Trends in Travel Behavior and Transit Ridership

CUTR Webinar

Thursday, March 29, 2018

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Outline

- What is going on with travel
- Trends and underlying causes of transit ridership decline
- Implications going forward

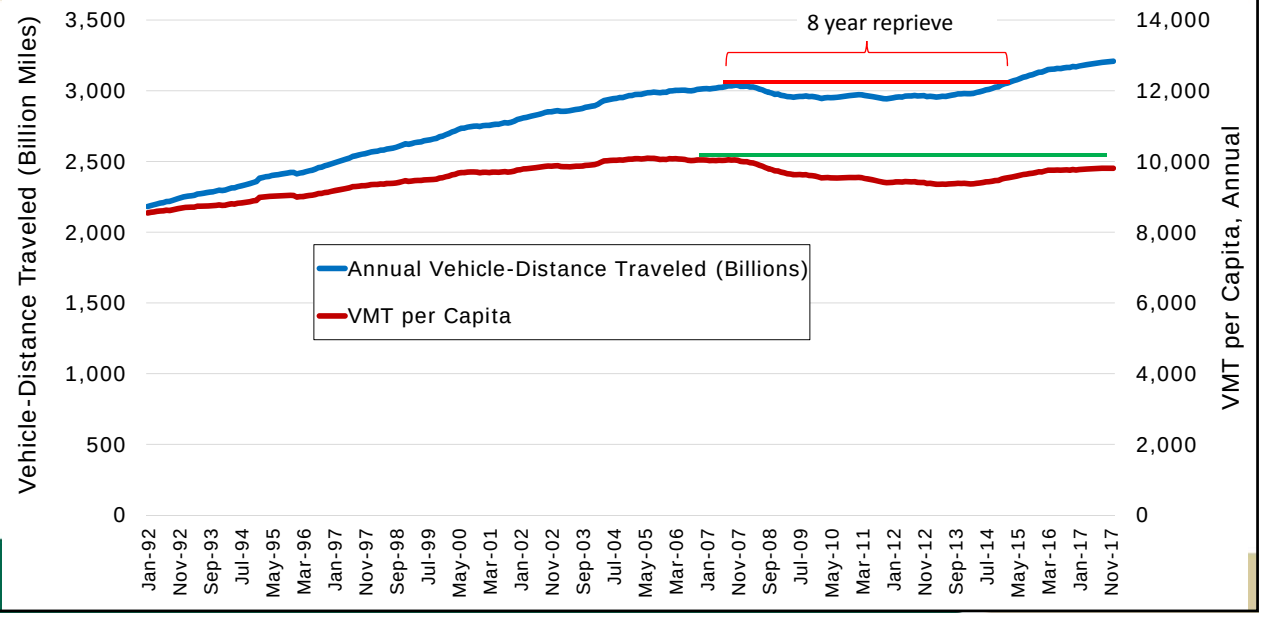
U.S. Context and Travel Trends

As of March 27, 2018

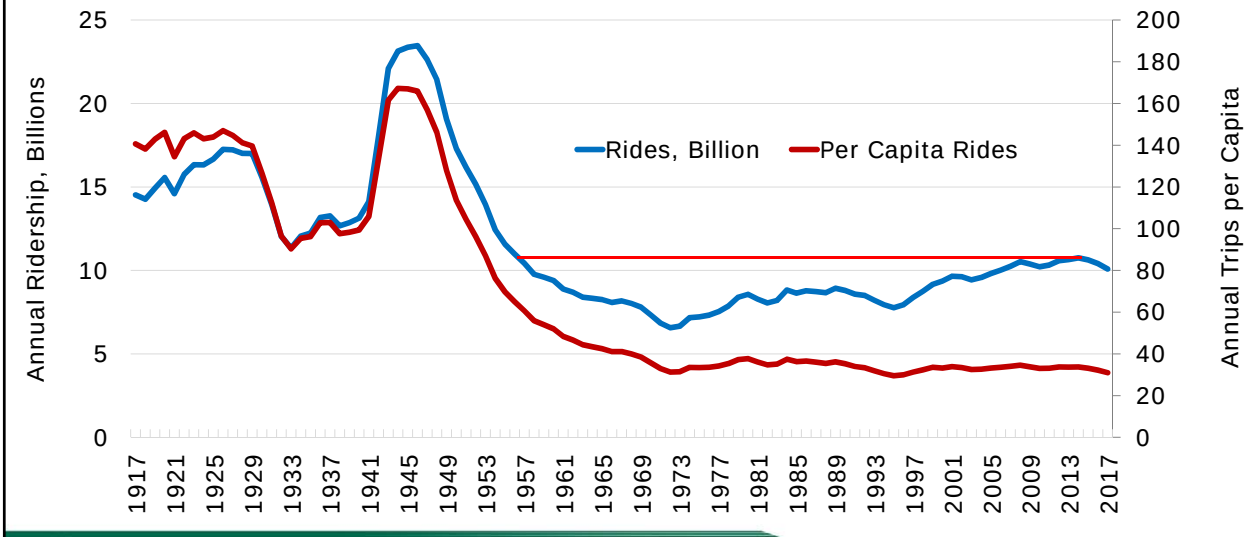
	2015/2014	2016/2015	2017/2016 YTD	Months	Source
U.S. Population	0.8%	0.5%	**0.7%**	-	Census
Total Employment	1.7%	1.7%	**1.3%**	12	BLS
Real GDP	2.9%	1.5%	**2.3%**	12	BEA (1st est.)
Gas Price	-29.3%	-14.8%	**15.1%**	12	EIA
Registered Cars and Light Trucks	2.1%	1.5%	**3.0%**	12 proj.	Hedges Co.
Light Vehicle Sales	5.8%	0.1%	**-1.8%**	12	BEA
Count of Zero-Vehicle Households	-1.0%	-1.9%			Census
VMT	2.3%	2.4%	**1.2%**	12	FHWA
Public Transit Ridership	-1.0% to -2.2%	-2.3% to -1.6%	**-3.1, -2.6%**	9, 12	APTA and NTD
Amtrak Ridership (FY)	-0.3%	1.9%	**1.9%**	12	Amtrak
Airline Passengers	5.3%	3.9%	**3.5%**	11	USDOT, BTS

