

## New York City Pilot Transportation Study Summary

On Wednesday, July 22, 2015 a small team of four riders collected 22 UberX observations and 32 taxi<sup>1</sup> observations in several lower-income community districts in the boroughs of Queens and Brooklyn.<sup>2</sup> Riders measured the time it took to successfully be picked up by a cab, livery car, or UberX (“wait time”) and the cost of these rides (“cost per ride”).

### METHODS

The study design required data to be harvested from areas of New York City with a combination of below-average crime and below-average median household income. Across the 5 boroughs of New York City, the average major crime rate was found to be 13.62 per 1000 residents<sup>3</sup> while the median household income was found to be \$50,711.00.<sup>4</sup> The complete list of the 59 community districts in New York City was assembled. All districts in Manhattan were removed as it was not an area of concern for the study. Next, for each community district in the four outer boroughs, the average crime rate and median household income was identified. The boroughs which did not have the required combination of below-average crime rate and below-average median household income were excluded from the list.

Each remaining district was then assigned a random number and put into a random number generator. The districts with the two lowest numbers were then selected for the study. The selected Districts were Queens 1 and Brooklyn 11. Using a map of the boroughs, any qualifying districts which were adjacent to the two selected were merged with the initial two in order to create a wider ‘cluster’ of districts within which our teams would operate. The idea behind doing this was to allow the riders to cover more ground across trips of realistic distances. These combined district ‘clusters’ were Queens District 1, 3 and 4 for Team 1 and Brooklyn District 11, 12 and 15 for Team 2.

Prior to the study, our team researched the current state of the ride hailing in the outer boroughs of New York City. This was done through a combination of reviewing critical published resources as well as consulting with New York City residents. To select the car services to utilize for our study, our team reviewed possible local options for the selected community districts. Because the discovery of optimal local options was so cumbersome and uncertain, we instead chose to imitate the experience of a rider new to a particular area of town or New York City generally by selecting appropriate car services to call based on recommendations from hotel staff, local residents, and prominent online reviews and search results.<sup>5</sup> From this survey of services, four promising car services were selected.

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<sup>1</sup> Taxi for the purpose of this study refers to New York City Yellow Cabs, Boro Cabs (also known as Green Cabs), and car service livery vehicles.

<sup>2</sup> This research was funded by Uber Technologies. The company had no control over the study design and no prior knowledge of the neighborhoods or locations that would be used in the study. Furthermore, Uber Technologies granted BOTEC Analysis Corporation full permission to publish the study results without prior review of the outcome.

<sup>3</sup> Major crime is defined as murder, rape, robbery, felony assault, burglary, grand larceny, and grand larceny auto. Data from Jan-Dec 2013. Retrieved from <http://nyc.pediacities.com/fsmaps/NYCCrimeMap/>

<sup>4</sup> Data from 2010-2012 estimates from the U.S. Census Bureau. Retrieved from <http://project.wnyc.org/median-income-nabes/>

<sup>5</sup> Specifically, the most promising online resource utilized was the NYC OpenData map of local bases for car services retrieved from <https://data.cityofnewyork.us/Transportation/FHV-Bases/v52x-36fy?firstRun=true>.

Each rider was required to take an equal number of UberX rides, of taxis by street hail, and car service rides by dispatch.<sup>6</sup> At each location, the first rider would randomly select one of these ride modes from a pre-stocked envelope of ride modes and eliminate that from his stock of rides to take for the day. The other rider would then draw, with the proviso that they could not select the same ride mode as the first rider for that location. At that point, each rider would begin requesting a ride via their randomly assigned mode. If a car could not be obtained within thirty minutes either via street hail or requested car services, then an UberX was summoned to provide a ride to the next location, and that additional UberX observation was recorded.

