If You Can't Beat Them, Join Them? Does the Listing of Conventional Taxis on the Uber App Impact Conventional Taxi Ridership

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Abstract

Since the emergence of car-hailing platforms like Uber, conventional taxi ridership has taken a severe hit. Although taxi-hailing apps like Curb have allowed conventional taxis to jump on the platform economy bandwagon and offer services similar to car-hailing platforms, high switching costs of popular car-hailing platforms (Uber, Lyft, etc) can cause an information deficit for users of these car-hail apps and hence restrict the trip volumes of conventional taxis. Recently, the car-hailing platform, Uber has started to add conventional taxis to its app under increasing pressure from Cities and conventional taxi associations. In this paper, focusing on the addition of conventional taxis as a travel option on the Uber app in New York City (NYC) and Chicago, I investigate whether such integrations lower search costs for Uber app users, lower the information deficit they face and hence increase conventional taxi trip volumes using a Differences-in-Differences (DiD) approach. The DiD results indicate that the integrations did indeed lead to a reduction in the information deficit for Uber app users and a statistically significant increase in conventional taxi ridership in both cities. Additionally, using a DiD model, I investigate the impact of nudging users towards conventional taxis by automatically matching requests for Uber car-hail with conventional taxis for the case of NYC. Results indicate a statistically significant increase in conventional taxi ridership after the intervention. This paper provides insights into how Cities can make use of such integrations to clamp down on the high switching costs of car-hail apps and foster better competition between these apps and conventional taxis.

JEL classification: L91, L86

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1 Introduction

1.1 Motivation and Research Objectives

Since the emergence of car-hailing platforms like Uber and Lyft, conventional taxi ridership has plummeted. This is illustrated by Figure 1 which compares the average daily ridership of car-hailing platforms and conventional taxis in New York City (NYC hereafter) for each month from January 2015 to April 2024. While car-hailing saw a meteoric rise in average daily ridership during the period, conventional taxis in the city saw a four-fold reduction in average daily trips – from 411,238 in January 2015 to 115,813 in April 2024. The market share of car-hailing rose from 12 % to 86 % during this roughly nine-year span as illustrated by Figure 2.

The 'Uberization' of the taxi space has impacted driver earnings and mental health. Berger et al. (2018) show that conventional taxi drivers experienced a relative earnings decline of about 10 percent subsequent to Uber's entry into a new market in the United States (US hereafter). Apouey and Stabile (2022) show that Uber's entry in the London market led to worsening mental health outcomes for conventional taxi drivers.

Conventional taxis have also jumped on the electronic-hailing (e-hailing hereafter) bandwagon via mobile apps like Curb and Arro (referred to as *taxi-hailing* apps in this paper subsequently with *car-hailing* used for non-taxi e-hailing apps like Uber and Lyft). These taxi-hailing apps are similar to car-hailing apps; they allow riders to request conventional taxis via an app, make payments via the app and see upfront trip prices at the time of booking a ride. However, despite the emergence of these taxi-hailing mobile apps, some intrinsic characteristics of popular car-hail apps like Uber and Lyft can hamper the ridership potential of these taxi-hail apps, making popular car-hail apps anti-competitive towards taxi-hail apps. These intrinsic characteristics of well-established car-hailing apps like Uber and Lyft include *network effects* (Carballa Smichowski (2018)) and *switching costs* (Guo et al. (2023)). These characteristics make popular car-hail apps winner-takes-all markets, impeding the ridership potential of taxi-hail apps.

The addition of external travel options to popular car-hailing apps could potentially expose users of these apps to other feasible travel options they can make use of. Such integrations can lower search costs for users of popular car-hail apps and hence reduce the information deficit they face due to network effects and switching costs associated with popular car-hail apps, increasing the visibility of the external travel options. This reduction

in search costs and hence the information deficit for users of car-hail apps can lead to increased usage of external travel options listed on popular car-hail apps, and hence improve competition between services provided by the car-hail provider and the external services listed on the provider's app.

The addition of conventional taxis to the Uber app in various cities in the US serves as a natural experimental setup to test this hypothesis. Hence, in this paper, focusing on the addition of conventional taxis to the Uber app in NYC and Chicago (see Figure 3), I study the implications of these listings vis-à-vis changes in trip volumes of conventional taxis in the two cities using a Differences-in-Differences (DiD hereafter) regression approach.

In addition to this, in this paper, I study the effectiveness of in-app nudges in encouraging users of popular apps to use external services listed on these apps. I do so by using a DiD approach to study the impact of a nudge Uber introduced in NYC that could potentially have directed Uber app users towards using conventional taxis; this intervention entailed passenger requests for UberX (Uber's standard offering) being automatically matched with a conventional taxi subject to a conventional taxi being closer than an UberX. After automatically matching Uber users who had requested an UberX ride with a conventional taxi (if a conventional taxi was closer), users were notified on the app that they had been matched with a conventional taxi; they could reject the conventional taxi offering as the notification on the app allowed them to be re-matched with an UberX driver or cancel their ride.

The results indicate that both these kinds of interventions lead to a statistically significant increase in conventional taxi ridership, entailing important implications for policymakers. Policymakers around the world are heavily engaged in the regulation of two-sided platform services (Airbnb, car-hailing, etc) for reasons including their impacts on conventional non-platform services (like hotels in the case of Airbnb; and conventional taxis and public transport in the case of car-hail services). As policymakers around the world try to regulate two-sided platforms with high switching costs and network effects, they can benefit from the insights provided in this paper as it shows that conventional services can better compete with their two-sided platform counterparts by being listed on them and hence given more visibility.