National VMT and VMT per Capita Trend,

Moving 12-Month Total, 1992–2016



U.S. Transit Ridership and Ridership per Capita



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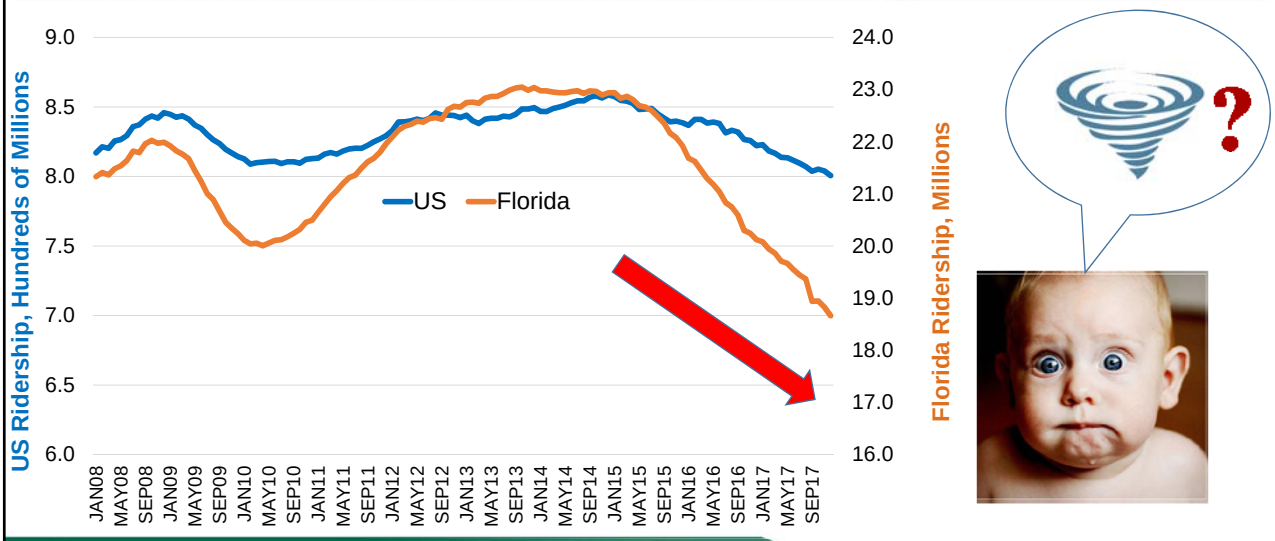
U.S. Transit Ridership, Fixed Route, 12-Month Rolling Average



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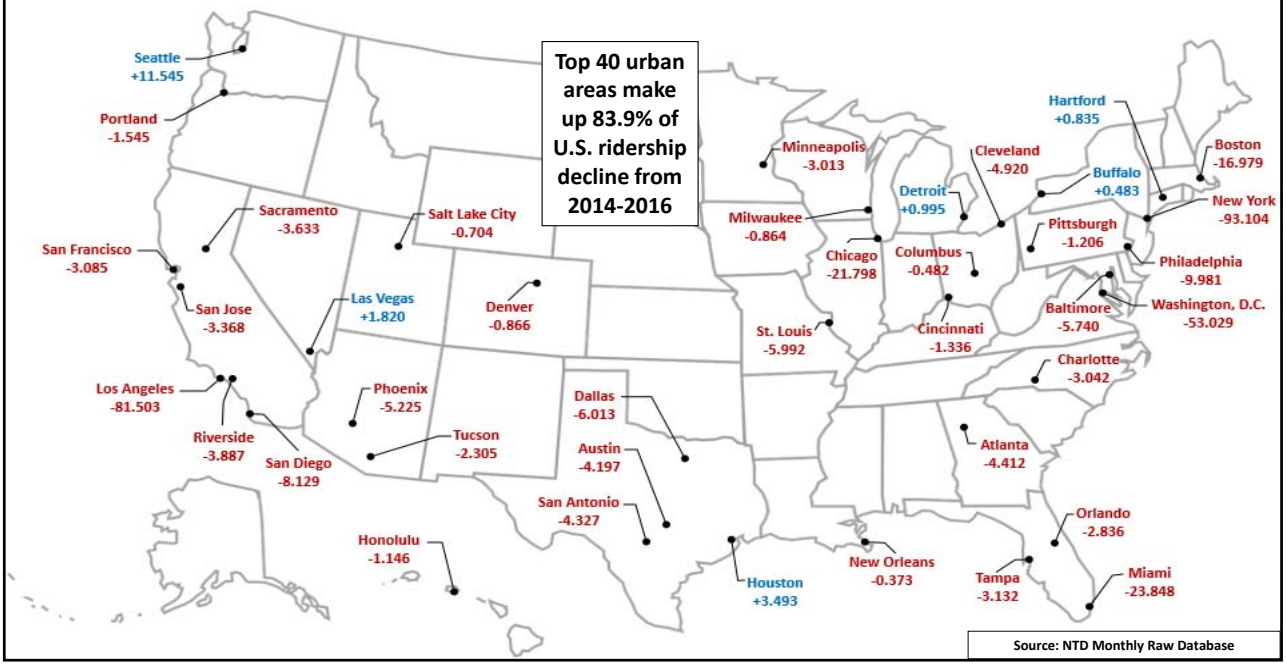
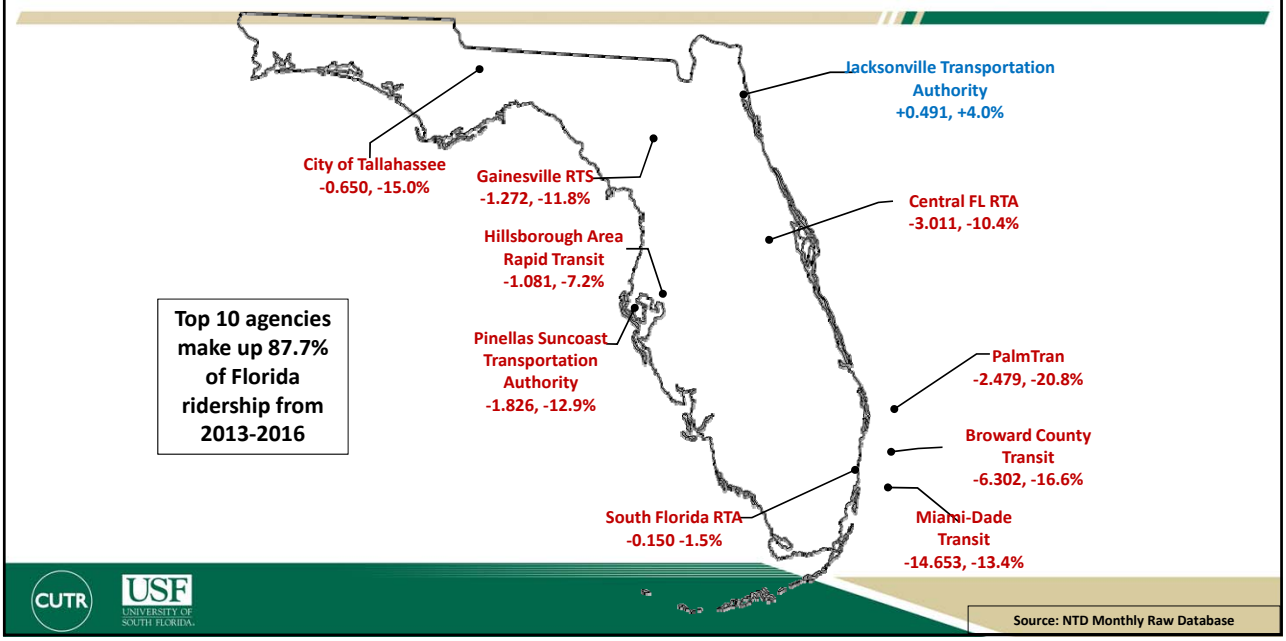
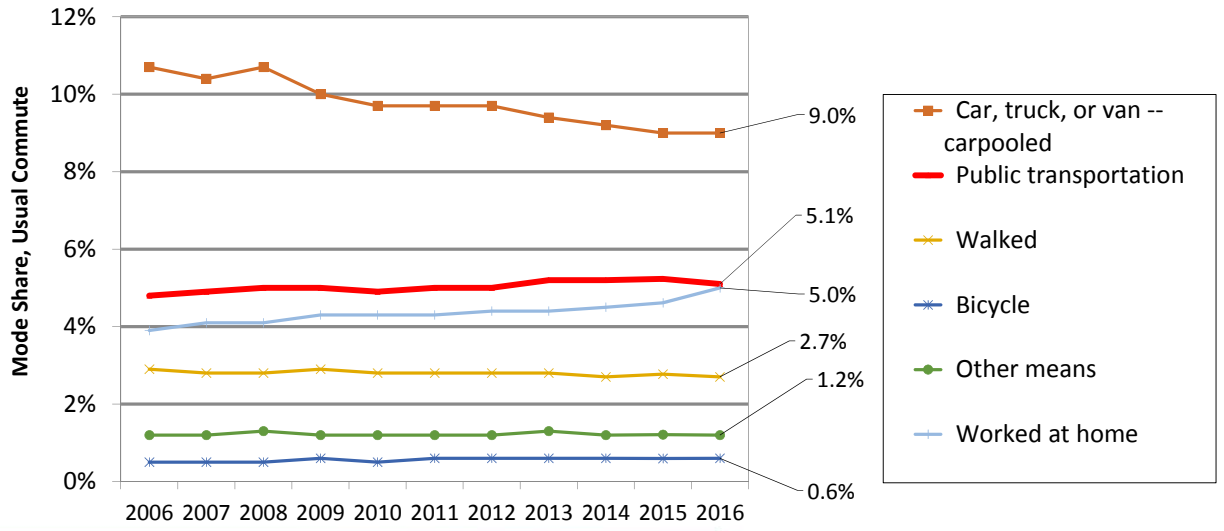
Top 40 UZAs by 2016 Transit Ridership, 2014-2016 Change (Millions)



