

The background is a vibrant, stylized illustration of a city street. It features a variety of transportation modes: a white and red high-speed train on an elevated track, a green bus, a red bus, a blue car, a pink bicycle, a red car, and a purple car. Pedestrians are shown in various activities: walking, pushing a green stroller, walking a brown dog, and talking in groups. The scene is set against a backdrop of colorful buildings in shades of orange, blue, and green, with a bridge visible in the distance. The overall style is flat and modern.

Emerging Modes: Evidence from a National Stated Choice Experiment

OMUG Meeting - October 10, 2019

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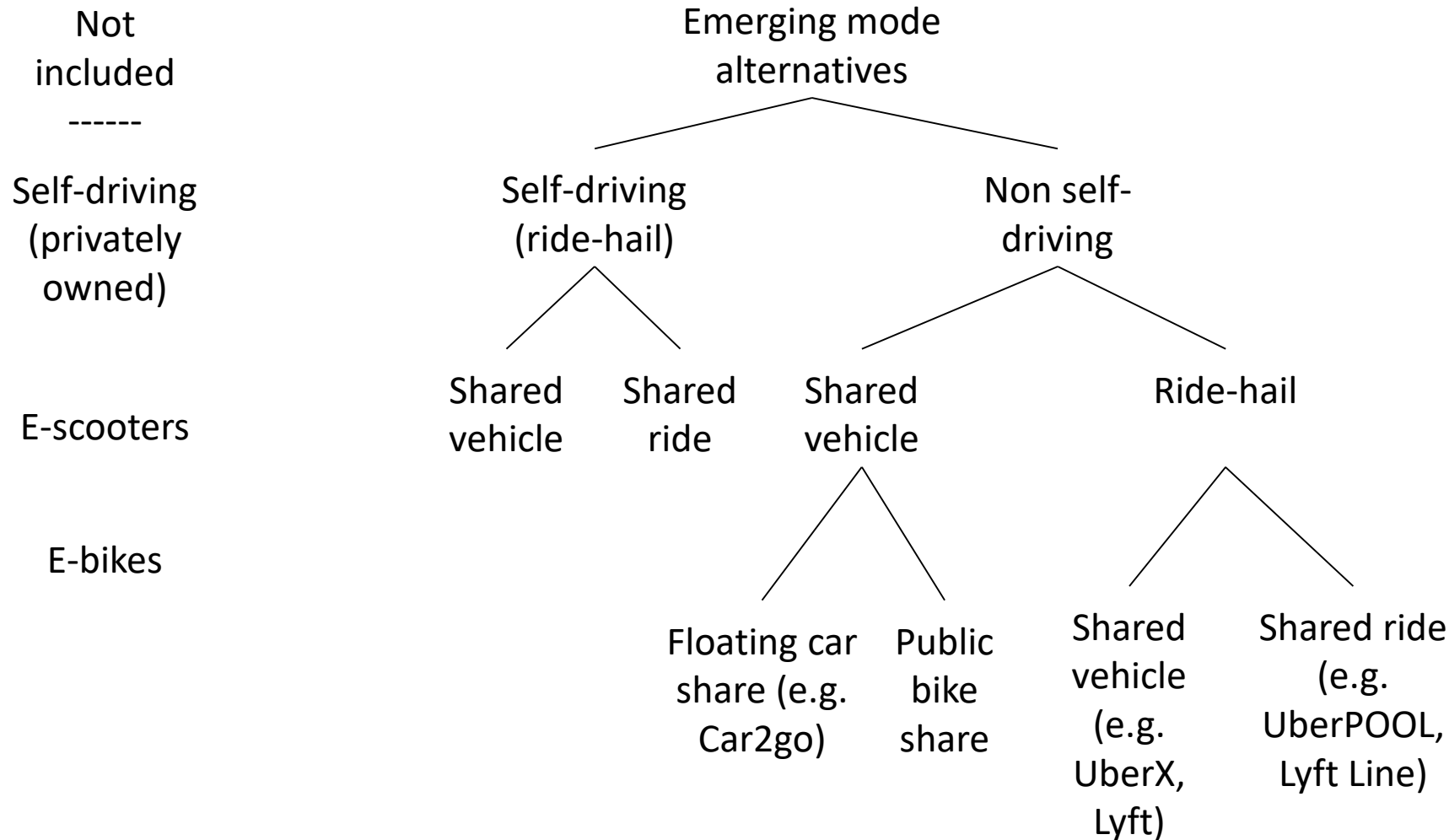
Spy shot of AV prototype



Today's Focus

1. Are emerging options MORE compelling than existing modes? Should we expect an increase in travel even if travel time + out of pocket costs stay the same?
2. WHO, WHERE, and WHEN will people switch to emerging modes?
3. What is the EQUITY potential of these modes?

