

Elasticity of Demand Study for Miami-Dade Transit



December 2020

Content

1. Project Objective
2. Data Description
3. Existing Ridership Trends
4. Data Constraints
5. Grouping
6. Weighted Fare Elasticities
7. Changing Fares
8. Peak and Off-Peak Pricing
9. Zone Based Pricing

Project Objective

Project Objective

Analyze Metrorail and Metrobus market specifically, with a view to understand the fare responsiveness of users

Goal

Inform future fare policy and the assessment of how future fare increases would affect ridership, revenue, and subsidy levels

Methodology

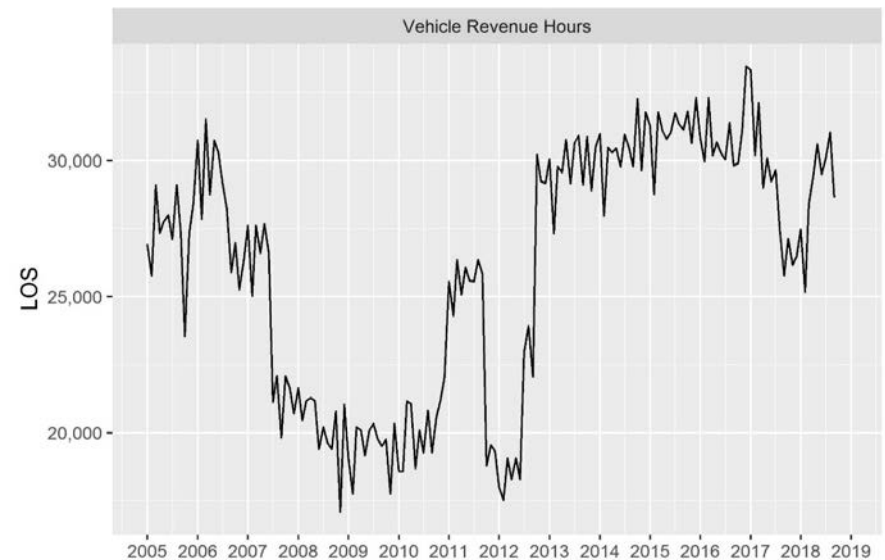
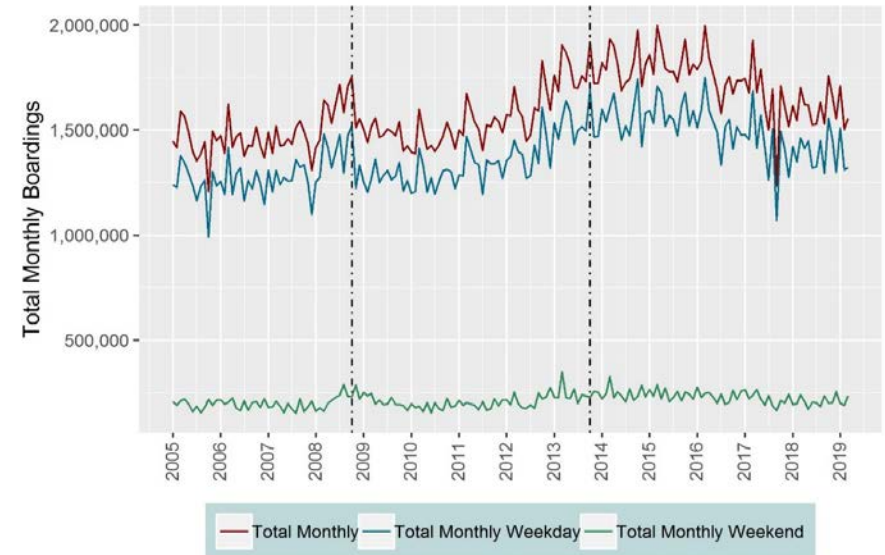
Develop a statistical model to predict the ridership and revenue effects of fare policy

Data Description

Data variable	Time Period	Source
Metrorail and Metrobus Ridership	2005 - Feb 2019	DTPW
Vehicle Revenue Hours, Vehicle Revenue Miles	2005 - Sep 2018	DTPW
Service performance metrics	Oct 2013 - Sep 2018	DTPW
Historic Fares	2005 - Sep 2018	DTPW
Employment by industry	2005-2018	Bureau of Labor Statistics
TNC activity (estimate)	2005-2018	Steer