Top 10 Agencies in Florida by 2016 Transit Ridership, 2013-2016 Change (Millions)



Declining Carpooling and Growing Work-at-Home Dominate Trends



Transit Ridership and Service Summary - National

			10 year trend – 2017-2007	3-year trend – 2017-2014	1 year trend – 2017-2016	Trending – Q4 2017 - Q4 2016
National		All bus	-15.2%	-11.3%	-5.1%	-3.4%
		Light rail (LR & SR)	20.7%	1.4%	-0.8%	-3.6%
		Commuter rail	5.6%	-1.3%	-1.7%	-1.3%
		Heavy rail	9.8%	-3.8%	-0.4%	1.2%
		Demand Response (DR-DT)	10.4%	-1.3%	-0.5%	0.2%
		Total	-3.4%	-7.1%	-2.8%	-1.4%
	Service miles	All bus	-3.5%	3.7%	0.5%	0.3%
		Light rail	54.9%	17.4%	6.8%	5.2%
		Commuter rail	16.5%	1.1%	0.9%	1.3%
		Heavy rail	7.8%	3.0%	1.8%	0.7%
		Demand Response	15.5%	1.2%	0.1%	0.8%
		Total	4.7%	3.2%	0.9%	0.7%

Transit Ridership and Service Summary - Florida

			10 year trend – 2017-2007	3-year trend – 2017-2014	1 year trend – 2017-2016	Trending – Q4 2017 - Q4 2016
Florida	Ridership	All bus	-18.4%	-20.5%	-7.6%	-5.6%
		Light rail	-50.0%	2.5%	-4.1%	2.7%
		Commuter rail	22.4%	-2.4%	2.0%	6.5%
		Heavy rail	15.3%	-9.4%	-6.7%	-3.8%
		Demand Response	-0.2%	6.6%	4.3%	6.4%
		Total	-15.1%	-18.6%	-7.0%	-4.9%
	Service miles	All bus	-4.6%	1.2%	-0.8%	-1.9%
		Light rail	-20.2%	2.4%	-1.7%	-16.6%
		Commuter rail	270.2%	1.9%	1.1%	7.7%
		Heavy rail	-9.0%	-7.5%	-8.9%	-18.8%
		Demand Response	9.1%	17.1%	5.8%	5.7%
		Total	0.8%	5.7%	1.0%	5.7%

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Where are We Headed?

2012-2014

Transit ridership near 60 year high

Millennials are different

We passed peak VMT

We are urbanizing and CBD's are thriving

Developers embrace transit

Strong referendum success

TNC's address first-mile/last-mile issue

2015-2017

Transit ridership loss accelerates in 3rd year of decline

Growth and migration resume historic patterns

VMT and VMT/Capita continue growth

Millennials buy cars and move to suburbs

System conditions, reliability, health care costs, etc. plague transit operators

How much will that subway cost? When will Hawaii's rail system open? How is that new streetcar doing?

TNC's can cannibalize transit ridership

2018 →

?

Why do we need transit with CAV?

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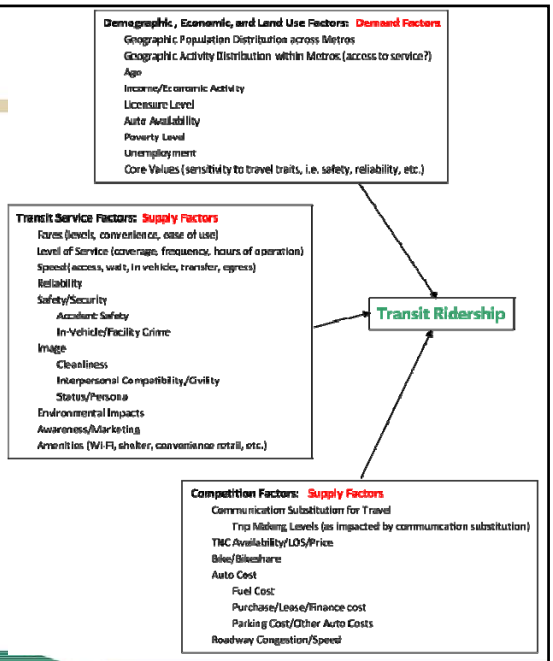
Framework for Understanding Changes in Transit Ridership

1. Demographics and Land-Use — Demand
2. Transit Service Quality — Supply
3. Competition — Supply

How much of ridership's change is explained by these factors?



