Improving Efficiency and Managing Growth in New York's For-Hire Vehicle Sector

NYC Taxi & Limousine Commission

NEW YORK CITY DOT

New York City Taxi and Limousine Commission and Department of Transportation

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Executive Summary

Traffic congestion in New York City has grown steadily worse since 2010, with average weekday travel speeds in Midtown Manhattan dropping from 6.1 mph in November 2010 to 4.3 mph in November 2018. Though not the only cause, the explosive growth of the for-hire vehicle (FHV) sector, which tripled from fewer than 40,000 vehicles in 2010 to over 120,000 in 2019, is certainly an important factor. As Uber, Lyft, Juno, and Via—app-based, high volume for-hire services—created new, convenient travel options in the outer boroughs, they also added tens of thousands of additional hours of vehicle travel into the Manhattan core (south of 96th Street) each day. The companies saturated the market with vehicles to ensure low wait times and spur demand, causing drivers to spend over 40% of total work time empty and cruising for passengers. Combined with decreasing per-trip pay, this underutilization led to significant declines in driver income.

In August 2018, responding to the increasing congestion on Manhattan streets and the financial hardship facing many taxi and for-hire vehicle (FHV) drivers, the New York City Council passed Local Law 147, pausing the issuance of new FHV licenses for a year and instructing the New York City Taxi and Limousine Commission (TLC) and Department of Transportation (DOT) to study the impact of the FHV sector on traffic congestion, vehicle utilization, driver income, traffic safety, and access to services throughout the city. It empowered TLC to implement policies to address these impacts, including limiting vehicles cruising around without a passenger (referred to in the legislation as a vehicle utilization standard) and regulating the number of FHV licenses. In addition, Local Law 150 of 2018 required the TLC to implement its driver minimum pay policy and determine whether minimum FHV fares would alleviate any problems identified in the study.

As part of the study, FHVs were counted to determine their share of total traffic in key areas of the city, the first ever vehicle classification counts to capture these vehicles specifically. In Manhattan, FHVs now make up nearly 30% of all traffic, confirming that reductions in FHV-related traffic could meaningfully impact overall traffic conditions. Though the state legislature approved a central business district (CBD) tolling program in April 2019, city policies specifically addressing the operational efficiency of high-volume FHVs remain necessary. How the tolling program will deal with FHVs will not be determined until the end of 2020; TLC's policies will take effect in August 2019 and aim to inform and complement the eventual tolling program structure.

To understand how various policy interventions would impact congestion, vehicle utilization, and driver income, the agencies and their consultants created an economic model of the taxi and for-hire vehicle industry. The model was built using data collected by the TLC, which included millions of records with detailed information on trips, cruising, driver pay, and passenger fares. The model also incorporated existing resources like the New York Metropolitan Transportation Commission (NYMTC) Regional Best Practice Model (BPM), and it was informed by an extensive literature review. The model included recently-implemented policies such as TLC's driver minimum pay rules and New York State's congestion zone surcharge, both of which took effect in February 2019.

TLC and DOT modeled several potential policy strategies for the FHV sector and used the economic model to compare their impacts against a 2020 "No Action" Baseline scenario. Key outputs of the model include impacts on traffic, driver pay, passenger fares and wait times, and shifts to other modes of transportation. The team modeled results for the entire city, Manhattan core, and city outside of the core (non-core) and reported them for the weekday AM and PM peak and midday periods, as well as a weekend overnight period[1].

The table below highlights the policies that the Council asked the agencies to study (alone and in combination), and critical indicators for the PM peak period, the period with the highest volume of FHVs.

Policy	Description	PM Peak Impacts (Compared to 2020 No Action)		
		FHV Vehicle Hours Traveled (VHT) in Core[2]	Average FHV Wait Time	
			Core	Non-Core
Cap on Cruising	Companies are required to keep time cruising without passengers below 31% of total driving time in the core during peak hours. Currently 41% industry-wide.	-21%	+11%	-3%
Regulating the number of FHV licenses	TLC restricts the number of FHV licenses, modeled as a continuation of the number of licenses as of August 2018.	-4%	+3%	+15%
Minimum FHV Fare	FHV companies cannot charge less than a standard rate, equal to the standard taxi rate.	-1%	-1%	0%
Combination 1: Cap on Cruising and Minimum Fare	Companies are required to keep cruising without passengers below 31% of total driving time in the core during peak hours and FHV companies cannot charge less than the standard taxi rate.	-25%	+11%	-4%
Combination 2: Cap on Cruising and Regulating the number of FHV licenses	Companies are required to keep cruising without passengers below 31% of total driving time in the core during peak hours and TLC restricts the number of FHV licenses.	-24%	+13%	+9%

Based on the results of the modeling and other critical legal, implementation, compliance, and enforcement considerations, TLC and DOT recommend that the city implement a cap on cruising set at 31% of total driving time in the core, in effect Monday through Friday from 6 AM to 11 PM, and

[1] Weekday periods modeled using data from Tuesdays and Wednesdays, from 6AM – 10AM (AM peak), 10AM – 4PM (midday), and 4PM – 8PM (PM peak). Weekend overnight period modeled using data from Thursdays, Fridays, and Saturdays, from 9PM – 12AM.

[2] FHV Vehicle Hours Traveled (VHT) is a measure of the total time FHVs operate on city streets for the high-volume for-hire services, including time without passengers. A reduction in FHV VHT in the Manhattan core represents a decrease in the total amount of time FHVs spend occupying street space, where they contribute to traffic congestion.

Saturday and Sunday from 8 AM to 11 PM[3]. This requirement would apply to the four high-volume for-hire services operating in New York City: Uber, Lyft, Via, and Juno. These companies collectively account for over 90% of all FHV trips and are the only part of the sector that is growing in trip volume. By mandating an increase in operating efficiency through a cap on cruising, the city will create accountability for the oversupply and underutilization of drivers in the Manhattan core and reduce congestion from empty vehicles providing no passenger service.

In addition, TLC will propose tighter regulation of the number of licensed FHVs moving forward. Since the vehicle license pause began and through June 2019, the number of FHVs grew by 5,000 vehicles, mostly from new licenses issued from open applications initiated before the pause took effect and not a result of the limited exemptions permitted during the pause. Initially, no new licenses would be permitted, except for wheelchair-accessible vehicles (WAVs), which are exempt under the current vehicle license pause, and battery electric vehicles (EVs). The City has set ambitious carbon-reduction targets and allowing EVs will spur the creation of high-capacity, private-sector provided charging infrastructure. The agencies do not believe EV adoption will occur at a rate to significantly undermine the congestion reducing impacts of tighter regulation of the number of FHVs. Current FHV license holders would still be able to renew existing licenses, and current drivers in lease-to-own arrangements prior to the vehicle licensing pause would continue to be able to get an FHV license after taking over title of the vehicle. Starting a year following passage of these regulations and every six months after that, TLC would evaluate metrics including congestion in the Manhattan core, driver pay, service levels throughout the city, and renewal rates among existing FHV license holders.

This report is being released in tandem with the draft rules, initiating a period of public comment. TLC will seek to implement these rules to replace the current year-long licensing pause. The agency looks forward to working with stakeholders to achieve the goals set out in these documents.

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[3] These hours were selected based on analysis of average hourly weekday and weekend traffic speeds south of 96th Street, and transit service availability.

Introduction

Traffic congestion in New York City has grown steadily worse since 2010. Average weekday travel speeds in Midtown Manhattan, measured from 8 AM to 6 PM, dropped to 4.9 mph for 2018, reaching 4.3 mph in November and December. Not just a nuisance to motorists, congestion creates a significant drain on the region's economy, impedes business deliveries, worsens air quality, and slows transit buses to a crawl.

The decline of traffic speeds to this pace, close to walking speed during peak hours, has many causes. The city has seen continual growth in population, employment, commerce, and construction activity, all of which add pressure to the street network. However, the explosive growth of the for-hire vehicle (FHV) sector, from fewer than 40,000 vehicles in 2010 to over 120,000 in 2019, stands out. As Uber, Lyft, Juno, and Via—app-based, high volume for-hire services—created new, convenient travel options in the outer boroughs, they also added tens of thousands of additional hours of vehicle travel into the Manhattan core (defined in this report as Manhattan south of 96th Street) each day. Traffic counts collected by the Department of Transportation (DOT) in fall 2018, summarized in Table 1, found that FHVs now make up 30% of peak period vehicle volumes in this geography. Relying on short wait times to keep demand high, the companies have saturated the market with vehicles, which currently spend 41% of their time in the core cruising around without passengers.

Table 1: Summary of DOT Vehicle Classification Counts Showing FHV and Taxi Share of Total Traffic: Fall 2018

Location	FHV	Yellow Taxi	All Other Vehicles*
Manhattan (south of 60th St)	29%	24%	47%
East River Crossings	22%	8%	70%
Downtown Brooklyn	24%	5%	71%
Long Island City	24%	6%	70%

* Note: Includes green taxis, buses, personal, commercial, and government vehicles.

As shown in Figure 1, high-volume FHVs grew from about 1.9 million trips in January 2015 to nearly 24 million trips citywide in March 2019. In the Manhattan core (a market historically dominated by taxis), High-volume FHVs overtook taxis in number of monthly trips in July 2018, shown in Figure 2. The total number of trips (taxi plus high-volume FHV) doubled from about 16 million monthly trips in January 2015 to roughly 32 million monthly trips in March 2019, while total trips in the core (taxi plus HV) increased by over 23% over the same period.

