



Dynamic Pricing for MTA

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Overview

We are a consulting firm that specializes in using data science for the public good. Our research of the turnstile data on the MTA developer site determined that a dynamically priced fare reduction will encourage ridership during off-peak hours. Our research supports that our proposal will alleviate peak congestion, generate revenue and satisfy your customers, especially those who are price-sensitive.

Goals

1. Identify off-peak hours and compare to similar markets
2. Encourage ridership during off-peak hours via fare reduction
3. Propose economics of fare reduction

Current Examples of Dynamic Pricing in Public Transportation:

There are only two domestic public transport systems that utilize dynamic pricing for fares: Washington Metro (implemented in 2014) & Long Island Rail Road (implemented in 2010). Behind MTA, Washington Metro is ranked 2nd, and the LIRR is ranked 7th.

Peak and off-peak hours for those transit systems:

Washington Metro defines peak hours as:

- Monday - Friday: 5:00 am - 9:30 am
- Saturday - Sunday: 7:00 am - 9:30 am
- Monday - Sunday: 3:00 pm - 7:00 pm

Long Island Rail Road defines peak hours as:

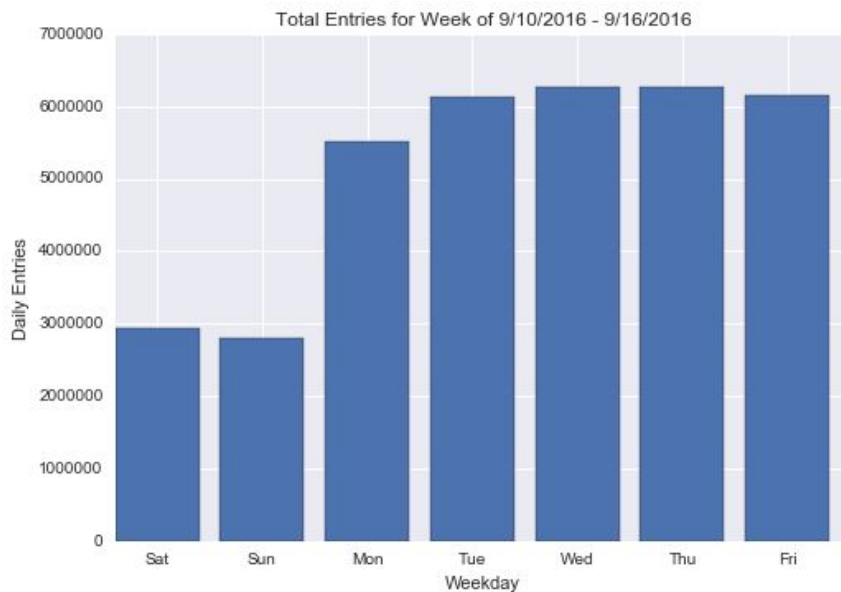
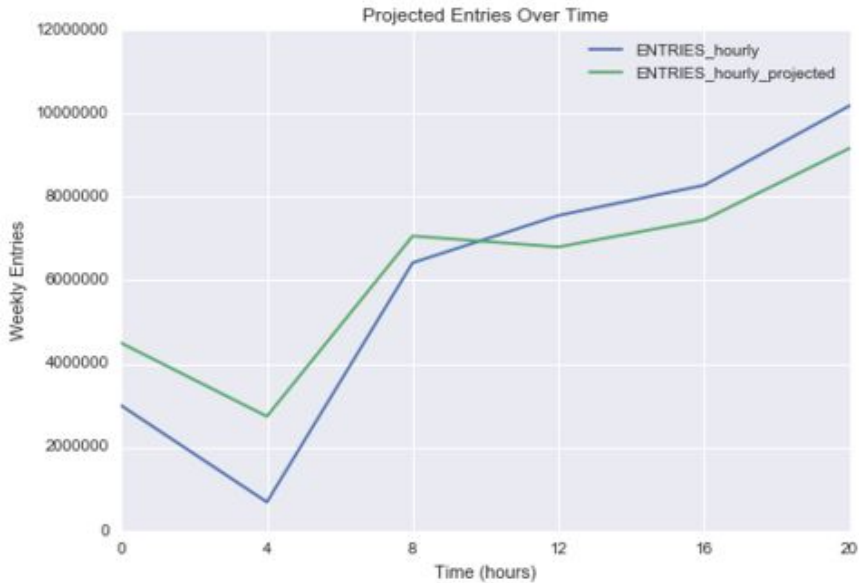
- Monday - Friday: 6:00 am - 10:00 am
- Monday - Friday: 4:00 pm - 8:00 pm

Dynamic pricing structure for these two systems:

Washington Metro offers their off-peak riders a weighted average -27% discount of peak-hour fares (morning fares are more dynamic than afternoon/evening fares). Long Island Rail Road offers their off-peak riders a -33% discount of peak-hour fares.