Emerging modes



Data Approach

- Supply characteristics
 - Modes in wide operation (car/bike share, ride-hail): scan of market rates
 - Self-driving options: literature review
- Demand response: stated choice survey
 - National (Top 50 UZAs)
 - Adaptive (trip attributes adjusted to RP trip & UAZ context via NHTS)
 - Web-based
 - HBW & HBNW trips only (all FROM home)

SC Survey implementation

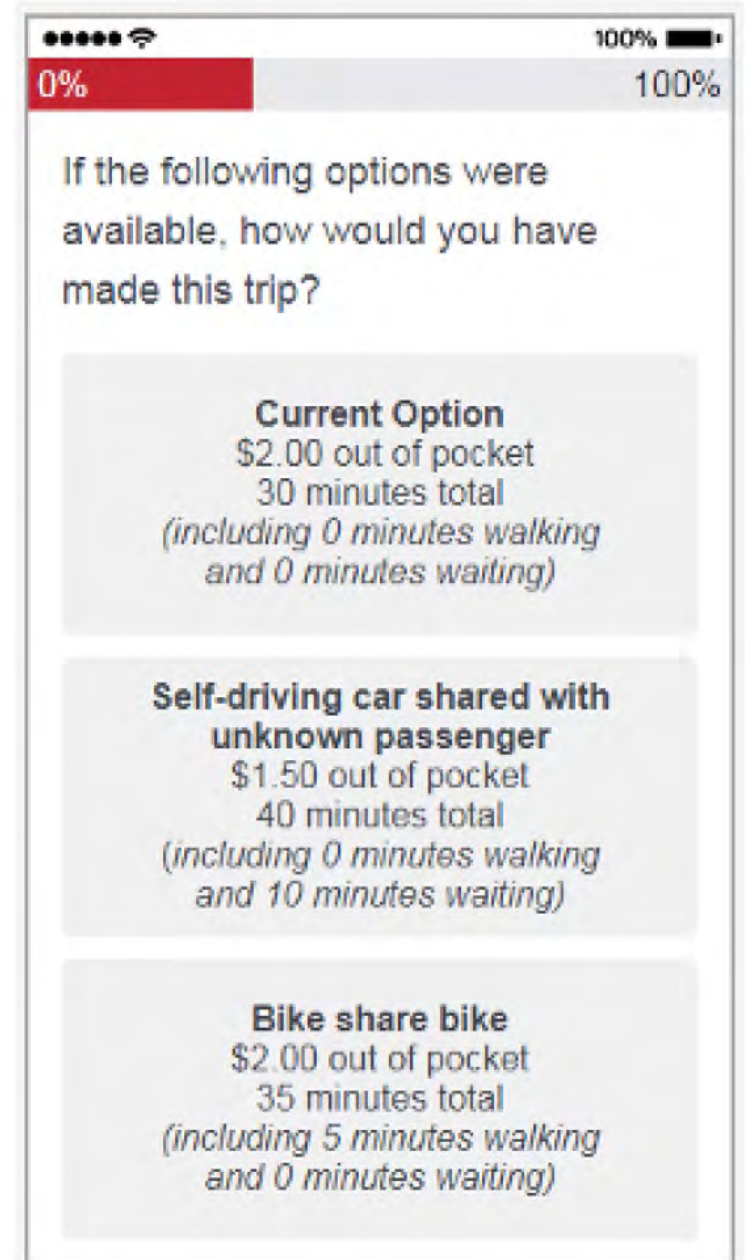
- Qualtrics/Python
- smartphone option
- Top 50 UZAs (email + mTurk)