Figure 1: High-Volume FHV and Taxi Trips, 2015-2018, Citywide

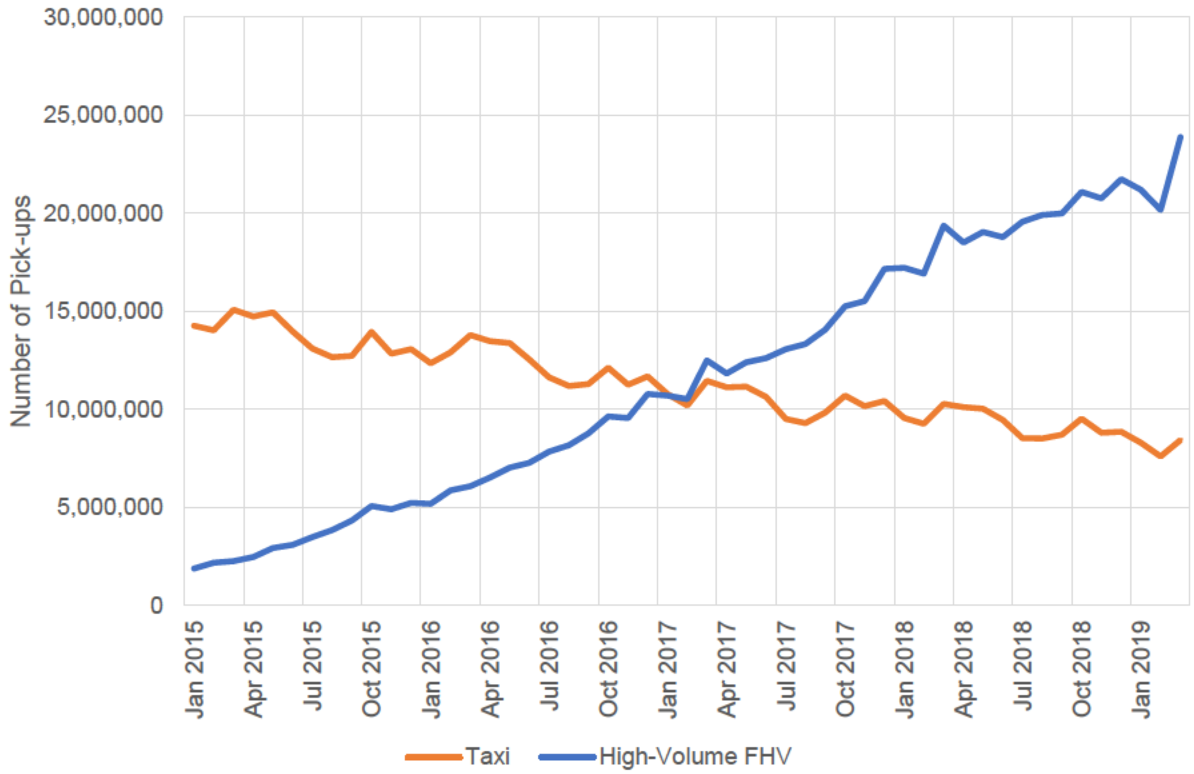
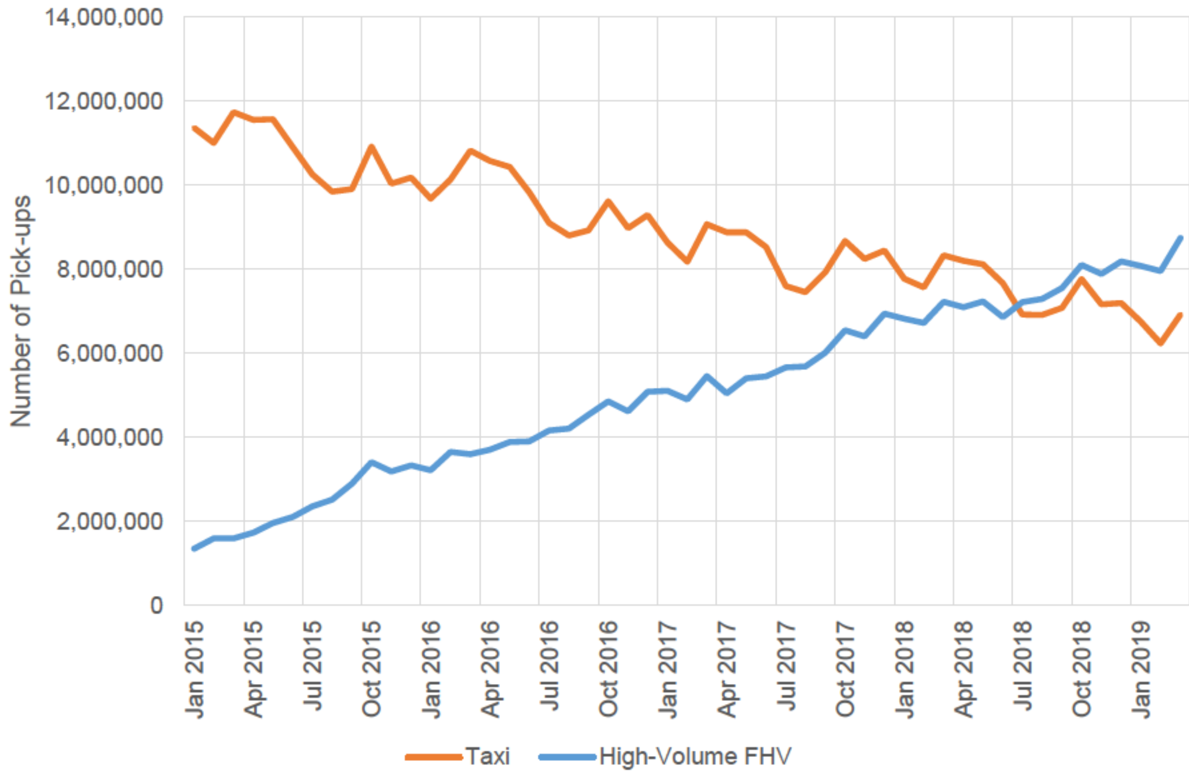


Figure 2: High-Volume FHV and Taxi Trips, 2015-2018, Manhattan Core



In 2018, amid growing concern over the adequacy of FHV driver pay, economists James Parrott and Michael Reich found in their study for the Taxi and Limousine Commission (TLC) that 96% of high-volume FHV drivers made at least one trip paying less than the equivalent of a minimum wage for independent contractors ($17.22 an hour to reflect total payroll taxes and 90 cents per hours for paid time off). At the same time, 80% of drivers had leased or purchased a vehicle specifically to drive for a platform, and over 60% were working full-time. Because the drivers are treated by the companies as independent contractors, companies were not obligated to pay for drivers' unoccupied time and had little incentive to use them efficiently.

To address driver pay, the New York City Council passed Local Law 150 of 2018 (LL150), directing TLC to implement the driver minimum pay standard that Parrott and Reich had studied, which was adopted by TLC in December 2018 and went into effect in February 2019. In addition to LL150, the City Council passed Local Law 147 of 2018 (LL147), instituting a one-year pause on new FHV registrations, except for wheelchair-accessible vehicles (WAVs) and those drivers leasing a vehicle under a conditional purchase agreement who subsequently take over the title to the vehicle. LL147 also tasked TLC and DOT with studying the impact of the FHV sector on congestion and the effectiveness of different policies in containing FHV-related congestion. The law empowered TLC to use the findings to implement new rules after the expiration of the licensing pause.

This document presents those findings, the study methodology, and TLC's next steps in implementing a long-term growth management strategy for the for-hire vehicle sector.

Policy Options

Local Law 147 required TLC and DOT to study the impacts of an FHV utilization standard (referred to in this report as a cap on cruising) and also consider the efficacy and impacts of regulating the number of vehicle licenses and incorporating minimum fares for FHVs. To understand the impacts of each policy, the team first modeled a 2020 "No Action" scenario. The basic mechanics of these policies as envisioned and modeled are described below. TLC and DOT studied the impacts of each of these policy interventions individually and also in combination.

2020 "No Action" baseline: Recent growth trends were analyzed to project trip demand and driver supply to 2020, to allow the market to readjust following the expiration of the pause in issuing new FHV licenses in August 2019. This scenario also incorporates recently implemented changes to the taxi and for-hire vehicle industry, notably the New York State congestion zone surcharge ($2.75 per FHV trip, $2.50 per taxi trip, and $0.75 per pooled trip that at any point enters Manhattan south of 96th Street) and TLC's driver minimum pay rules, which both went into effect in February 2019.

The results of all policy scenarios are compared against the 2020 Baseline.

Cap on cruising: High-volume FHVs would be required to keep their company-wide Manhattan core cruising rate, or the share of total vehicle hours traveled (VHT) in the core spent cruising without passengers, below a certain percentage. TLC would set the cap to be lower than the current industry-wide cruising rate of 41% and measure each company's cruising rate monthly or quarterly. After a target date, if a company's cruising exceeds the cap, it would face fines and escalating licensing sanctions. TLC and DOT considered caps which limit cruising to 31%, 26%, and 21% of total driver VHT.

Regulating the number of FHV licenses: TLC would restrict the number of new FHV licenses it would issue going forward, regularly examining factors including congestion in the Manhattan core, driver pay, service levels, and license renewal rates. In considering the impacts from limiting vehicle licenses, the team modeled the number of FHVs active in the high-volume FHV sector at the level as of August 14, 2018, when the licensing pause was put into place. In reality, this number represents a decrease in active vehicles from the post-pause period, as active high-volume FHVs increased by over 6,000 since the license pause began.

Minimum FHV fare: TLC would set a minimum fare schedule for high-volume FHV trips in the Manhattan core, equal to the current fare schedule for taxis.

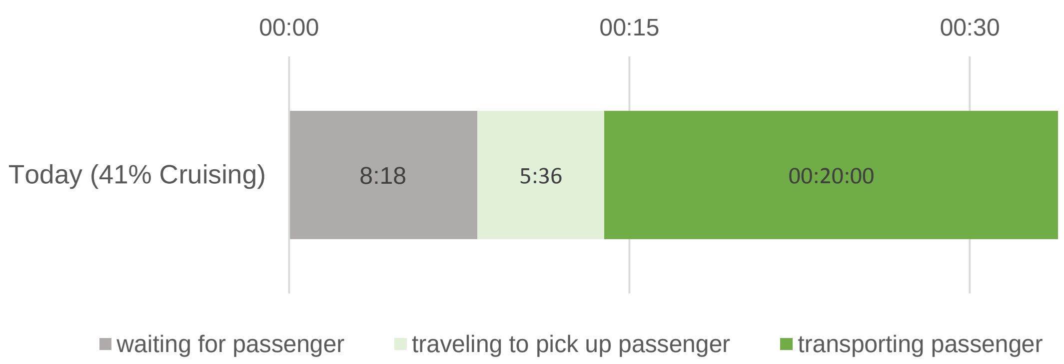
The study team also explored additional policy options including restricting access to the core to FHVs with a special permit, charging a VHT fee for time spent in the core, and implementing a credit cap-and-trade system for VHT in the core. These approaches were deemed infeasible or suboptimal from a policy perspective because they presented disproportionate implementation challenges without offering more compelling congestion reduction results; this report will therefore focus on the options required by Local Laws 147 and 150 of 2018.

What is cruising and why does it matter?

Cruising is the time drivers spend between trips, which can be divided into two segments: (1) time when drivers are waiting to receive their next trip and (2) time when they are driving to pick up a passenger after receiving a trip. For most drivers, both segments are time when the driver is working but not earning money.

The 41% cruising rate in the Manhattan core today means that for the average 20-minute trip a driver spends almost an additional 14 minutes cruising. Less than half of that time, about 5.5 minutes on average in the core, is the driver traveling to pick up a passenger. This leaves roughly 8 minutes a driver spends waiting for their next trip. During this time, the driver does not have a specific destination and may either be parked, double-parked, circulating, or driving to a different area. Because of high demand for and utilization of on-street parking in the Manhattan core, most drivers are likely either double-parked or driving around, both of which contribute to congestion.