Identify Off-Peak Hours:

Through our research, we concluded that MTA's off-peak hours are 8:00 pm - 8:00 am. Ridership in those hours represented 22.7% of the total day. Because MTA offers a 24-hour service, we concluded that a fare reduction would increase ridership in off-peak hours. Encouraging ridership in off-peak times would reduce both system and traincar congestion.



[We are looking at a total of 36 million turnstile entries during the week of 9/10-9/16/2016]

Off-peak Fare Proposal:

The current MTA fare is \$2.75 for a one-way trip anywhere on the system. We understand that in July, the MTA board approved a planned +8.3% fare increase from \$2.75 to \$3.00 effective March 2017. Our proposal is to simultaneously reduce the off-peak fare to \$2.50 (a modest fare reduction of -16.7%). This proposal would be effective all week from Monday - Sunday, similar to Washington Metro's schedule.

Future Considerations:

Our data set only included one week of data: 9/10 - 9/16/2016.

The traffic pattern on 9/11/2016 might be considered atypical due to the 15th anniversary of the September 11 attacks.

As a test, we identified the top 5 (and bottom 5) stations with the greatest variance in peak and off-peak ridership.

Our proposal for dynamic pricing continuing through Saturday and Sunday mirrors Washington Metro's weeklong model. We will continue to analyze the weekend data to see if our current model is most effective or needs to be modified (e.g., only offer fare reduction on Fridays & Saturdays 12:00 am - 8:00 am).

Our research concluded that off-peak transit users are nearly two times more likely to be influenced by fare price than peak-hour users (ref: Pham-Linsalat in Sources).

Conclusion:

As a critical driver of economic growth in the New York region, the MTA provides economic opportunities and leisure activities to millions. By improving the efficiency of MTA mass transit, a dynamic-pricing model has the potential to transform North America's largest transportation network. It will reduce congestion; boost ridership; and increase revenue. These changes will help ensure that the MTA remains the envy of other cities.

Sources:

Proposed MTA fare increase:

<http://www.nydailynews.com/new-york/mta-eyeing-2017-bus-subway-fare-hike-3-article-1.2728911>

Washington Metro fare data: <http://www.wmata.com/fares/metrorail.cfm>

Long Island Rail Road fare data: <http://web.mta.info/lirr/about/TicketInfo/>

MTA annual ridership: <http://web.mta.info/nyct/facts/ridership/>

Rank of domestic rapid transit systems by ridership:

https://en.wikipedia.org/wiki/List_of_United_States_rapid_transit_systems_by_ridership

Economist, May 2016 on Surge Pricing:

<http://www.economist.com/news/finance-and-economics/21698656-jacking-up-prices-may-not-be-only-way-balance-supply-and-demand-taxis>

Apps and downs

Whether Uber remains a big part of the transport network in future, and whether it retains surge pricing, depends in part on how well local governments manage the transport system as a whole. In districts or cities where travellers have appealing alternatives, in the form of good public transport or private competitors to Uber, users will be more sensitive to price. Surge pricing will therefore not generate a big financial windfall for Uber (or its drivers). But where public transport is thin on the ground, or where Uber has little private competition, it is a different story. In other words, surge pricing is really only as painful as local officials allow it to be.

Price Elasticity of peak-hour vs. off-peak-hour public transportation:

http://www.apta.com/resources/reportsandpublications/Documents/Pham_Linsalata_Fare_Elasticity_1991.pdf

- Although the data for peak vs. off-peak services are available for only six transit systems, the difference between the fare elasticity levels is very clear: *The average peak-hour elasticity is -0.23 while the off-peak hour elasticity is -0.42*, indicating that peak-hour commuters are much less responsive to fare changes than transit passengers travelling during off-peak hours.

FARE ELASTICITY - BUS SERVICES

	Cities/Areas with Population of	
	more than 1 million	less than 1 million
All hour average	-0.36	-0.43
Peak hour average	-0.23	
Off-peak average	-0.42	
Peak hours	-0.18	-0.27
Off-peak	-0.39	-0.48



Optional addressee:

Mr. Robert E. Foran

Chief Financial Officer

New York Metro Transit Authority