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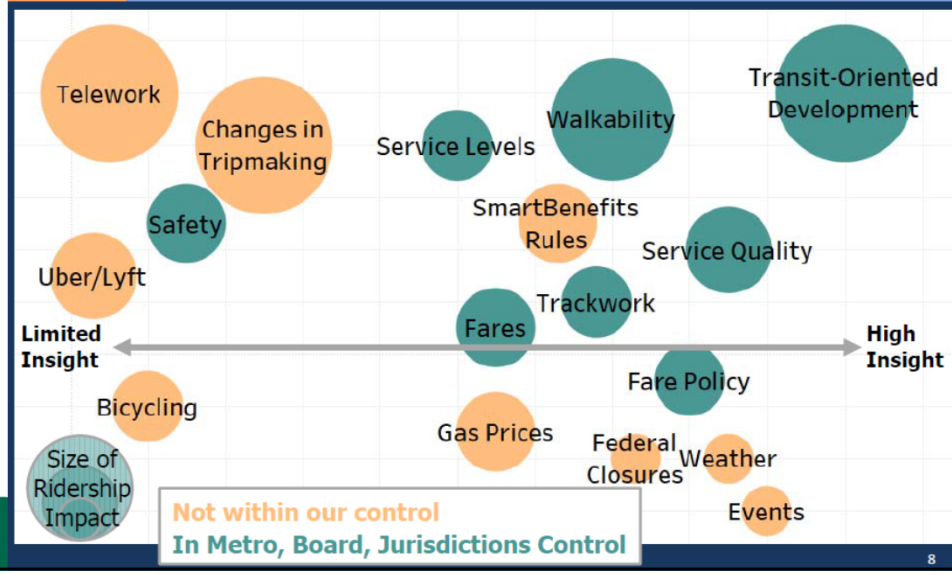
Findings from Phase 1 Factors Influencing Ridership

Framework used in Metro analysis

Considers agency control



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Framework for Understanding Changes in Transit Ridership

1. Demographics and Land-Use

- Age
- Geographic Distribution across Metros – Migration and Growth Trends, International Migration Trends
- Geographic Distribution within Metros (within proximity of service?/gentrification)
- Income
- Licensure Levels
- Auto Ownership
- Poverty Levels (SNAP enrollment)
- Unemployment
- Reduced College Student Ridership (APTA report)
- Core Values

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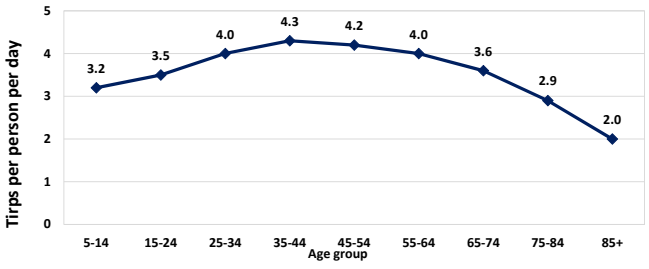
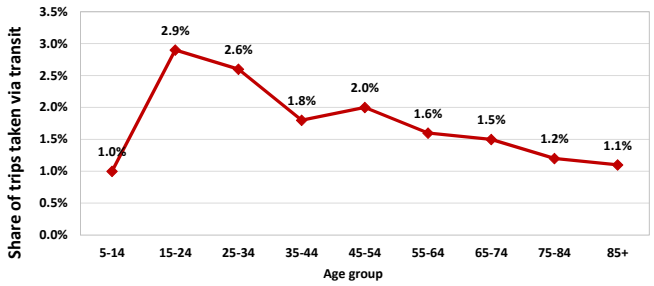
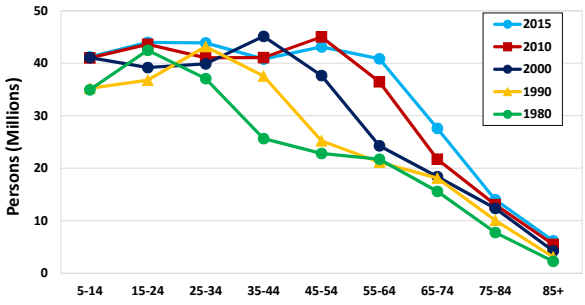
Aging Population has a Negative Impact on Ridership







Migration and Growth are Higher in Low Transit Use Areas

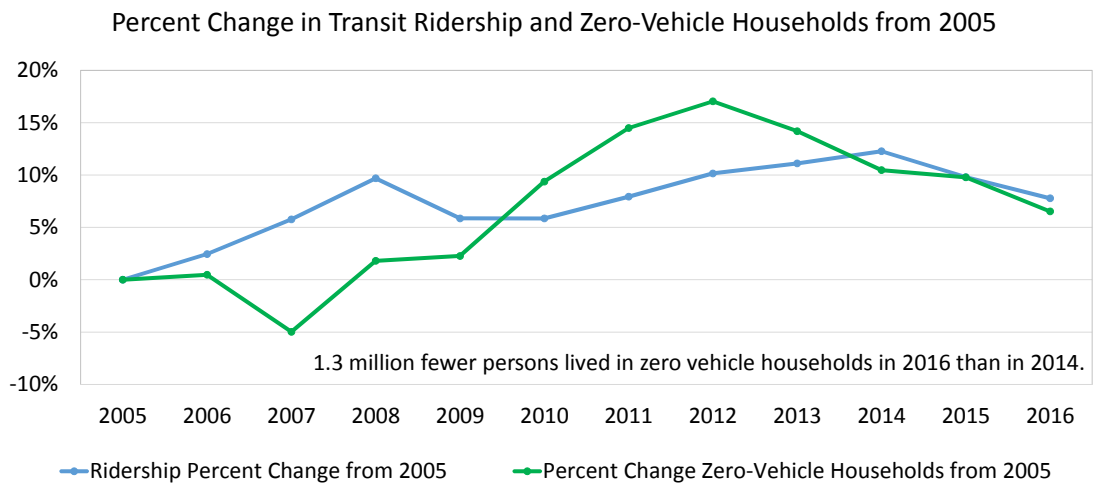
Top 10 Largest-Gaining Counties (Numeric Change): July 1, 2015 to July 1, 2016

County	Population	Numeric Change	Percent Change	Transit Commute Share 2015
Maricopa County, Arizona	4,242,997	81,360	1.95	2.3%
Harris County, Texas	4,589,928	56,587	1.25	2.8%
Clark County, Nevada	2,155,664	46,375	2.2	4.2%
King County, Washington	2,149,970	35,714	1.69	12.6%
Tarrant County, Texas	2,016,872	35,462	1.79	0.6%
Riverside County, California	2,387,741	34,849	1.48	1.4%
Bexar County, Texas	1,928,680	33,198	1.75	2.6%
Orange County, Florida	1,314,367	29,503	2.3	3.2%
Dallas County, Texas	2,574,984	29,209	1.15	2.9%
Hillsborough County, Florida	1,376,238	29,161	2.16	1.7%
Average				**3.4%**

Largest-Declining Counties or County Equivalents (Numeric Change): July 1, 2015 to July 1, 2016

County	Population	Numeric Change	Percent Change	Transit Commute Share 2015
Cook County, Illinois	5,203,499	-21,324	-0.41	18.8%
Wayne County, Michigan	1,749,366	-7,696	-0.44	2.5%
Baltimore city, Maryland	614,664	-6,738	-1.08	19.6%
Cuyahoga County, Ohio	1,249,352	-5,673	-0.45	5.1%
Suffolk County, New York	1,492,583	-5,320	-0.36	6.8%
Milwaukee County, Wisconsin	951,448	-4,866	-0.51	6.2%
Allegheny County, Pennsylvania	1,225,365	-3,933	-0.32	9.1%
San Juan County, New Mexico	115,079	-3,622	-3.05	0.3%
St. Louis City, Missouri	311,404	-3,471	-1.1	9.7%
Jefferson County, New York	114,006	-3,254	-2.78	0.0%
Average				**7.8%**

Improving Vehicle Availability Coincides with Declining Transit Ridership



Impact of Greater Auto Availability

Each Fewer Resident in a Zero-Vehicle Household is Estimated to Reduce Annual Transit Trips by 191

Sources: 2009 NHTS, U.S. Census, NTD

Change in Population (5 and up), 2014-2016	-1.094 million	-1.440 million	+5.360 million	+4.265 million
Estimated Transit Trip Change	-251 million	-55 million	+67 million	-239 million
Total Population (5 and up), 2016	19.036 million	73.889 million	221.115 million	295.004 million

Note: Fixed-route transit ridership was 10,331 million in 2014 and 9,881 million in 2016, declining 449 million trips.