Placing a cap on cruising requires companies to manage supply to better meet passenger demand, including by sending underutilized drivers to other service areas, so drivers are not driving around empty as often. Reducing cruising reduces congestion that is secondary to passenger service and makes more productive use of drivers' time and resources.



Policy Metrics

TLC and DOT identified six key metrics to use in assessing the impacts of each policy. These metrics were tracked across three geographies, with particular emphasis on the impacts in the Manhattan core (from the Battery to 96th Street in Manhattan).

Transportation System Impacts

- FHV and taxi trips: the number of trips taken in FHVs and taxis.
- FHV and taxi vehicle hours traveled (VHT): the total number of hours FHVs and taxis spend on the street network. A vehicle hour is one vehicle driving for one hour. This metric is important for two reasons. First, it captures total driving time, including time when an FHV is circulating waiting to be assigned a trip and is traveling to the passenger prior to the start of

the trip (the total of the two considered "cruising time" in this report). Second, unlike vehicle miles traveled (VMT) with or without a passenger (which actually decreases as speeds decrease if VHT remains the same), VHT includes any idle time where a vehicle may be double-parked and still contributing to congestion.
- FHV utilization: the share of total FHV VHT during which vehicles are carrying passengers. A higher utilization rate means the industry is operating more efficiently.

Service Impacts

- Passenger wait time: the duration between the trip request and the beginning of the trip.
- Passenger fare: the amount that the passenger pays for the trip.

Driver Pay Impacts

- Hourly driver earnings: the hourly pay of FHV drivers after expenses. TLC's driver minimum pay standard, which is set forth in TLC rules and requires that companies pay drivers a minimum per trip targeted to produce hourly earnings of $17.22 after expenses, was factored into all scenarios.

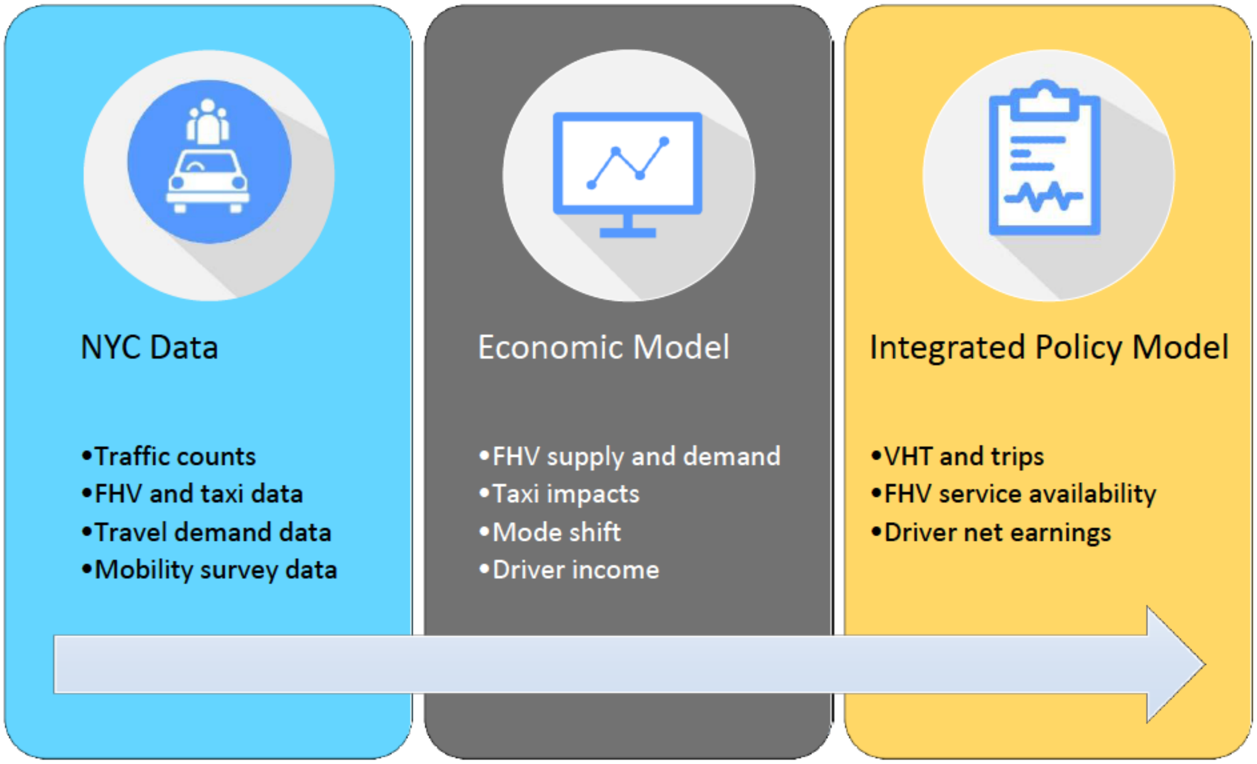
Methodology

TLC and DOT engaged a team of nationally-known transportation experts to conduct the study between September 2018 and March 2019. The consultant team was led by HDR, which created the Economic Model of the supply and demand for FHVs in New York City that served as the foundation of the analysis. Other team members include Cambridge Systematics, which managed the travel demand models that fed into the analysis; JHK, which provided project management; KLD, which provided assistance with data processing and traffic modeling; Traffic Databank, which conducted the classification counts; and Dr. James Parrott, Director of Economic and Fiscal Policy at Center for New York City Affairs at The New School, and Dr. Michael Reich, Director of the Institute for Research on Labor and Employment at the University of California at Berkeley, who served as subject matter experts.

Overview

The study team used data from a variety of sources with multiple models (some developed specifically for this study) to study the current state of the FHV industry and estimate how selected policy choices would affect FHV availability and use, and, in turn, impact users, drivers, and New Yorkers at large. Figure 3 below illustrates the overall process and relationships between the data and models used in the study. The study team used vehicle classification counts collected for the study; travel speed data for the Manhattan central business district (Manhattan south of 60th Street) and Midtown core (34th Street to 60th Street, East River to 9th Avenue) derived from taxi Global Positioning System (GPS) data; mode choice data from DOT's Citywide Mobility Survey; and millions of records from high-volume FHVs and taxis collected by TLC with detailed information on trips, cruising, driver pay, and passenger fares. The team also extracted data from the region's travel demand model (New York Best Practice Model, or BPM) and combined it with the other data as inputs into an Economic Model developed expressly for this study. The outputs of the Economic Model were used to calculate performance metrics, including changes in FHV activity, FHV VHT, driver pay, and passenger wait times.

Figure 3: Models Used to Study Potential Policy Impacts



Economic Model

The core of the analysis was conducted in the Economic Model, which draws on transportation economics research and research on FHVs, particularly in the New York City market. The team performed a review of pertinent literature on FHVs, focusing on how rider demand changes with respect to fare, changes in wait time as a result of a change in utilization rates of FHV drivers, and the impact of FHVs on demand for taxis. The Economic Model incorporates three interacting modules:

1) A module analyzing the interaction of the supply of and demand for FHVs;
2) A module analyzing impacts on the finances and supply for taxis; and
3) A module estimating shifts to taxis and other modes.

The output generated by the Supply and Demand Module includes the change in FHV driver income, FHV fare, FHV utilization, FHV wait time, total hours driven by FHV drivers, and total passenger hours of FHV users in response to a given policy change. Outputs from this module are used as the input to the modules for taxis and other modes.

After accounting for changes in parameters, including the introduction of a given growth management strategy, the Economic Model produces a series of outputs that includes changes in the number of trips by FHVs and taxis. Using data on the shift between modes of transportation outlined in the *2017 NYCDOT Citywide Mobility Survey*, the model estimates changes in the use of transportation modes resulting from the introduction of a policy, including the increase or decrease in the supply of or demand for FHVs and taxis.

Supply and Demand Module

The Supply and Demand Module is the central component of the Economic Model. It predicts the changes that passengers, drivers, and high-volume FHV companies (collectively, the economic agents in the New York City FHV market) would make in response to the introduction of a specific policy. The module is an adjustment model in which the supply of and demand for FHV trips meet at an equilibrium level (the price and quantity at which supply and demand are equal). The level is calculated in a series of equations using data from the BPM travel demand model and TLC (FHV trip data, FHV shared rides data, FHV app on/app off data, FHV rider fare and driver pay data, FHV GPS data, taxi trip data, and taxi GPS data), along with parameter values derived from the literature on transportation economics and FHVs, particularly the two Parrott and Reich reports prepared for TLC. A change in a parameter causes the model to recalculate supply and demand functions and estimate revised outputs for FHV driver income, utilization rates, wait times for FHV passengers, and other indicators.

Elasticity Coefficients

The amount of increase or decrease in the demand for FHV trips and in the supply of FHVs following a change in another variable is dependent on their elasticity—an economic term used to describe how much consumers or producers respond to a change in price. Multiple elasticity coefficients are used in the Economic Model. These coefficients are provided in **Appendix A**.

Other Parameters

For the model to appropriately evaluate the policy alternatives, certain parameters regarding expenses and the minimum pay standard are included as inputs. For example, the model uses the expenses and pay standard values to determine fare and supply. These parameters are summarized in Table 2.

Table 2: Expenses and Pay Standard Parameters of S&D Model

Parameter		Value	Source
Minimum Pay Standard for FHV	Per-mile expense factor	$0.631	Parrott & Reich (2019)
	Per-minute compensation factor	$0.287	Parrott & Reich (2018)
	Citywide utilization (July 2018 Pay Standard)	58.0%	Ibid.
Average expense per mile for Taxi	Taxicab Passenger Enhancement Program (TPEP), Citywide	$1.73 - $1.98	HDR estimates
	Livery Passenger Enhancement Program (LPEP), Citywide	$2.36 - $3.09	Ibid.

Additionally, the model uses findings from the 2017 Citywide Mobility Survey regarding mode replacement to indicate how certain policy alternatives would impact taxi ridership. When the demand for FHV services decreases or increases in the model, trips are allocated to or from other modes based on previous mode replacement patterns.

NYC Trip and Driver Data

TLC provided trip data for yellow taxis, green taxis, and the high-volume FHVs for June 2018. The study team used this data to develop the baseline conditions and support calculations of the impacts of potential policy changes. TLC also provided FHV revenue trip data from all four high-volume FHV companies for June 2018. This dataset included pickup and drop-off time information, which the study team analyzed in four distinct time periods grouped by origin-destination pairs. The data includes the number of trips, base passenger fare, sales tax, Black Car Fund (BCF) surcharge, tips, tolls, driver pay, trip miles, and trip time. GPS vehicle location data provided to TLC by the high-volume FHV companies was cross-referenced with the trip information based on pick-up and drop-off timestamps to determine when a high-volume FHV was operating with a passenger and to calculate FHV utilization. From the trip data, the study team extracted driver hours, hourly trips, wait time, shared rides, and utilization. When analyzing the impact of potential policies, the team projected 2018 data to 2020 levels (2020 Baseline). Policy impacts were estimated in comparison to the 2020 Baseline, representing impacts under a No Action scenario.