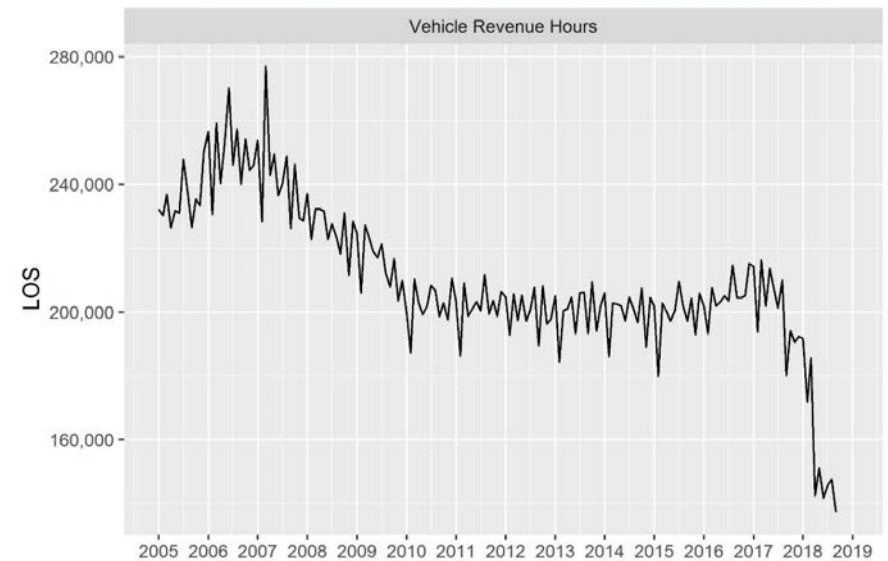
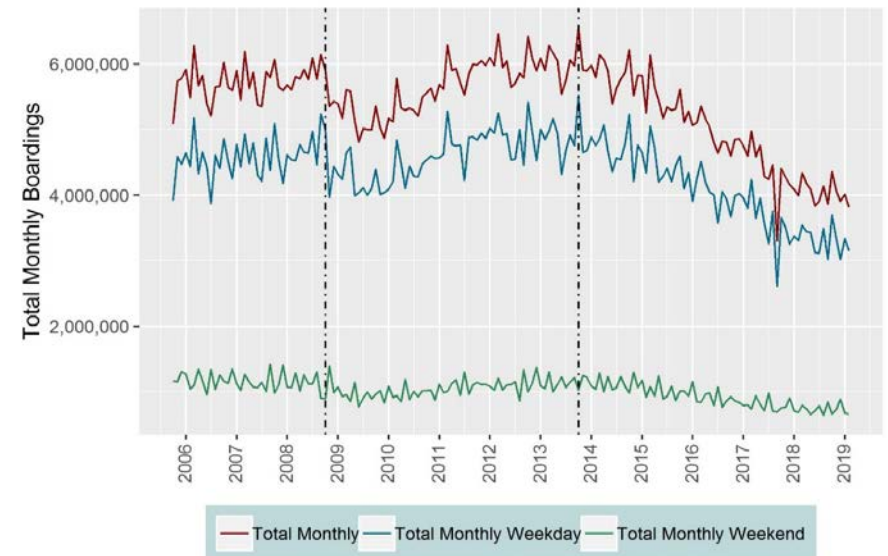
Existing Trends - *Metrorail*

- Steady increase in ridership between 2005 and 2008
- Decline in ridership following the recession
- Ridership recovers back to pre-recession levels in 2012
- Stronger growth following the recession between 2012 and 2013
- Decline in ridership after 2015 but appears to be stabilizing from 2016 onwards