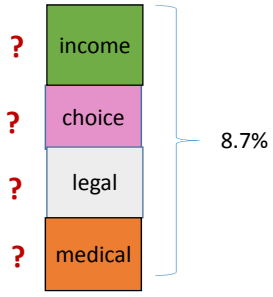
Transit trip rates based on 2009 National Household Travel Survey and Census data suggest 240 million, or 53%, of the decline is explained by changes in vehicle availability.

Zero-Vehicle Household Trend

VEHICLES AVAILABLE – U.S.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
No vehicles available	8.70%	8.80%	8.90%	9.10%	9.30%	9.20%	9.10%	9.10%	8.90%	8.70%

- Nearly half of all transit trips are made by residents of zero-vehicle households – 44.6% in 2001 NHTS, 48.1% in 2009 NHTS, 43.0% in 2017 NHTS
- We do not know what share of zero-vehicle households are zero-vehicle by choice, law, physical/medical condition, or income
- The share of zero-vehicle households ranges from 4% in Utah to 12.6% in Massachusetts then 29% in New York and 37.3% in DC



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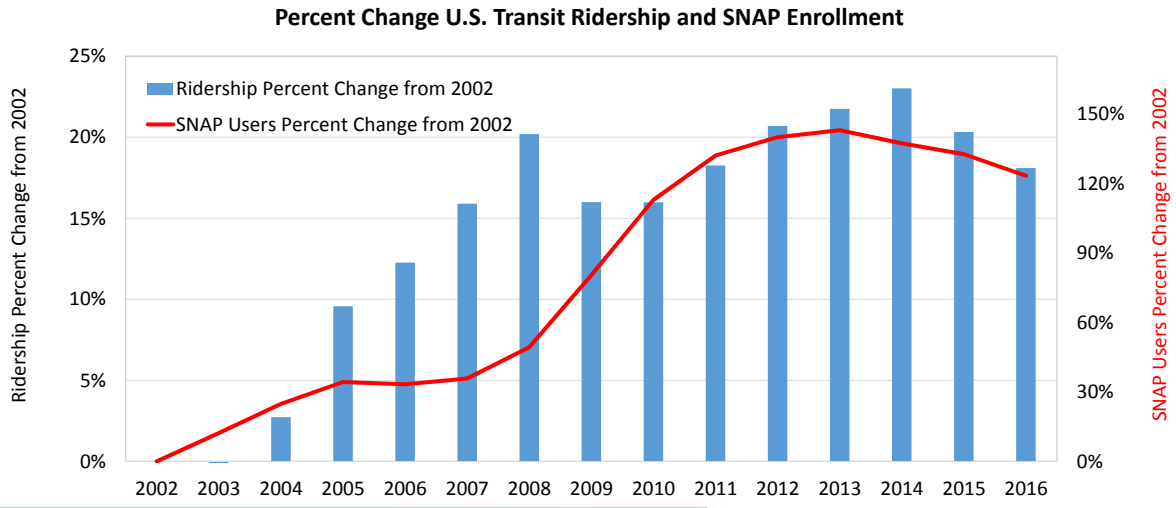
Transit Use Correlates with Need-Based Program Participation

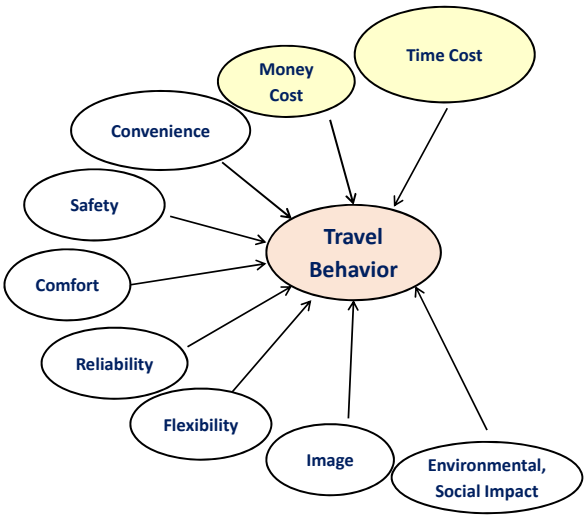


Other Hypothesized Demographic Factors

- Resumption of suburban growth trend
- International immigrants may have a different demographic profile than in the past
- International immigrants may be arriving at, or moving to, less transit intensive areas
- Undocumented immigrant drivers license authorization may be spurring auto ownership

Are Core Values that Impact Travel Changing?

- Do we value autonomy, privacy, flexibility, convenience, etc. more than in the past?

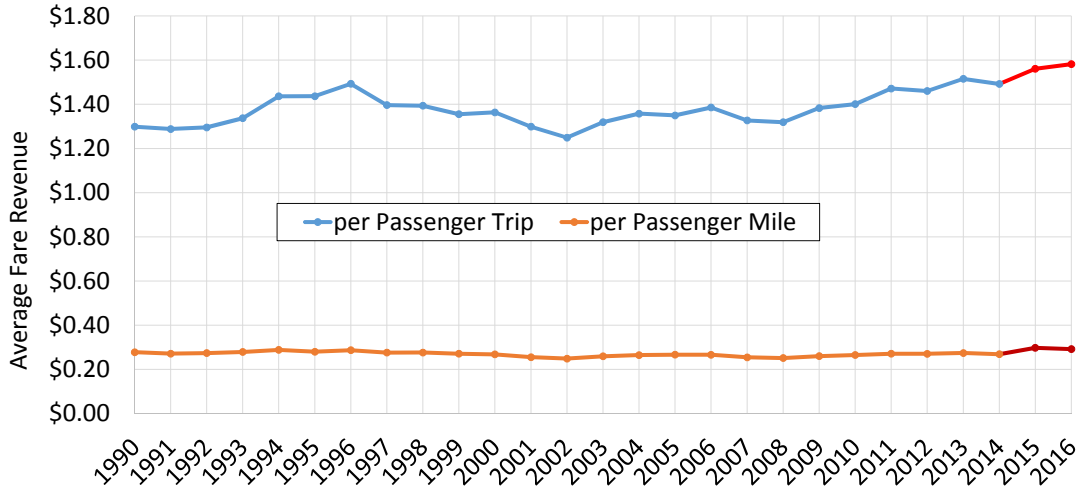


Framework for Understanding Changes in Transit Ridership

2. Transit Service Quality

- Fares (levels, convenience, ease of use)
- Level of Service (coverage, frequency, hours of operation)
- Speed (access, wait, in vehicle, transfer, egress)(tolerance for waiting in our immediate gratification culture)
- Reliability
- Safety/Security
  - Accident Safety, In-Vehicle/Facility Crime
- Image
  - Cleanliness
  - Interpersonal Compatibility - Increased homeless/mentally ill ridership (APTA report)
  - Status/Persona
- Environmental Impacts
- Awareness/Marketing (trip planning, real time information, digital fare payment, etc.)
- Amenities (Wi-Fi, shelter, convenience retail, etc.)