By making the listings of conventional services on their digital counterparts an imperative operating pre-condition upon certain popular two-sided platforms, Cities can foster better competition between conventional services and their digital counterparts. Additionally, Cities benefit from allowing and encouraging platforms to have in-app nudging that could trigger increased usage of conventional services listed on their digital counterparts.

This paper contributes to the literature on multimodal transport (Heinen and Mattioli (2019)), behavioral changes in response to changing defaults on digital platforms (Decarolis et al. (2024)) and the impacts of changing travel options on transport platforms (Thorne et al. (TBC)).

2 Data

In this paper, I utilize open-source data for all analyses conducted. Taxi ridership data for three U.S. cities—NYC (New York City (2024)), Chicago (City of Chicago (2024a)), and Washington, D.C. (District of Columbia (2024))—are publicly available online, provided by the respective local governments of these cities on their websites. Additionally, the local governments of NYC and Chicago provide car-hail trip data on their websites (New York City (2024) and City of Chicago (2024b)). None of these datasets contain passenger-related information (e.g., names, ages, genders) for privacy reasons.

When it comes to taxi trip data for NYC, the City provides granular trip-level data for both yellow and green taxis, the two taxi services operating in the city. For yellow taxis, data for all trips since January 2009 are available, while for green taxis, data since August 2013 are available (which is when green taxis were introduced in the city). Additionally, the City provides car-hail trip data for trips since January 2015.

Among other details, the yellow and green taxi data contain the following information: pickup and drop-off dates and times; ride fares; amounts of tips given; trip distances; pickup and drop-off neighborhoods (in the form of *taxi zones* which are geographical neighborhoods whose boundaries can be sought on the City's website (New York City (2024)); ride sources (e-hail or street hail); and payment methods (mobile app, credit card or cash).

The car-hail data for NYC provide the following information, in addition to other details: service provider company corresponding to each trip (Uber, Lyft, etc.), pickup and drop-off dates and times, ride fares, tip amounts, trip distances, whether a certain trip is a shared/pooled trip or not, whether a certain trip occurred in a wheelchair-friendly vehicle or not, and taxi zones where the pickups and drop-offs occurred.

For the case of Chicago, the taxi data contain information about trips done since January 2013, while the car-hail data contain details regarding car-hail trips done since November 2018.

Along with other variables, the taxi data for Chicago encompass information related to the pickup and drop-off dates and times; ride fares; tips given to drivers; pickup and drop-

off neighborhoods within Chicago (in the form of Community Areas and Census Tracts); trip distances; durations of trips; trip sources (e-hail or street hail); and payment methods (mobile app, credit card, travel voucher offered to employees by some companies or cash).

Among other specifications, the car-hail data for Chicago contain information on pickup and drop-off dates and times; ride fares; tipping; trip distances; trip durations; whether a certain trip is a pooled/shared trip or not; and pickup and drop-off Community Areas and Census Tracts.

For DC, only taxi trip data are available. The data provide information on pickup and drop-off dates and times, pickup and drop-off location coordinates, fares, tips, payment methods (mobile app, credit card or cash), trip distances, travel durations, and more.

2.1 Context and Overview of Findings

NYC is the most populated city in the US encompassing five geographical areas commonly referred to as boroughs. These five boroughs are Queens, Manhattan, Bronx, Brooklyn and Staten Island (Figure 4).

In the city, there are two conventional taxi services, namely green taxis and yellow taxis, named according to the colors of the vehicles. Both services follow similar business models and are permitted to pick up passengers both on the street and through e-hail apps. The only difference between the two services is the locations where they are authorized to pick up and drop off passengers.

Yellow taxis are allowed to pick up and drop off passengers in all areas of NYC. Green taxis, on the other hand, are allowed to pick up passengers throughout the city except at NYC airports and in a region of Manhattan encompassing Midtown and Lower Manhattan. For drop-offs, green taxis are authorized to operate citywide, just like yellow taxis. Figure 5 illustrates the operational differences between the areas where green and yellow taxis are allowed to undertake pickups. The figure shows a map of NYC: yellow taxis can pick up and drop off passengers in all areas, while green taxis are restricted to drop-offs across the city and pickups only in the areas marked in green on the map.

Prior to 2013, the city only had yellow taxis. Green taxis were launched in the city in 2013 to increase taxi supply in Upper Manhattan and the outer boroughs (boroughs other than Manhattan) since yellow taxi drivers had a tendency to stay in Midtown and Lower Manhattan (areas with the most popular tourist spots in the city) and the airports as these areas provided better chances of a ride being hailed. To increase taxi supply in the other

areas of NYC (i.e. the areas colored green in Figure 5), the City launched green taxis in 2013; these taxis were barred from doing pickups in the areas colored yellow on the map (Midtown and Lower Manhattan) and grey (La Guardia and JFK airports).

In August of 2022, only one of NYC's conventional taxi services, i.e. yellow taxis, was listed on the Uber app as a travel option after which Uber app users could see how long it would take the nearest yellow taxi to reach them, see the trip fare for their desired journey via a yellow taxi and book a yellow taxi via the Uber app (see Figure 3 to understand the information provided to Uber app users regarding nearby yellow taxis post-listing). The trip fare for conventional yellow taxis booked via the Uber app was the same as the fare for UberX (Uber's standard and most popular option).