Our team used the same “drag race” buddy system methodology that was employed during the Los Angeles Transportation Study. Riders traveled in pairs and alternated modes of transportation so that each individual was always taking a different mode than the other. Routes and locations were not predetermined in this study, however; instead, they were determined “on the fly” using a simplified randomization method. At the start of the route, one of the paired riders used the Google Maps app to identify two potential locations that could serve as the next destination. In general, the potential locations had to meet the following criteria: they must be within the borders of the community districts chosen for study, roughly equidistant from the current location, and located near major streets or intersections where one might expect taxi traffic. The destinations generally consisted of major intersections, parks, restaurants, and coffee shops. The two locations were then assigned to faces of a coin, heads and tails, which the other rider then flipped in order to determine the next destination. This same process was repeated, with riders alternating roles, at every subsequent location. Rides were between one and a half and four miles in length.

## RESULTS

### *Wait Time*

Observations in which the car service refused to send a car for the rider (N=10) and observations where the taxi company stated the wait time would be longer than the study-determined maximum wait time of 30 minutes (N=2) were assigned a wait time of 30 minutes. These observations were subsequently dropped from the wait time calculations (N=12). In one observation the taxi company stated a driver was on the way but the wait time exceeded 30 minutes and was then cancelled by the rider. However, this observation was included in wait time calculations with a recorded wait time of 30 minutes.

After dropping observations in which the taxi company refused to send a driver, the sample size included 22 UberX observations and 20 taxi observations (2 by calling Arecibo, 4 by calling New Experience Car Service, 13 by hailing Boro Cab, and 1 by walking into the local base for a car service). The mean wait time of UberX was 5 minutes and 6 seconds and the mean wait time of taxis was 10 minutes and 24 seconds. Detailed summary statistics are included in Table 1. **The mean difference between UberX and taxi wait times is 5 minutes and 18 seconds which**

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Although the service is seemingly comprehensive, the usability of the map is extremely limited for an individual on the go. The decision was made to mimic the experience of a rider new to either New York City generally or that particular community district—who would not know the best local car service to call but would know prominent city wide services—rather than a local intimately familiar with which exact car service to call for a particular area.

<sup>6</sup> Due to issues of car service coverage (as described in the “results” section), the distribution of rides were not even in the end.

corresponds to an observed effect size of .7714 and is statistically significant at the 5% level (p=.02).

<b>Table 1: NYC Wait Time Summary Statistics<sup>7</sup></b>						
	<b>Observations</b>	<b>Mean</b>	<b>Median</b>	<b>Std Deviation</b>	<b>Min</b>	<b>Max</b>
<b>UberX</b>	22	5:06	4:18	3:25	1:18	15:48
<b>Taxi</b>	20	10:24	8:05	9:05	0:02	30:00

Observations in which the taxi company refused to send a driver speak to the unreliability of dispatch taxi service in lower-income and geographically dispersed community districts of New York City. Of the total number of attempted dispatch taxi rides, the company was unable to send a driver within 30 minutes 38% of the time. Although it is possible these specific taxi companies did not serve the boroughs of Brooklyn or Queens except when dropping off or picking up a rider from the airport, this lack of clear information contributes to the difficulty riders new to the city generally, or merely a particular part of the city, face when attempting to travel around the city via car service.

**Cost Per Ride**

The data collected did not provide conclusive evidence of a difference in cost between UberX and taxis. The sample included 15 UberX observations and 14 taxi observations (2 by calling Arcibo, 2 by calling New Experience Car Service, and 10 by hailing Boro Cab). Detailed summary statistics are included in Table 2. The average cost of UberX was \$12.27 and the average cost of taxis was \$13.36. The average cost difference of \$1.09 corresponds to an observed effect size of .2459 and is not statistically significant (p=.52).

<b>Table 2: NYC Cost Summary Statistics<sup>8</sup></b>						
	<b>Observations</b>	<b>Mean</b>	<b>Median</b>	<b>Std Deviation</b>	<b>Min</b>	<b>Max</b>
<b>UberX</b>	15	\$12.27	\$11.04	\$3.96	\$8.00	\$20.59
<b>Taxi</b>	14	\$13.36	\$12.00	\$4.86	\$8.00	\$25.00

<sup>7</sup> Calculations include one UberX outlier but exclude taxi observations where the companies refused to pick up the rider

<sup>8</sup> Calculations include only those observations which were matched pairs, i.e. UberX and one taxi taken from the same pick-up location traveling to the same destination