning and regulations to address rapid food deliveries, ghost kitchens, and MFCs. Municipalities may look to distinguish ghost kitchens or MFCs from other retail uses in their zoning codes to help ensure that these facilities do not create conflicts with more traditional retail. MFCs that provide for walk-in customers and virtual brands that operate out of an existing restaurant could be permitted by-right, given the activities are more like traditional dining and retail establishments.

In October 2021, Prince William County, Virginia passed a Zoning Text Amendment (ZTA). In addition to creating an E-Commerce Overlay District, the ZTA established development standards that address the nuances between 'distribution and fulfillment' versus 'neighborhood retail and fulfillment.' For Neighborhood Retail and Fulfillment Centers, the ZTA requires a sliding scale of retail component for the center depending on overall square footage and establishes design standards. The City of Miami Beach, Florida has adopted ordinances that define Retail Fulfillment Center and Neighborhood Center and designate where these establishments may or may not be located. Additionally, Miami Beach has also clarified the definition of "convenience stores," ensuring that public sales areas are at least 70% of the store's floor area.

Municipalities will need to consider trade-offs on where to allow for ghost kitchens and MFCs in downtowns/main streets and neighborhood retail centers. Ghost kitchens and MFCs create more activity and tax revenue than an empty storefront; however, other businesses on main streets and in neighborhood retail centers are more successful when traditional office, retail, and dining establishments are in proximity and bring in foot traffic, adding to the vibrancy of the area.

No matter the location, zoning regulations for ghost kitchens and MFCs and restaurants/stores with high levels of delivery activity should follow many of the urban design principles that municipalities adopt for other uses within a neighborhood retail center or main street. These may include:

- Placing parking and deliveries to the rear of the building to minimize conflicts with sidewalk and other nearby storefront activity.
- Creating the most positive storefront as possible with a vibrant and active ground floor. For example, ghost kitchens could have a working kitchen at the street level windows, and MFCs could display products within the window with a QR code for online orders, particularly if the establishment does not accept walk-in customers.
- Following applicable requirements on signage, with possible additional signage to avoid confusion.
- Installing specific signage to notify all users of potential conflicts, such as where curb cuts and driveways interact with sidewalks, bicycle lanes, and have heavy delivery traffic.

Appendix B identifies zoning actions adopted by municipalities nationwide that define ghost kitchens, MFCs, and Newton's zoning amendment to regulate "last mile" delivery services.

GoPuff Micro Fulfillment Center with an In-Person Retail Component in New York City. Left Photo Source: Igor Katrach

Economic Impacts

As of March 2020, it was estimated that there were about 16,000 restaurants in Massachusetts. Of that number, between one-third and one-half are hyperlocal neighborhood places.[59] While the long-term economic and social impacts from app-based rapid food delivery on downtowns, main streets, and neighborhood and village centers are unknown, there are several important considerations.

Most impacts to restaurants from third-party food delivery plat-forms are due to costs from delivery fees and competition from ghost kitchens. Fewer people dining out and shopping in-person means less foot-traffic and potential transactions at nearby stores and businesses.[60] On the other hand, food delivery apps can play a role in expanding a restaurant's customer base and expanded delivery can provide a way for restaurants or shops to increase their business when hiring more in-house staff can be difficult.[61]

Relationship between Third-Party Delivery Platforms and Restaurants

Deliveries by third-party platforms are increasingly critical to the viability of restaurants as they link restaurants, customers, and delivery drivers via the internet and smart phone technology. These platforms facilitate the customers' ability to choose from many local restaurants, enable restaurants to manage additional orders, and coordinate the deliveries.[62] A 2020 survey conducted by the National Restaurant Association found that 70% of customers ordered a delivery, and 40% used a third-party service for their delivery.[63]

The benefits customers receive come at a tremendous cost to restaurant owners. To run on their platforms, third-party food delivery service providers charge restaurants a commission or service fee, which typically ranges between 15-30% percent.[64] This can be a significant added expense for restaurants, and particularly for small, independent, or neighborhood restaurants, as they already operate on slim profit margins [§] that range on average between 3-5%.[65] Because restaurants receive just 55% of total customer expenditures if a meal is ordered and delivered by a third-party platform,[66] this business model is likely to be unsustainable for restaurants in the long term.

When partnerships between third-party food delivery service providers and restaurants are established, there can be challenges centering on transparency and permission. The National Restaurant Association recently developed a set of guiding principles in collaboration with several third-party food delivery companies[67] to be used as a framework for states and municipalities to follow. Examples of these principles include:

§ Third party delivery platforms attain their revenue through five revenue streams: 1) restaurant commission fees (ranges between 15-30%), 2) customer delivery fees (usually between $2 to $5 per order), 3) customer service fees (surcharges of up to 15%), 4) in-app advertising, and 5) tips (while tip revenue goes directly to drivers, they are viewed as subsidizing platforms' operating costs). (Source: Ordering In: The Rapid Evolution of Food Delivery, McKinsey, September 2021, page 4)

- Transparency on fees (including commissions, delivery fees, and promotional fees) charged by third-party delivery companies, including contract terms, policies, marketing practices involving the restaurant, and insurance/indemnity.
- Clarity on sales tax responsibility for collecting and remitting the specific sales tax to the appropriate authority.
- Best practices for providing anonymized data on orders from their restaurant that originate on third-party platforms.

Additionally, ghost kitchens may become a point of concern for restaurants. Ghost kitchens are in a stronger position to pay or negotiate the commission fees charged by third-party food delivery providers and thus are likely to be featured more prominently in the platforms' apps. As a result, ghost kitchens may have a competitive edge compared to restaurants.

New York City recently adopted a suite of rapid food delivery platform requirements, which include setting a delivery fee cap of 15% and a purchase price cap of 3% for each online order.[68] In California, a bill was passed requiring rapid food delivery platforms to disclose both to the restaurant and the customer a cost breakdown of each transaction that includes commission fees.[69] It is worth noting that during the pandemic, Massachusetts temporarily set a cap that prohibited food delivery service companies from charging fees to restaurants that exceed 15% of the purchase price of an online order. The fee cap came into effect on January 14, 2021 and remained in place until June 15, 2021.[70] Several cities, including Baltimore, Columbus, Jersey City, New York, Oakland, San Francisco, Santa Monica, Seattle, and Washington, D.C. temporarily capped fees food delivery service companies could charge restaurants during the height of the pandemic.[71]

State Tax Requirements

Massachusetts does not currently impose a tax remittance requirement for meals ordered through the platforms of companies such as DoorDash, Grubhub, and Uber Eats.[72] Rather, these companies are required to turn the tax over to the restaurant from which the meal order was placed.[73] It is worth noting that the majority of states do require the collection and remittance of state-administered meals taxes by third-party food delivery platforms.[74] Massachusetts does impose a tax remittance requirement for the delivery of grocery and convenience products. Requiring third-party food delivery platforms to remit their sales taxes would be one way to understand the scale and reach of these services in the Commonwealth.

Delivery Assessment

As detailed earlier in the report, MAPC estimates that third-party platform rapid food delivery trips exceed the number of ride-hailing trips annually in Massachusetts. Other research indicates that the amount of time drivers spend deadheading, or waiting for the next delivery assignment, also exceeds that of ride-hailing drivers. Furthermore, it is highly probable that delivery vehicles spend more time dwelling and idling at the curb for both pick-up and drop-off. Collectively, these trips further increase greenhouse gas (GHG) emissions, traffic congestion, and demands on curb usage.

Unlike ride-hailing, there is currently no rapid food delivery assessment in Massachusetts. State statute requires each ride-hailing provider (e.g., Lyft, Uber) to submit to the Massachsuetts Department of Public Utilities' Transportation Network Companies Division the number of rides that originated within each city or town and a per-ride assessment of $0.20. One-half of the per-ride assessment is distributed proportionally to each city and town based on the number of rides that originated in that city or town. The expenditure of this revenue must be used "to

address the impact of transportation network services on municipal roads, bridges, and other transportation infrastructure or any other public purpose substantially related to the operation of transportation network services in the city or town including, but not limited to, the complete streets program established in G.L.c.901, sec.1 and other programs that support alternative modes of transportation."¶

Since 2016, revenue from this assessment has financed millions of dollars' worth of sustainable transportation projects across the state and has helped municipalities with their transportation goals in various ways. Examples include roadway infrastructure and maintenance projects, pedestrian and bicycle projects, and Safe Routes to Schools projects.[75] The other half of revenue from the per-ride assessment goes to the Commonwealth's Transportation Fund.

MAPC recommends that an assessment be considered for trips made by rapid food delivery vehicles that would be proportional to their impacts on the transportation network. A delivery assessment should be designed to encourage more sustainable travel options. For example, an assessment would be lower or eliminated if deliveries are made by electric cars, electric mopeds, electric bikes, or traditional bikes. Most restaurant deliveries are between one and five miles,[76] suggesting that more deliveries could be made by bicycle or moped. An assessment could also be applied to help reduce traffic congestion. For example, a lower assessment could be applied for deliveries made during off-peak times (e.g., late at night) or if deliveries of multiple orders are made in one trip.

Comparable to the ride-hailing assessment, revenue from a rapid food delivery assessment can be used to mitigate impacts to the curb, traffic congestion, and vehicle emissions and encourage more sustainable travel options. It is critical that revenue from a rapid food delivery assessment be reported and tracked to ensure that it is not going to projects that increase vehicle miles

¶ Chapter 187 of the Acts of 2016 – An Act Regulating Transportation Network Companies.

traveled (VMT), increase emissions, or go to a general fund. Additionally, revenue could be allocated for a program that would support locally owned restaurants and convenience stores.

It is critical to point out that while these measures will contribute to more sustainable outcomes, a targeted approach to devising a rapid food delivery assessment is not possible unless detailed data is provided by the delivery service providers. At a minimum, necessary data to determine assessment fees that are proportional to the impact on the transportation network includes trip routes, time and duration of trips, deadheading, delivery pick-up and drop-off times and locations, as well as vehicle type.

Labor Impacts

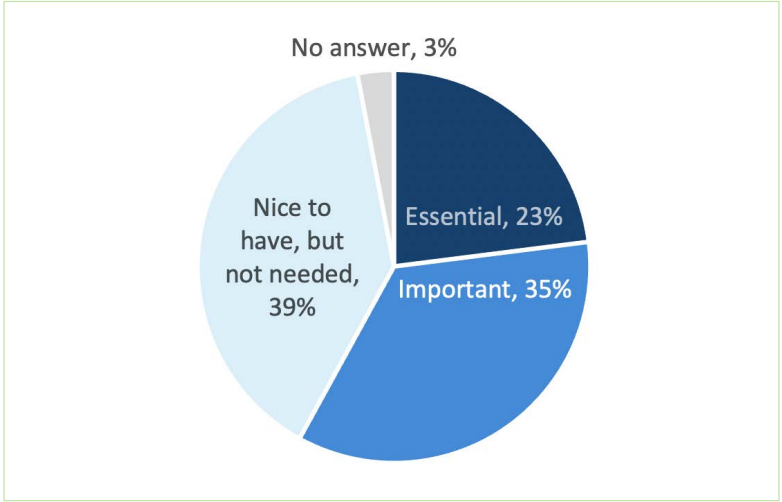
National Studies and Surveys

The growth in app-based rapid food deliveries has raised questions about worker pay and other labor concerns. Most rapid food delivery platforms consider their delivery workers to be independent contractors; however, others such as Getir classify their delivery workers as employees, in part to ensure that they have the workers on hand to deliver items quickly.[77] Surveys of app-based gig workers have found that many independent contractors prefer their independent worker status and the flexibility of delivery work, but low compensation and lack of employee benefits are challenges for many workers.[78] Workers classified as independent contractors are not provided benefits such as health insurance, sick and vacation leave, and retirement, and these workers also must pay their own Medicare and Social Security taxes. According to data from the U.S. Bureau of Labor Statistics, benefits on average are one-third of an employee's total compensation — meaning that the rapid food delivery businesses are saving around 30% in labor costs by classifying workers as independent contractors.[79]

There are few independent studies or surveys of workers of the rapid food delivery companies. A 2021 Pew Research Center Survey of Americans who earned money working for online platforms (such as Uber, Lyft, DoorDash) found that around 4% of Americans currently work for these companies, with 9% having worked for one the last 12 months.[80] One study estimates that Massachusetts has 200,000 app-based gig workers, which would equal around 5% of the Commonwealth's workforce.[81] Another study estimates that nearly 10 percent of the working population has engaged in some gig work with online rapid food delivery and ride-hailing platforms in the last year, and that "we can state with some degree of confidence that this workforce is experiencing fast growth, especially over the last three to four years."[82]

The rise in app-based rapid food deliveries raises several equity concerns for delivery workers. These app-based gig workers are more likely to be under 30 years of age, lower-income, foreign born, and identify as Hispanic. According to one survey, around 58% of gig workers consider the money they earn from these jobs as "essential" or "important" for meeting basic needs (Figure 5). Lower-income gig workers also are more likely to state that they need the jobs to cover gaps or changes in their income, they prefer being their own boss, and do not have other job opportunities in their area. Non-white gig workers were also more likely than their white coworkers to say they have sometimes felt unsafe or faced sexual harassment.[83]

Figure 5. Worker Responses of Importance of Gig Platform Work for Meeting Basic Needs



Survey of U.S. adults conducted Aug. 23-29, 2021. Responses from gig platform workers who have worked for the platforms in the last 12 months. Source: The State of Gig Work in 2021, Pew Research Center, December 2021.