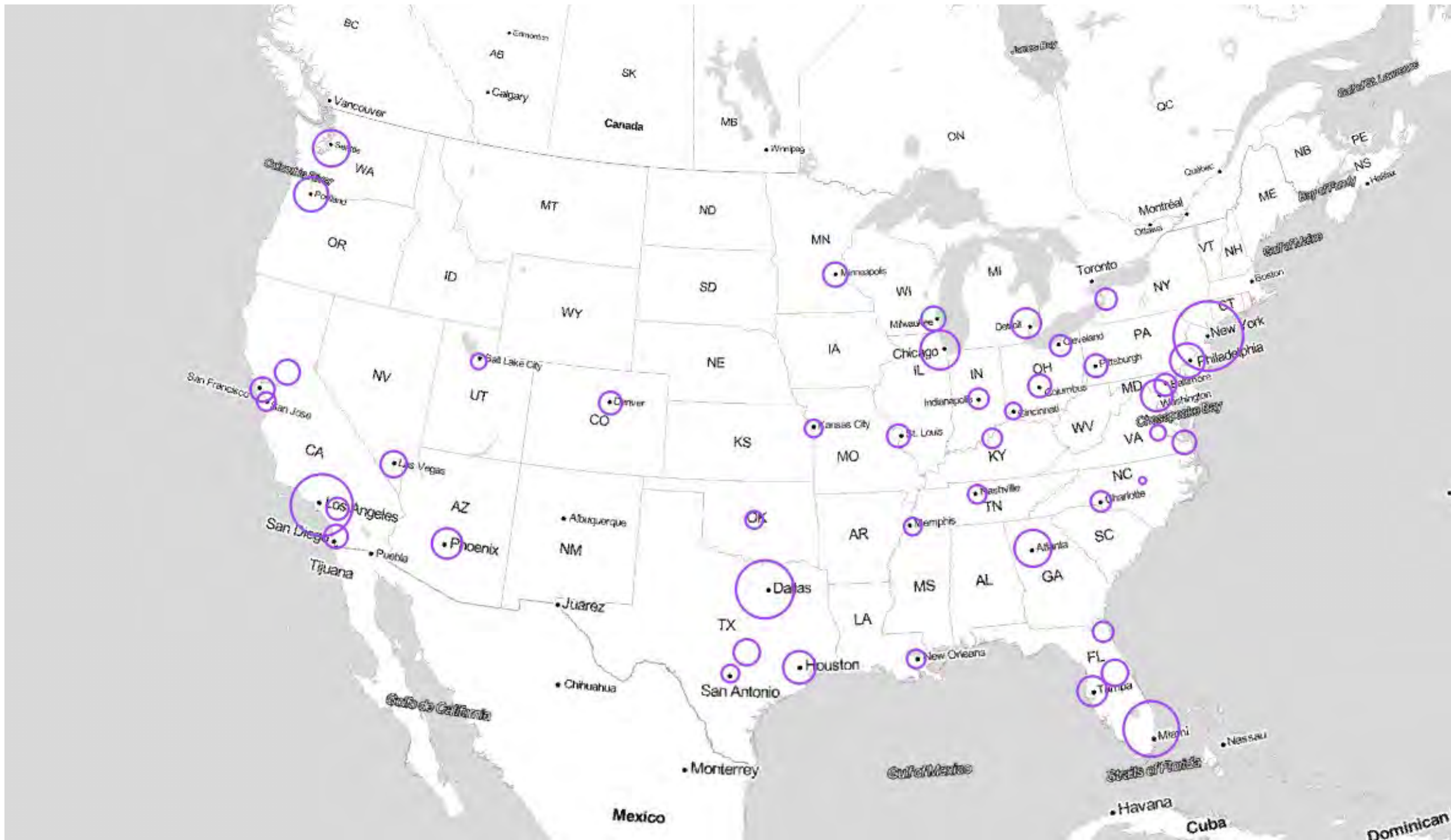
If the following options were available, how would you have made this trip?