The team extracted socioeconomic data from the BPM and supplemented it with additional data from the American Community Survey (ACS) from the US Census Bureau. These were used in calculating driver expenses and earnings.

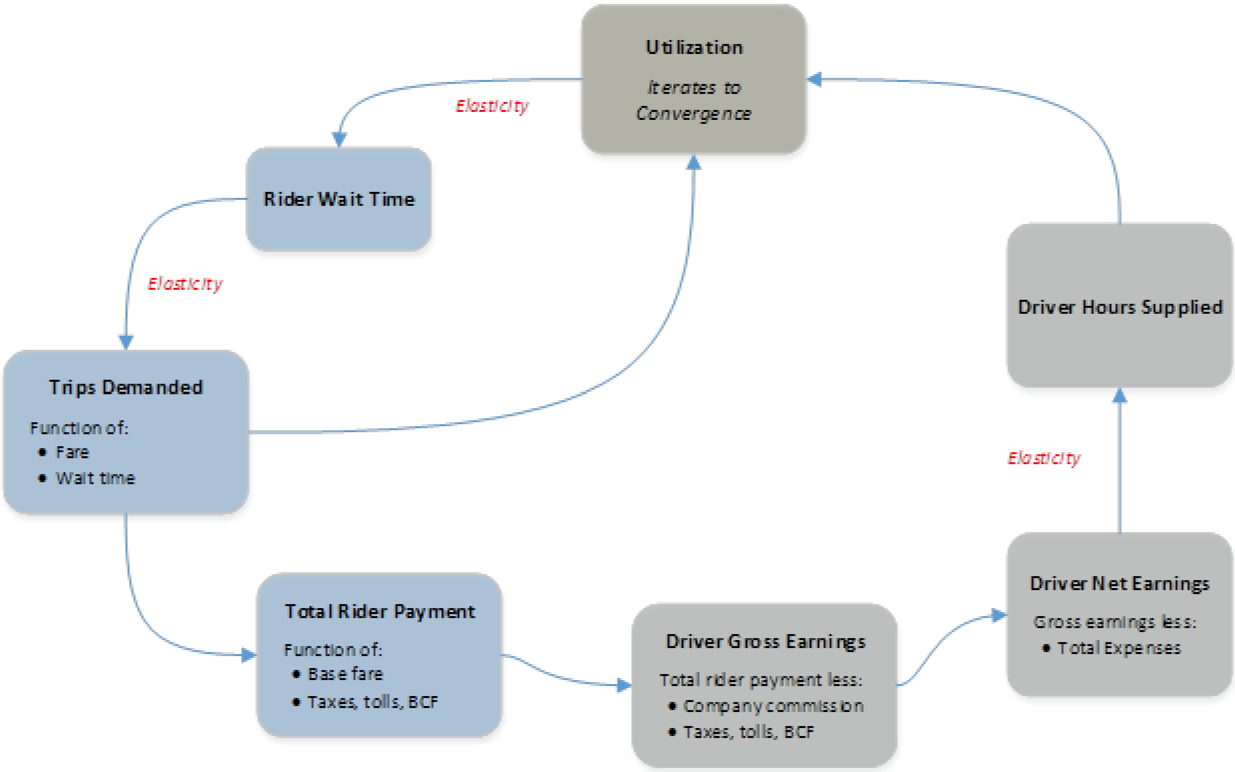
Table 3: Selected Data and Sources

Data	Source
FHV Trips	TLC
FHV Wait time	TLC
FHV Shared trips	TLC
FHV Utilization	TLC
FHV Driver hours	TLC
Percent of time in core	NYBPM
Driver information	TLC
Yellow and Green Taxi trips	TLC
Yellow and Green Taxi utilization	TLC
Infrequent/one-time expenses	TLC & DOT
Recurring and operating expenses	TLC & EIA.gov
Socioeconomic data for FHV markets	NYBPM & ACS

Interaction of Supply and Demand for FHV Trips

Figure 4 illustrates how the baseline data and assumptions are inputs into demand-side and supply-side calculations. Demand, which is defined as total rider trip hours, is determined as a function of the baseline number of trips, baseline wait time, and baseline utilization. Supply, which is defined as total driver hours, is determined by driver gross earnings, company commission, driver utilization, and driver net earnings. The model runs each policy alternative by initiating a change to a policy variable. When the policy variable is changed, the model solves for all other variables to produce the output.

Figure 4: Key Data and Function Relationships in the Economic Model



The model makes calculations for four distinct time periods and three different geographical configurations of the city (discussed in detail below under *Analysis Geographies*). The model estimates the equilibrium level of supply and demand for each origin-destination pair of the 24 sub-geographies.

Time Periods:
- 6AM-10AM (Tuesday, Wednesday)
- 10AM-4PM (Tuesday, Wednesday)
- 4PM-8PM (Tuesday, Wednesday)
- 9PM-12AM (Thursday, Friday, Saturday)

2020 "No Action" Baseline

While the TLC data used in the model is from June 2018, the study team set up the model to compare the impact of policies against a 2020 "No Action" Baseline, modeling a representative month in 2020, for several reasons:

- Any selected policy is assumed to go into effect starting in August 2019, following the expiration of the FHV license cap as directed by LL147. Selecting 2020 as the base year allows time for the market to adjust to the policies.

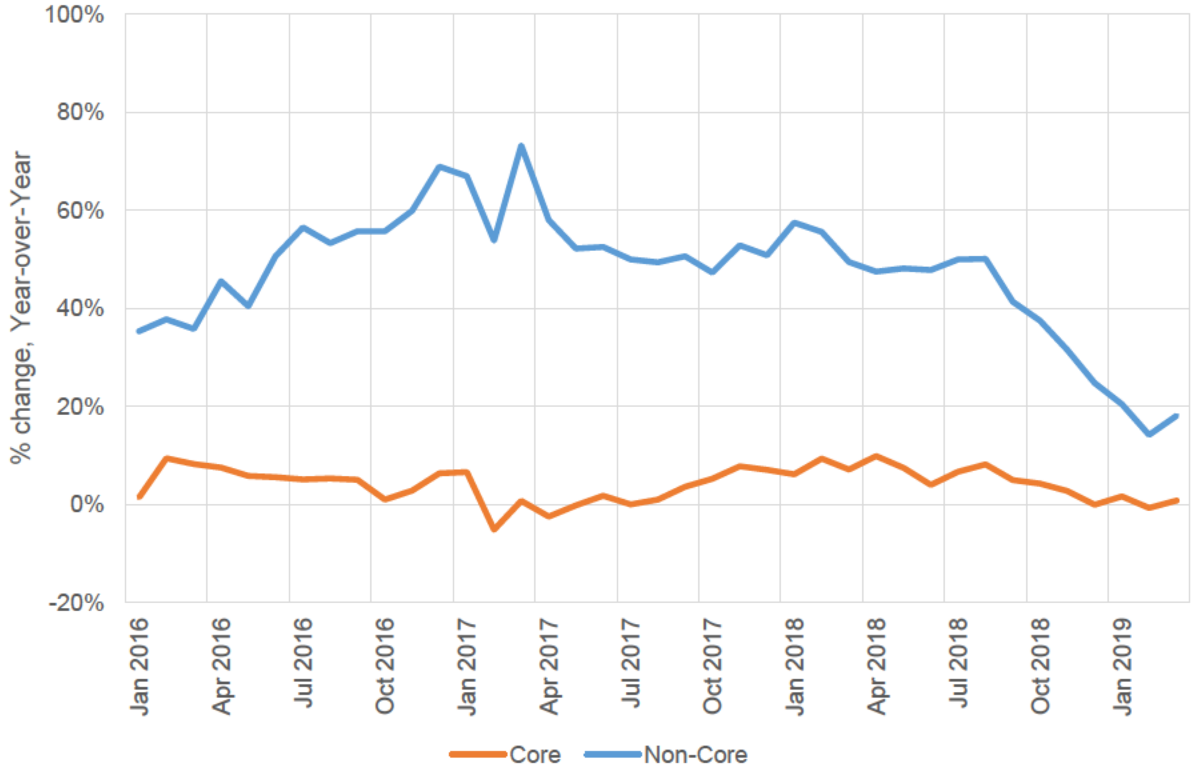
- The NYS Congestion Surcharge took effect in February 2019. Under this surcharge, passengers are charged \$2.75 per FHV trip, \$2.50 per taxi trip, and \$0.75 per pooled trip that at any point enters Manhattan south of 96th Street. Modeling a Baseline with an earlier base year (such as 2018) would leave out impacts from the NYS Congestion Surcharge.

- TLC's Minimum Driver Pay regulations took effect in February 2019. Modeling an earlier base year (2018) would not include these regulations in the analysis.

- When the study team was developing the study plan in fall 2018, the L Train subway line was scheduled to shut down for rehabilitation for 15 months, starting in April 2019. The study analysis assumed that the L Train would be back in service in mid-2020 and any long-term travel pattern shifts would be minimal. Using an earlier base year would have required additional assumptions on shifts in travel patterns compensating for the unavailability of the L Train, whereas modeling a representative month in 2020 with a fully-operational L Train did not.

To properly assess policies against a 2020 Baseline, the study team projected trip demand for 2020, based on normal market growth that would occur without any policy intervention. TLC provided monthly data on the trip trends in the core and non-core markets for FHVs and taxis for the previous four years (2015-2018). This included the time period when LL 147 was in effect (August 2018 onwards). The data indicates that the core taxi and FHV market overall was fairly mature, with limited growth, while the non-core market has been experiencing more significant year-over-year growth, as shown below. It should be noted that the pace of outer-borough growth has slowed significantly, from rates of approximately 50% monthly in early 2018 to approximately 20% monthly in recent months.