A 2020 Urban Institute/Robert Wood Johnson survey of U.S. workers found that independent contractors (including app-based gig workers) were less likely to have health insurance coverage; they were also more likely to experience material hardships, including difficulty paying for housing, food, and medical care regardless of whether they worked as independent contractors full-time or part-time.[84] A 2022 analysis of U.S. workers' health found "significant associations with poorer overall health" with all forms of non-salaried income, such as those earned by workers of rapid food deliveries. The same study also found that U.S. workers who reported compensation from jobs that included work for rapid deliveries platforms had "greater odds of reporting poorer overall health and psychological stress" compared to salaried workers.[85]

Because most rapid food delivery workers are compensated on a per-delivery basis and not by the hour, calculating a typical hourly rate can be difficult. Estimates of per-hour compensations range from $5 to more than $25.[86]

One of the first comprehensive surveys of app-based rapid food delivery workers was conducted in New York City in 2021. This survey found that most respondents were immigrants who identified as people of color and worked their delivery jobs full-time (five days a week). The survey noted that delivery workers must pay out of pocket for many of the tools needed to do their job, such as: owning, operating, maintaining, parking a vehicle, moped, e-bike or bicycle; mobile phone and mobile phone plan; reflective clothing, gloves, and other safety gear (including personal protective equipment/PPE); and health insurance. While workers are paid for each delivery, many respondents reported that they must be logged into the apps waiting for an order, which is uncompensated work time. Moreover, most of a delivery worker's pay is from tips, which are highly unstable. The survey found that, including tips and net monthly expenses, the median hourly pay was $12.21; excluding tips, the median pay was $7.94[87], less than New York City's minimum wage of $15 per hour.

A survey of Amazon Fresh, Instacart, and DoorDash delivery workers in San Francisco in 2020 had similar findings. Most of the workforce identifies as people of color, and a third were immigrants. Many work for these platforms full-time, with the deliveries serving as their primary source of income. This survey found that many workers (after expenses) earn less than San Francisco's minimum wage ($15.59/hour), with perhaps 12% earning nothing when all expenses (taxes, fuel, etc.) are considered.[88]

These surveys found that most gig workers like the flexibility of the work, enjoy being their own boss, and consider it a good way to make extra money, but have also expressed interest in having greater pay and benefits. As noted below, laws have been proposed at the federal, state, and municipal levels that would either reclassify app-based gig workers as employees (and thus offer them more worker protections, including higher earnings and benefits) or would allow workers to remain as independent contractors but receive health insurance and other benefits from the delivery platforms that would be portable (e.g., not tied specifically to one company).

Insurance Requirements

The varied insurance requirements and offerings for each app create a confusing environment, particularly for workers/drivers who may operate for multiple delivery platforms.[89] Depending on the delivery platform, workers who use their own vehicle might also need to acquire additional commercial vehicle insurance. Some delivery platforms provide liability insurance to drivers at no cost, while others offer insurance to delivery workers for a fee. Some platforms, such as DoorDash, provide coverage only while actively delivering food and not while waiting or driving to pick up food.[90]

For ride-hailing businesses (TNCs) and drivers in Massachusetts, the insurance requirements are clearer because these are set by the legislation governing ride-hailing. For example, ride-hailing businesses must "clearly and conspicuously provide a driver" with information on the insurance

requirements in Massachusetts and the insurance provided by the TNC.[91] These Massachusetts insurance requirements under the ride-hailing legislation, however, do not apply to delivery platforms nor to the workers engaged in rapid food deliveries, thus creating confusion for workers who may be engaged in both app-based rapid food deliveries and ride-hailing.[92] Furthermore, most delivery commercial insurance policies are tied to automobile liability insurance; food delivery workers using bicycles or other personal mobility devices, such as scooters, may be required to purchase a separate commercial liability coverage.

Legislative Actions Outside Massachusetts

New York City in January 2022 announced new legislation regulating online third-party food delivery services and enforcing new labor standards for delivery workers, including a minimum wage and greater transparency on the earnings (including tips) for each delivery for workers and consumers.[93] California recently passed Proposition 22, a law that allows delivery platform businesses to classify their workers as independent contractors. This law also provides workers with some benefits and protections such as a health care stipend, occupational accident insurance for medical expenses, and a guaranteed pay equal to 120% of the minimum wage during times when deliveries or trips are in progress.[94] Washington state passed similar legislation that includes minimum pay per trip, paid sick leave, and worker's compensation coverage while continuing to classify delivery workers as independent contractors.[95]

In October 2022, the Biden Administration announced new proposed Federal rules on worker classification for independent contractors.[96] At this time, the new rules are unclear on whether they might classify delivery workers as employees of rapid food delivery companies. At least one rapid delivery company stated that the proposed new rules would not change the status of their delivery workers.[97]

Pending Legislation in Massachusetts

Massachusetts voters in 2022 were to address a ballot question that is similar to California's Proposition 22. The proposed measure would have formally classified workers for rapid food delivery platforms as independent contractors, rather than as employees, and would have enabled the provision of benefits such as healthcare stipends and paid sick time. The proposed ballot initiative also would have guaranteed that drivers and delivery workers would earn 120% of the minimum wage during times when they are completing requests (deliveries or trips), but not for time spent waiting for trips or deliveries, plus 100% of tips.[98] In June 2022, however, the Massachusetts Supreme Judicial Court ruled unanimously that the ballot initiative was unconstitutional due to its vague wording. The future of new legislation on the classification of rapid food delivery workers in Massachusetts is uncertain.[99] (The proposed ballot initiative is separate from a lawsuit by Massachusetts Attorney General Maura Healey against Uber and Lyft seeking a court ruling that drivers for these companies are employees under Massachusetts Wage and Hour Laws.[100])

Future Trends

While the rate of change is uncertain as the region moves out of the COVID-19 pandemic, rapid food delivery platforms will likely continue to grow in market share and trips, like other aspects of e-commerce.

Profitability of Delivery Platforms

Despite their rapid growth and growing importance for business owners and their customers, most rapid food delivery platforms are not yet profitable. In addition to reporting significant losses, rapid

food delivery platforms are competing for market share in a very low margin business.[101] According to the Wall Street Journal, the rapid food delivery platforms for groceries can average losses of $20 per order.[102] [103] DoorDash is estimated to have an average profit of 90 cents for each food order.[104] The long-term financial success of rapid food delivery apps remains unknown.

Overlapping and Blending in the Industry

Platforms such as DoorDash, Grubhub, and Uber Eats are positioning themselves to become service providers for businesses beyond restaurants. They have expanded their business models by offering to deliver products from convenience stores, grocery stores, and pharmacies. DoorDash has launched a convenience category called DashMart which is supported by partnerships that include Walgreens and CVS. Grubhub has also partnered with 7-Eleven on their on-demand delivery service, Grubhub Goods.[105] DoorDash has launched a 15 minute grocery delivery pilot in New York.[106] DoorDash and Uber Eats have both partnered with Grocery Outlet, a discount supermarket retailer, to deliver on-demand and scheduled grocery deliveries.[107] According to researcher Edison Trends, third-party delivery services had a 225% increase in online grocery orders between 2020 and 2021. These pilot programs could further add to the increase in online grocery orders.[108]

Uber and DoorDash have launched their own white label fulfillment services for retailers, Uber Direct and DoorDash Drive. White label delivery is the ability to deliver-as-a-service that allows businesses to leverage delivery workers to transport items to customers. For example, DoorDash provides delivery services for companies including Petco and Macy's.[109] Furthermore, DoorDash is testing a service that will enable its drivers to pick up and drop off Facebook Marketplace orders and a package return feature that will enable customers to return items to the post office, UPS, or FedEx.

Ghost kitchens, MFCs, rapid food delivery apps, and ride-hailing companies are also teaming up to offer restaurant delivery services, convenience store offerings, retail offerings, and grocery services all in one.[110] For example, Grubhub and GoPuff recently began a partnership offering items from Gopuff's network of stores on the Grubhub Marketplace, with a pilot in Boston and other locations. DoorDash now offers a restaurant lending program, DoorDash Capital, in which the company will offer cash advances to restaurants that will be automatically repaid via deductions from each DoorDash order fulfilled by the restaurant.[111] This space is rapidly evolving, and it is highly likely that there will be new business models in the future. By offering new product types and broadening partnerships with businesses, the probability of expanding the customer base increases.

Application of Delivery Apps to Address Food Insecurity

A recent Brookings study found that 90% of people living in lower-income areas with limited fresh food access have at least one of four major grocery delivery platforms (Amazon Fresh / Whole Foods, Instacart, Uber Eats, and Walmart), showing the potential reach and usefulness of these delivery services.[112] The Supplemental Nutrition Assistance Program (SNAP) has an online grocery purchase and delivery pilot program in 48 states, including Massachusetts.[113] DoorDash's Project DASH is another example of online ordering platforms providing last-mile delivery solutions for community organizations such as food banks and food pantries.

It should be noted that these programs provide online ordering and delivery of groceries done within a few hours, and not meals from restaurants and convenience store items that are associated with rapid food deliveries provided by platforms such as DoorDash, Getir, GoPuff, Grubhub, and Uber Eats. As the online grocery delivery business model evolves, policy makers and others can explore how these platforms might be leveraged to increase grocery access to those living in areas with limited grocery stores, and for low-income, homebound, or other individuals that have greater risks of food insecurity. Evaluating and ensuring that these services equitably address food access needs will be critical. At the same time, it will be important to remain cognizant of potential impacts to locally-owned, brick-and-mortar grocery stores from the investment of consumer dollars outside local economies, labor effects from greater use of independent contractors for these deliveries, and other impacts noted in this paper.

Key Learnings and Recommendations

Key Learnings

The exponential growth of the rapid food delivery sector has significant transportation, environmental, economic, labor, and land use implications. Based upon the research completed for this paper, our key learnings are as follows.

The scale of rapid food deliveries in Massachusetts is unknown, but likely exceeds that of ride-hailing (Uber, Lyft) trips.

Data suggest that rapid food deliveries in Massachusetts may now exceed the number of ride-hailing (Uber, Lyft) trips. MAPC estimates that in 2021, Massachusetts may have had between 80 and 105 million rapid food deliveries by third-party platforms — a figure that has more than doubled in the last three years. By comparison, Massachusetts had 91 million ride-hailing trips in 2019, but less than 40 million ride-hailing trips in 2021. It is important to note that the decline in ride-hailing trips is directly related to the pandemic, with fewer people traveling in 2020 and 2021. By contrast, the pandemic accelerated the pace of rapid food deliveries, with more households ordering delivery and doing so more frequently. This trend is highly likely to continue, but perhaps at a slower pace. Consistent and reliable data reporting is needed to monitor the rapid food delivery sector and its impact on public infrastructure.