Current Option
\$2.00 out of pocket
30 minutes total
*(including 0 minutes walking
and 0 minutes waiting)*

**Self-driving car shared
with unknown
passenger**
\$1.50 out of pocket
40 minutes total
*(including 0 minutes
walking
and 10 minutes waiting)*

Bike share bike
\$2.00 out of pocket
35 minutes total
*(including 5 minutes
walking
and 0 minutes waiting)*

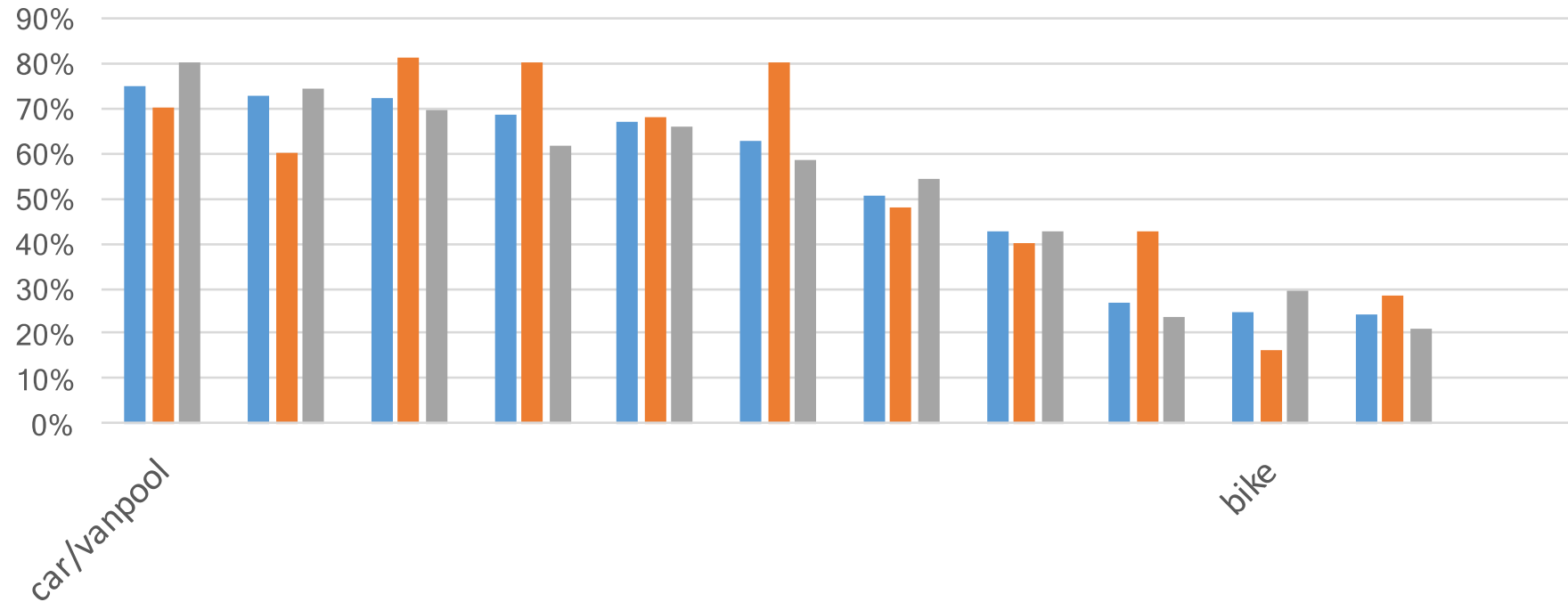




Supply characteristics

	Self-driving alternatives		Non-self-driving alternatives			
Attribute	Self-driving	Self-driving (shared ride)	Ride-hail	Ride-hail (shared ride)	Car Share	Bike Share
In-vehicle travel time (mins)	revealed driving time or NHTS-based estimate					RP distance at assumed 10 mi/hr
Out of pocket cost (\$)	\$0.30 - \$2.00 /mi	0.5x – 0.8x Self-driving \$	\$0.80 - \$1.50 /mi + \$0.10 - 0.30/min + \$2.00 - 4.00	0.5x – 0.8x Ride-hail \$	[0.35, 0.40, 0.45, 0.50] /min + 1.00	[1.00, 2.00, 3.00] /trip
Walk time (mins)	0				NHTS city-specific model estimate	0 – 10
Wait time (mins)	2 – 10	2 – 15	2 – 10	2 – 15	0	