Additionally, in the last week of August 2023, Uber took the integration up a notch. If a yellow taxi was closer than an UberX, Uber app users who requested an UberX trip were automatically matched with a yellow taxi. After automatically matching Uber users who had requested an UberX ride with a yellow taxi (if a yellow taxi was closer), users were notified on the app that they had been matched with a yellow taxi; they could reject the yellow taxi offering as the notification on the app allowed them to be re-matched with an UberX driver or cancel their ride.

Using DiD regression models, I investigate the impacts of these two interventions in NYC on yellow taxi ridership. I use a Differences-in-Differences specification to compare yellow taxi ridership (treated group) with green taxi ridership (control group) while restricting the analysis to the areas of NYC where green taxis are allowed to operate; since green taxis were not listed on the Uber app, the DiD results imply the treatment effect of integrating yellow taxis on the Uber app.

The results indicate that both the interventions (i.e. the intervention in 2022 and 2023) led to a statistically significant increase in yellow taxi ridership in the city.

For Chicago, I similarly use a Differences-in-Differences regression model to estimate the impact of listing conventional taxis on the Uber app. Conventional taxis were integrated on the Uber app in April 2024 after which Uber app users could see how long it would take the nearest yellow taxi to reach their pickup location, see the trip fare and book a ride. In the regression model, I use conventional taxis hailed using mobile apps as the treatment group and mobile-app hailed for-hire vehicles as the control group. The regression results indicate that the integration of conventional taxis on Uber in Chicago led to a statistically significant increase mobile app-hailed conventional taxi ridership in the city.

3 Methods and Results

For the 2022 intervention in NYC, Figure 7 illustrates the pre-post ridership of conventional yellow and green taxis in NYC. The shaded-region represents July and August, months for which there are often tourist influxes and outflows from the city. The listing of yellow taxis on the Uber app occured in August of 2022. Comparing the riderships in September, October, November and December with riderships from January through June implies an increase in yellow taxi ridership relative to green taxis.

To investigate the ridership implications of listing conventional taxis on the Uber app in NYC causally, I make use of the following DiD regression model:

$$ln(Count_{dtb}) = \beta_1 Yellow + \beta_2 Yellow \times Post_t + \delta_d + \gamma_t + \sigma_b + \epsilon_{dtb} \tag{1}$$

The outcome variable $Count_{dtb}$ of equation 1 is the taxi ridership count on date d, at time t and in NYC borough b. *Yellow* is a dummy variable which is one for yellow taxi trips and zero for green taxi trips. The variable *Post* is a dummy variable which is zero for the pre-integration period used in the DiD and one for the post-integration period used. δ_d represents fixed effects for the date, γ_t represents time fixed effects and σ_b represents fixed effects for the NYC borough where the pickup took place. β_2 i.e. coefficient of the interaction term is the coefficient of interest and it will indicate the treatment effect.

The results of this equation can be seen in Table 1. The table illustrates that the listing of yellow taxis on the Uber app in NYC led to increased usage of yellow taxis, using green taxis as the control group.

As for the 2023 intervention in NYC, Figure 8 illustrates that the intervention led to increased yellow taxi ridership relative to green taxis. To establish causality, I again make use of equation 1, with Table 2 depicting the results; as the table implies, there was a statistically significant increase in yellow taxi ridership with respect to green taxis post-intervention. The graph and table only include trips in Manhattan, since Manhattan is the borough with the highest yellow taxi availability and hence the highest chances of a yellow taxi being closer than an UberX.

Just as for NYC, for the case of Chicago, a Differences-in-Differences regression model is utilized to understand the ridership implications for conventional taxis in response to the listing of taxis on the Uber app in April 2024. Just like the integration in NYC in September of 2022, this integration in Chicago led to conventional taxis appearing as a travel option

on the Uber app, Uber users being able to check how long it would take the nearest taxi to reach their pickup point and Uber users being able to book a conventional taxi via the Uber app.

For the case of Chicago, a Diff-in-Diff model comparing mobile-hailed conventional taxi ridership and app-hailed for-hire vehicle ridership is used. The regression equation is as follows:

$$ln(Count_{dtn}) = \beta_1 Taxi + \beta_2 Taxi \times Post_t + X_{dtn} + \delta_d + \gamma_t + \sigma_n + \epsilon_{dtn} \quad (2)$$

n represents the pickup neighborhood in Chicago where the app-hailed taxi or car-hail pickup took place. *Taxi* is a dummy variable which is one for e-hailed conventional taxi trips and zero for car-hail trips.

Figure 9 illustrates that intervention led to an increase in e-hailed conventional taxi ridership relative to car-hail, also confirmed by the regression results in Table 3

4 Conclusions

Since the emergence of popular digital platform-based services like Uber and Airbnb, their traditional counterparts (conventional taxis, hotels, etc) have taken a serious hit. The high switching costs and network effects of such platforms make them anti-competitive.

Recently, especially in the transport sector, digital platforms have been adding conventional services to their apps. Zooming in on the integration of traditional taxis to the Uber app in the US cities of NYC and Chicago, this paper shows that such interventions can increase usage volumes of traditional services and hence foster competition between traditional services and their digital counterparts.