The transportation impacts of rapid food deliveries may be greater than ride-hailing impacts.

Like ride-hailing, the types of transportation impacts from rapid food deliveries include increased street congestion, idling and associated emissions at the curb, as well as greater competition for parking resulting in unsafe and illegal practices such as double-parking in bus, bike, and travel lanes. However, data suggest that the impact per trip may be even greater for rapid food deliveries than ride-hailing.

- A study of food deliveries in London determined that the average time occupying the curb or parking area for picking up food at a restaurant was 10 minutes, while delivering a meal to a customer lasted an average of two minutes. In contrast, the typical time for ride-hail curb interactions is one to five minutes for pick-ups and 30 seconds for drop-offs.

- A survey of delivery drivers working for apps such as DoorDash, Grubhub, or Uber Eats found that only 7.5% of drivers are always able to find parking at the curb upon arrival and 25% spend between four and seven minutes searching for parking. One-fourth of survey respondents admitted to parking in spaces not meant for them when unable to find parking.

- When not delivering, many food delivery drivers spend time waiting for their next assignment — time known as deadheading. A study of food deliveries in London found that workers spend nearly 50% of their time waiting for their next delivery assignment. A study of ride-hailing trips in the Boston area determined that one-third of miles driven by drivers were considered deadheading while waiting for a ride request. While these two studies are not apples-to-apples comparisons, the data illustrate the inefficiencies of these services and their associated impacts on streets.

- Most rapid food deliveries are within one to five miles — suggesting more environmentally sustainable delivery methods such as e-bikes or electric mopeds might be feasible.

Signage for delivery pick-up at Taco Bell in Dedham.

The proliferation of ghost kitchens and micro-fulfillment centers is directly related to the rapid food delivery industry.

Ghost kitchens are commercial facilities that house one or more restaurant operators who prepare food exclusively to fulfill online orders. While some ghost kitchens are stand-alone facilities, others operate out of existing restaurants delivering food under virtual brands that exist only online. Based on MAPC's research, most Massachusetts ghost kitchens currently operate as virtual brands from existing restaurants. Over time, ghost kitchens and virtual brands may appropriate business from traditional brick-and-mortar restaurants, a pattern comparable to ride-hailing companies disrupting the taxi industry. Often located in densely populated areas, micro-fulfillment centers (MFCs, sometimes referred to as dark stores) primarily fulfill online grocery and convenience item orders. Because ghost kitchens and MFCs do not bring in the foot traffic of traditional stores and restaurants, they have the potential to diminish the vibrancy and economic vitality of neighborhoods and main streets.

Deliveries by third-party platforms are increasingly critical to the viability of restaurants, yet restaurants are encumbered by high commission or service fees.

While third-party rapid food delivery platforms can play a role in expanding a restaurant's customer reach, they also charge high commission or service fees and generate competition between in-person restaurants and delivery-only ghost kitchens. Commission or service fees typically range between 15-30%, which is a significant added expense for restaurants that already operate on slim profit margins. It is particularly challenging for small, independent, or neighborhood restaurants that lack the power to negotiate fees and commissions.

Most delivery workers are independent contractors and many earn less than $16 per hour after expenses.

It is difficult to estimate the number of workers who provide rapid food deliveries. Most rapid food delivery apps consider their delivery workers to be independent contractors, who are more likely to be non-white, younger, immigrants, and lower-income. As independent contractors, they face confusing rules and options on liability insurance, whether delivering by car or other means. Frequently referred to as gig workers, these employees consider the money they earn from these jobs as essential or important for meeting basic needs, yet many earn less than $16 per hour after expenses such as transportation and insurance.

Recommendations

The following recommendations are proposed to manage this evolving and growing sector of the Massachusetts economy in a sustainable manner. Advancing these recommendations will require collaboration among the Administration, the Legislature, municipalities, the delivery platforms, and restaurants. The Commonwealth should consider Identifying an existing agency, creating a new agency, or forming an inter-agency partnership to oversee implementing the recommendations.

Our recommendations, which are divided into legislative actions, state actions, regional and local actions, and other emerging best practices should all be undertaken now. Many of the recommendations include obtaining and collecting data to better understand the scale and geographic reach of rapid food deliveries in Massachusetts. Consistent and reliable data collection is essential as it will inform and refine policies, regulations, and guidelines to mitigate the impacts of this expanding and evolving component of the economy.

Legislative Actions

- *Require rapid food delivery platforms to report data to the Commonwealth, similar to the requirements that are in place for ride-hailing services*. Legislation should be developed for data sharing requirements that, at a minimum, include data on precise trip origins, destinations, time spent at the curb, and time of day. The Massachusetts Department of Public Utilities and MassDOT should maintain, manage, and publish the data.

- *Require the state meals tax to be collected and remitted by rapid food delivery platforms*. Short of obtaining data directly from rapid food delivery platforms, meals tax data is another means to understand the scale and growth of app-based food deliveries in the Commonwealth. Currently, thousands of individual restaurants and stores in Massachusetts are required to report on meals tax collection for rapid food delivery platforms. The majority of states require the collection and remittance of state-administered meals taxes by rapid food delivery businesses. Having the rapid food delivery businesses collect and remit the state meals tax would be more efficient and remove this reporting burden from multiple entities. The Massachusetts Department of Revenue should oversee the implementation of this adjustment to meals tax collection and remittance.

- *Require an assessment for trips made by delivery vehicles proportional to their impacts on the transportation network*. Currently, the existing statute governing the fees on ride-hailing trips by TNCs in Massachusetts does not include trips for deliveries made by rapid food delivery platforms. Legislation should be developed to require a delivery assessment for trips made by rapid food deliverers, similar to the existing assessment on ride-hailing trips by TNCs. This assessment should be designed to encourage more sustainable travel options that yield fewer greenhouse gas emissions and have less detrimental impacts on curb access and safety (e.g., a lower assessment or no assessment if deliveries are made

by electric cars, electric mopeds, electric bicycles, or traditional bicycles). This assessment could also be applied to reduce congestion (e.g., a lower assessment for deliveries made during off-peak times or for deliveries of multiple orders made in one trip). This fee structure should hold customers and restaurants harmless.

- *Require revenue from the delivery assessment to mitigate local impacts on streets and support locally owned businesses*. Like the current assessment on ride-hailing trips, similar legislation should be enacted that requires revenue from an assessment on rapid food deliveries be used to address local impacts on businesses and streets. Revenue from a delivery assessment would be administered by MassDOT and municipalities to mitigate impacts to the curb, traffic congestion, and vehicle emissions (e.g., installing dedicated cycle lanes and charging infrastructure, designating areas where bicycles and mopeds can be left safely at restaurants and properties with high delivery activity, supporting local e-bike share programs, generating revenue for public transit, and / or planting street trees). Additionally, revenue should be designated for a program that would support locally owned restaurants and convenience stores, which could be managed by one of the Commonwealth's economic development agencies. This would help such businesses to cope with the impacts of rapid food delivery platforms and transition to an economy in which such deliveries are more common.

- *Ensure that delivery workers receive fair compensation and operate in a safe working environment*. Legislation should be developed that requires fair compensation to gig workers on rapid food delivery platforms, similar to the efforts that have been made to ensure that ride-hailing drivers receive fair compensation.

- *Require delivery platforms to insure delivery workers, similar to the Massachusetts requirements for ride-hailing platforms*. The Legislature should require rapid food delivery platforms to provide clear information to workers on insurance coverage when engaged in the platform,

as well as information on optional coverage that might be available for purchase. Required coverage should apply to delivery workers whether they use their own personal vehicle, walk, or use a personal mobility device such as a bicycle or e-scooter. These insurance requirements should apply to rapid food delivery platforms such as DoorDash, Uber Eats, and Grubhub, and other delivery platforms such as Amazon and Instacart.

- *Require rapid food delivery platforms to provide safety training for delivery workers.* Legislation should be developed that requires rapid food delivery platforms to provide safety training as part of onboarding new delivery workers and on an annual basis for existing delivery workers. Safety training can reduce dangerous driving and biking behaviors and increase adherence to roadway regulations.

State Regulations

- *Ensure that delivery workers receive fair compensation and operate in a safe working environment*. State agencies should regularly survey app-based delivery workers in Massachusetts to monitor wages, tips, and benefits received, particularly for workers who rely on delivery work as a major source of income for their households. The surveys should also monitor worker safety, such as harassment, insurance requirements, and crashes. This data will help the Commonwealth determine whether delivery workers are earning the applicable minimum wage after expenses such as transportation, liability and health insurance, and self-employment taxes. The survey data can be used to ensure delivery workers are fairly compensated and are operating in a safe working environment. The Massachusetts Attorney General's Public Protection and Advocacy Bureau Fair Labor Division and its Consumer Protection Division should be responsible for conducting surveys and enforcing possible legislation on compensation and safety for app-based delivery workers.

- *Require rapid food delivery platforms to implement programs that make it easier for delivery workers to access e-bikes and adopt electric vehicles.* The Department of Public Utilities or MassDOT should work with third-party delivery platforms to implement programs similar to DoorDash's partnership with e-bike company Zoomo, which provides access to e-bikes at reduced rates and offers cash bonuses for bicyclists who deliver via bike or e-bike in select cities. These state agencies should also work with delivery platforms to develop programs that advance the adoption of electric vehicles, such as DoorDash's low-cost electric vehicle subscription leasing program in California, which also includes cash bonuses for drivers. It is important to note that the recently adopted Climate Bill requires the Massachusetts Department of Public Utilities to create a plan to electrify ride-hailing vehicles.

Municipal and RPA Actions

- *Regional Planning Agencies (RPAs) should analyze data collected by the state and work with municipalities to develop curb management policies.* Data analysis would enable local officials to understand the scale of traffic and curb usage in local areas, given that most delivery trips are less than five miles.

- *Conduct local and regional surveys of restaurants, ghost kitchens, MFCs, grocery stores, and convenience stores to understand the impacts of rapid food delivery platforms.* Continuous surveys conducted by the Commonwealth (through the Massachusetts Office of Consumer Affairs and Business Regulation or similar agency) would be critical as part of monitoring the impacts of policy recommendations and changes in the rapid delivery marketplace. MassDOT, RPAs, and/or municipalities could also conduct regional or local studies to understand delivery patterns.

- *Implement curb management strategies, particularly in areas with multiple restaurants or high delivery activity*. Curb management strategies municipalities can implement include designating spaces for rapid-delivery vehicles (including e-cargo bikes), evaluating loading requirements, creating dynamic curbside pricing, and continuous study and re-evaluation of curb uses and policies. Where needed, municipalities should adjust zoning, curbside management policies, and loading zone requirements to minimize negative impacts.

- *Establish zoning, design, operational, and development standards for ghost kitchens and MFCs*. Standards for municipalities to consider include zoning requirements that regulate parking for delivery vehicles, loading zones, and hours of operation to minimize impacts to neighbors (especially residential).

- *Strengthen placemaking around local restaurants and retailers to create more positive in-person experiences*. This can be accomplished by creating more outdoor dining and pedestrian areas (for example, via MassDOT's Shared Streets and Spaces program) and requiring parking and deliveries to be behind the building rather than on the street front. RPAs can assist municipalities in planning and implementing such placemaking and place-enhancing programs and policies.

Emerging Best Practices

- *Monitor emerging practices in other states that apply automated enforcement to prevent the occurrence of roadway violations, including parking violations at the curb.* The application of cameras and other types of automated enforcement can serve to reduce speeding, running red lights, and other dangerous driver behaviors for all roadway users, not just those of delivery workers. At a minimum, automated enforcement programs must be transparent and open to the public, motivated by safety, and equitable to lower-income drivers such as rapid food delivery workers.

- *Monitor other state and municipal actions on regulating agreements between restaurants and delivery businesses*, such as New York City's delivery fee and purchase price caps and California's cost breakdown disclosure requirements. It is highly recommended that an annual report be issued to summarize key legislative actions nationwide. An economic development agency such as the Office of Consumer Affairs and Business Regulation should be responsible for authoring and releasing the annual report. If the report finds that regulations in other states and municipalities are successful in protecting small businesses, the Legislature should implement similar requirements in Massachusetts or encourage municipalities to adopt their own local requirements for agreements between restaurants and third-party delivery platforms.