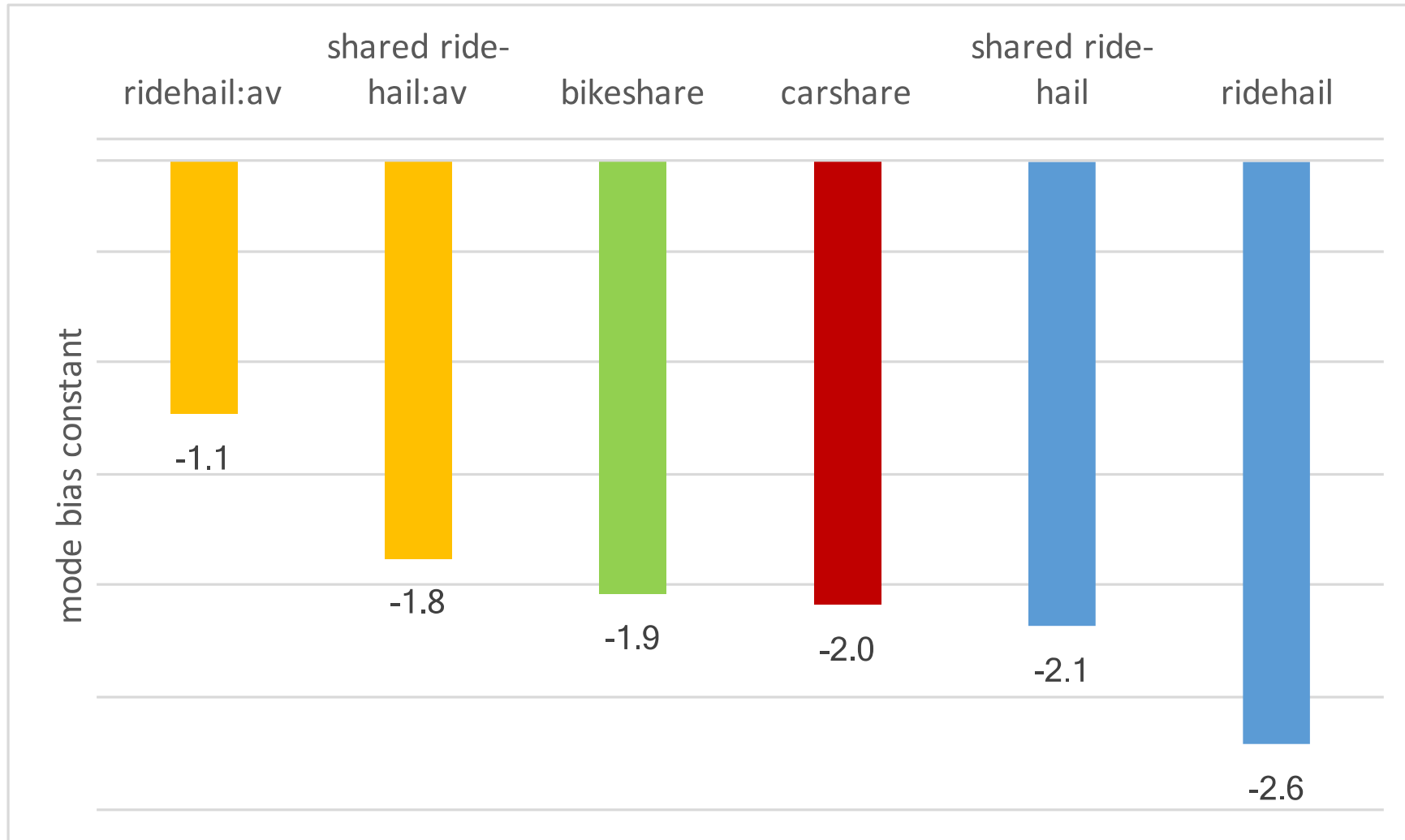
Stated switch rates *away* from current mode to an emerging mode



