

Profitability of NYC Yellow Taxis in 2024

Introduction

The yellow taxi is an iconic symbol of New York City. Although the advent of rideshare companies like Uber and Lyft have eliminated the market for taxis in much of the US, a market for taxis still exists in NYC. We can see from Figure 1 that, while the market share of yellow taxis in NYC has been significantly reduced in the last 10 years, there were on average over 3 million rides a month in NYC yellow taxis in 2023. Demand for taxi services has recovered from the dramatic reduction in 2020 and 2021 due to the Covid-19 pandemic and appears to have reached an equilibrium, reflecting a change in the market from 10 years ago. The change in demand for taxis makes the use of data analytics crucial for the current NYC taxi driver.

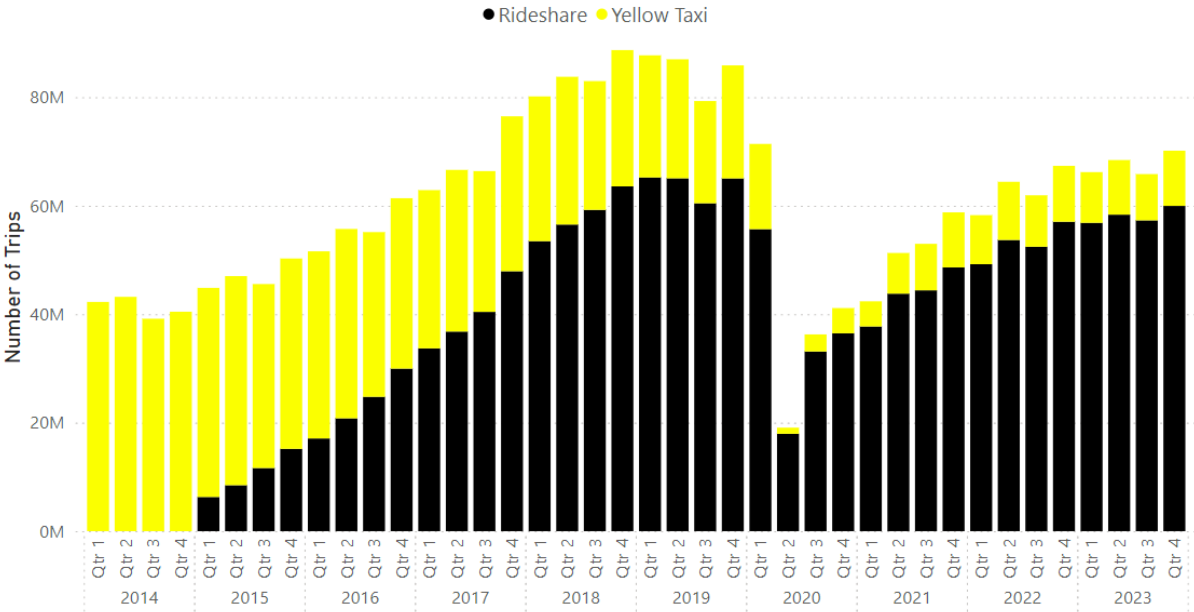


Figure 1: Market Share for Yellow Taxis Since 2014

In this analysis, we will examine the ride data for every yellow taxi trip in 2023 made available by the NYC Taxi and Limousine Commission (TLC) to understand the NYC yellow cab market and how taxi drivers can use that data to determine optimal strategies for profitability. Drivers have control over the times they work and, to some extent, the areas they choose to work in, so the day and time of ride and the pickup neighborhood will be investigated to determine the most profitable times and areas for drivers to work in.

KPI

Standard taxi fares are calculated based on the following rules:

1) \$3.00 initial charge.

2a) \$0.70 per 0.2 miles when travelling above 12 mph.

or

2b) \$0.70 per minute when travelling at or below 12 mph.

The primary way to increase the profitability of a ride is to increase the average speed above 12 mph. Drivers are not expected to drive faster than is prudent, but can choose rides at times and in locations that will correlate to higher average speeds.

For each ride, the total earned by the driver of fare and tip, minus the expense of gas, divided by the time the ride takes, will determine the profitability of the ride measured in dollars per minute

$$\text{Profitability} = \frac{\text{fare} + \text{tip} - 0.15 * \text{distance}}{\text{duration}}$$

The expense of gas is based on an average price of gas in 2023 for NYC of \$3.50/gallon and an average fuel economy of 25 miles/gallon. This is a simplification, as fuel economy does vary significantly with speed and traffic conditions, but ultimately the expense of gas is much less than the fare, and has a minimal impact on the profitability of each ride. The fare and duration of the ride are the most important factors in determining the profitability.