- *Encourage restaurants to review contract terms deliberately when they enter agreements to run on a third-party delivery platform.* The Massachusetts Restaurant Association and local Chambers of Commerce can work closely with restaurants to ensure they are equipped to navigate these agreements, especially regarding commission fees, marketing practices, anonymized data on orders, and other guidelines identified by the National Restaurant Association's Public Policy Principles for Third-Party Delivery.

- *Monitor labor-related legislative changes outside Massachusetts, including new Federal rulemaking on classifying independent contractors*. The Massachusetts Attorney General's Public Protection and Advocacy Bureau Fair Labor Division can assist in reviewing emerging polices and new legislation that might assist and support app-based delivery workers. Examples include new requirements in New York City and the National Safety Principles signed by delivery platforms in Australia, as well as the Biden Administration's proposed rules on classifying employees and independent contractors.

Appendix A:

Steps Outlining Estimates for Third-Party Delivery Trips in the U.S. and Massachusetts

MAPC developed a seven-step process to estimate the number of third-party restaurant deliveries in the U.S. and Massachusetts for 2019, 2020, and 2021. The process uses industry market share estimates and data published by Business of Apps and YipitData; information in SEC filings from DoorDash, Grubhub, and Uber; ride-hailing industry market share estimates from Statista; and ride-hailing data from the Massachusetts Department of Public Utilities (DPU). Because Business of Apps and YipitData had differing estimates on the market share for third-party deliveries in the U.S., MAPC developed an estimated range of third-party deliveries (shown as Estimate 1 and Estimate 2). Several of these data sources were not available prior to 2019, and thus we were unable to estimate earlier years. *These are only estimates and more detailed data is needed to confirm the scale of these deliveries both nationwide and within Massachusetts.*

This table summarizes the estimates for 2019, 2020, and 2021.

	2019	2020	2021
U.S. Estimated Annual Third-Party Food Apps Deliveries (millions)			
Estimate 1	885.38	1,655.87	2,329.04
Estimate 2	755.63	1,596.41	2,488.70
MA Estimated Annual Third-Party App Deliveries (millions)			
Estimate 1	45.63	58.78	79.21
Estimate 2	36.44	60.77	105.67

The following table estimates the annual per capita third-party app deliveries for the U.S. and Massachusetts for all three years. The table shows that in 2019, the U.S. averaged slightly more than two deliveries per person, while Massachusetts averaged between five and seven deliveries per person. With the growth in online ordering due in part to the COVID-19 pandemic, by 2021 the estimated number of annual deliveries per person increased to approximately seven in the U.S. and between 11 and 15 in Massachusetts.

	2019	2020	2021
Annual Per Capita U.S. Estimated Third-Party Apps Deliveries			
Population Est., *million*	*328.24*	*331.45*	*331.89*
Estimate 1	2.70	5.00	7.02
Estimate 2	2.30	4.82	7.50
Annual Per Capita MA Estimated Third-Party App Deliveries			
Population Est., *million*	*6.89*	*7.03*	*6.98*
Estimate 1	6.62	8.36	11.34
Estimate 2	5.29	8.65	15.13

A November 2021 survey by Pymnts found that 41% of U.S. consumers ordered delivery from platforms such as DoorDash and Uber Eats within the last month, and 4.4% said they order from these platforms every day. (Assuming 4.4% of the 258 million U.S. adults ordering delivery daily would equal more than 4 billion orders in 2021, nearly double our estimate). While we could not find a similar survey for Massachusetts, Statista in 2019 reported that Greater Boston ranked third

in the U.S. for online food ordering. With a substantial population of college students and workers in the tech industry, Massachusetts has been an early adopter of both new mobility such as Uber and Lyft as well as e-commerce platforms such as Instacart, DoorDash, Grubhub, Uber Eats, GoPuff, and Getir. Therefore, we believe that these annual estimates are plausible. More detailed reporting from third-party delivery businesses and additional surveys of people's ordering habits are needed, however, to verify these estimates.

The seven-step process:

Step 1: Determine Range of Third-party Food Delivery Market Share, using estimates from Business of Apps and YipitData. Third-party platforms included are DoorDash, Uber Eats, Grubhub, Postmates, and others.

Step 2: Estimate Number of Third-party Deliveries in the United States, based upon market share data in Step 1 and publicly reported data for DoorDash and Grubhub from their SEC filings or other sources.

Step 3: Estimate Number of Uber Trips in the United States. Using data in Uber's SEC filings, Step 3 estimates the number of Uber trips in the U.S. (passenger, deliveries with Uber Eats, and Uber Freight).

Step 4: Estimate Breakdown of Uber's Passenger Trips and Delivery Trips in the United States, using estimates of Uber Eats trips from Step 2 and the estimate of total number of Uber trips in the U.S. from Step 3.

Step 5: Estimate Number of Uber Passenger Trips in Massachusetts, based upon industry estimates of the U.S. market share for Uber compared with the number of ride-hailing trips reported in Massachusetts.

Step 6: Estimate Number of Uber Delivery Trips in Massachusetts, based on estimates on Uber Eats and Uber passenger trips in the U.S. in Step 4, and the estimate of the Uber passenger trips in Massachusetts in Step 5.

Step 7: Estimate Number of Third-party Deliveries in Massachusetts, using the U.S. market share estimates from Step 1 and the estimate of Uber Eats trips in Step 6.

The following pages detail the seven-step process and estimates for 2019, 2020, and 2021.

2019 Estimates

Step 1	**Determine Range of Third-party Food Delivery Market Share Percent** in the United States in 2019		
		Estimate 1 Market share (%) (Business of Apps*)	Estimate 2 Market share (%) (YipitData†)
	DoorDash	30	31
	Uber Eats	32	26
	Grubhub	20	27
	Postmates	11	0
	Other	7	15

* Business of Apps, DoorDash Revenue and Usage Statistics (2019), https://www.businessofapps.com/data/doordash-statistics/. Business of Apps notes their sources are McKinsey and Second Measure Bloomberg.

† Data provided to MAPC by YipitData via email July 2022.

Step 2	**Estimate Number of Third-party Deliveries in the United States (in millions),** based upon market share data in Step 1 and data from DoorDash and Grubhub		
		Estimate 1 Market share	Estimate 2 Market share
	DoorDash	263.00	263.00
	Uber Eats	283.26	198.41
	Grubhub	179.69	179.69
	Postmates	97.37	0.00
	Other	61.96	114.47
	Total	**885.20**	**755.47**

According to wallstreetzen.com, DoorDash had 263 million orders nationwide. Since DoorDash was not a publicly traded company in 2019 there is no SEC filing. Assumed that order = trip.

According to Grubhub's SEC Form 10-K Annual Report for FY Ended December 31, 2019, Grubhub had 492,300 "Daily Average Grubs", – p. 5. Assumed that Grub = trip, and 492,300 x 365 = 179,689,500 orders in 2019.

Verification of annual Grubhub numbers from Business of Apps: https://www.businessofapps.com/data/grubhub-statistics/

Based on DoorDash data of 263 million annual orders, Grubhub data of 179.69 million annual orders (combined 442.69 million orders), and the market shares in Step 1, estimated trips for Uber Eats, Postmates, and others in the U.S. are calculated in Step 2.

Step 3	**Estimate Number of Uber Trips in the United States,** based on Uber's SEC filings
	Uber had 6.904 billion trips worldwide in calendar year 2019. This includes Uber (Mobility) and Uber Eats (Delivery). As of December 31, 2019, Uber operated in approximately 69 countries and markets outside the United States, which accounted for approximately 78% of all trips. Based on this percentage, there were an estimated 1.52 billion Uber trips in the United States in 2019. 6.904 Billion Worldwide Trips 5.38512 Billion Trips Outside U.S. (78%) 1.51888 Billion Uber Trips in U.S.

According to Uber's SEC Form 10-K Annual Report for FY Ended December 31, 2019, Uber had 6.904 billion trips worldwide. – p. 57. Trips are defined as the number of completed consumer Rides or New Mobility rides and Eats meal deliveries in a given period.

Step 4	**Estimate Breakdown of Uber's Passenger Trips and Delivery Trips in the United States (in millions),** based on data from Steps 2 and 3		
		Estimate 1	Estimate 2
	Passenger and Delivery Trips	1,518.88	1,518.88
	Delivery Trips (Uber Eats)	283.26	198.41
	Passenger (Uber) Trips	1,235.62	1,320.47

Based on the Uber trips estimate from Step 3 and estimated Uber Eats trips from Step 2, the breakdown of Uber's Passenger and Delivery (Uber Eats) trips in the United States was estimated in Step 4.

Step 5	Estimate Number of Uber Passenger Trips in Massachusetts
	In 2019 in the U.S., Uber had 69.9% of the ride-hail market share and Lyft 28.66% of the ride-hail (TNC) market share. In 2019 in MA, there were 91.1 million TNC passenger trips. Based upon the U.S. ride-hail market shares, of the 91.1 million trips in MA, estimate that 26.10926 million were Lyft trips and 63.6789 million were Uber trips.

Market share of the leading ride-hailing companies in the United States from September 2017 to July 2021, https://www.statista.com/statistics/910704/market-share-of-rideshare-companies-united-states/;

MA Department of Public Utilities 2019 Rideshare Data Report https://www.mass.gov/info-details/2019-rideshare-data-report

Step 6	Estimate Number of Uber Delivery Trips (Uber Eats) in Massachusetts (in millions), based on estimates from Steps 4 and 5		
		Estimate 1	Estimate 2
	Delivery Trips (Uber Eats)	14.60	9.57

Step 6 estimate is based on estimated number of Uber Delivery Trips in the U.S. (Step 4) X estimated number of Uber Delivery Trips in MA (Step 5) / Estimated number of Uber Passenger Trips in the U.S. (Step 4).

Step 7	**Estimate Number of Third-party Deliveries in Massachusetts (in millions),** based on data from Step 1 and estimates in Step 6		
		Estimate 1	Estimate 2
	DoorDash	13.69	11.41
	Uber Eats	14.60	9.57
	Grubhub	9.13	9.94
	Postmates	5.02	0.00
	Other	3.19	5.52
	Total	**45.63**	**36.44**

Based upon the estimated Uber Eats Delivery Trips in MA in Step 6 and the market shares of Uber Eats, DoorDash, and Grubhub in the U.S. in Step 1, the estimated total delivery trips in Massachusetts were calculated in Step 7.

2020 Estimates

Step 1	**Determine Range of Third-party Food Delivery Market Share Percent** in the United States in 2020		
		Estimate 1 Market share (%) (Business of Apps*)	Estimate 2 Market share (%) (YipitData†)
	DoorDash	45	47
	Uber Eats	22	26
	Grubhub	18	19
	Postmates	8	0
	Other	7	9

* Business of Apps, DoorDash Revenue and Usage Statistics (2019), https://www.businessofapps.com/data/doordash-statistics/. Business of Apps notes their sources are McKinsey and Second Measure Bloomberg.

† Data provided to MAPC by YipitData via email July 2022.

Step 2	**Estimate Number of Third-party Deliveries in the United States (in millions),** based upon market share data in Step 1 and data from DoorDash and Grubhub		
		Estimate 1 Market share	Estimate 2 Market share
	DoorDash	816.00	816.00
	Uber Eats	364.29	410.96
	Grubhub	227.20	227.20
	Postmates	132.47	0.00
	Other	115.91	142.25
	Total	**1,655.87**	**1,596.41**

According to DoorDash's SEC Form 10-K Annual Report for FY Ended December 31, 2020, DoorDash had 816 million orders nationwide. – p 66. Assumed that order = trip.

According to Grubhub's SEC Form 10-K Annual Report for FY Ended December 31, 2020, Grubhub had 622,700 Daily Average Grubs. – p 5. Assumed that Grub = trip, and 622,700 x 366 = 227,908,200 orders in 2020.