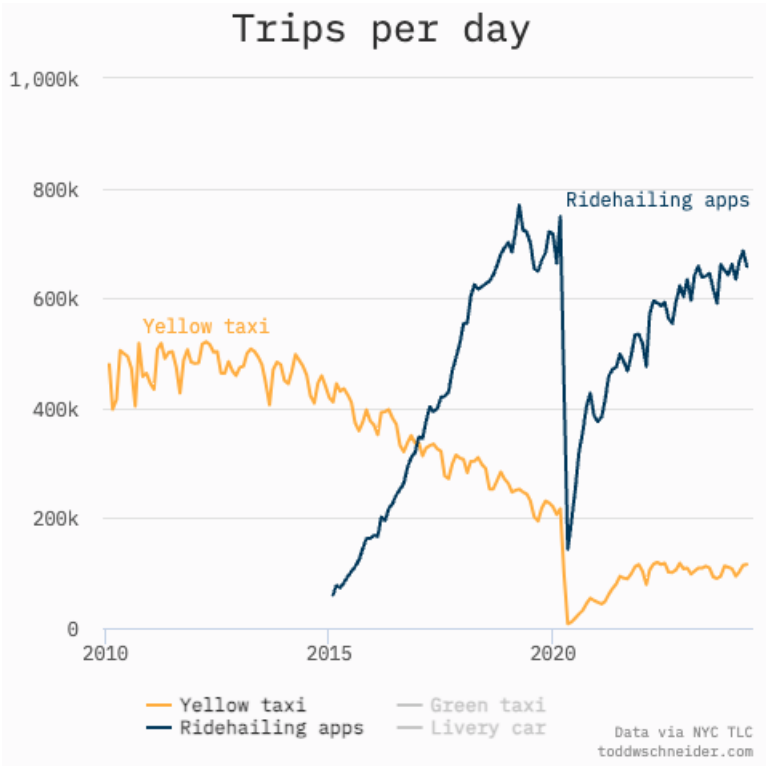
Using a Differences-in-Differences approach, I show that the listing of traditional taxis to the Uber app in NYC in 2022 and Chicago in 2024 led to a statistically significant increase in traditional taxi ridership in both these cities. The results indicate that the high switching costs and network effects of popular car-hailing platforms restrict users from seeking alternative travel options. Hence users of these car-hailing apps are left with an information deficit whereby they are deprived of information related to other viable travel options for their desired journey. Considering this, the listing of conventional taxis on a popular car-hailing app like Uber can narrow this information deficit by lowering search costs for users of such apps and consequently increase the usage of conventional taxis.

In addition to the listing of conventional taxis on the Uber app, this paper also explores the role of nudges in changing travel behaviors of car-hail app users. In that regard, using a Differences-in-Differences model, the paper shows that when Uber automatically started matching requests for UberX with conventional yellow taxis in NYC subject to a yellow taxi being closer than an UberX - while giving users the option to be rematched with an UberX or cancel the ride - there was a statistically significant increase in conventional yellow taxi ridership.

Policymakers can deduce from the findings of this paper that requiring popular ride-hailing platforms to list conventional taxis on their apps can improve competition between the two services. The results of the paper indicate that these interventions can also benefit conventional taxi drivers and businesses that operate conventional taxis via increased trip volumes. Lastly, car-hail platforms can infer from these findings that such integrations benefit them as well since they can charge commissions on conventional taxi trips undertaken via their platforms and increase their revenues.

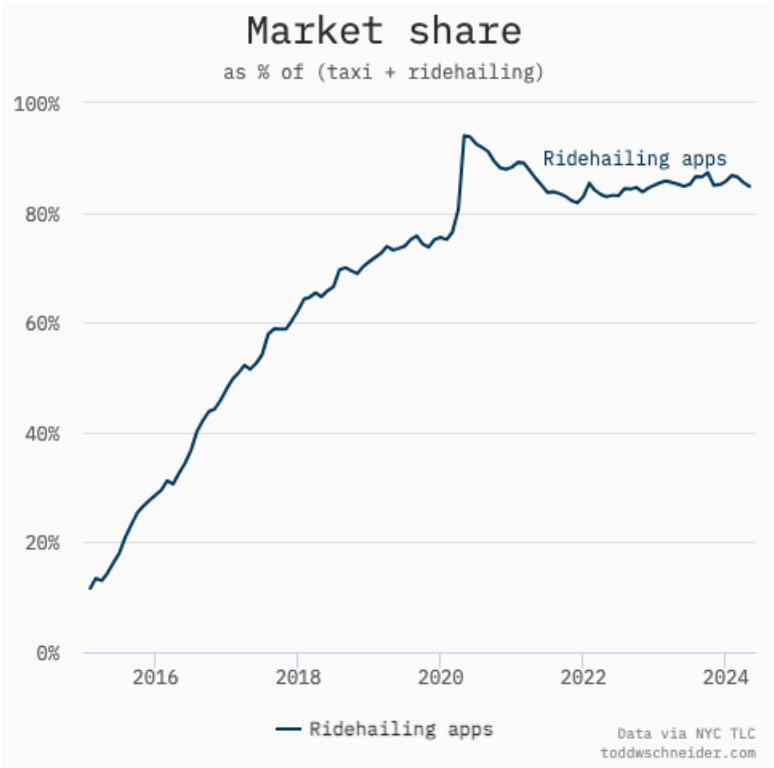
5 Figures

Figure 1: Illustration of the Decline in Conventional Taxi Ridership as Ride-Hailing App Usage Increased in NYC [1]



[1]Source: https://toddwschneider.com/dashboards/nyc-taxi-ridehailing-uber-lyft-data/

Figure 2: Visualisation of the Temporal Market Share of Ride-Hailing Apps in NYC [2]



[2]Source: https://toddwschneider.com/dashboards/nyc-taxi-ridehailing-uber-lyft-data/

Figure 3: Depiction of Conventional Taxi Listing on the Uber App (Screenshot Taken By the Author Directly From the Uber App)