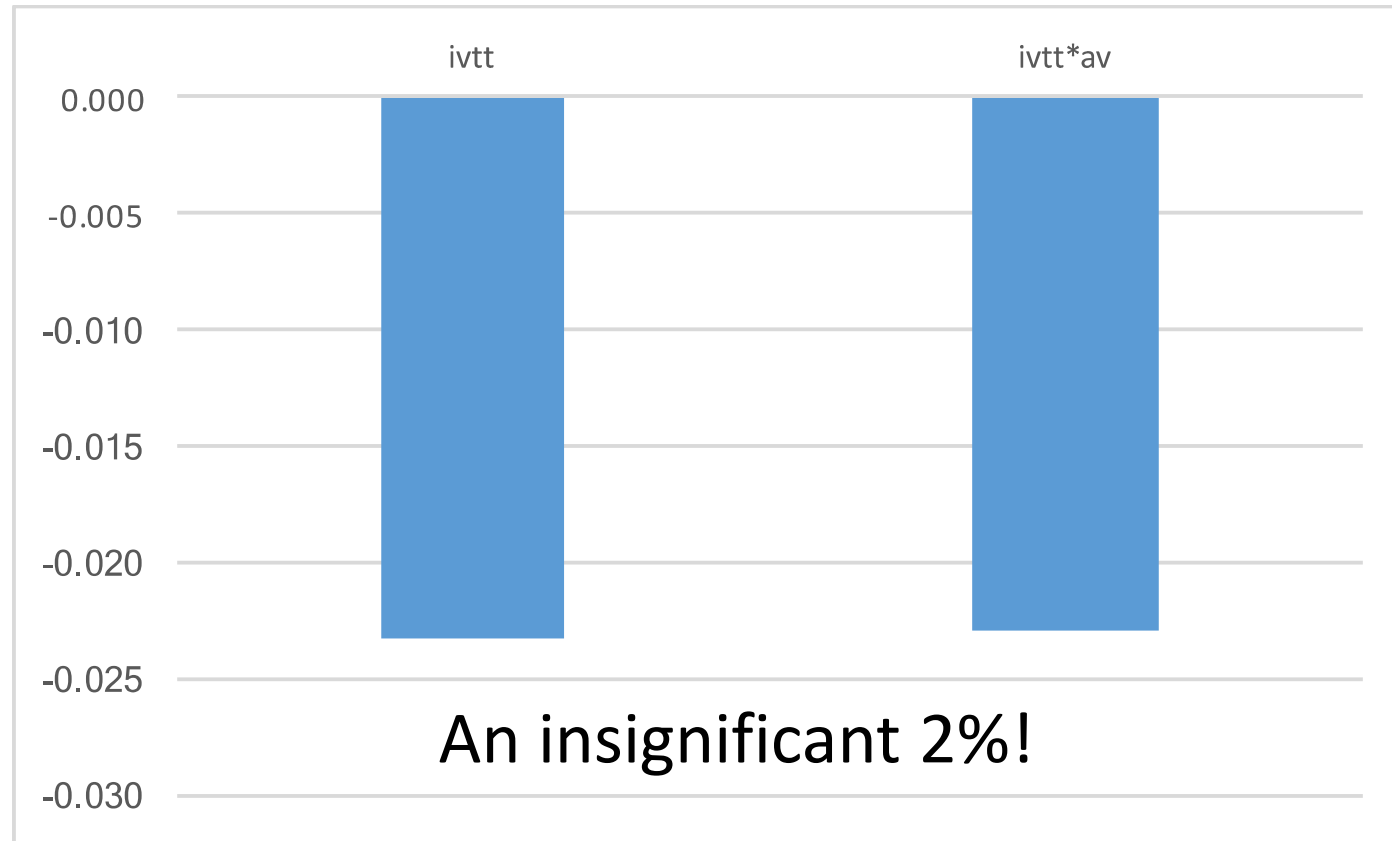
MNL model

$\text{Pr}(\text{Choice: current, 2x emerging}) = f(\text{ivtt, wait, walk, OOP cost})$

All else equal? We'll stick with conventional modes...