Verification of annual Grubhub numbers from Business of Apps: https://www.businessofapps.com/data/grubhub-statistics/

Based on DoorDash data of 816 million annual orders, Grubhub data of 227.20 million annual orders (combined 1,043.91million orders), and the market shares in Step 1, estimated trips for Uber Eats, Postmates, and others in the U.S. are calculated in Step 2.

Step 3	**Estimate Number of Uber Trips in the United States,** based on Uber's SEC filings
	Uber had 5.025 billion trips worldwide in calendar year 2020. This includes Uber (Mobility) and Uber Eats (Delivery). As of December 31, 2020, Uber operated in approximately 71 countries and markets outside the United States, which accounted for approximately 79% of all trips. Based on this percentage, there were an estimated 1.06 billion Uber trips in the United States in 2020. 5.025 Billion Worldwide Trips 3.96975 Billion Trips Outside U.S. (79%) 1.05525 Billion Uber Trips in U.S.

According to Uber's SEC Form 10-K Annual Report for FY Ended December 31, 2020, Uber had 5.025 billion trips worldwide. – p. 69. Trips are defined as the number of completed consumer Rides or New Mobility rides and Eats meal deliveries in a given period.

Step 4	**Estimate Breakdown of Uber's Passenger Trips and Delivery Trips in the United States (in millions),** based on data from Steps 2 and 3		
		Estimate 1	Estimate 2
	Passenger and Delivery Trips	1,055.25	1,055.25
	Delivery Trips (Uber Eats)	364.29	410.96
	Passenger (Uber) Trips	690.96	644.29

Based on the Uber trips estimate from Step 3 and estimated Uber Eats trips from Step 2, the breakdown of Uber's Passenger and Delivery (Uber Eats) trips in the United States was estimated in Step 4.

Step 5	Estimate Number of Uber Passenger Trips in Massachusetts
	In 2020 in the U.S., Uber had 70.08% of the ride-hail market share and Lyft 29.67% of the ride-hail (TNC) market share. In 2020 in MA, there were 35 million TNC passenger trips. Based upon the U.S. ride-hail market shares, of the 35 million trips in MA, estimate that 10.38 million were Lyft trips and 24.52 million were Uber trips.

Market share of the leading ride-hailing companies in the United States from September 2017 to July 2021, https://www.statista.com/statistics/910704/market-share-of-rideshare-companies-united-states/;

MA Department of Public Utilities 2020 Rideshare Data Report.

Step 6	Estimate Number of Uber Delivery Trips (Uber Eats) in Massachusetts (in millions), based on estimates from Steps 4 and 5		
		Estimate 1	Estimate 2
	Delivery Trips (Uber Eats)	12.93	15.65

Step 6 estimate is based on estimated number of Uber Delivery Trips in the U.S. (Step 4) X estimated number of Uber Delivery Trips in MA (Step 5) / Estimated number of Uber Passenger Trips in the U.S. (Step 4).

Step 7	**Estimate Number of Third-party Deliveries in Massachusetts (in millions),** based on data from Step 1 and estimates in Step 6		
		Estimate 1	Estimate 2
	DoorDash	26.45	28.28
	Uber Eats	12.93	15.65
	Grubhub	10.58	11.43
	Postmates	4.70	0.00
	Other	4.11	5.42
	Total	**58.78**	**60.77**

Based upon the estimated Uber Eats Delivery Trips in MA in Step 6 and the market shares of Uber Eats, DoorDash, and Grubhub in the U.S. in Step 1, the estimated total delivery trips in Massachusetts were calculated in Step 7.

2021 Estimates

Step 1	**Determine Range of Third-party Food Delivery Market Share Percent** in the United States in 2021		
		Estimate 1 Market share (%) (Business of Apps*)	Estimate 2 Market share (%) (YipitData†)
	DoorDash	57	55
	Uber Eats	26	31
	Grubhub	16	14
	Postmates	0	0
	Other	1	1

* Business of Apps, DoorDash Revenue and Usage Statistics (2019), https://www.businessofapps.com/data/doordash-statistics/. Business of Apps notes their sources are McKinsey and Second Measure Bloomberg.

† Data provided to MAPC by YipitData via email July 2022.

Step 2	**Estimate Number of Third-party Deliveries in the United States (in millions),** based upon market share data in Step 1 and data from DoorDash and Grubhub		
		Estimate 1 Market share	Estimate 2 Market share
	DoorDash	1,390.00	1,390.00
	Uber Eats	605.55	763.86
	Grubhub	310.20	310.20
	Postmates	0.00	0.00
	Other	23.29	24.64
	Total	**2,329.04**	**2,488.70**

According to DoorDash's SEC Form 10-K Annual Report for FY Ended December 31, 2021, DoorDash had 1.39 billion orders nationwide. – p 66. Assumed that order = trip.

According to Grubhub's SEC Form 10-Q for Quarterly Period Ended March 31, 2021, GH had 745,700 Daily Average Grubs. – p 17. Grubhub was acquired by Just Eat Takeaway in 2021, and there is no 10-K Annual report to calculate annual deliveries same as 2019 and 2020. Instead, we used 2021 estimated annual Grubhub numbers from Business of Apps: https://www.businessofapps.com/data/grubhub-statistics/

Based on DoorDash data of 1.39 billion annual orders, Grubhub data of 310.2 million annual orders, and the market shares in Step 1, estimated trips for Uber Eats and others in the U.S. are calculated in Step 2.

Step 3	**Estimate Number of Uber Trips in the United States,** based on Uber's SEC filings
	Uber had 6.368 billion trips worldwide in calendar year 2021. This includes Uber (Mobility) and Uber Eats (Delivery). As of December 31, 2021, Uber operated in approximately 72 countries and markets outside the United States which accounted for approximately 78% of all trips. Based on this percentage, there were an estimated 1.40 billion Uber trips in the United States in 2021. 6.368 Billion Worldwide Trips 4.96704 Billion Trips Outside U.S. (79%) 1.40096 Billion Uber Trips in U.S.

According to Uber's SEC Form 10-K Annual Report for FY Ended December 31, 2021, Uber had 6.368 billion trips worldwide. – p. 51. Trips are defined as the number of completed consumer Rides or New Mobility rides and Eats meal deliveries in a given period.

Step 4	**Estimate Breakdown of Uber's Passenger Trips and Delivery Trips in the United States (in millions),** based on data from Steps 2 and 3		
		Estimate 1	Estimate 2
	Passenger and Delivery Trips	1,400.96	1,400.96
	Delivery Trips (Uber Eats)	605.55	763.86
	Passenger (Uber) Trips	795.41	637.10

Based on the Uber trips estimate from Step 3 and estimated Uber Eats trips from Step 2, the breakdown of Uber's Passenger and Delivery (Uber Eats) trips in the United States was estimated in Step 4.

Step 5	Estimate Number of Uber Passenger Trips in Massachusetts
	In 2021 in the U.S., Uber had 68.14% of the ride-hail market share and Lyft 31.86% of the ride-hail (TNC) market share. In 2020 in MA, there were 39.7 million TNC passenger trips. Based upon the U.S. ride-hail market shares, of the 39.7 million trips in MA, estimate that 12.65 million were Lyft trips and 27.05 million were Uber trips.

Market share of the leading ride-hailing companies in the United States from September 2017 to July 2021, https://www.statista.com/statistics/910704/market-share-of-rideshare-companies-united-states/;

MA Department of Public Utilities 2021 Rideshare Data Report.

Step 6	Estimate Number of Uber Delivery Trips (Uber Eats) in Massachusetts (in millions), based on estimates from Steps 4 and 5		
		Estimate 1	Estimate 2
	Delivery Trips (Uber Eats)	20.59	32.43

Step 6 estimate is based on estimated number of Uber Delivery Trips in the U.S. (Step 4) X estimated number of Uber Delivery Trips in MA (Step 5) / Estimated number of Uber Passenger Trips in the U.S. (Step 4).

Step 7	**Estimate Number of Third-party Deliveries in Massachusetts (in millions),** based on data from Step 1 and estimates in Step 6		
		Estimate 1	Estimate 2
	DoorDash	45.15	57.54
	Uber Eats	20.59	32.43
	Grubhub	12.67	14.65
	Postmates	0.00	0.00
	Other	0.79	1.05
	Total	**79.21**	**105.67**

Based upon the estimated Uber Eats Delivery Trips in MA in Step 6 and the market shares of Uber Eats, DoorDash, and Grubhub in the U.S. in Step 1, the estimated total delivery trips in Massachusetts were calculated in Step 7.

Appendix B:

Examples of Zoning and Regulations of Ghost Kitchens and Micro-fulfillment Centers

While ghost kitchens and micro-fulfillment centers (MFCs) are allowed without the passage of new zoning bylaws, most municipalities have no concrete framework for managing these land use types. Identified below are examples of the limited number of zoning actions municipalities have undertaken both in Massachusetts and nationwide.

Ghost Kitchens

DeLand, Florida and Paulding County, Georgia, both define and regulate "virtual kitchen" as a distinct use.

DeLand, Florida

Virtual kitchen, also known as ghost or cloud kitchen is a professional food preparation and cooking facility set up for the preparation of delivery-only meals. (Section 33-12)

Paulding County, Georgia

Virtual kitchens: A food service establishment with minimal on-site work space that delivers food directly to patrons. Virtual kitchen establishments have a kitchen on-site, no patron seating available on-site, may or may not have space on-site dedicated to facilitating deliveries (management office, administrative office, break room, etc.). (Article III, Section B)

Micro-Fulfillment Centers

Fairfax County, Virginia

Fairfax County's Zoning Ordinance identifies MFCs as goods distribution hubs – a facility for the receipt, transfer, short-term storage, and dispatching of retail and other similar goods transported by truck or other vehicle. (Fairfax County Zoning Ordinance - Industrial Uses 6.A.)

Fairfax County also has adopted an ordinance which identifies vehicle size standards, building size -standards, locations when permitted by-right or by development plan. When permitted by special exception, retail sales accessible to customers must be provided. In addition, the layout and architecture must be designed to be compatible with surrounding buildings. (Ordinance 4102.6.B Goods Distribution Hub)

Prince William County, Virginia

In October 2021, Prince William County, Virginia passed a Zoning Text Amendment (ZTA). In addition to creating an E-Commerce Overlay District, the ZTA established development standards that address the nuances between 'distribution and fulfillment' versus 'neighborhood retail and fulfillment':

"Distribution and fulfillment center shall mean a facility where goods or products are stored on-site temporarily, for the purpose of delivery to a neighborhood retail and fulfillment center or residential property. Such facilities may include automated systems, office space, and a pick and pack area to be used by employees for sorting and packaging goods and products for delivery from available, on-site inventory. Distribution and fulfillment center may include Warehousing and is not defined as Retail uses with an accessory delivery component."

"Neighborhood retail and fulfillment center shall mean a facility which contains both a retail and a fulfillment component. Both components must be operated by the same user. Neighborhood retail and fulfillment centers may include the dispatching, coordination, preparation, routing of package pick-up and delivery, and parking of vehicles associated with the delivery of goods. Neighborhood retail and fulfillment is not defined as Warehousing, Distribution and fulfillment center, or Retail uses with an accessory delivery component." (Prince William County Zoning Text Amendment #DPA2017-00018)

For Neighborhood Retail and Fulfillment Centers, the ZTA requires a sliding scale of retail component for the center depending on overall square footage and establishes design standards:

Total Gross Floor Area (Square Feet)	**Minimum Gross Floor Area Retail Component**
10,000 or less	25%
10,001 - 20,000	20%
20,001 – 30,000	15%
30,001 or more	10%

City of Miami Beach, Florida

The City of Miami Beach, Florida has adopted ordinances which define Retail Fulfillment Center and Neighborhood Fulfillment Center. The ordinances designate where these establishments may or may not be located.

Retail Fulfillment Center

In January 2022, the City Commission adopted an ordinance which prohibits Retail Fulfillment Centers citywide. The ordinance also adds a clarification to the definition for "convenience stores" to ensure that that publicly accessible sales areas are at least 70% of the floor area of the store.