We have a single Key Performance Indicator (KPI) to measure the profitability of a ride in dollars per minute.

Data Cleaning & Manipulation

The initial dataset from the TLC included monthly data for all rides in 2023, totalling approximately 38.3 million rides. The data was cleaned to remove records outside 2023 date ranges, various outliers for distance and time, and zero or negative fares and tips, leaving approximately 36.2 million rides.

The key data fields from the initial dataset included: pickup and dropoff times, trip distance, pickup and dropoff zones, payment type, fare, and tip. Several fields were calculated to aid in analysis: ride duration, average speed, day of week, and the profitability KPI.

When considering profitability by pickup zone, only zones with over 10,000 rides were included, to avoid issues with small sample sizes.

Analysis

Figure 2 shows profitability by pickup zone. The TLC divides the five boroughs into 263 pickup zones. Larger bubble size indicates more rides from that zone, with JFK and LaGuardia airports having the most pickups outside of Manhattan.

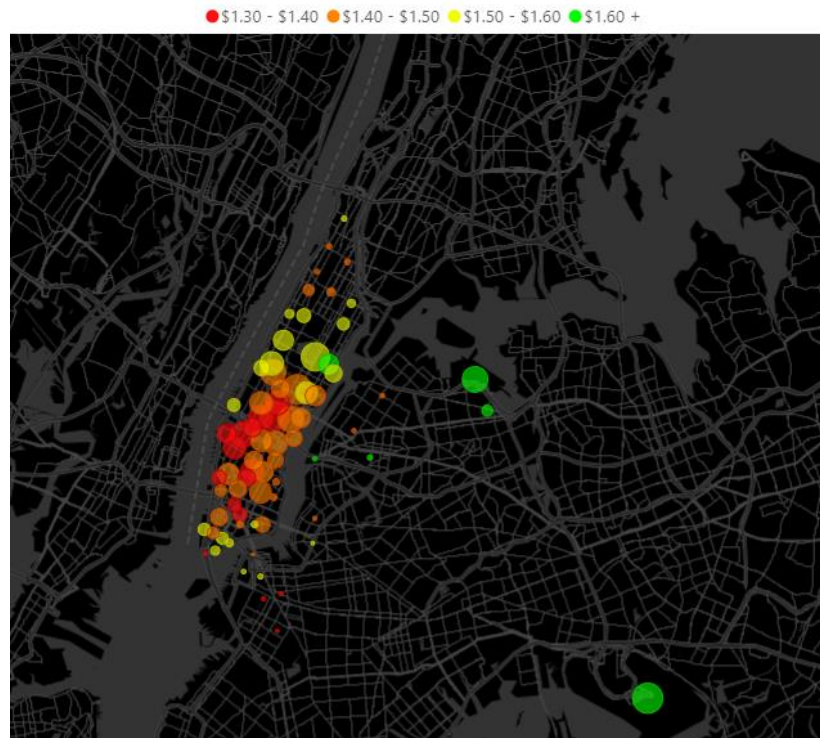


Figure 2: Profitability of Taxi Ride by Pickup Zone

Figure 3 shows the top 10 pickup zones by profitability (of zones having more than 10,000 rides).

Pickup Zone	\$/minute	# Rides
Long Island City/Hunters Point	2.70	15566
Sunnyside	1.89	22870
JFK Airport	1.84	1819455
East Elmhurst	1.80	161168
LaGuardia Airport	1.79	1254062
Yorkville West	1.62	704531
Yorkville East	1.58	494108
Upper West Side North	1.55	712945
Downtown Brooklyn/MetroTech	1.54	22810
Two Bridges/Seward Park	1.53	42578
Total	1.47	36176683

Figure 3: Top 10 Pickup Zones by Profitability

Airport pickups are some of the more profitable, as the flat fees to Manhattan from JFK and LaGuardia tend to produce a higher fare. A noticeable outlying pickup zone is Long Island City. The Long Island Railroad terminates in this zone, which may account for a higher than usual number of fares wanting profitable airport rides.

Figure 4 shows profitability by day of the week and time.