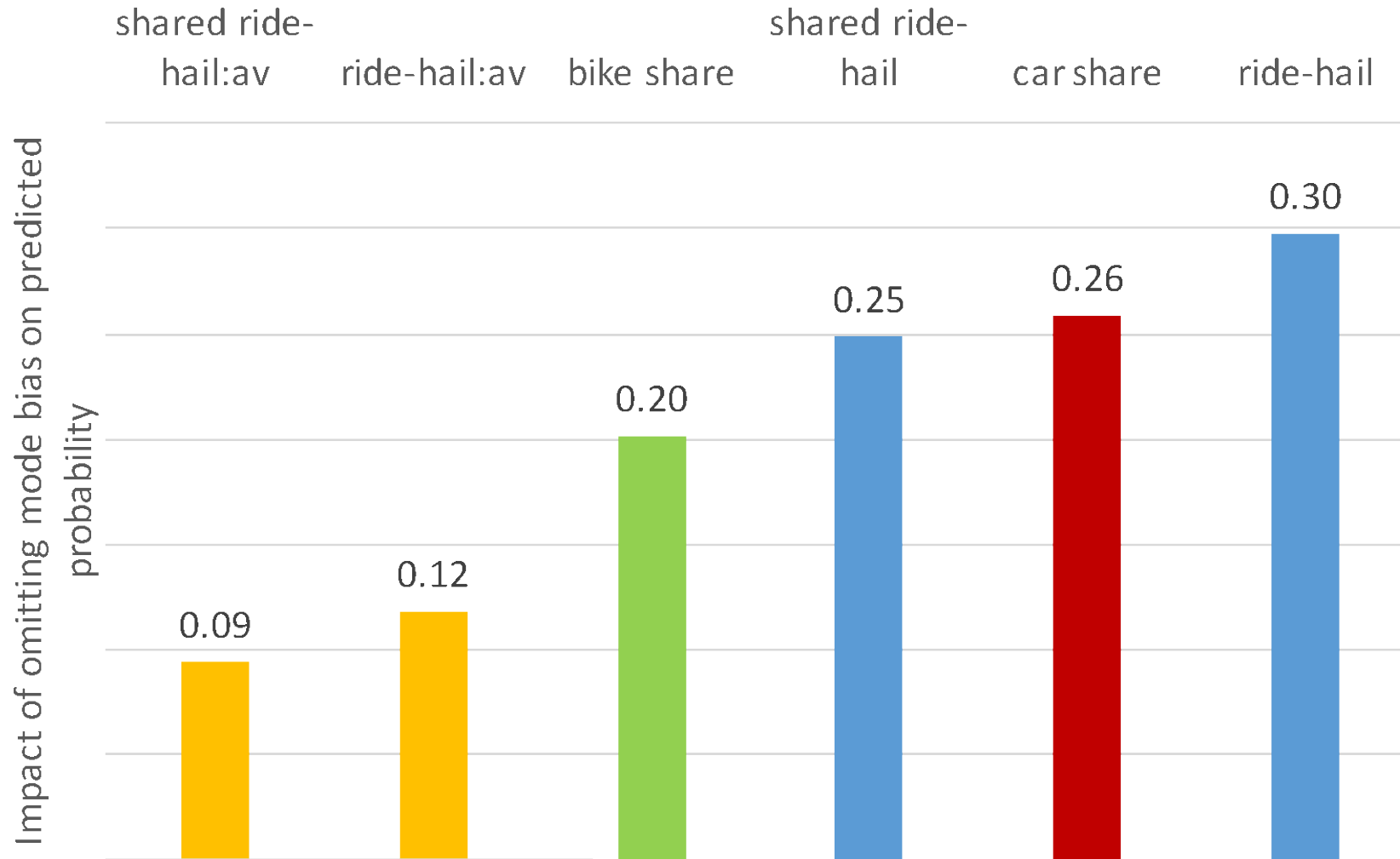


And the AV “travel time discount” is...?