The ordinance defines a Retail Fulfillment Center as: "a retail establishment, not licensed as an adult bookstore or adult entertainment establishment, where goods are primarily sold online and/or delivered off premises. Such goods shall not include the sale of any type of alcoholic beverage, nor the sale of cannabis (or marijuana), cannabis derivative products, or cannabis delivery devices, nor the sale of any type of tobacco product, vaping, vapor-generating electronic device, or smoking device. Such establishment must also have an active storefront, along all sidewalk facing portions of the building, that is open to the general public at least eight hours per day. The active storefront must have a minimum depth of 15 feet and a minimum area of 70 square feet. Retail fulfillment centers shall be limited to no more than 7,000 square feet. Goods sold by a retail fulfillment center may include goods similar to those that are sold in a convenience store, except for those products identified in this paragraph." (page 2) (Retail Fulfillment Centers — Ordinance No. 2022-4468, adopted January 20, 2022)

Neighborhood Fulfillment Center

In November 2018, the City Commission adopted an ordinance which permits Neighborhood Fulfillment Centers only in the North Beach Town Center – Central Core (TC-C) District. There is a limit of two establishments (page 8). To date, no establishments have been built.

The ordinance defines a Neighborhood Fulfillment Center as: "a retail establishment where clients collect goods that are sold off-site, such as with an internet retailer. Additionally, the establishment

provides a hub where goods can be collected and delivered to clients' homes or places of business by delivery persons that do not use cars, vans, or trucks. Such facilities are limited to 35,000 square feet." (page 4) (North Beach Town Center — Central Core Land Development Regulations — Ordinance No. 2018-4224, adopted November 14, 2018)

Based on our research, MAPC is aware of two actions to zone for MFCs in Massachusetts.

City of Newton, Massachusetts

In May 2022, the Newton City Council voted to amend the Zoning Code to regulate "last mile" delivery services. This amendment includes the addition of a definition for "Microfulfillment Center" and allows their use in Business Use 4 by special permit. MFCs are allowed in Mixed Use 1, Mixed Use 2, Manufacturing, and Limited Manufacturing Districts subject to standards. The update to the Zoning Code also includes size, parking, and design standards for MFCs.

Size: The maximum gross floor area for a MFC is 10,000 square feet.

Parking: One stall per 1,000 square feet and one stall per four employees. The operator of a MFC shall provide onsite parking dedicated for deliveries by providing a minimum of two off-street parking stalls for the first 2,500 square feet of gross floor area and an additional one off-street parking stall for every 2,500 square feet of gross floor area.

Design Standards: If the MFC is located at street-level in Business Use 4 and Mixed Use 1 and 2 Districts, it shall be located more than 16 feet from the street-facing building façade or any point of the building containing the use is located at least 30 feet from a street.

More information can be found in Newton City Ordinances — Chapter 30: Zoning Ordinance in Section 6.4.37 — Microfulfillment Center.

Town of Chelmsford, Massachusetts

The Town of Chelmsford's 2020 Master Plan recommends revising the Town's zoning by-law to accommodate pop-up stores, e-commerce, fulfillment centers, dark stores, and ghost kitchens. While it did not pass*, an amendment was brought to Town Meeting held in April 2021 to add new definitions of dark stores (defined as micro-fulfillment centers in this report) and ghost kitchens, and to modify the definition of retail. Ultimately, the proposed zoning amendments did not pass. Under the proposed zoning, dark stores and ghost kitchens would be a permitted use in districts zoned as Shopping Center (CC) or Limited Industrial (IA). Dark stores would be authorized under special permit from the Planning Board in districts zoned as Neighborhood Commercial (CA) or Roadside Commercial (CB). Ghost kitchens would be authorized under special permit from the Planning Board in districts zoned as Roadside Commercial (CB), General Commercial (CD), and Center Village (CV). (For more information, see Article 38, Town of Chelmsford Warrant for Annual Town Election, April 6, 2021)

**The failure to adopt this amendment was primarily related to fulfillment centers.*

Endnotes

1 David Curry, "Food Delivery App Revenue and Usage Statistics (2021)," Business of Apps, https://www.businessofapps.com/data/food-delivery-app-market

2 PitchBook, "Emerging Space: Ghost Kitchens," PitchBook, October 14, 2021, https://pitchbook.com/blog/emerging-space-ghost-kitchens

3 Uber, https://www.uber.com/newsroom/super-bowl-2022/; and Grubhub, "Grubhub Launches Grubhub Goods Brand Nationwide," February 15, 2022, https://media.grubhub.com/media/News/press-release-details/2022/Grubhub-Launches-Grubhub-Goods-Brand-Nationwide/default.aspx

4 DoorDash, "Ghost Kitchen Brands," webpage, https://www.doordash.com/business/ghost-kitchen-brands-472430/

5 Statista, Online Food Delivery Report, 2021, December 2021.

6 S. Lock, "Change in online restaurant delivery penetration share of the restaurant market in the United States due to the coronavirus pandemic from 2020 to 2025," Statista, January 21, 2022, https://www.statista.com/statistics/1170614/online-food-delivery-share-us-coronavirus/

7 Pymnts, "The Connected Economy Monthly Report", July 2022, https://www.pymnts.com/study/the-connected-economy-monthly-report-the-rise-of-the-smart-home-automation/

8 Statista, "Platform-to-Consumer Delivery," accessed January 2022, https://www.statista.com/outlook/dmo/eservices/online-food-delivery/platform-to-consumer-delivery/united-states?currency=USD

9 Statista, "Platform-to-Consumer Delivery," accessed January 2022, https://www.statista.com/outlook/dmo/eservices/online-food-delivery/platform-to-consumer-delivery/united-states?currency=USD, and Statista, "Consumer-to-Delivery," accessed January 2022, https://www.statista.com/outlook/dmo/eservices/online-food-delivery/restaurant-to-consumer-delivery/united-states?currency=USD.

From Statista: "The Platform-to-Consumer Delivery market segment focuses on online delivery services that provide customers with meals from partner restaurants that do not necessarily have to offer food delivery themselves. In this case, the platform (e.g. Deliveroo) handles the delivery process. Not included are orders by telephone, unpacked food for immediate consumption as well as non-processed or non-prepared food (e.g. HelloFresh). The Restaurant-to-Consumer Delivery segment includes the delivery of meals carried out directly by the restaurants. The order may be made via platforms (e.g. Delivery Hero, Just Eat) or directly through a restaurant website (e.g. Domino's). The aggregation services collect the menus of independent restaurants and specialized delivery services. The restaurant itself takes care of the delivery process. Not included are telephone orders, unpackaged food for immediate consumption and non-prepared food (e.g. HelloFresh)."

10 According to Uber's SEC Form 10-K Annual Report for FY Ended December 31, 2020, Gross Bookings are defined as the total dollar value, including any applicable taxes, tolls, and fees, of Mobility and New Mobility rides, Delivery meal or grocery deliveries, and amounts paid by Freight shippers, in each case without any adjustment for consumer discounts and refunds, Driver and Merchant earnings, and Driver incentives. Gross Bookings do not include tips earned by Drivers. Gross Bookings are an indication of the scale of the company's current platform, which ultimately impacts revenue. (page 69)

11 According to the SEC filing, mobility products connect consumers with drivers. Delivery offerings allow consumers to search for and discover local restaurants, order a meal, and either pick-up at the restaurant or have the meal delivered. In certain markets, delivery also includes offerings for grocery and convenience store delivery.

12 Edison Trends, "2021 Edison Trends U.S. Grocery Delivery Sales Report," September 13, 2021, https://trends.edison.tech/research/grocery-delivery-sales-report-2021.html

13 Stephan Soroka, "Ultrafast Delivery: the $28B Market to build the on-demand bodega!" LinkedIn, July 25, 2021, https://www.linkedin.com/pulse/ultrafast-delivery-28b-market-build-on-demand-bodega-stephan-soroka-

14 S. Lock, "Cities that spend the most on delivery food in the United States as of May 2019, per capita," Statista, September 17, 2019, https://www.statista.com/statistics/1051250/us-food-delivery-cities-spending-per-capita-2019/

15 Janelle Nanos and Annisa Gardizy, "A downtown full of delivery warehouses? 'Dark stores' are coming to Boston," Boston Globe, December 10, 2021, https://www.bostonglobe.com/2021/12/10/business/downtown-full-delivery-warehouses-dark-stores-are-coming-boston/

16 Annie Palmer, "SoftBank-backed delivery start-up goPuff valued at $8.9 billion in new funding round, more than double from five months ago, CNBC, March 23, 2021, https://www.cnbc.com/2021/03/23/gopuff-raises-1point15-billion-at-8point9-billion-valuation.html; Lizette Chapman, "When Same-Day Delivery Is Too Slow: Gopuff is trying to outrace its competitors in the "dark convenience store" business", Bloomberg, December 2, 2021, https://www.bloomberg.com/news/articles/2021-12-02/delivery-startup-gopuff-aims-to-dominate-dark-convenience-store-business.

17 Annisa Gardizy, "As companies offering 15-minute grocery delivery grow in Boston, so does scrutiny of how they operate," Boston Globe, February 20, 2022, https://www.bostonglobe.com/2022/02/20/business/companies-offering-15-minute-grocery-delivery-grow-boston-so-does-scrutiny-how-they-operate/.

18 Due to the lack of data, we were unable to develop estimates for prior years.

19 Brett Helling, "Uber Eats vs DoorDash – Which Food Delivery Service is Better for Drivers?", Riderster.com, last updated April 12, 2022, https://www.ridester.com/ubereats-vs-doordash-drivers/ and Ezra Dubroff, "Best Food Delivery Service to Work For: 13 Apps Compared," The Rideshare Guy, posted August 1, 2022, https://therideshareguy.com/best-food-delivery-service-to-work-for/.

20 International Transport Forum, "The Shared-Use City: Managing the Curb," 2018, https://www.itf-oecd.org/sites/default/files/docs/shared-use-city-managing-curb.pdf; pp. 56-57.

21 Julian Allen, Maja Piecyk, Tom Cherrett, Muhammad Mabil Juhari, Fraser McLeod, Marzena Piotrowska, Oliver Bates, Tolga Bektas, Kostas Cheliotis, Adrian Friday, Sarah Wise, "Understanding the Transport and CO2 Impacts of On-Demand Meal Deliveries: A London Case Study," Cities, Volume 108, January 2021, https://doi.org/10.1016/j.cities.2020.102973.

22 Anil Merchant, "Delivery Driver Survey: Parking at the Curb," Automotus, February 2022, https://www.automotus.co/post/automotus-delivery-driver-survey.

23 Julian Allen, Maja Piecyk, Tom Cherrett, Muhammad Mabil Juhari, Fraser McLeod, Marzena Piotrowska, Oliver Bates, Tolga Bektas, Kostas Cheliotis, Adrian Friday, Sarah Wise, "Understanding the Transport and CO2 Impacts of On-Demand Meal Deliveries: A London Case Study," Cities, Volume 108, January 2021, https://doi.org/10.1016/j.cities.2020.102973.

24 Melissa Balding, Teresa Whinery, Eleanor Leshner, and Eric Womeldorff, "Estimated TNC Share of VMT in Six US Metropolitan Regions (Revision 1)," Fehr & Peers, August 6, 2019, https://www.fehrandpeers.com/what-are-tncs-share-of-vmt/, p. 9.

25 Chris Benner, Erin Johansson, Kung Feng, Hays Witt, "On-Demand and On-the-Edge: Ride-hailing and delivery workers in San Francisco, Summary 2020 Survey of Delivery Workers," UC Santa Cruz and Institute for Social Transformation, October 16, 2020, https://transform.ucsc.edu/on-demand-and-on-the-edge/.

26 Evan Iacobucci, Noreen McDonald, Charles H.W. Edwards, Ruth Steiner, "Using Social Media to Understand Challenges Faced by US Urban Parcel Delivery Drivers: Reports from the Curb", Transport Policy 126, Department of City and Regional Planning, University of North Carolina, 2022.