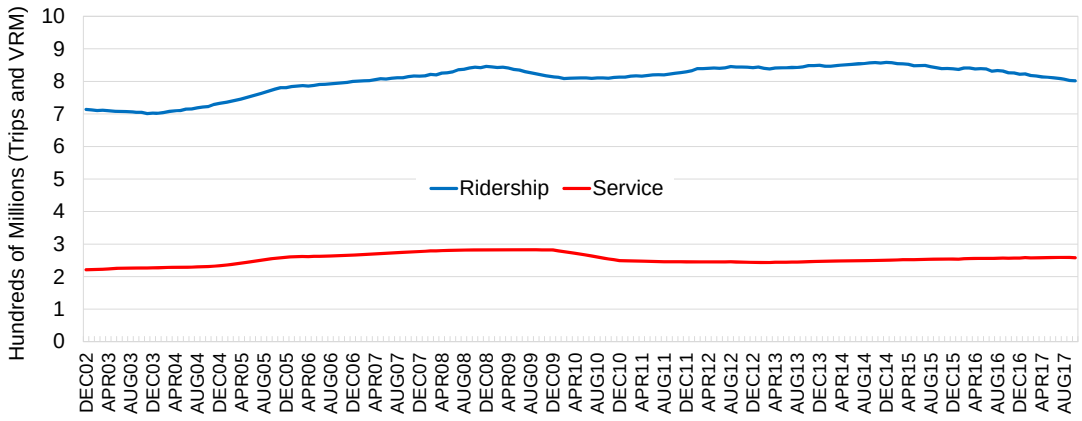
Average Fare Revenue per Passenger Trip and Passenger Mile
(2017 Dollars)



Pre 2014 data from APTA Fact Book, Post 2014 data from NTD

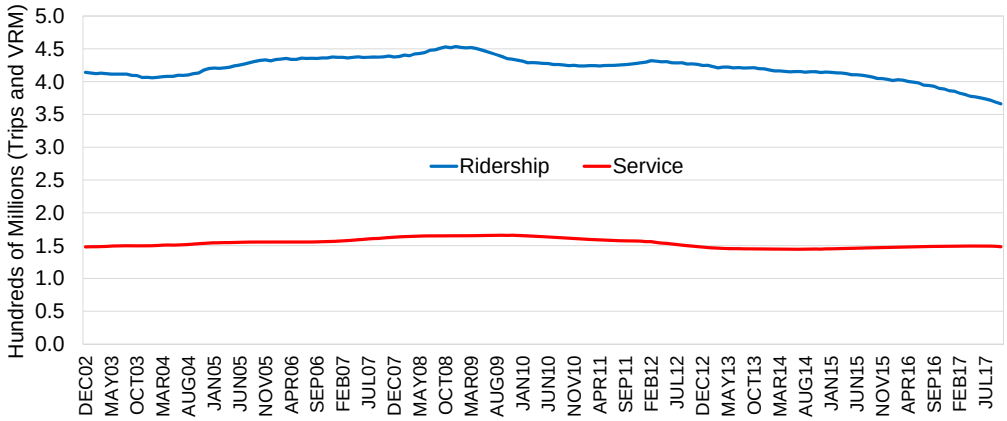
Service Supply

12-Month Rolling Average of U.S. Transit Ridership and Service, **Fixed Route**



Service Supply

12-Month Rolling Average of U.S. Transit Ridership and Service, **Metro Bus**



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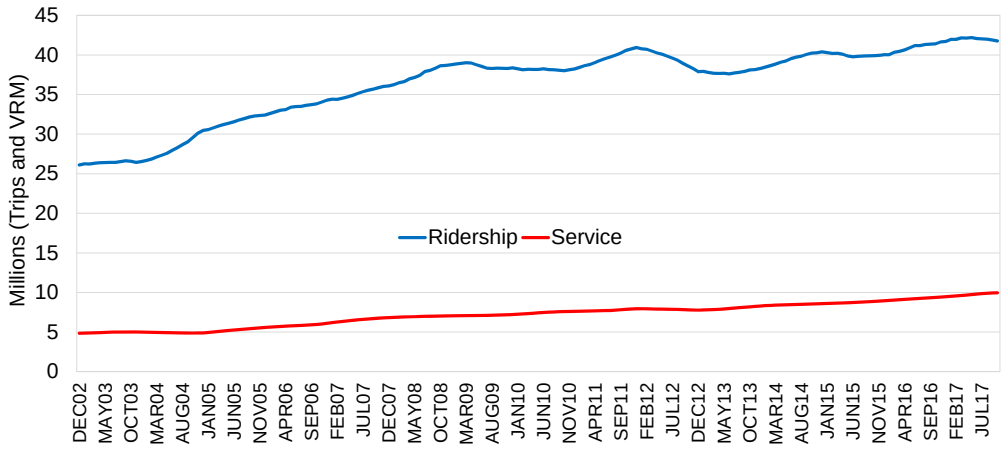
Service Supply

12-Month Rolling Average of U.S. Transit Ridership and Service, **Light Rail**



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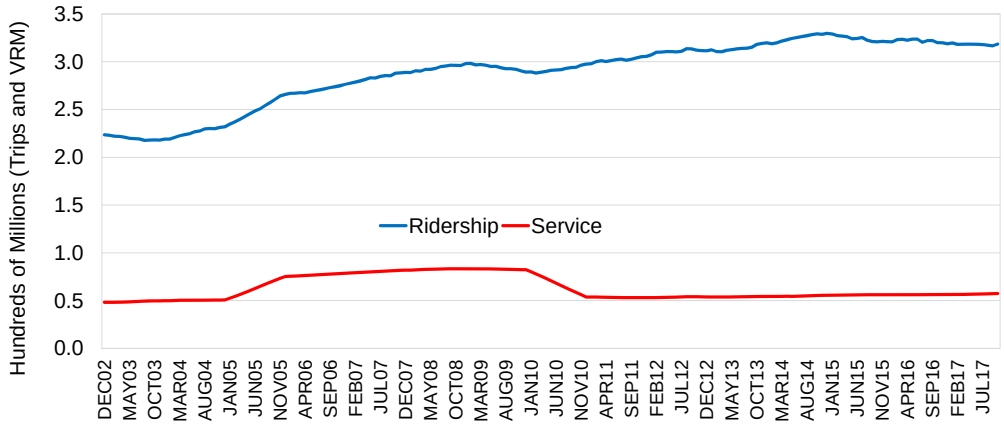
Service Supply