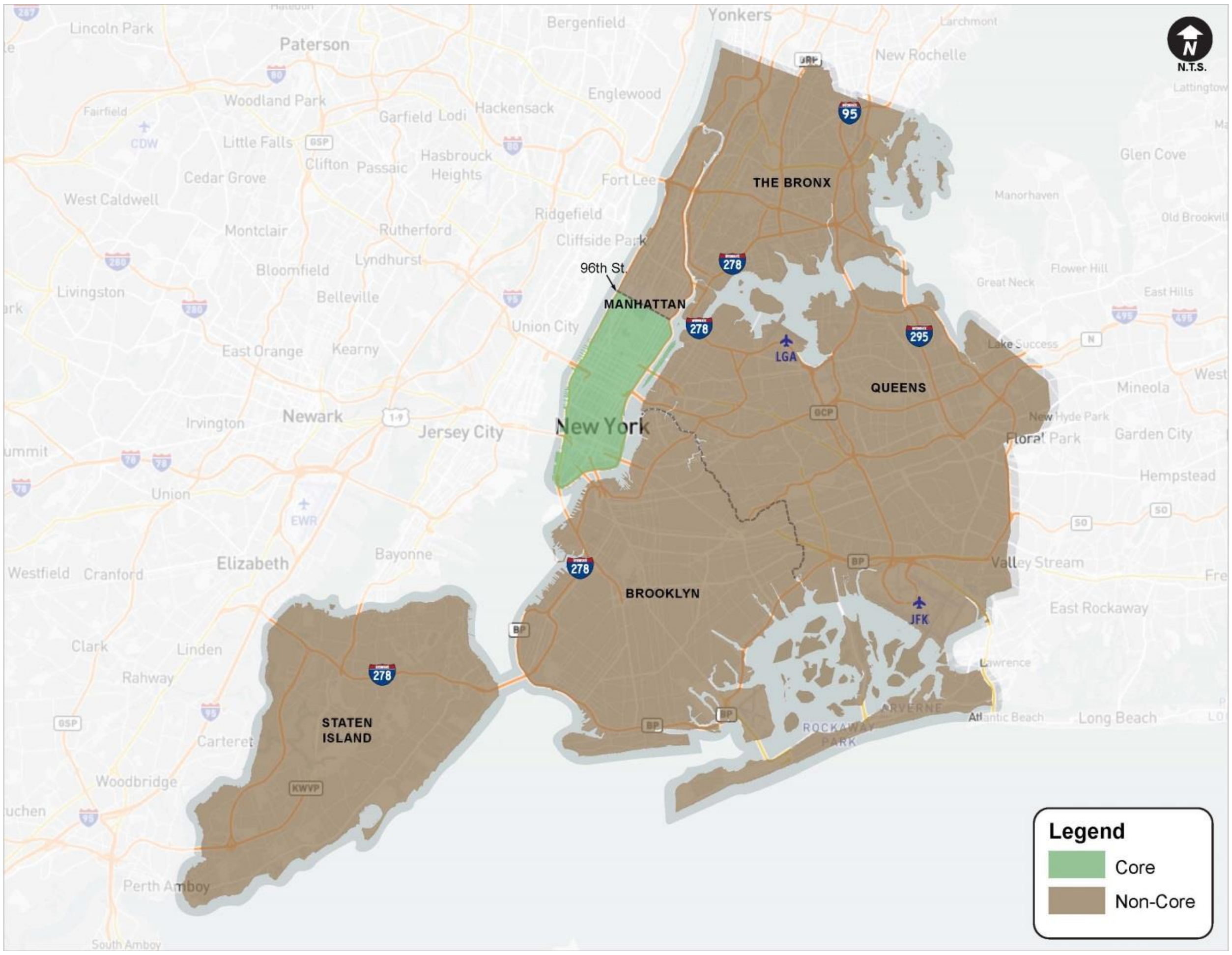
Figure 5: Monthly Trips, Year-over-Year % Change



Analysis Geographies

The study team reviewed the impacts of each policy on three geographic zones: citywide, the Manhattan core (south of 96th Street), and the non-core. Figure 6 illustrates these geographies.

Figure 6: Analysis Geographies in the Economic Model



For policies that apply to only the Manhattan core (the cap on cruising and minimum fare), additional calculations were made to report impacts overall for the entire city.

Other Model Considerations

Other key factors and important assumptions included in the Economic Model are listed below:

- The model considers an average trip and average driver within each market and time period in its estimations.
- The model assumes that high-volume FHV companies comply with new rules, policies, and fees being modeled.
- Baseline high-volume FHV fare is determined from the NYC trip data provided by TLC. However, the model increases the fare to eliminate excess demand in policy scenarios when supply is constrained and reaches an assumed maximum capacity.

- Wait time is a function of the utilization rate through a simple elasticity approach (i.e., changes in wait time represent the result of aggregate responses).
- As discussed above, the growth of the FHV market as a whole is expected to be slower in the core than in the outer markets.
- The total demand for FHV rides is not assumed to increase as a result of increased pooling.
- The model shows the effects after the policy has been fully implemented and the market has adjusted. In other words, the model does not incorporate a specific amount of time to fully incorporate the impacts of a policy change, so there is no ramp-up or adjustment period in the analysis.
- All scenarios assume implementation of minimum driver income rules and the state congestion surcharge where passengers are charged $2.75 per FHV trip, $2.50 per taxi trip, and $0.75 per pooled trip that at any point enters Manhattan south of 96th Street.

Policy Variables

The Supply and Demand Module includes multiple policy variables that can be adjusted so the impact of the change can be analyzed. These variables include:

- Percentage change in FHV fare.
- Percentage change in FHV utilization.
- Amount of State-mandated surcharge, per trip. (100% of surcharge is assumed to be passed onto riders.)
- Amount of minimum gross pay, per trip. (Modeled as the per-mile expense factor and per-minute compensation factor in the baseline and the average trip miles, trip time in minutes, and percent of shared rides in the policy scenario.)
- Amount of minimum fare, per trip. (Modeled as the average dollar per mile fare for yellow taxis and the average trip length in miles of FHV trips.)

Findings

Current FHV Market

In order to better understand the characteristics of the current FHV market and contextualize it within the broader transportation network in and around the Manhattan central business district, the study team conducted vehicle classification counts to determine the portion of total traffic that taxis and FHVs represent and performed a wide array of analyses on recent TLC trip records. A selection of these analyses is presented below.

Classification Counts

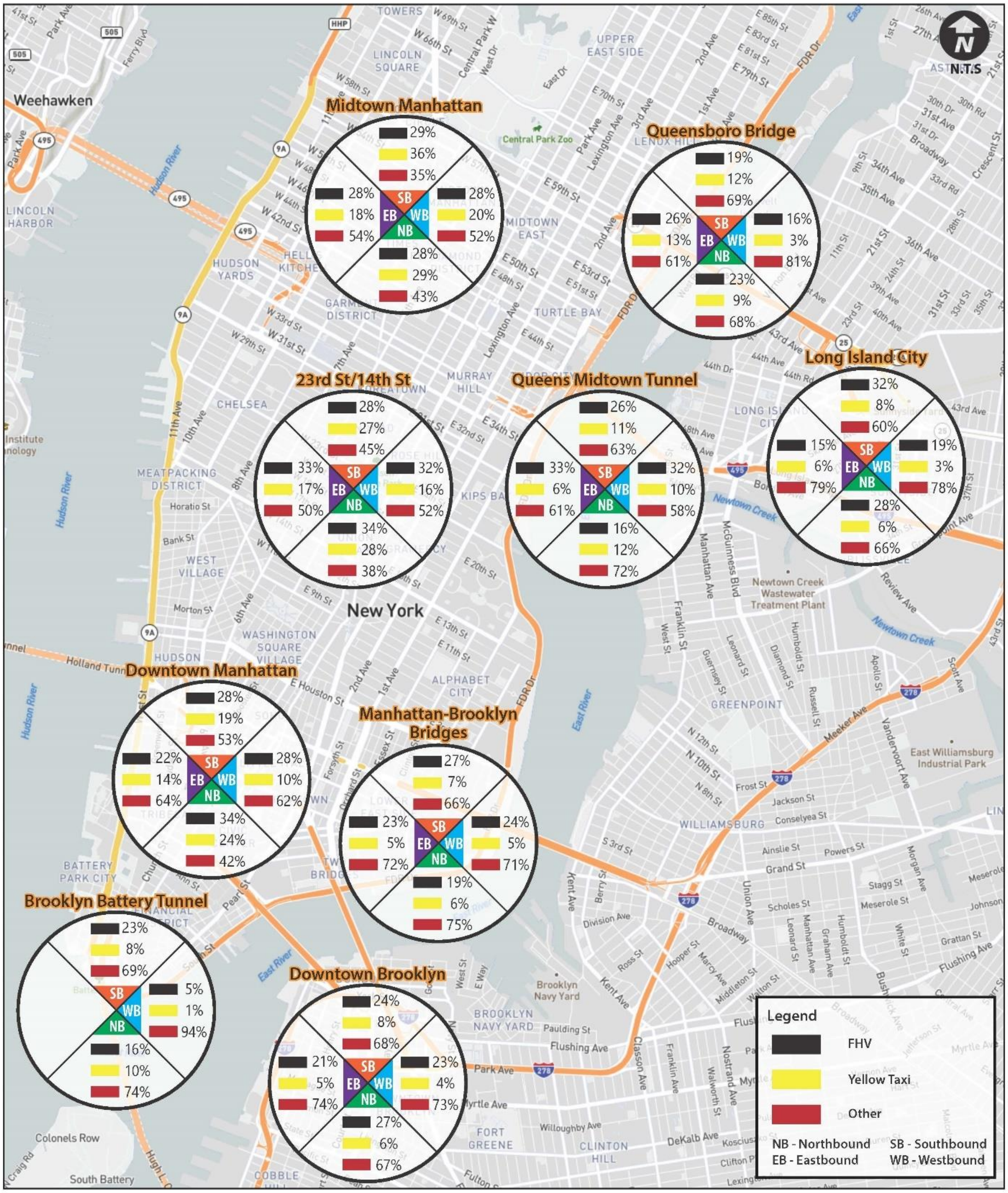
The study team conducted vehicle classification counts at locations in the Manhattan core, Downtown Brooklyn, and Long Island City to determine the overall percentage of vehicular traffic composed of taxis and FHVs. Understanding the share of total traffic these vehicles make up is an important step toward understanding the degree to which they contribute to traffic congestion. These were the first vehicle classification counts taken by the city that specifically identified FHVs. In total, 51 locations, combined into 14 location clusters in Figure 7, were selected for counts during four three-hour peak periods:

- Weekday AM Peak Period (Tuesday-Thursday 7 AM-10 AM) – peak hour 8 AM-9 AM
- Weekday Midday (MD) Peak Period (Tuesday-Thursday 12 PM-3 PM) – peak hour 1 PM-2 PM

- Weekday PM Peak Period (Tuesday-Thursday 5 PM-8 PM) – peak hour 6 PM-7 PM
- End of Week Late Evening Peak Period (Thursday-Saturday 9 PM-12 AM) – peak hour 11 PM-12 AM

The counts consisted of video turning movement counts (VTMCs) using cameras mounted on streetlights and bridge infrastructure for the peak periods, supplemented with manual counts of FHVs based on TLC-issued license plates for the peak hours. Peak periods were identified based on the three-hour block with the lowest average speeds; the peak hours experienced the lowest average speeds within the peak period.