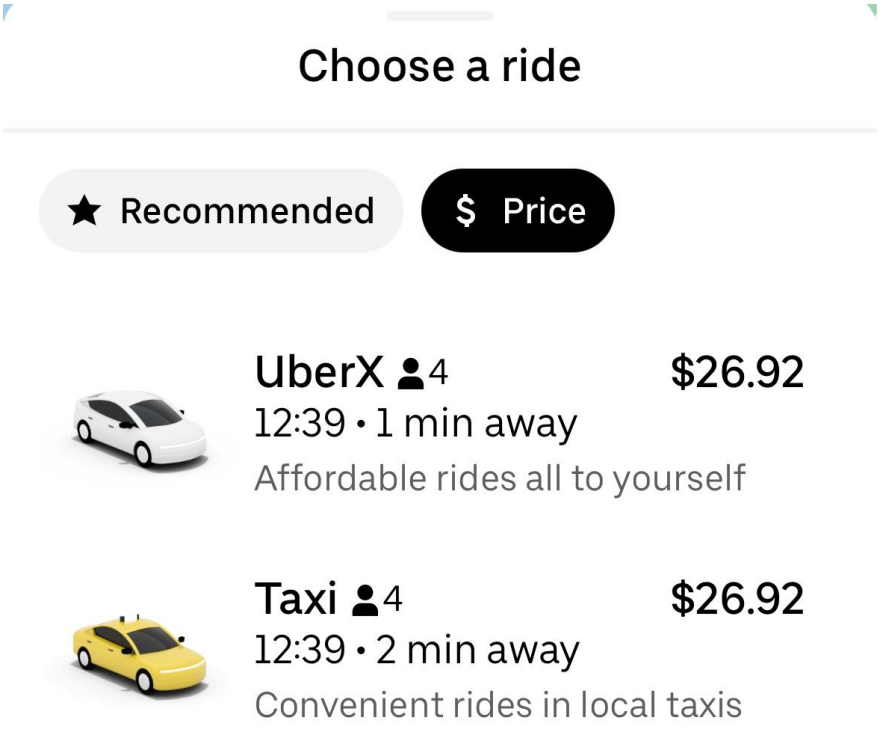
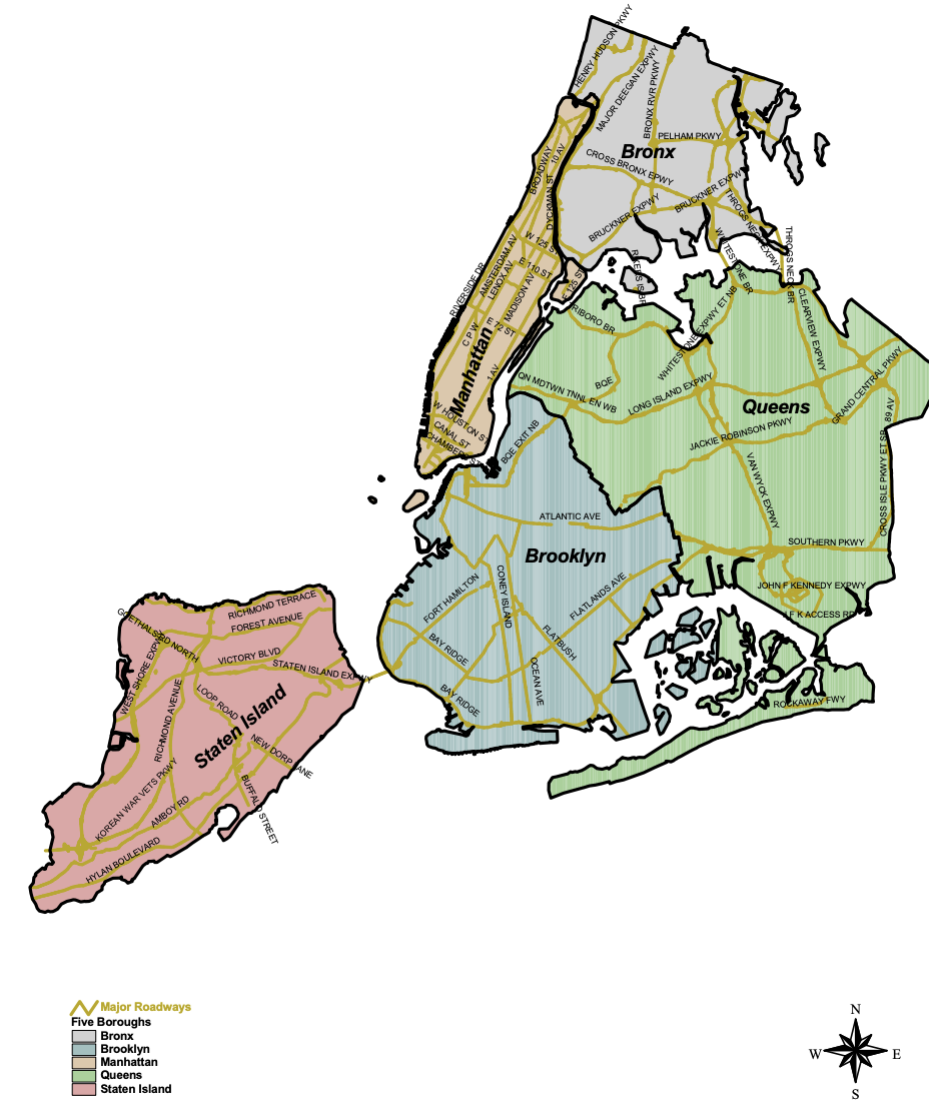