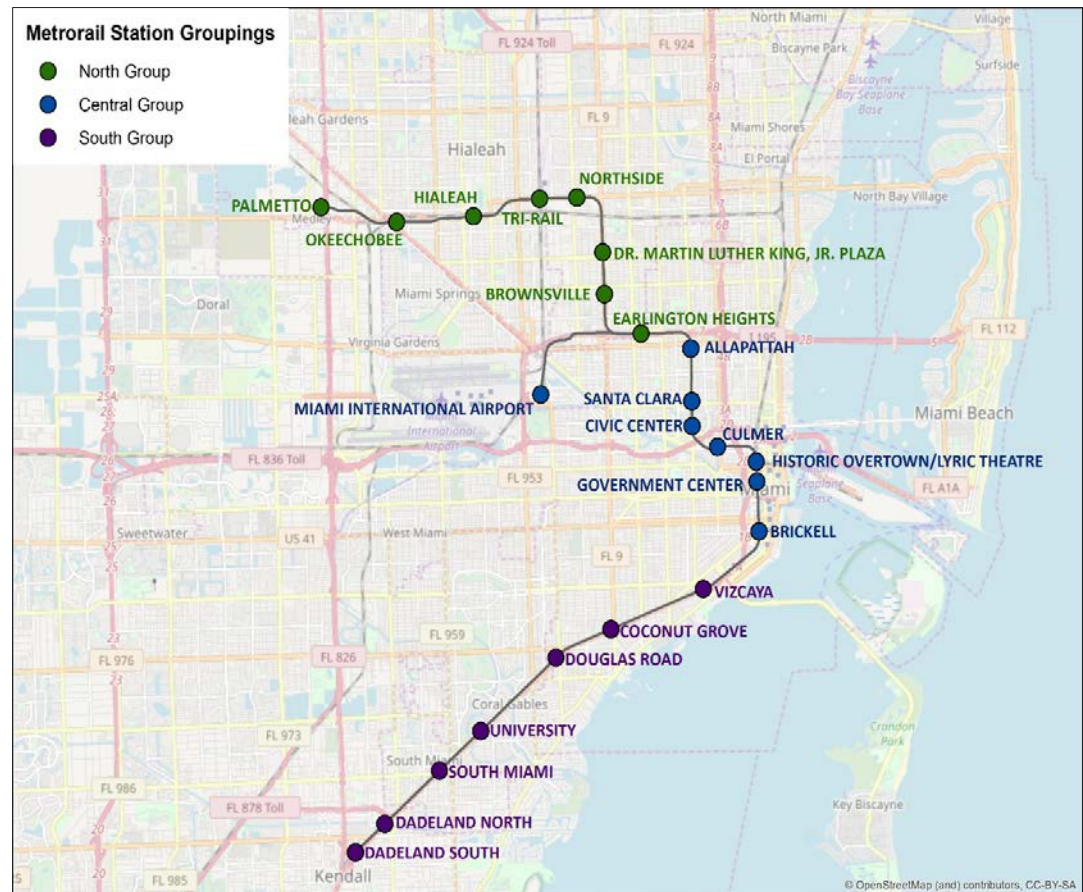
Existing Trends - *Metrobus*

- Stable but low growth between 2005 and 2008
- Compared to Metrorail, larger decline in ridership following the recession
- Ridership recovers back to pre-recession levels faster than Metrorail and continues stable but low growth
- Decline in ridership from 2013 onwards at annual decline of -7.5% per year
- Weekend ridership declined more than weekday ridership

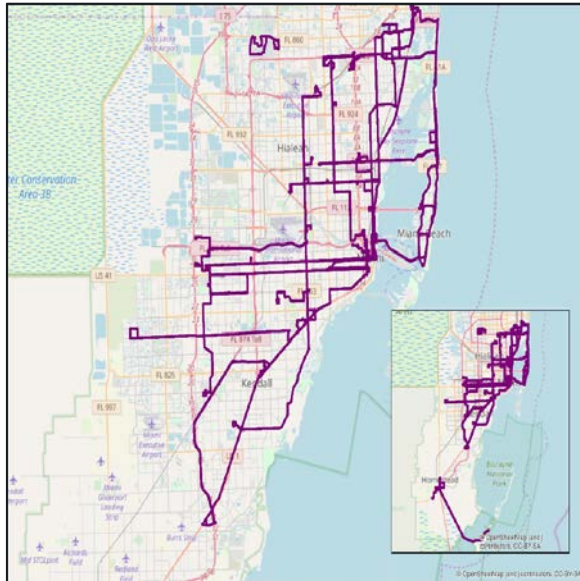


Modeling Approach - Metrorail

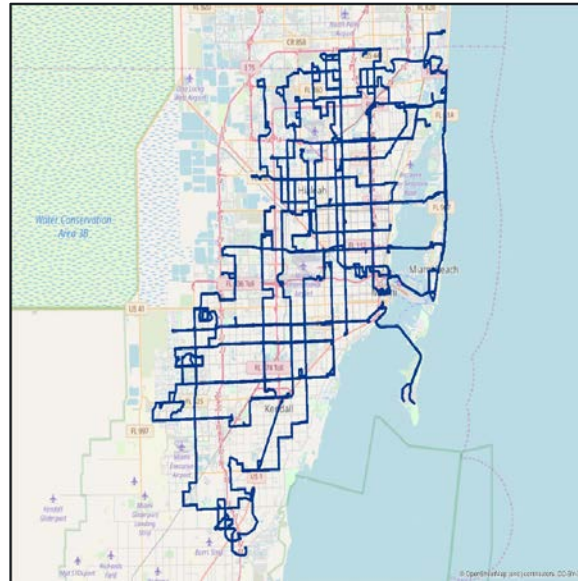
- Separate models developed for three distinct markets
- Doing so captures differences in markets by trip length, land use and income levels
- North: Mixed use, middles and lower-middle income range predominates
- Central: Denser, significant tourism component and varied income ranges
- South: Higher average incomes