Figure 7: Classification Counts Results by Location Cluster – All Peak Hours



As shown in Table 1 and Figure 7, FHVs and taxis together make up roughly half of the traffic sampled in Manhattan, with FHVs representing approximately 30%. Although the policies and their associated impacts on VHT are limited to FHVs, their large presence within the Manhattan core indicates that those impacts will be meaningful for overall traffic. However, any change in VHT for FHVs will result in a relatively smaller change to the total VMT/VHT in the core.

Utilization in the Manhattan Core

The time spent by both taxis and FHVs on city streets can be divided into two distinct groups – time *with passengers* (fare) and *without passengers* (cruising). Utilization is defined as the ratio of the time the vehicles carry passengers, to the total time spent in the system (fare and cruising). This metric gives TLC and DOT a better understanding of how well high-volume FHV companies are managing the supply of vehicles within a certain area and how efficiently they are dispatching trips: when utilization is low because supply significantly exceeds demand, drivers get fewer trips, and empty vehicles add congestion to city streets.

The study team used a combination of the available data sets to estimate utilization. Using data showing when drivers logged onto the high-volume FHV platform (App On) and when they logged off (App Off), total VHT was calculated system-wide. The fare VHT was calculated using the revenue trip information (with passengers). These two values provided an average utilization citywide. The team used GPS vehicle location to allocate the utilization in specific geographies in the city. Table 4 shows June 2018 utilization rates by time period and geography.

Table 4: June 2018 High-Volume FHV Utilization Rates by Time Period and Geography

	Full Month June 2018	June 2018 AM Peak (Tue-Wed 6AM-10AM)	June 2018 PM Peak (Tue-Wed 4PM-8PM)
Citywide	58.9%	58.7%	58.3%
Manhattan Core	58.9%	60.8%	60.2%
Non-Core	58.9%	57.4%	56.9%
Bronx	62.1%	63.0%	62.2%
Staten Island	41.0%	41.0%	36.9%
Manhattan	59.8%	61.3%	61.1%
Brooklyn	66.0%	66.0%	64.6%
Queens	58.8%	54.8%	56.1%

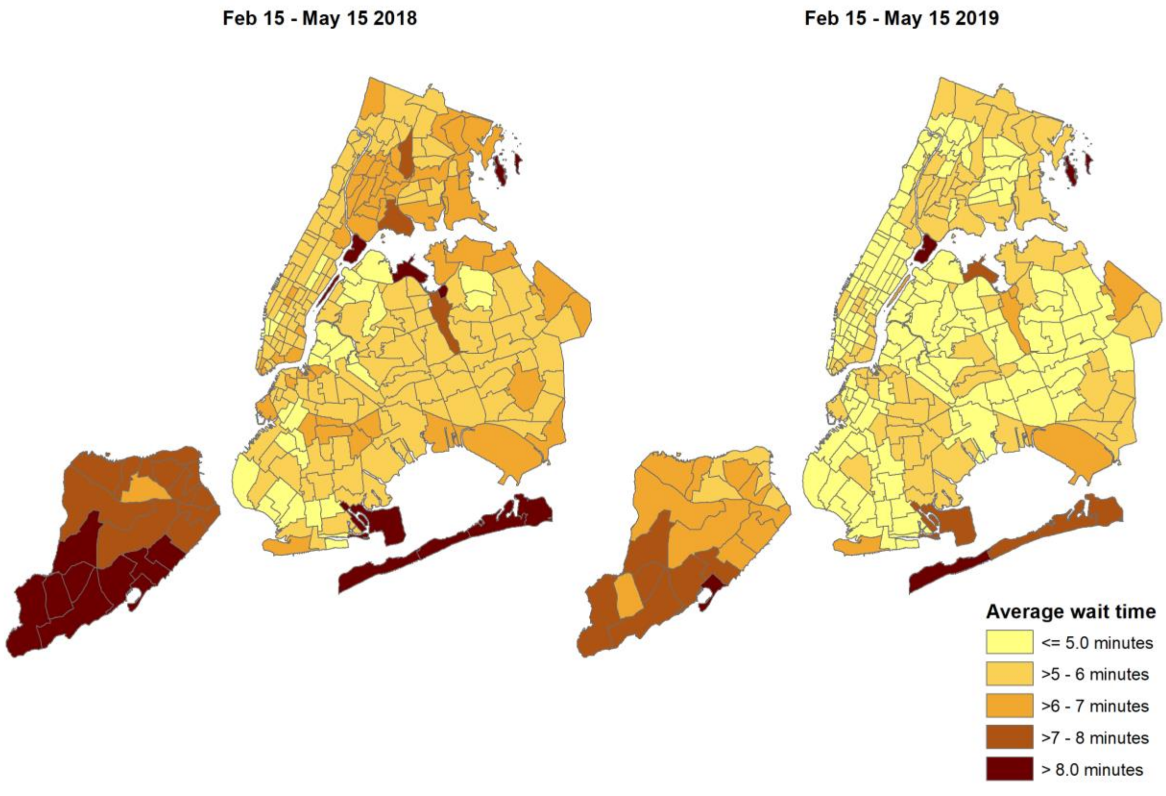
Citywide utilization across the entire industry is 59% for June 2018, and only slightly lower during the peak travel hours. Via, whose business model focuses on pooled rides using larger vehicles primarily in the Manhattan core, has a substantially higher utilization in the Manhattan core (87%) than do Uber, Lyft, or Juno (54-58% in the Manhattan core). Of the other three high-volume FHV companies, Uber has the highest utilization and Juno the lowest, but the difference is small.

Impact of the Temporary Citywide License Pause

Service availability outside of the Manhattan core, as measured by total trip volume and passenger wait times, has improved while the vehicle license pause has been in effect. Trips outside of the core have grown during the first three quarters of the pause compared to the same period last year across all boroughs. In the most recent quarter from mid-February through mid-May, daily trips increased 43% in the Bronx, 15% in Brooklyn, 21% in Manhattan (outside of the core), 29% in Queens, and 62% in Staten Island, when compared to 2018. Trips have also grown each quarter of the pause compared to previous quarters. At the same time, wait times have decreased across each borough. As shown in Figure 8, nearly all neighborhoods now have average wait times below 8 minutes, and most neighborhoods have average wait times below 7 minutes as of the third quarter of the vehicle licensing pause. Many neighborhoods within Manhattan, the Bronx, Brooklyn, and Queens now have wait times averaging below 5 minutes, while very few neighborhoods had average wait times below 5 minutes over the same period in 2018.

From the time the temporary FHV license pause went into effect in August 2018 to May 2019, the total FHV fleet increased by 5,000 to over 120,000 vehicles. Around 15,000 new FHV licenses were issued between August 2018 and May 2019, over 96% of which were issued from open applications initiated before the pause took effect and not a result of the limited exemptions permitted during the pause. The net gain of only 5,000 current vehicles over the first nine months of the license pause is due to vehicle license attrition, which occurs as licenses are not renewed by existing owners at the end of the two-year license cycle.

Figure 8: Average High-Volume FHV Wait Time by TLC Taxi Zone, 2018 and 2019

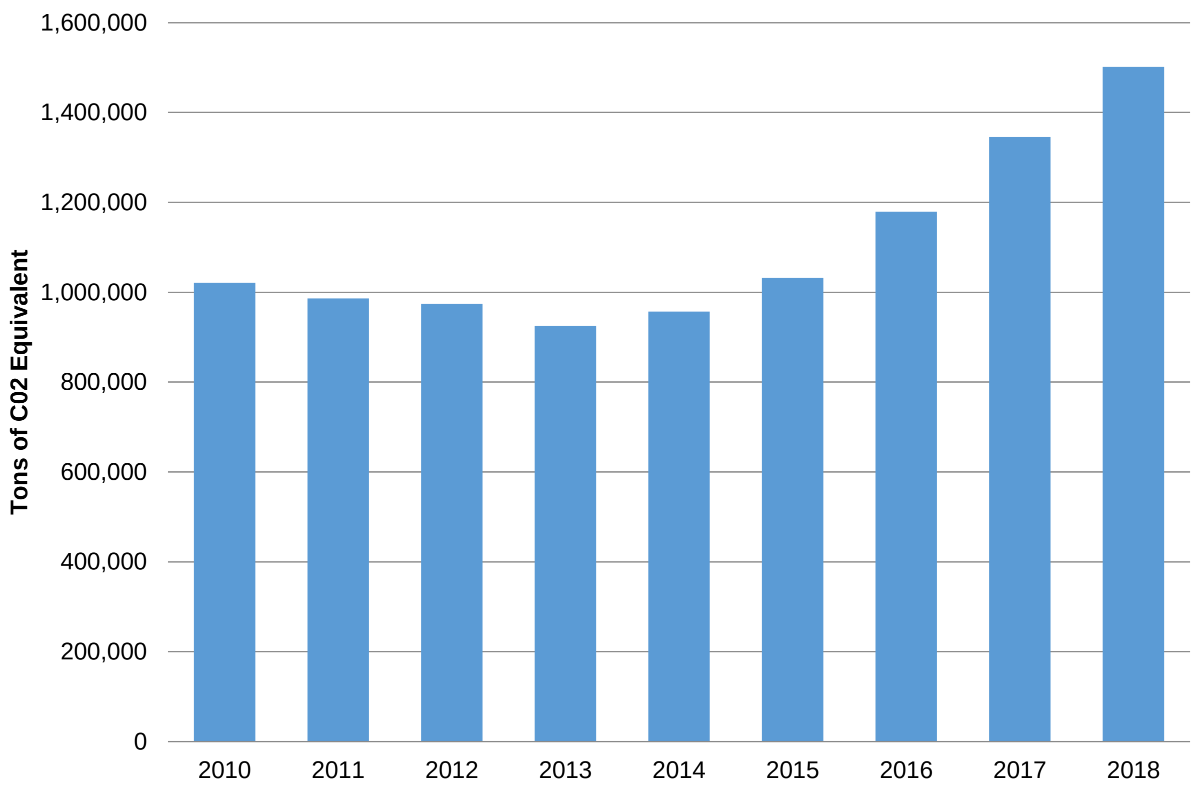


Vehicle license attrition has reduced during the license pause as more current FHV license holders decide to renew their licenses. Attrition rates ranged from 25% to 28% over the first three quarters following the start of the licensing pause, down from roughly 33% before the pause took effect. The total number of licensed FHVs will begin to decrease because outstanding applications from before the pause have been processed but attrition continues (even at diminished rates). Measures that reduce FHV VHT in the Manhattan core are likely to shift vehicles to other parts of the city, so even if total FHVs decrease, those that remain in operation should spend more time in the outer boroughs where high-volume FHV service options are expanding.