Figure 4: Map of NYC Boroughs [3]



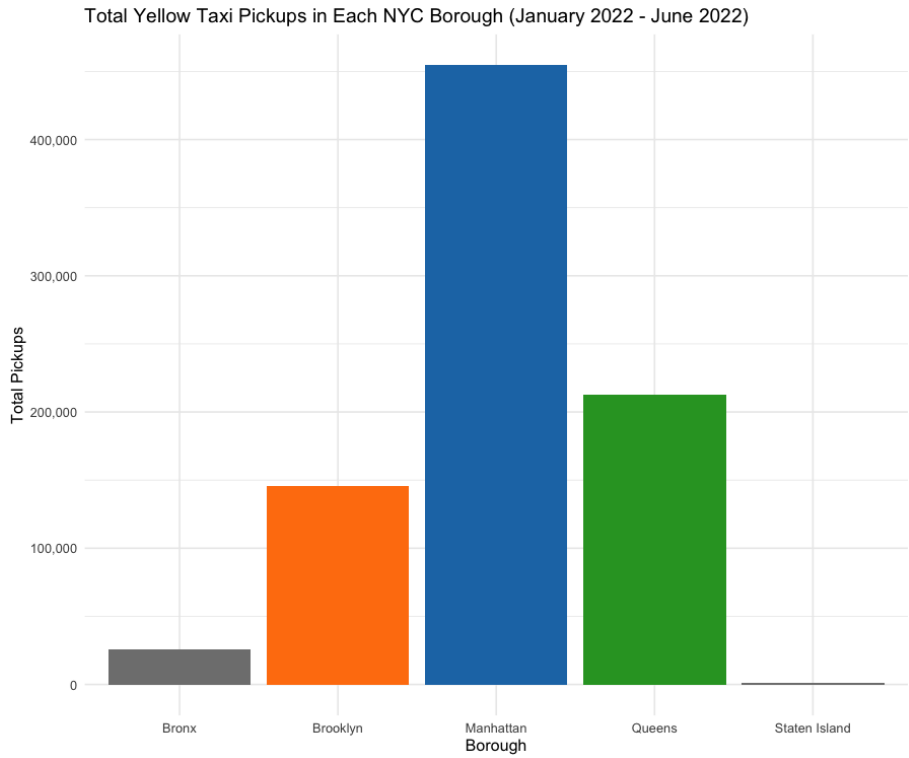
[3]Source: https://www.nyc.gov/html/dot/downloads/pdf/bridgerpt05_allboro.pdf

Figure 5: Map of Locations in NYC Where Green Taxis are Allowed Pickups (Depicted By the Green Region) [4]



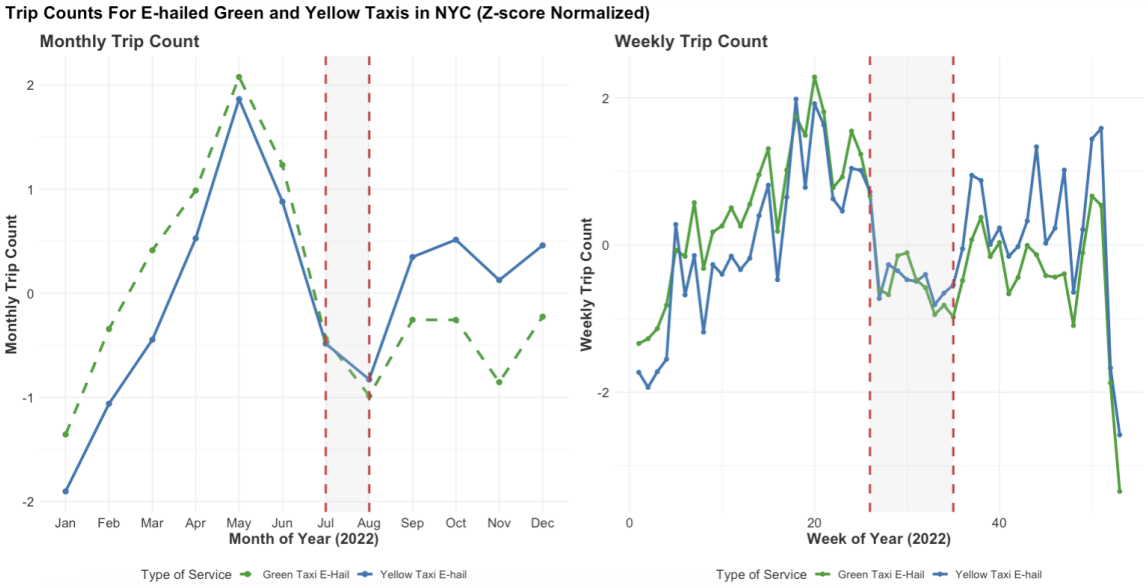
[4]Source: https://www.nyc.gov/assets/tlc/downloads/pdf/trip_record_user_guide.pdf

Figure 6: Bar Chart Illustration of Yellow Taxi Pickups in Each NYC Borough (January to June of 2022) [5]



[5]The chart excludes regions where green taxis are not allowed to pick up passengers, such as NYC airports and areas in Manhattan where green taxi pickups are restricted.