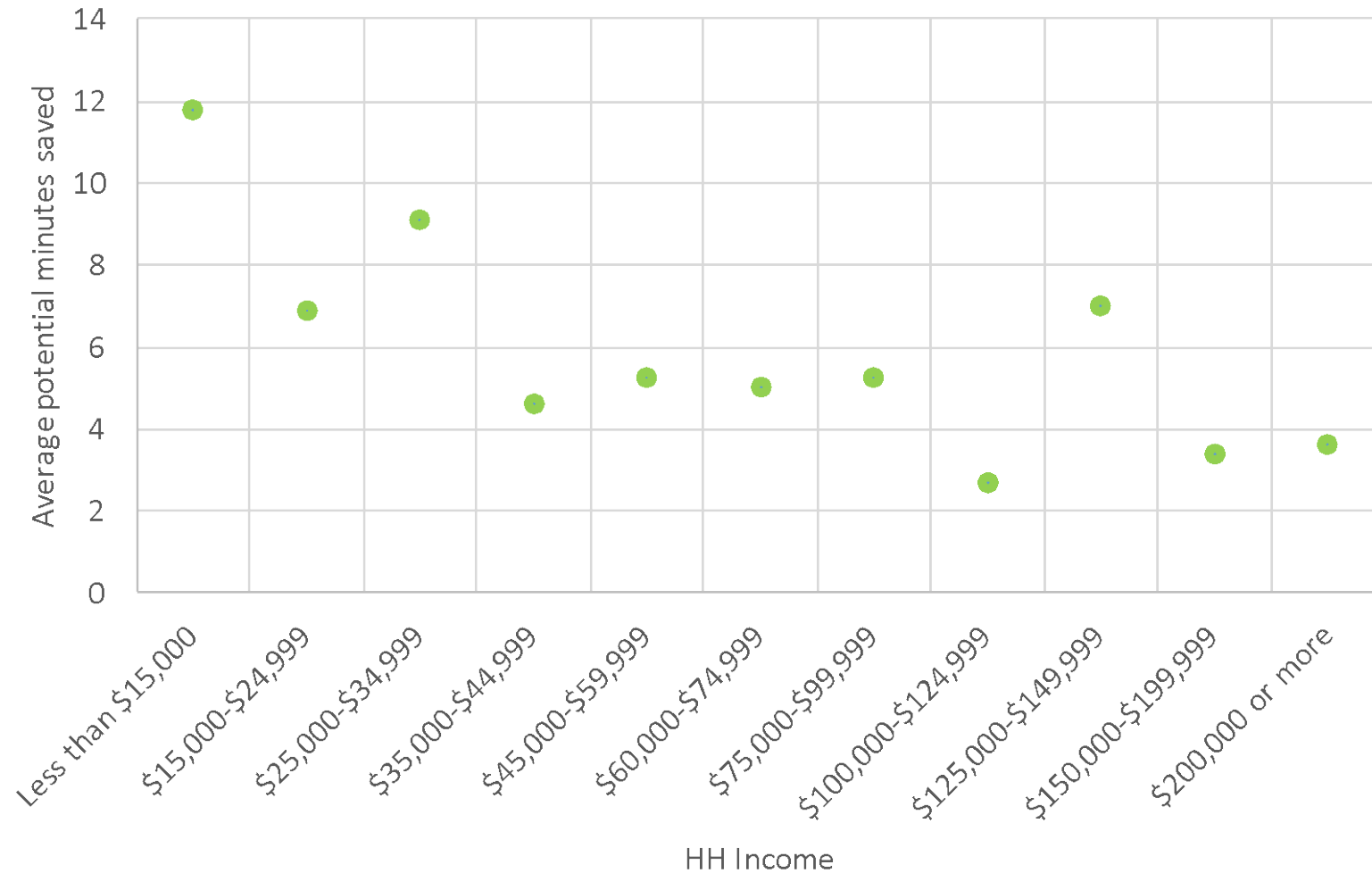


(and, yes, this held for both work and non-work trips, and for long trips)

Prediction bias if mode-specific prefs ignored



Is there equity potential here?



Preliminary Conclusions & Implications

- Emerging modes generally NOT preferred at this time, all else equal (technology skepticism?); will need to be considerably cheaper/faster than existing options
 - Failure to incorporate mode-specific preferences in models could lead to significant over-prediction of emerging modes studied
- AV tech may lower demand for ride sharing vs. ride hail w/ driver
- Inertia varies by current travel mode, with personal vehicle (incl. bicycle) users most reluctant to shift in short-run (did not examine longer-term decisions)
- NO evidence for significant shift in value of travel time for AV ride hail
- If self-driving technology declines in cost as much as theoretical research suggests, changes in urban travel patterns could be substantial and particularly challenging for bike share and public transit markets

Further resources



- <https://nitc.trec.pdx.edu/research/project/881/>
- <https://visioneval.org/>
- <https://github.com/cities/VETravelDemand>

If you'd like to see the web survey instrument:

https://portlandstate.qualtrics.com/jfe/form/SV_2uwDJ3vPn7wc0iV?source=test