12-Month Rolling Average of U.S. Transit Ridership and Service, **Heavy Rail**



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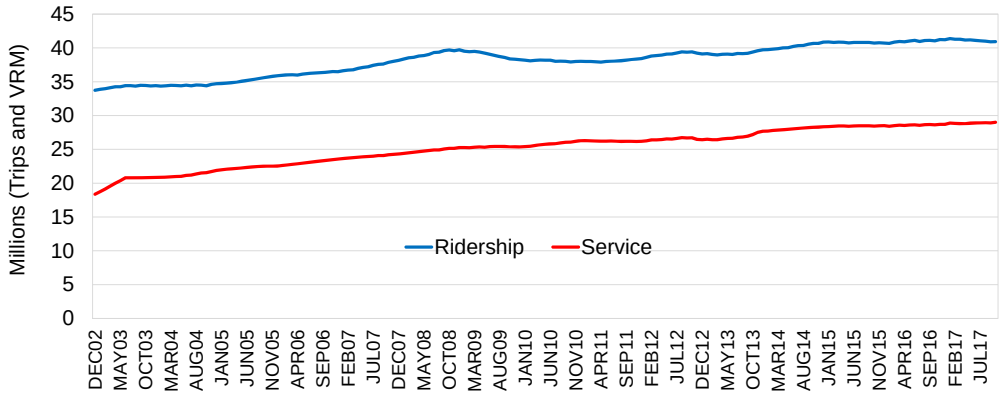
Service Supply

12-Month Rolling Average of U.S. Transit Ridership and Service, **Commuter Rail**



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Framework for Understanding Changes in Transit Ridership

3. Competition

- Communication Substitution for Travel
- Trip making levels (telecommuting, e-commerce, distant learning, online banking etc.)
- TNC availability/LOS/price
- Bike/Bikeshare
- Auto Cost
  - Fuel Cost
  - Purchase/Lease/Finance Cost
  - Parking Cost/Other Auto Costs
- Roadway Congestion/Speed

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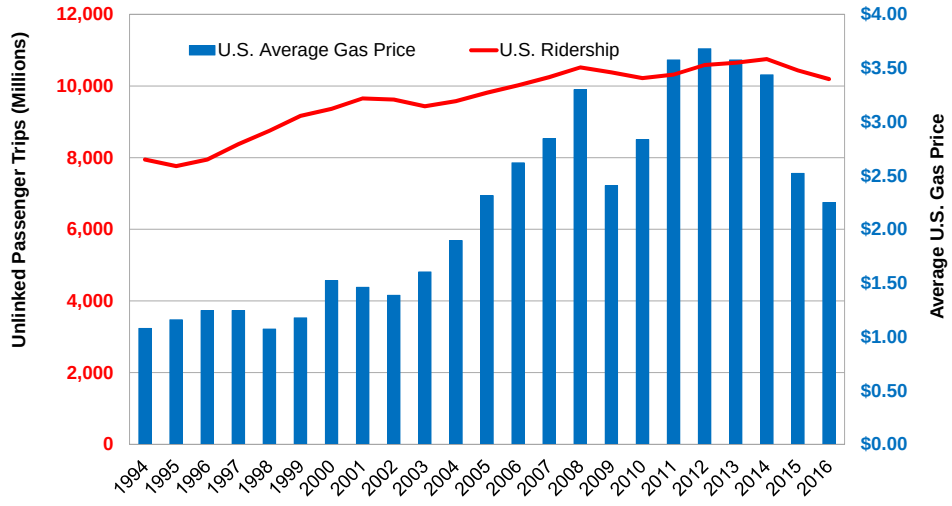
Gas Prices and Transit Ridership, 1994-2016



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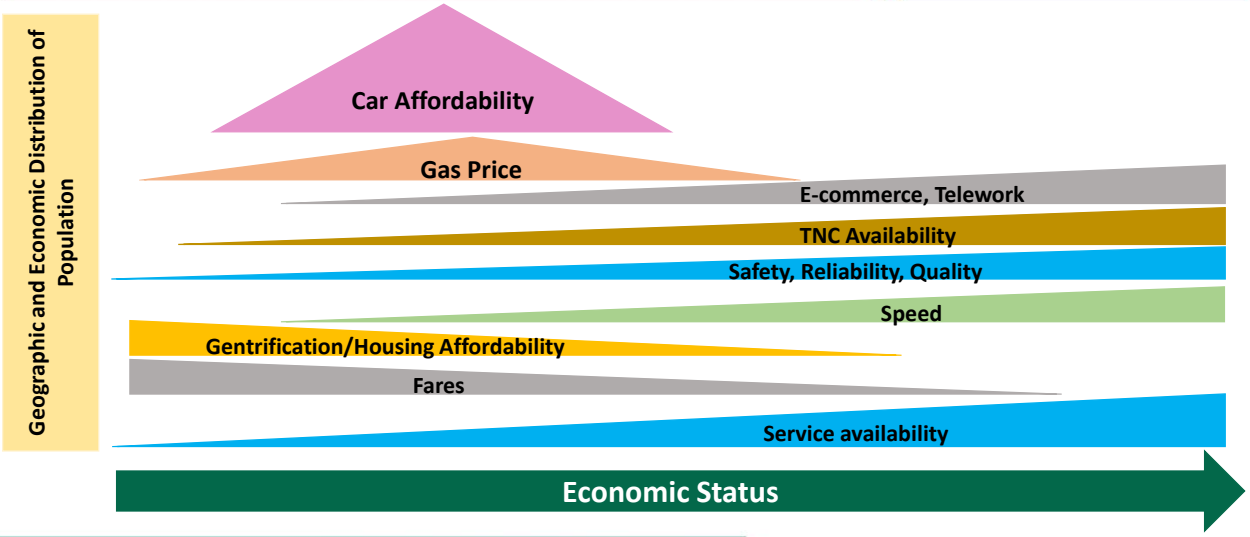
*Inflation adjustment performed using Bureau of Labor Statistics inflation calculator using CPI, UPT for 2015 and 2016 from Bureau of Transportation Statistics, Gas prices from EIA

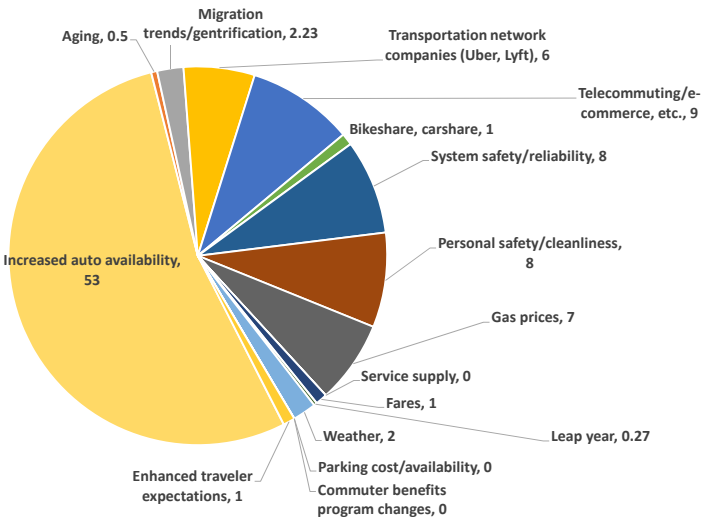
Key Issues – Travel Behavior

- Ridership trends are context specific and vary significantly across geography.
- The reasons for soft ridership differ across contexts with telecommuting, TNC's, service reliability, auto ownership trends, fares, and other factors having different impacts in different markets.
- Transit has historically had the lowest mode loyalty (mode of last resort).
- Declining fare revenues and/or dampened public willingness to increase subsidies resulting from soft ridership could contribute to continuing declines in ridership.