27 Camile Krier, Laetitia Dablanc, Anne Aguilera, Nicole Louvet, "Sharing within the gig economy: The use of shared e-bikes by on-demand platform-based instate meal delivery workers in Paris," Case Studies on Transport Policy Volume 10 Issue 4, pages 280-2289, Science Direct, December 2022, https://doi.org/10.1016/j.cstp.2022.10.012

28 The summary of state and municipal laws on automated enforcement is from the following sources.

National Conference of State Legislatures, "State School Bus Stop-Arm Camera Laws", posted February 15, 2022, https://www.ncsl.org/research/transportation/state-school-bus-stop-arm-camera-laws.aspx; and "Traffic Safety Review" State Speed and Red-Light Camera laws and Programs," posted August 26, 2022, https://www.ncsl.org/research/transportation/traffic-safety-review-state-speed-and-red-light-camera-laws-and-program.aspx

Insurance Institute for Highway Safety, Highway Loss Data Institute, "Automated Enforcement Laws", November 2022, https://www.iihs.org/topics/red-light-running/automated-enforcement-laws; and "Red Light Running", updated July 2022, https://www.iihs.org/topics/red-light-running

Centers for Disease Control and Prevention, "Automated Speed-Camera Enforcement", page last updated December 2, 2015, https://www.cdc.gov/motorvehiclesafety/calculator/factsheet/speed.html

National Association of City Transportation Officials, "Automated Enforcement", https://nacto.org/publication/city-limits/the-right-speed-limits/corridor-speed-limits/determine-best-option-for-speed-management/automated-enforcement/

29 Massachusetts Vision Zero Coalition, "State Legislation" https://www.visionzerocoalition.org/state_legislation; An Act Relative to Automated Enforcement — Bill H. 2532 https://malegislature.gov/Bills/192/H2532 or Bill H./2426 https://malegislature.gov/Bills/192/H2426.

30 Currently, there are no camera technologies that can determine excess idling. See John Surico, "How to Win the War on Car Idling", Bloomberg City Lab, August 10, 2021, https://www.bloomberg.com/news/features/2021-08-10/can-cities-finally-win-the-war-on-vehicle-idling.

31 John Surico, "Can Technology Help Cities Manage Curbs Better?" New York Times, August 24, 2022, https://www.nytimes.com/2022/08/24/business/curbside-management-cities-technology.html; and Carolyn Sackariason, "Downtown Aspen loading zones to be part of national pilot program", The Aspen Times, October 26, 2020, https://www.aspentimes.com/news/downtown-aspen-loading-zones-to-be-part-of-national-pilot-program/.

32 Boston Region Metropolitan Planning Organization, "Managing Curb Space in the Boston Region: A Guidebook," October 2021, https://www.bostonmpo.org/data/calendar/pdfs/2021/MPO_1202_Future_of_the_Curb_Guidebook_Final.pdf.

33 Alison Felix, AICP, and Travis Pollack, AICP, "Hidden and In Plain Sight: Impacts of E-Commerce in Massachusetts," MAPC, February 25, 2021, https://metrocommon.mapc.org/reports/20, p. 37.

34 Julian Allen, Maja Piecyk, Tom Cherrett, Muhammad Mabil Juhari, Fraser McLeod, Marzena Piotrowska, Oliver Bates, Tolga Bektas, Kostas Cheliotis, Adrian Friday, Sarah Wise, "Understanding the Transport and CO2 Impacts of On-Demand Meal Deliveries: A London Case Study," Cities, Volume 108, January 2021, https://doi.org/10.1016/j.cities.2020.102973.

35 The database comprised 40,941 meal deliveries made by 195 delivery drivers over a three-month period in 2017.

36 Page 4 of the London Case Study distinguishes the amount of CO2e emissions associated with a bicycle and an e-bicycle.

37 Brian Straight, "Park and pray: More delivery drivers park illegally amid curb congestion," Modern Shipper, March 15, 2022, https://www.freightwaves.com/news/park-and-pray-more-delivery-drivers-park-illegally-amid-curb-congestion.

38 Julian Allen, Maja Piecyk, Tom Cherrett, Muhammad Mabil Juhari, Fraser McLeod, Marzena Piotrowska, Oliver Bates, Tolga Bektas, Kostas Cheliotis, Adrian Friday, Sarah Wise, "Understanding the Transport and CO2 Impacts of On-Demand Meal Deliveries: A London Case Study," Cities, Volume 108, January 2021, https://doi.org/10.1016/j.cities.2020.102973. Quote from page 3.

39 Ning Ai, Ph.D., Junjun Zheng, Xiaochen Chen, and Kazuya Kawamura, Ph.D., "Neighborhood-Specific Traffic Impact Analysis of Restaurant Meal Delivery Trips: Planning Implications and Case Studies in Chicago," Journal of Urban Planning and Development, 2021.

40 Ibid.

41 Ghost kitchens are also referred to as cloud kitchens, dark kitchens, or virtual food halls.

42 Planning Advisory Service (PAS) Quick Notes No. 93 – Ghost Kitchens, American Planning Association, 2021.

43 Terrance Doyle, "Guy Fieri Is Operating Ghost Kitchens Out of a Handful of Boston Area Bertucci's," Boston Eater, February 10, 2021, https://boston.eater.com/2021/2/10/22276668/guy-fieri-operating-ghost-kitchens-bertuccis-massachusetts.

44 Alison Felix, AICP, and Travis Pollack, AICP, "Hidden and In Plain Sight: Impacts of E-Commerce in Massachusetts," Metropolitan Area Planning Council, February 25, 2021, https://metrocommon.mapc.org/reports/20.

45 Kabir Ahuja, Vishwa Chandra, Victoria Lord, and Curtis Peens, "Ordering In: The Rapid Evolution of Food Delivery," McKinsey & Company, September 2021, https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/ordering-in-the-rapid-evolution-of-food-delivery

46 Adrianne Jefferies, "What Are Ghost Kitchens?", The Markup, September 15, 2020, https://themarkup.org/ask-the-markup/2020/09/15/ghost-kitchens-virtual-food-delivery-restaurants; and Matt Newberg, "My Testimony for the Nation's First Hearing on Ghost Kitchens," Medium, February 6, 2020, https://medium.com/hngry/my-testimony-for-nations-first-hearing-on-ghost-kitchens-c999c76dad19.

47 PitchBook, "Emerging Space: Ghost Kitchens," October 14, 2021, https://pitchbook.com/blog/emerging-space-ghost-kitchens.

48 Annisa Gardizy, "What are 'Ghost Restaurants?', That spot on your delivery app might not actually exist," Boston Globe, May 23, 2021. https://www.bostonglobe.com/2021/05/23/business/that-restaurant-you-see-your-delivery-app-might-not-actually-exist/.

49 Peter Romero, "Door Dash Opens a Ghost Kitchen," Restaurant Business, October 14, 2019, https://www.restaurantbusinessonline.com/operations/doordash-opens-ghost-kitchen.

50 Kabir Ahuja, Vishwa Chandra, Victoria Lord, and Curtis Peens, "Ordering In: The Rapid Evolution of Food Delivery," McKinsey & Company, September 2021, https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/ordering-in-the-rapid-evolution-of-food-delivery.

51 "Panera Opens the First of Its Restaurants for Digital-Only Pick Up and Delivery," Restaurant Technology News, June 10, 2022, https://restauranttechnologynews.com/2022/06/panera-opens-the-first-of-its-restaurants-for-digital-only-pick-up-and-delivery/.

52 Planning Advisory Service (PAS) Quick Notes No. 93 – Ghost Kitchens, American Planning Association, 2021.

53 Ibid.

54 Ashley Colpaart, "Everything You Need to Know About Cloud Kitchens (aka. Ghost Kitchens) in 2020," The Food Corridor, December 5, 2019, https://www.thefoodcorridor.com/2019/12/05/everything-you-need-to-know-about-cloud-kitchens-aka-ghost-kitchens-in-2020/; and Planning Advisory Service (PAS) Quick Notes No. 93 – Ghost Kitchens, American Planning Association, 2021.

55 Winne Hu and Chelsia Rose Marcius, "15-Minute Grocery Delivery Has Come to N.Y.C. Not Everyone Is Happy," New York Times, November 9, 2021, https://www.nytimes.com/2021/11/09/nyregion/online-grocery-delivery-nyc.html?smid=em-share.

56 Ibid.

57 Lev Kushner and Greg Lindsay, "The Dark Side of 15-Minute Grocery Delivery," Bloomberg City Lab, December 17, 2021, https://www.bloomberg.com/news/articles/2021-12-07/what-instant-delivery-services-could-do-to-cities.

58 City of Newton – Zoning & Planning Committee Agenda from April 25, 2022, and the April 22, 2022, City of Newton Memorandum - Request for Amendment to the Zoning Code to Regulate "Last Mile" Delivery Services

59 Meeting notes from conversation with Massachusetts Restaurant Association.

60 Janelle Nanos and Annisa Gardizy, "A downtown full of delivery warehouses? 'Dark stores' are coming to Boston," Boston Globe, December 10, 2021, https://www.bostonglobe.com/2021/12/10/business/downtown-full-delivery-warehouses-dark-stores-are-coming-boston/.

61 Planning Advisory Service (PAS) Quick Notes No. 93 – Ghost Kitchens, American Planning Association, 2021.

62 David Curry, "Food Delivery App Revenue and Usage Statistics (2021)," Business of Apps, January 11, 2022, https://www.businessofapps.com/data/food-delivery-app-market.

63 National Restaurant Association, "Restaurants and Third-Party Delivery Companies Agree to Public Policy Principles," December 16, 2020. https://restaurant.org/research-and-media/media/press-releases/restaurants-and-third-party-delivery-companies-agree-to-public-policy-principles/.

64 Joanna Fantozi, "Uber Eats and Postmates introduce tiered commission pricing for operators starting at 15%," Nation's Restaurant News, September 13, 2021, https://www.nrn.com/news/uber-eats-and-postmates-introduce-tiered-commission-pricing-operators-starting-15.

65 David Kranker, "What is the Average Restaurant Profit Margin?" BudgetBranders.com, August 17, 2021, https://budgetbranders.com/blog/average-restaurant-profit-margin/.

66 Kabir Ahuja, Vishwa Chandra, Victoria Lord, and Curtis Peens, "Ordering In: The Rapid Evolution of Food Delivery," McKinsey & Company, September 2021, https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/ordering-in-the-rapid-evolution-of-food-delivery, page 10.

67 National Restaurant Association, "Seven principles guide public policy for third-party delivery," March 1, 2021, https://restaurant.org/education-and-resources/resource-library/seven-principles-guide-public-policy-for-third-party-delivery/.

68 New York City Consumer and Worker Protection, "Delivery Apps Requirements," posted December 23, 2021, https://www1.nyc.gov/site/dca/businesses/Delivery-Apps-Requirements.page.

69 Ervin, Cohen & Jessup LLP, "California Passes AB-286, Further Regulating Food Delivery Platforms," JD Supra, October 21, 2021, https://www.jdsupra.com/legalnews/california-passes-ab-286-further-5613824.

70 Office of Attorney General Maura Healey, "AG Healey Sues Grubhub for Charging Restaurants Illegally High Fees During COVID-19 Public Health Emergency," Press Release, July 29, 2021, https://www.mass.gov/news/ag-healey-sues-grubhub-for-charging-restaurants-illegally-high-fees-during-covid-19-public-health-emergency; and General Court of the Commonwealth of Massachusetts, "An Act Enabling Partnerships for Growth," Session Laws, Acts (2020), Chapter 358, approved (in part), January 14, 2021, https://malegislature.gov/Laws/SessionLaws/Acts/2020/Chapter358.

71 Adrianne Jefferies, "During the Pandemic, Grubhub Should Be Thriving. It's Not," The Markup, May 27, 2020, https://themarkup.org/coronavirus/2020/05/27/during-the-pandemic-grubhub-should-be-thriving-its-not; and Kristopher J. Brooks, "Food delivery services are suing NYC for capping their fees," CBS News, September 10, 2021, https://www.cbsnews.com/news/uber-eats-lawsuit-new-york-city-grubhub-doordash-15-percent-cap-manhattan/.

72 Massachusetts Department of Revenue, "830 CMR 64H.1.9: Remote Retailers and Marketplace Facilitators," DOR Regulations, https://www.mass.gov/regulations/830-CMR-64h19-remote-retailers-and-marketplace-facilitators?uclick_id=66182b45-5b26-463e-bcc0-0a2936ece2e4.