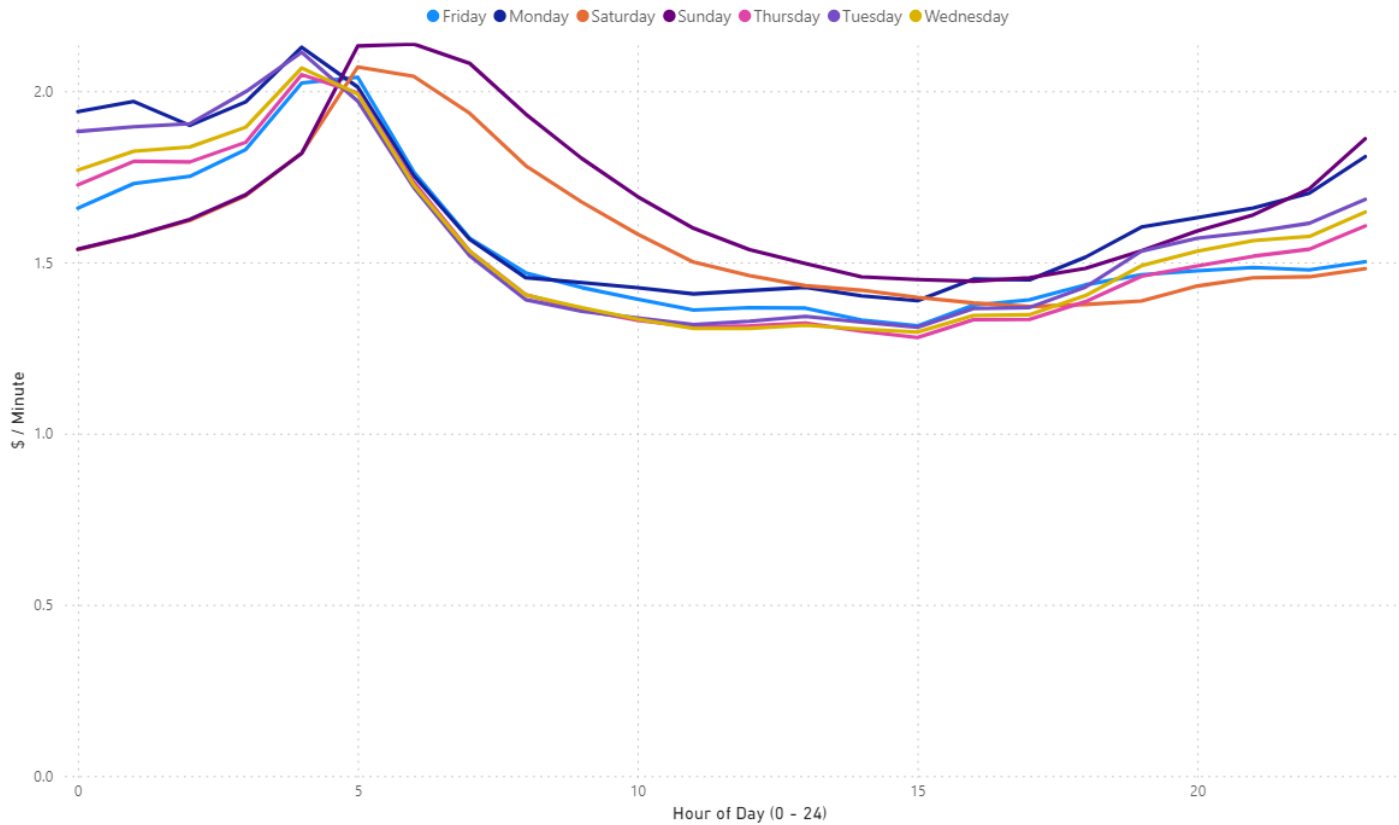


Figure 4: Profitability by Day and Time

Weekdays follow a similar pattern of profitability, peaking from 3 – 5 AM, dropping off sharply from 5 – 8 AM, remaining constant from 8 AM – 8 PM, and increasing from 8 PM – 3 AM.

Weekends follow a different pattern, with morning rides being more profitable than weekday mornings, and Friday and Saturday nights being the least profitable nights.

Recommendations

Based on this analysis, recommendations for optimal profitability are:

- 1) Concentrate on weeknights and weekend days, avoiding weekdays and weekend nights.
- 2) When given a choice of pickup zone (e.g. at the beginning of a shift), operate near Long Island City, JFK, LaGuardia, or the Upper East Side of Manhattan, avoiding most parts of Midtown and West Manhattan.