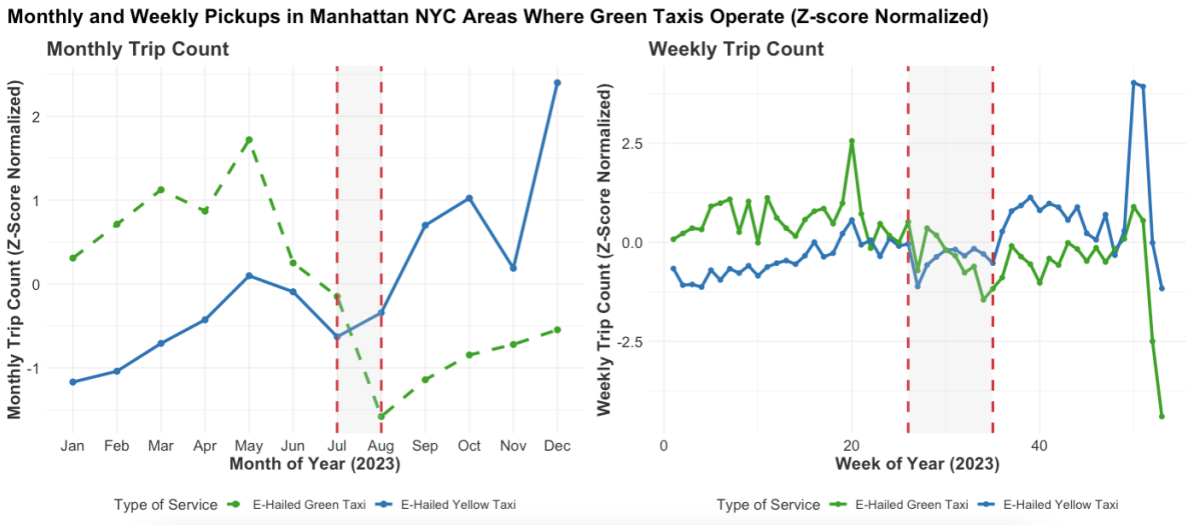
Figure 7: Pickup Counts for E-hailed Yellow and Green Taxis in NYC (2022). The Y-axis Has Been Z-Score Normalized for Visual Comparison Purposes [6]



[6] Pickups in the NYC Boroughs of Staten Island and Bronx have been excluded from the counts in this figure; as Figure 6 shows, these boroughs have very low yellow taxi pickups so yellow taxis rarely show up as a travel option on the Uber app in these two boroughs. Additionally, NYC airports and the yellow-colored region of Manhattan in Figure 5 are excluded, as green taxis are not permitted to pick up passengers in these locations.

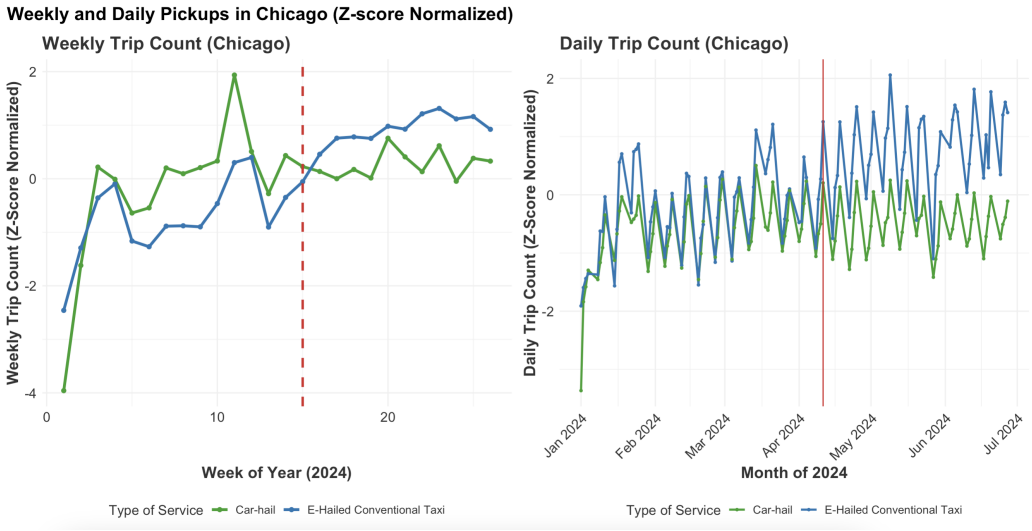
The shaded region in the figure represents July and August, months often characterized by significant inflows and outflows from NYC for vacation purposes. The listing of conventional taxis on the Uber app started in August; consider the trends on either side of the red vertical lines to visualize the relative trends before and after the intervention.

Figure 8: Total E-hailed Yellow Taxi and Green Taxi Pickups in Manhattan, NYC (2023). The Y-axis Has Been Z-Score Normalized for Visual Comparison Purposes [7]



[7] Manhattan areas where green taxis are not allowed pickups (Figure 5) are excluded from the counts. The automatic matching of conventional yellow taxis for UberX requests started in August of 2023; consider the trends on either side of the red vertical lines to visualize the comparative trends before and after the intervention.

Figure 9: Z-Score Normalized Pickup Counts in Chicago for the First Half of 2024, Comparing App-Hailed Conventional Taxis (Via Apps Like Curb, Arro, Uber, etc) and App-Hailed For-Hire Vehicles (Via Apps Like Uber, Lyft, etc) [8]



[8] Fridays, Saturdays and Sundays have been removed from the daily counts for visual purposes as the addition of these days leads to excessive overlapping of the two curves, making the trends difficult to visualize.

The red vertical lines mark April 11, which is the date when conventional taxis were listed as a travel option on the Uber app in Chicago.