Influences on Transit Choice (Hypothesized)



Wild Guess as to Attribution of Causes of Ridership Decline

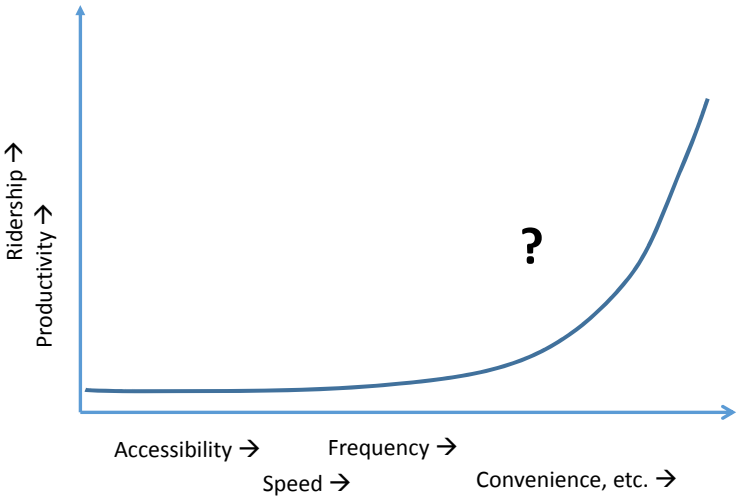


Key Issues – Travel Behavior

- Strong employment growth and growing real income could continue to undermine transit dependency and jeopardize ridership.
- Urban civility may influence future ridership trends.
- Demographic trends in proximity to transit services (TOD) will influence future ridership.
- Increasing roadway congestion could favor premium transit services but undermine mixed traffic transit operations.
- System condition and quality of industry execution may influence ridership.

Key Issues – Strategic

- Is there an **inflection point** where service becomes more attractive to choice travelers?
- What transit quality of service is required to make it attractive?
- What transit service concepts are sustainable in low to moderate density dispersed activity environments?



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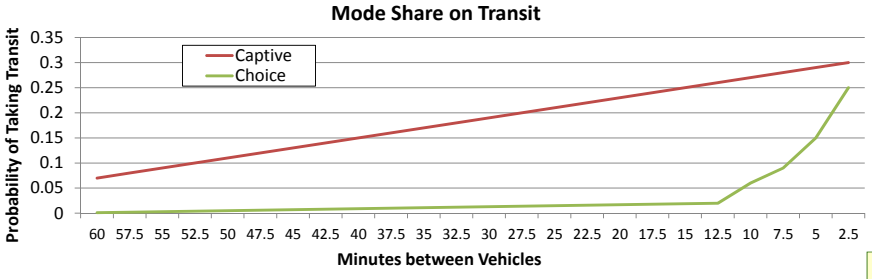
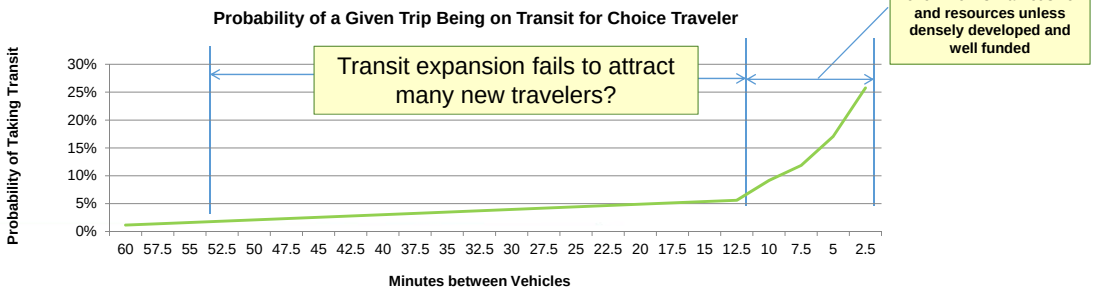
What do These Curves Really Look Like?





Research on Ridership Trends

- APTA. "Understanding Recent Ridership Changes: Trends and Applications." Policy Development and Research. Nov. 2017.
- Agency Initiatives: "Falling Transit Ridership: California and Southern California." UCLA Institute of Transportation Studies. Dec. 2017.
- FDOT, Understanding Ridership Trends in Transit – in progress
- TCRP J-11/Task 28, Synthesis, "Analysis of Recent Public Transit Ridership Trends", Georg Tech.

Pending:

- TCRP A-43, "Recent Decline in Public Transportation Ridership: Analysis, Causes, Responses," $400,000.
- TCRP H-56, "Reinventing Transit Networks for a New Mobility Future," $300,000.

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How Should Stakeholders Respond?

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New Technologies are Leading to New Mode Concepts and Business Models

- Key goals → May be best addressed with multiple

1. *Mobility*
2. *Resource efficiency*
3. *Economic competitiveness*

1. *Technologies and services*
2. *Mixes of public and private providers*
3. *Different pricing and funding strategies*

Today's modal silos will disappear

We won't worry about the future of transit but instead worry about the future of mobility

Upcoming seminar

Kurt Lehmann
Graduate Research Assistant
CUTR · USF

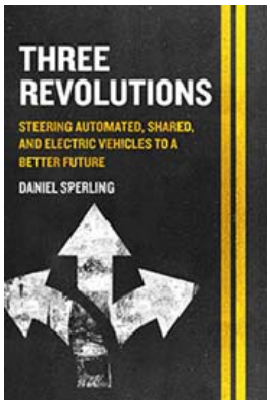
CUTR Webcast Series Presents:

Understanding the Effects of Demographic and Socio-Economic Factors on Public Transit Ridership Trends

April 12th · 12pm-1pm

More Information: https://www.cutr.usf.edu/2018/

- You may find the new book of interest. I was the principal author of Chapter 5, Upgrading Transit for the Twenty-First Century, of the recently released text, *Three Revolutions Steering Automated, Shared, and Electric Vehicles to a Better Future*. https://islandpress.org/book/three-revolutions
- If you'd like to purchase a copy of the book from Island Press, use the code **4SPERLING**, which is good for a 20% discount. You can also order it from Amazon, Barnes and Noble, and your local independent bookseller.



The Future of Public Transportation

http://scholarcommons.usf.edu/jpt/vol21/iss1/

Joel Volinski Prologue	Reflections on the Future of Public Transportation
Dan Boyle	The Future of Transit
Ralph Buehler	Can Public Transportation Compete with Automated and Connected Cars?
Graham Currie	Lies, Damned Lies, AVs, Shared Mobility, and Urban Transit Futures
Jill Hough and Ali Rahim Taleqani	Future of Rural Transit
Steven E. Polzin	Just Around the Corner: The Future of U.S. Public Transportation
Kari Watkins	Does the Future of Mobility Depend on Public Transportation?
Carol Schweiger	Improved Mobility through Blurred Lines
Susan Shaheen and Adam Cohen	Is It Time for a Public Transit Renaissance?: Navigating Travel Behavior, Technology, and Business Model Shifts in a Brave New World
Eric Schreffler	Better Integrating Travel Choices into Future Urban Mobility Systems: The Day the Highways Stood Still
Jerome Lutin	Not If, but When: Autonomous Driving and the Future of Transit
Michael Manville, Brian D. Taylor, and Evelyn Blumenberg	Transit in the 2000s: Where Does It Stand and Where Is It Headed?
Jarrett Walker	To Predict with Confidence, Plan for Freedom

Thank You!

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