Citywide Emissions

The increase in total TLC-licensed vehicles since 2010 has also led to growth in citywide emissions. An analysis of TLC vehicle inspection data by TLC and the Mayor's Office of Sustainability (MOS) shows that overall greenhouse gas (GHG) emissions from taxis and FHVs increased by 47% from 2010 to 2018, and by 62% from 2013 to 2018 (Figure 9). GHG emissions decreased from 2010 to 2013 as total vehicle numbers remained stable while many taxis converted to hybrid vehicles. The subsequent increase in emissions from 2013 to 2018 results primarily from growth in the number of FHVs from 2014 through 2018.

Figure 9 Taxi and FHV Annual Greenhouse Gas Emissions, 2010-2018



Traffic Safety

LL 147 instructed TLC and DOT to study a range of aspects of the FHV sector, one of which was traffic safety. Though it was outside of the capabilities of the Economic Model to predict exactly the traffic safety impacts of the policies studied, existing research from the Federal Highway

Administration shows that reductions in overall VMT lead to fewer crashes and associated injuries and fatalities. TLC regularly reports crashes involving TLC-licensed vehicles and will be continuing to monitor overall trends by industry segment in the future.

Policy Modeling

The study team used the Economic Model to analyze the impacts of multiple policy options to manage growth in the FHV sector. In addition to the 2020 "No Action" Baseline, three individual policies and two policy combinations were considered, for a total of six policy options. Each policy option was modeled using a unique set of inputs that reflected how the policy would affect FHVs and taxis in NYC.

The study looked at the impact of different policies on several key metrics, including:

- Trips
- Vehicle hours traveled (VHT)
- Utilization
- Net driver earnings
- Average fare
- Average wait time (in minutes)

Table 5 presents the 2020 Baseline scenario, the three policy interventions specified by City Council in LL 147 and LL 150, and the two additional scenarios combining those policies.

Table 5: Policies by Method of Impact on the Core

Category	Description
2020 Baseline	1. **No Action:** the cap expires, and trip growth resumes.
Individual Policies	2. **Cap on Cruising:** High-volume FHVs are required to keep cruising activity below a certain share of total driving time while in the Manhattan core during peak hours. 3. **Regulating FHV licenses:** TLC restricts how many new licenses will be issued, modeled at the number of FHV licenses at the level as of August 14, 2018 when the pause on new FHV licenses began. 4. **Minimum FHV Fare:** High-volume FHVs are required to charge a minimum per-trip fare equal to standard yellow taxi rates.
Policy Combinations	5. **Cap on Cruising with Minimum Fare:** High-volume FHVs are required to keep cruising activity below a certain share of total driving time while in the Manhattan core during peak hours, and to charge a minimum per-trip fare equal to standard yellow taxi rates. 6. **Cap on Cruising with Regulation of FHV licenses:** High-volume FHVs are required to keep cruising activity below a certain share of total driving time while in the Manhattan core during peak hours, and TLC restricts the number of new FHV licenses. FHV license regulation modeled at the number of FHV licenses at the level as of August 14, 2018 when the pause on new FHV licenses began.

Other Policy Strategies

In addition to the baseline, cap on cruising, regulation of FHV licenses, minimum FHV fare, and combination scenarios, the study team considered three other policy options not required by LL 147 or LL 150. For each of these options, the study team ultimately determined that their implementation was infeasible or had more significant shortcomings than the required policies. Below is a brief overview of these scenarios, including why the study team ultimately decided not to pursue them.

Congestion Zone License

FHVs would need a new TLC permit in order to pick-up passengers in the Manhattan core. The permit would be in addition to the existing FHV license, which would then only allow drivers to initiate trips outside of the core. The city would cap the number of these new congestion zone permits, while the number of FHV licenses would remain unrestricted.

While this strategy would achieve VHT reduction comparable to the cap on cruising, it has important shortcomings. The policy targets drivers, taking away access to the core from individuals who had previously been able to start trips there, instead of placing the onus on high-volume FHV companies to deploy their vehicles more efficiently. This policy is more prescriptive than the cap on cruising, which leaves greater flexibility to the companies to determine how to manage vehicles in the core and allows all drivers to continue to have some access to trips in the core.

Vehicle Hours Traveled (VHT) Fee

High-volume FHVs would be subject to a per-minute charge when drivers on their apps were operating in the Manhattan core during the most congested times. When a driver had multiple apps open while cruising, the companies would split the cost of that cruising time.

Several considerations make this policy less feasible. First, the modeling analysis revealed that to achieve a reduction in VHT comparable to the projected reduction under the 31% cap on cruising, the fee would have to be set at a very high rate, potentially increasing the average cost of an FHV in the core by over 100%. Additionally, the city does not have the legal authority to establish a VHT fee.

Cap and Trade

High-volume HVs would be required to have time-based credits in order for their drivers to cruise or initiate a trip while in the core. TLC could auction credits or allocate them directly to the high-volume FHVs either equally (each company can have an equal amount of cruising in the core) or proportionally (companies would be allocated credits based on market share or some other measure).

While a cap and trade system could be designed to reduce legal FHV operation to any VHT target, such a program introduces an unnecessary level of regulatory and administrative complexity and presents significant communication challenges. An additional challenge is designing an allocation process that promotes fair competition for both incumbents and new entrants. The study team determined that the cap on cruising could indirectly achieve the same meaningful congestion reduction while leveraging the industry's familiarity with the concept of vehicle utilization and avoiding the many new challenges that pursuing a cap and trade system would introduce.

Modeling Results Highlights

Four out of six of the modeled scenarios—all but the no action scenario and the minimum FHV fare—showed reductions in FHV VHT in the Manhattan core. Three of the alternatives, the cap on cruising and two combination scenarios, are estimated to reduce FHV travel in the core by more than 20%, while modeling of the regulation of the number of FHV licenses alone resulted in only a 4% reduction.

Wait times in non-core markets (i.e., the outer boroughs and upper Manhattan) would see small or no impact under all of the policies except for the scenario modeling the regulation of FHV licenses. If no new licenses are issued (the extreme scenario of the FHV license regulation policy), the supply of FHVs may not meet demand in the long term as it continues to grow. This would be particularly true outside of the Manhattan core, where supply constraints would lead to a reduction in service and increased wait times.

By constraining the supply of FHVs and thus the number of drivers, holding constant the number of FHV licenses has the potential to increase driver wages citywide. However, this increase would partly depend on companies allocating increased revenue to drivers. Note that the baseline analysis against which the policy options are compared incorporates the minimum driver pay regulations implemented by TLC in February 2019.

Policy 1: 2020 Baseline/No Action

Policy Description and Goals

The baseline/no action scenario models what would happen by 2020 if the current cap expires and no alternative growth management strategy is implemented.

Geography and Hours

- Entire city
- Hours: 24 hours/day, 7 days/week

Modeling Details

Trip growth is assumed to resume without restrictions on the supply of FHVs. Based on an analysis of recent trends, the study team projects demand would increase by approximately 1% in the core and 50% in non-core markets from June 2018 to mid-2020. It should be noted that outer-borough growth rates have slowed significantly since the study began. If this trend of slowing growth rates continues, actual rates of growth in the outer boroughs may turn out to be lower than those assumed in this scenario. FHV supply is expected to grow commensurately with this demand. Taxi utilization rates are assumed to remain constant, so the taxi hours driven decline between 2018 and 2020 to maintain current utilization rates as demand shifts to FHVs.

Modeling of the baseline and policy alternatives included the state-imposed surcharge and TLC's minimum driver pay regulations, both of which took effect in February 2019. In the model, increases in driver pay to meet the minimum attracts a slightly larger FHV supply. The increase in supply reduces driver utilization, but it also lowers passenger wait times, which attracts riders. Company commissions are reduced to accommodate the increased pay. If commissions drop below 50% of current commissions, FHV prices are increased to restore the commissions to at least 50% of current commissions. The total hours driven by taxis decline with demand.

Under the baseline scenario, traffic congestion worsens throughout the city compared to today's conditions.

Policy 2: Cap on Cruising

Policy Description and Goals

TLC would cap the amount of time high-volume FHVs can spend cruising in the Manhattan core during peak hours at 31% of total driving time. High-volume FHV cruising in the Manhattan core is currently approximately 41% industry-wide. Lowering cruising is achievable as high-volume FHVs already spend a smaller percentage of time cruising outside of Manhattan (utilization rates are higher in both Brooklyn and the Bronx). In addition, one high-volume FHV company is currently already compliant with a 31% cap on cruising.

Cruising is measured as the amount of time that vehicles in the core spend without passengers as a percentage of their total active time in the core. Companies that exceed the cap on cruising would face escalating fines and licensing sanctions.

Geography and Hours

- Core
- Hours: weekdays 6 AM to 11 PM; weekends 8 AM to 11 PM

Modeling Details

To model this policy option, existing high-volume FHV utilization rates were calculated as of June 2018 from detailed data on each company's total revenue and cruising time. In June 2018, high-volume FHV cruising in the Manhattan core across all companies was 39.2% in the AM peak, 39.8% in the PM peak, and 41.1% for all hours.

Driver utilization affects both the demand and supply sides of the FHV market. Driver utilization is also a factor in driver net earnings. In general, when driver utilization is higher, drivers' net earnings are higher because they are spending more time driving with fare-paying passengers.

The model adjusted fares and supply until the high-volume FHVs reached the specified cruising targets (31%, 26%, and 21% of total work time). The more stringent cruising targets resulted in greater VHT reductions. The model initially lowered fares to stimulate additional demand for trips originating in the core, increasing the utilization of vehicles in that zone. Fares were lowered until the specified cruising target was met or the high-volume FHV companies' commission (the revenue left after driver pay, taxes, and fees) dropped below 50% of the commission they received in the Baseline from total rider payments (a lower bound to prevent commissions from going to zero or negative in the long term). If the cruising target was not yet met, the model constrained the supply of high-volume FHV drivers in the core until it was achieved. The excess high-volume FHV drivers were redistributed outside the core based upon current distributions of FHV trip times.

The shift in FHV supply from the core to the non-core would lead to increases in wait times in the core, as supply is constrained and utilization is increased, leaving fewer available FHVs to respond in the core. Taxis, which would not be subject to the cap on cruising, would absorb some passenger demand in the core as wait times for FHVs increase. In non-core areas, wait times would decrease as FHV supply increases.