73 The state meals tax in Massachusetts is 6.25%.

74 Uber Eats, "Marketplace facilitator: frequently asked questions," Ubereats.com, accessed September 5, 2022, https://merchants.ubereats.com/us/en/resources/learning-center/marketplace-facilitator/.

75 Metropolitan Area Planning Council, "How are communities using their TNC funds?", https://www.mapc.org/wp-content/uploads/2020/04/April2020_TNC-Funds-Infographic.pdf.

76 Eril Eti, "What's the Average Distance for Food Delivery Services?" ShopFood.com, March 19, 2022, https://www.shopfood.com/online-shopping/whats-the-average-distance-for-food-delivery-services/

77 Aarian Marshall, "These Startups Deliver Groceries Fast—Without Gig Workers," Wired, December 1, 2021, https://www.wired.com/story/startups-deliver-groceries-fast-without-gig-workers/.

78 Michael Karpman, Pamela J Loprest, and Heather Han. "Characteristics and Well-Being of Adults with Nonstandard Work Arrangements." Urban Institute, February 2022, https://www.rwjf.org/en/library/research/2022/01/characteristics-and-well-being-of-adults-with-nonstandard-work-arrangements.html

79 U.S. Bureau of Labor Statistics, "Employer Costs for Employee Compensation Summary", June 16, 2022, https://www.bls.gov/news.release/ecec.nr0.htm.

80 This survey also found that 16% of adult workers in the U.S. either currently work or have worked for an app-based platform at least once. See Monica Anderson, Colleen Mcclain, Michelle Faverio and Risa Gelles-Watnick, "The State of Gig Work in 2021", Pew Research Center, December 2021, https://www.pewresearch.org/internet/2021/12/08/the-state-of-gig-work-in-2021/.

81 Amy Sokolow, "Employee misclassification, gig economy major sources of lost unemployment insurance in Mass.," Boston Herald, October 8, 2021, https://www.bostonherald.com/2021/10/08/employee-misclassification-gig-economy-major-sources-of-lost-unemployment-insurance-in-mass/; compared with approximately 3.5 million workers in Massachusetts - see U.S. Bureau of Labor Statistics, "Economy at a Glace – Massachusetts," accessed March 2022, https://www.bls.gov/eag/eag.ma.htm.

82 Tom Ahn, "What We Do and Don't Know about Online Platform Rideshare/Delivery Workers in Massachusetts," Pioneer Institute White Paper No. 253, September 2022, https://pioneerinstitute.org/pioneer-research/what-we-do-and-dont-know-about-online-platform-rideshare-delivery-workers-in-massachusetts/.

83 Monica Anderson, Colleen Mcclain, Michelle Faverio and Risa Gelles-Watnick, "The State of Gig Work in 2021", Pew Research Center, December 2021, https://www.pewresearch.org/internet/2021/12/08/the-state-of-gig-work-in-2021/.

84 Michael Karpman, Pamela J Loprest, and Heather Han. "Characteristics and Well-Being of Adults with Nonstandard Work Arrangements." Urban Institute February 2022.

85 Robert D. Thomas, John W. David, Paula M. Cuccaro, Gretchen L. Gemeinhardt, "Assessing associations between insecure income and US workers' health: AN IPUMS-MEPS analysis", Social Science & Medicine 309 (2022) 115240. This report includes analysis of self-reported overall health and psychological stress of salaried workers and non-salaried workers who had different types of non-salaried compensation, including daily pay, hourly pay, and piece rate pay. Piece rate pay includes work for ride-hailing platforms such as Uber and Lyft or food delivery platforms such as DoorDash, Uber Eats, and Grubhub.

86 Tom Ahn, "What We Do and Don't Know about Online Platform Rideshare/Delivery Workers in Massachusetts," Pioneer Institute White Paper No. 253, September 2022, https://pioneerinstitute.org/pioneer-research/what-we-do-and-dont-know-about-online-platform-rideshare-delivery-workers-in-massachusetts/.

87 Maria Figueroa, Ligia Guallpa, Andrew Wolf, Glendy Tsitouras, and Hildalyn Colón Hernández. "Essential but Unprotected: App-based Food Couriers in New York City." Workers' Justice Project/ Los Deliveristas. September 2021, https://www.ilr.cornell.edu/worker-institute/blog/reports-and-publications/first-its-kind-industry-report-shows-new-york-citys-app-based-delivery-workers-experience-harsh.

88 Chris Benner, Erin Johansson, Kung Feng, Hays Witt, "On-Demand and On-the-Edge: Ride-hailing and delivery workers in San Francisco, Summary 2020 Survey of Delivery Workers," UC Santa Cruz and Institute for Social Transformation, October 16, 2020.

89 Jason Metz, "Navigating Auto Insurance for Delivery Drivers," Forbes, March 31, 2021, https://www.forbes.com/advisor/car-insurance/delivery-drivers/, and Dash Bridges, "Here's How Delivery Insurance Works for Uber Eats and DoorDash Drivers," blog post, The Rideshare Guy, May 28, 2020, https://therideshareguy.com/how-delivery-insurance-works-and-options-for-drivers/.

90 Car and Driver, "Everything You Need to Know About DoorDash Insurance," May 13, 2021, https://www.caranddriver.com/car-insurance/a36421529/doordash-insurance/; and Door Dash insurance provisions noted on company webpage, https://help.doordash.com/dashers/s/article/Does-DoorDash-have-auto-insurance?language=en_US. Accessed September 15, 2022.

91 Massachusetts Legislation on Transportation Network Companies, 220 CMR 274.00, https://www.mass.gov/files/220_cmr_274_00_final_9-22-17_1.pdf

92 Irene Morrill, "Tech Talk: Covered or Not? Delivery for Hire and the MAP - Driving for DoorDash, Uber Eats, Grubhub, Amazon Flex, etc:" Massachusetts Association of Insurance Agents, https://www.massagent.com/MassAgentSite/Publications/Tech-Talk--Covered-or-Not--Delivery-for-Hire-and-the-MAP.aspx. Accessed September 15, 2022.

93 Other changes in the legislation regulate restaurants and the delivery apps. See New York City Consumer and Worker Protection, "Online Third-Party Food Delivery Services Industry," https://www1.nyc.gov/site/dca/about/Third-Party-Food-Delivery-Services.page.

94 Kimberly Valladares, "Uber, Lyft Win on Prop 22: The Most Expensive Ballot Measure in California's History," Berkley Law, November 16, 2020, https://sites.law.berkeley.edu/thenetwork/2020/11/16/uber-lyft-win-on-prop-22-the-most-expensive-ballot-measure-in-californias-history/.

95 Chris Marr, "Uber Driver Compromise in Washington Is Tougher Sell Elsewhere," Bloomberg Law, August 8, 2022, https://news.bloomberglaw.com/daily-labor-report/uber-driver-compromise-in-washington-is-tougher-sell-elsewhere.

96 U.S. Department of Labor, "US Department of Labor Announces Proposed Rule on Classifying Employees, Independent Contractors; Seems to Return to Longstanding Interpretation", New Release, October 11, 2022, https://www.dol.gov/newsroom/releases/WHD/WHD20221011-0.

97 DoorDash, "DoorDash Statement of Department of Labor Draft Rule", October 11, 2022, https://doordash.news/get-the-facts/doordash-statement-on-department-of-labor-draft-rule/.

98 Spencer Buell, "What You Need to Know about the Gig Worker Ballot Question," Boston Magazine, September 20, 2021, https://www.bostonmagazine.com/news/2021/09/20/massachusetts-gig-worker-ballot-question/.

99 Matt Stout, "SJC Rejects Gig-Worker Ballot Question in Victory for Unions," Boston Globe, June 14, 2022, https://www.bostonglobe.com/2022/06/14/business/mass-high-court-blocks-gig-worker-question-november-ballot/.

100 Office of Attorney General Maura Healey, "Uber and Lyft Drivers are Employees Under Massachusetts Wage and Hour Laws," Press Release, July 14, 2020, https://www.mass.gov/news/ag-healey-uber-and-lyft-drivers-are-employees-under-massachusetts-wage-and-hour-laws.

101 PitchBook Blog, "Emerging Space: Ghost Kitchens," October 14, 2021, https://pitchbook.com/blog/emerging-space-ghost-kitchens.

102 Eliot Brown and Preetika Rana, "Losses Mount for Startups Racing to Deliver Groceries Fast and Cheap," The Wall Street Journal, January 30, 2022, https://www.wsj.com/articles/losses-mount-for-startups-racing-to-deliver-groceries-fast-and-cheap-11643544004#comments_sector.

103 Pymnts.com, "Delivery Startup JOKR Reportedly Looking to Drop NYC Biz," February 1, 2022, https://www.pymnts.com/news/delivery/2022/delivery-startup-jokr-reportedly-looking-to-drop-nyc-biz/.

104 Preetike Rana and Heather Hadon, "DoorDash and Uber Eats Are Hot. They're Still Not Making Money," Wall Street Journal, May 28, 2021, https://www.wsj.com/articles/doordash-and-uber-eats-are-hot-theyre-still-not-making-money-11622194203.

105 Brooke DePalma, "Grubhub partners with 7-Eleven for new convenience-item delivery service dubbed 'Grubhub Goods'," Yahoo!Finance, February 15, 2022, Grubhub Partners with 7-Eleven for New Convenience Item Delivery Service Dubbed 'Grubhub Goods'; and Grubhub, "Grubhub Launches Grubhub Goods Brand Nationwide," Press Release, February 15, 2022, https://about.grubhub.com/news/grubhub-launches-grubhub-goods-brand-nationwide/.

106 Jack Daleo, "DoorDash and Instacart go head-to-head on ultrafast grocery delivery," FreightWaves, December 6, 2021, https://www.freightwaves.com/news/doordash-and-instacart-go-head-to-head-on-ultrafast-grocery-delivery.

107 Russell Redman, "Grocery Outlet stores pilot Uber Eats delivery," Supermarket News, May 19, 2022, https://www.supermarketnews.com/online-retail/grocery-outlet-stores-pilot-uber-eats-delivery; and "Grocery Outlet teams with DoorDash for same-day delivery," Supermarket News, August 15, 2022, https://www.supermarketnews.com/online-retail/grocery-outlet-teams-doordash-same-day-delivery.

108 Edison Trends, "2021 Edison Trends U.S. Grocery Delivery Sales Report," September 13, 2021, https://trends.edison.tech/research/grocery-delivery-sales-report-2021.html.

109 Kabir Ahuja, Vishwa Chandra, Victoria Lord, and Curtis Peens, "Ordering In: The Rapid Evolution of Food Delivery," McKinsey & Company, September 2021, https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/ordering-in-the-rapid-evolution-of-food-delivery; and Aisha Malik, "DoorDash is ending its delivery partnership with Walmart," TechCrunch, August 19, 2022, https://techcrunch.com/2022/08/19/doordash-is-reportedly-ending-its-delivery-partnership-with-walmart/.

110 PitchBook Blog, "Emerging Space: Ghost Kitchens," October 14, 2021, https://pitchbook.com/blog/emerging-space-ghost-kitchens; and "Grubhub and Gopuff Partner to Power Nationwide Delivery from Gopuff's Network on the Grubhub Marketplace," October 4, 2022, https://about.grubhub.com/news/grubhub-and-gopuff-partner-to-power-nationwide-delivery-from-gopuffs-network-on-the-grubhub-marketplace/.

111 Amy McCarthy, “Attention Restaurants: DoorDash Will Eat Your Profits and Loan You Money,” Eater, February 10, 2022, https://www.eater.com/22927222/doordash-capital-cash-advance-loans-to-restaurants?sfmc_id=67320827.

112 Caroline George and Adie Tomer, “Delivering to deserts: New data reveals the geography of digital access to food in the U.S.,” Brookings.edu, May 11, 2022, https://www.brookings.edu/essay/delivering-to-deserts-new-data-reveals-the-geography-of-digital-access-to-food-in-the-us/.

113 See https://www.fns.usda.gov/snap/online-purchasing-pilot and https://www.mass.gov/snap-online-purchasing-program