6 Tables

Table 1: Results of a DiD Comparison of Yellow Taxi and Green Taxi Pickups in the NYC Boroughs of Queens (Excluding the JFK Airport and La Guardia airport), Manhattan (Excluding the Yellow-Colored Area of Manhattan in Figure 5) and Brooklyn. The table considers 3 months before the intervention (before July to exclude the high tourism months) and 3 months post-intervention starting from September. This Table Sheds Light on the Ridership Implications for E-Hailed Yellow Taxis After the 2022 Listing of Yellow Taxis on the Uber App in NYC

Dependent Variable:	log(Count)			
Model:	(1)	(2)	(3)	(4)
Variables				
Constant	5.669***			
	(0.0270)			
Post	-0.3193***			
	(0.0393)			
Yellow	0.5589***	0.5589***	0.6046***	0.3948***
	(0.0382)	(0.0222)	(0.0970)	(0.0668)
Yellow × Post	0.2042***	0.2042***	0.2032***	0.1641***
	(0.0555)	(0.0330)	(0.0256)	(0.0233)
Fixed-effects				
Date of Pickup		Yes	Yes	Yes
Time of Pickup			Yes	Yes
Pickup Borough				Yes
Fit statistics				
Observations	350	350	8,177	21,757
R^2	0.64718	0.93779	0.53851	0.40746
Within R^2		0.90384	0.24172	0.10406

Signif. Codes: ***: 0.001, **: 0.01, *: 0.05

Table 2: Results of a DiD Comparison of E-Hailed Yellow Taxi Pickups and E-hailed Green Taxi Pickups in Manhattan (Only the Manhattan Region Colored Green in Figure 5). The table considers 3 months before the intervention (before July to exclude the high tourism months) and 3 months post-intervention starting from September. This Table Illustrates the Ridership Implications of the 2023 Intervention in NYC that Entailed Yellow Taxis Being Matched With UberX Requests If a Yellow Taxi Was Closer Than an UberX

Dependent Variable:	ln(Count)			
Model:	(1)	(2)	(3)	(4)
Variables				
Constant	4.186***			
	(0.0309)			
Post	-0.2345***			
	(0.0439)			
Yellow	0.9793***	0.9793***	0.9159***	0.2320***
	(0.0436)	(0.0274)	(0.0530)	(0.0167)
Yellow × Post	0.4488***	0.4488***	0.2919***	0.1715***
	(0.0621)	(0.0581)	(0.0702)	(0.0287)
Fixed-effects				
Date of Pickup		Yes	Yes	Yes
Time of Pickup			Yes	Yes
Pickup Taxi Zone				Yes
Fit statistics				
Observations	364	364	7,471	27,728
R^2	0.81165	0.91854	0.55967	0.24195
Within R^2		0.90879	0.42955	0.08614

Signif. Codes: ***: 0.001, **: 0.01, *: 0.05

Table 3: Regression Table for a DiD Comparing the Pickup Counts of Platform-Hailed Conventional Taxis and For-Hire Vehicles. This Table Provides Insight on Whether There Were Changes to E-hailed Conventional Taxi Ridership After the 2024 Listing of Conventional Taxis on the Uber App in Chicago (3 months before and 3 months after the intervention are used in the DiD)

Dependent Variable:	ln(Count)			
Model:	(1)	(2)	(3)	(4)
Variables				
Constant	12.41***			
	(0.0229)			
Post	0.0147			
	(0.0335)			
Taxi	-4.698***	-4.698***	-4.979***	-3.511***
	(0.0323)	(0.0318)	(0.1096)	(0.0626)
Taxi × Post	0.2983***	0.2983***	0.3475***	0.1880***
	(0.0474)	(0.0405)	(0.0194)	(0.0159)
Fixed-effects				
Date of Pickup		Yes	Yes	Yes
Time of Pickup			Yes	Yes
Pickup Community Area				Yes
Fit statistics				
Observations	344	344	8,244	2,038,920
R^2	0.99095	0.99656	0.96302	0.74041
Within R^2		0.99653	0.95924	0.47503

Signif. Codes: ***: 0.001, **: 0.01, *: 0.05

References

Apouey, B. and Stabile, M. (2022). Drivers of disruption? estimating the uber effect. Health Economics, 31:1468–1490.

Berger, T., Chen, C., and Frey, C. B. (2018). Drivers of disruption? estimating the uber effect. European Economic Review, 110:197–210.

Carballa Smichowski, B. (2018). Is ride-hailing doomed to monopoly? theory and evidence from the main u.s. markets. Revue d'économie industrielle, 162:43–72.

City of Chicago (2024a). Taxi trips. Accessed in 2024.

City of Chicago (2024b). Transportation network providers - trips. Accessed in 2024.

Decarolis, F., Li, M., and Paternollo, F. (2024). Competition and defaults in online search. SSRN Working Paper.

District of Columbia (2024). Trip record data. Accessed in 2024.

Guo, X., Haupt, A., Wang, H., Qadri, R., and Zhao, J. (2023). Understanding multi-homing and switching by platform drivers. Transportation Research Part C: Emerging Technologies, 154:104233.

Heinen, E. and Mattioli, G. (2019). Multimodality and co2 emissions: A relationship moderated by distance. Transportation Research Part D: Transport and Environment, 75:179–196.

New York City (2024). Trip record data. Accessed in 2024.

Thorne, V., Guzzardi, M., Roth, S., and Wolff, H. (TBC). Can apps save the planet? enhancing urban mobility and the environment through tech adoption. Working Paper.