Policy 3: Regulating the Number of FHV Licenses

Policy Description and Goals

This policy would regulate the number of new FHV licenses issued by TLC. To analyze the impacts, the team modeled a continuance of the number of FHV licenses in use by high-volume FHV companies at the level as of August 14, 2018 (78,530). This number represents a decrease in active vehicles from the post-pause period, as active high-volume FHVs have increased to over 85,000 since the license pause began.

Geography and Hours

- Citywide
- Hours: 24 hours/day, 7 days/week

Modeling Details

This policy limits the supply of FHVs throughout the city. When modeled, keeping vehicles at the level when the vehicle license pause began resulted in a decrease in service in the outer boroughs and a much smaller decrease in VHT in the core. This is because FHVs are likely to concentrate in the strongest core market, as has been the case since the arrival of the high-volume FHV companies. The impact on non-core service is compounded as demand there is expected to increase between 2018 and 2020 by a greater percentage than in the core.

To model this scenario, the model reduced the hours driven in each sub-market (smaller geographies than core and non-core) of the city until the number of active drivers was below the allocated number of licenses in that market (allocated based on the 2018 distribution throughout the city). The model allowed the percent of vehicles used by multiple drivers to increase from 5% (the current share derived from the June 2018 TLC trip data) to 15%. This reflects the expectation that, in response to fewer new licenses being available, new vehicle leasing models and less formal arrangements between drivers would emerge to allow a greater portion of FHVs to be shared between multiple drivers. Because of a number of barriers to sharing vehicles and the low current rate of double-shifting in the FHV sector, TLC expects this growth would be modest.

As VHT for FHVs declined relative to the 2020 Baseline, wait times increased, especially in the non-core areas. The increase in wait times spurred taxis to fill some of the supply gap. FHV driver earnings could increase because their overall utilization would increase (demand increases over time, but the supply of vehicles does not, so driver utilization must increase), but this would partly depend on high-volume FHV companies allocating increased revenue per trip to driver pay instead of lowering fares or keeping it as company commission.

Even though they are not restricted by the regulation of new FHV licenses, wheelchair-accessible FHVs were not modeled because the percentage of wheelchair-accessible FHVs is currently very low.

Policy 4: Minimum FHV Fare

Policy Description and Goals

Under this policy, high-volume FHVs would be required to charge minimum fares equal to standard yellow taxi rates in the core. TLC would set minimum fare schedule for trips that begin in the core so passengers would pay the same for any service (taxi or high-volume FHV).

Geography and Hours

- Core
- Hours: 24 hours a day, 7 days a week

Modeling Details

The team modeled this policy by increasing fares to equal average yellow taxi fares (minimum yellow taxi base fare plus extra rush hour and overnight surcharges). The following items were not included in the base fare calculations: improvement surcharges, MTA tax, tip amount, and tolls. When compared with the 2020 Baseline, this policy has relatively small impacts because most high-volume FHV fares in the core already exceed minimum fare levels during the AM and PM peak periods. The policy is expected to produce minimal changes in wait time and trips in the core. It is also expected to lead to a small decline in net driver earnings. As some high-volume FHV fares are increased to equal minimum fares in the core, the demand per driver decreases, which lowers earnings, and the impact of the decline in demand on driver earnings more than offsets the impact of increased minimum fares.

The minimum fare and change in fare charged were derived from the average fare per mile for yellow taxis and the trip length (based on June 2018 data) for FHVs. The slight increase needed to reach the minimum fare requirements results in only small changes in overall demand for FHVs and a small shift from FHVs to taxis in the core since riders' elasticity (the amount by which demand for FHV trips changes in response to a price change) is low.

Combination 1: Cap on Cruising and Minimum Fare

Policy Description and Goals

This policy would combine the cap on cruising and minimum fare options. This scenario would require high-volume FHVs to keep cruising under 31% of total driving time in the core during peak hours (a 10-percentage point decrease from the current industry-wide rate). Additionally, high-volume FHVs would be required to charge minimum fares equal to standard yellow taxi standard rates for pick-ups in the core.

Geography and Hours

- Cap on cruising: core; weekdays 6 AM to 11 PM; weekends 8 AM to 11 PM
- Minimum fare: core; 24 hours/day, 7 days/week

Modeling Details

To assess the impact of this policy, the Economic Model constrains the supply of FHV hours until the utilization target is met. The additional FHV supply is redistributed outside the core based upon current distributions of FHV trip times. Inside the core, fares are increased to ensure that high-volume FHVs met minimum fare requirements (i.e., fares equal average yellow taxi fares). The fare changes lead to slight increases in overall FHV fares in the core because most fares are already at or above the minimum base fare and the riders' elasticity (the amount by which demand for FHV trips changes in response to a price change) is low.

The combination of these two policies would lead to a shift of FHVs from the core to non-core markets, with a decline in active cruising time in the core compared to the 2020 Baseline, coupled with an increase in wait times. The increase in wait times will spur taxis to fill some of the supply gap. Since the minimum fare is mandatory, the model does not reduce fare to stimulate demand as in the standalone cap on cruising scenario. This results in a slightly higher reduction in core VHT.

Some FHV supply shifts from the core to the non-core areas; while taxi supply shifts to the core to fill gaps in in FHV supply. FHV wait times in the non-core areas decline due to the shift in supply from core to non-core.

Combination 2: Cap on Cruising and Regulation of New FHV Licenses

Policy Description and Goals

This policy would combine the cap on cruising with regulation of new FHV licenses (modeled as the freezing of the number of FHV licenses at the level of August 14, 2018).

Geography and Hours

- Cap on cruising: core; weekdays 6 AM to 11 PM; weekends 8 AM to 11 PM
- Regulation of new FHV licenses: citywide; 24 hours/day, 7 days/week

Modeling Details

To approximate the cumulative impact of the two policies, the impacts of the policies were modeled separately and then combined by multiplying the effects for all geographies. The regulation of new FHV licenses was modeled for all markets citywide, while the cap on cruising is modeled in the Manhattan core (with secondary impacts on the non-core area).

The cap on cruising and FHV license regulation policies would lead to a decline in FHVs in the core compared to the 2020 Baseline, as well as a shift of FHVs from the core to non-core markets. Some FHV demand in the core would shift to taxis. Driver earnings increase as a result of higher utilization and constrained FHV supply.

The combined policy results in the lower FHV VHT of the standalone cap on cruising scenario with the increased driver earnings associated with the regulation of new licenses. The policy is expected to result in high-volume FHV companies assigning trips in such a way as to move FHVs out of the core and into the outer boroughs. This provision of service in non-core markets should be sufficient to meet demand in the near term, especially considering the significantly slowed rates of growth in the outer boroughs observed in recent months. If the pace of growth does not continue its downward trend, then the policy may lead to decreases in service.

Next Steps

The agencies recommend the combination policy of the cap on cruising and regulation of new FHV licenses. The scenario modeling results showed that of the six policies considered, this policy would yield the strongest VHT reduction in the Manhattan core, as well as the greatest potential increase in driver wages. Although modeling suggested that holding the number of FHV licenses constant between August 2018 and 2020 could eventually lead to decreases in outer-borough service, in reality, due to the net increase of over 5,000 vehicles since the pause took effect and recent fleet-management strategies implemented by high-volume FHV companies to increase driver utilization in response to the TLC minimum pay standard, wait times have continued to decrease across the city.

High-volume FHVs will be given a year to reduce their company-wide cruising rate below 31% for driving in the Manhattan core weekdays 6 AM to 11 PM and weekends 8 AM to 11 PM. These times were selected based on hourly traffic speeds south of 96^{th} Street and the availability and frequency of train and bus service. The regulation of new FHV licenses will prevent dislocation in the market while the industry regulatory structure transitions. It will also allow the City to continue to regulate the number of FHVs as deemed necessary through TLC's ongoing monitoring and analysis.

To provide a degree of flexibility consistent with the city's aggressive accessibility and greenhouse-gas reduction goals, TLC will not restrict new registrations of wheelchair accessible vehicles or battery electric vehicles (not including hybrid vehicles, which still generate tailpipe emissions when running on gasoline). TLC will also continue to allow drivers in lease-to-own arrangements to obtain an FHV license when taking over title to the vehicle. Regular evaluation of service levels will help ensure that vehicle numbers are at appropriate levels to meet demand. If vehicle license attrition continues at its current rate, citywide GHG emissions from taxis and FHVs could decrease between 7% and 9% in the first year.

Concurrent with the publishing of this report, TLC is publishing draft rules to implement this strategy. TLC will take feedback from stakeholders throughout the rulemaking process to ensure that these policy measures are most effective in achieving the city's goals. Upon their implementation, TLC and DOT will monitor their effectiveness; engage with industry, passengers, and other road users; and prepare to refine them as necessary to ensure that they achieve the city's goals of decreased traffic congestion, a fair income for drivers, and equitable, sustainable mobility options for all New Yorkers.

Appendix A: Elasticity Coefficients Used in the Economic Model

<table>
<tr><th colspan="2">Elasticity Coefficient</th><th>Value</th><th>Source</th><th>Notes</th></tr>
<tr><td colspan="2" rowspan="2">Elasticity of demand with respect to fare</td><td>-0.30</td><td>In consultation with Team Subject Matter Experts</td><td>Core markets</td></tr>
<tr><td>-1.20</td><td>Parrott & Reich (2018) page 50.</td><td>Non-core markets</td></tr>
<tr><td colspan="2" rowspan="2">Elasticity of demand with respect to wait time</td><td>-0.50</td><td rowspan="2">Derived</td><td>Calculated as a function of value of time and fare elasticity. Core markets.</td></tr>
<tr><td>-0.20</td><td>Calculated as a function of value of time and fare elasticity. Non-core markets.</td></tr>
<tr><td rowspan="4">Elasticity of FHV driver hours with respect to gross pay</td><td>all drivers</td><td>0.40</td><td rowspan="4">Parrott & Reich (2018)</td><td rowspan="4"></td></tr>
<tr><td>full-time</td><td>0.35</td></tr>
<tr><td>part/full-time</td><td>0.70</td></tr>
<tr><td>part-time</td><td>0.50</td></tr>
<tr><td colspan="2">Elasticity of wait time with respect to utilization</td><td>0.60</td><td>Ibid</td><td></td></tr>
<tr><td colspan="2" rowspan="2">Elasticity of taxi driver hours with respect to gross pay</td><td>0.37</td><td rowspan="2">Farber (2015)</td><td>Morning/mid-day drivers</td></tr>
<tr><td>0.62</td><td>Evening/late evening drivers</td></tr>
</table>

An elasticity of demand with respect to wait time applicable to the FHV market in the New York City boroughs is not available in the literature, so a set of estimates was made in consultation with economic and transportation subject matter experts James Parrott and Michael Reich. Elasticities of demand with respect to wait time were calculated as a function of the value of time (based on income levels) and fare elasticity in the core and non-core markets.