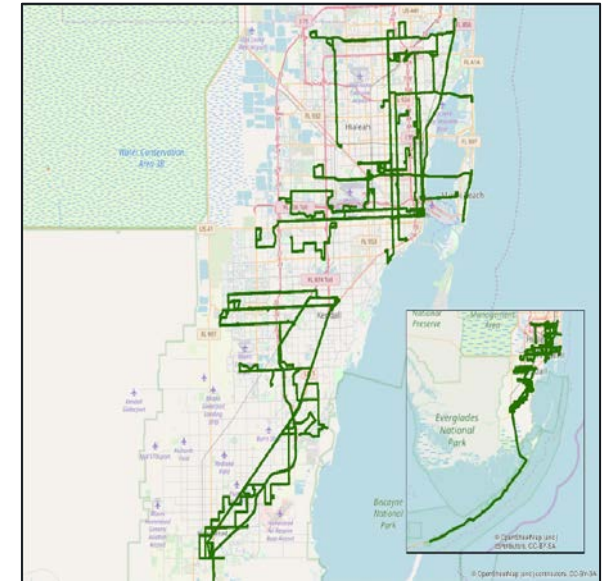
Modeling Approach - *Metrobus*



Low Growth Routes



Medium Growth Routes



High Growth Routes

- Separate models developed for groupings or *routes*
- Groupings into low, medium and high growth routes to capture different trends

Results

- **Fare elasticity** is a measure of how responsive ridership is to a change in fares
- Definition: The percent change in ridership due to a 1% change in fares
- Demand is highly inelastic: Raising fares raises revenues much more than ridership declines

	Metrorail		Metrobus	
	Weekday	Weekend	Weekday	Weekend
Fare elasticity	-0.23	-0.18	-0.32	-0.37

Changing Fares – Metrorail (2018 ridership)

Fare	Annual Weekday Ridership (000s)	Annual Weekend Ridership (000s)	Annual Ridership (000s)	Change in Annual Ridership (000s)	Change in Annual Ridership (%)	Change in Annual Revenue (%)
\$2.25	16,443	2,839	19,282	-	-	-
\$2.75	15,603	2,725	18,328	-954	-5%	16%
\$5.00	11,821	2,214	14,035	-5,247	-27%	62%
No Fare	20,209	3,348	23,556	4,274	22%	-100%

Changing Fares – Metrobus (2018 ridership)

Fare	Annual Weekday Ridership (000s)	Annual Weekend Ridership (000s)	Annual Ridership (000s)	Change in Annual Ridership (000s)	Change in Annual Ridership (%)	Change in Annual Revenue (%)
\$2.25	41,912	9,118	51,030	-	-	-
\$2.75	38,931	8,368	47,300	-3,730	-7%	7%
\$5.00	25,520	4,995	30,514	-20,516	-40%	33%
No Fare	55,264	12,477	67,741	16,711	32%	-100%

Peak/Off-Peak Pricing – Metrorail (2018 ridership)

Peak Fare	Off Peak Fare	Annual Ridership (000s)	Change in Annual Ridership (000s)	Change in Annual Ridership (%)	Change in Annual Revenue
\$2.25	\$2.25	19,282		-	-
\$2.50	\$2.50	18,863	-420	-2%	7.2%
\$2.85	\$1.25	19,867	585	3%	No change

Peak elasticity is -0.15 and Off Peak elasticity is -0.35 based on study of other comparable rail systems

Zone Based Pricing – Metrorail (2018 ridership)

Fare	Trip Types	Annual Ridership (000s)	Change in Annual Ridership (000s)	Change in Annual Ridership (%)	Change in Revenue
\$2.25	Short Distance Trips	12,053			
\$2.25	Long Distance Trips	7,230			
	Total Metrorail	19,282			
<i>Increasing Fares on Long Distance Trips</i>					
\$2.25	Short Distance Trips	12,053	No change	No change	No change
\$3.00	Long Distance Trips	6,971	-259	-4%	29%
	Total Metrorail	19,024	-259	-1%	11%

Long distance trips “approximated” by trips in the South grouping

Conclusion

- Transit fare responsiveness is *relatively inelastic* on Miami-Dade system
- Price response is different based on markets and are linked to alternative modes available and income of the residents
- Pricing policy can be used effectively to meet several objectives including
 - increasing revenue
 - increasing cost recovery
 - increasing both revenue and ridership using peak and off-peak pricing