Observations on the State-of-the-Practice: Transit Demand Forecasting

Florida Transit Modeling Workshop

Steven Polzin, PhD
CUTR
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Outline

- The State-of-the-Practice
- How are We Meeting the Basic Needs of Policy Makers
- Are Forecasting Tools Addressing Other Issues on our Agency Agendas?
- Are Core Values Stable?
- Captive Versus Choice Transit Ridership
- Distinctive Transit Use Behaviors
- Socio-Demographic Trends that Appear to have Played Themselves Out

State-of-the-Practice

How much about travel behavior do we understand?

What knowledge have we operationalized in our models?

How carefully and objectively have we applied our methods?

Planners' Concerns

Cost/Ease of Use
- Hardware
- Software
- Data
- Skilled staff

Quality of Results
- Accuracy
- Precision/scale
- Sensitivities
- Credibility

Policy Makers' Concerns

- **Comply with "fed" or "FDOT" requirements**

- **Give Desired Results**

Quality of Results
- Accuracy
- Precision/scale
- Sensitivities
- Credibility

Cost/Ease of Use
- Hardware
- Software
- Data
- Skilled staff

Matching Method with Need

Low Risk Decision
- Low Cost
- Reversible
- Near-Term Impacts
- Supported by Similar Experience

High Risk Decision
- High Cost
- Reversible
- Longer-Term Impacts
- Original/Untried Solution

Risk

Application

Bus Route Change → Bus Network → BRT → Rail
Policy Issue

Method

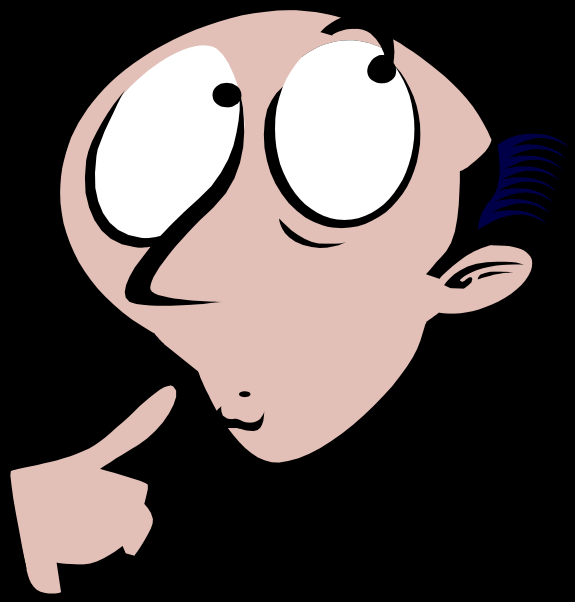
Experimentation?

Case study? Judgment? Simple Model?

Complex Model?

Man or woman Versus Model

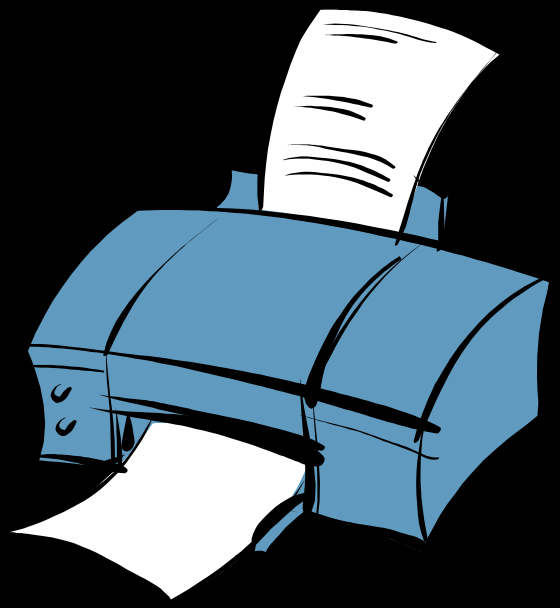
Talented Transit Planner



- Capable of considering a multitude of complex factors
- Highly adaptable
- Decent intercity transferability
- Self calibrating and validating but requires years to refine
- Not too precise
- Not replicable
- Subject to modal and other biases
- Can disappear and steal "coefficients"
- Seldom requires upgrades/patches
- Limited supply and increasingly expensive
- Not perceived as objective

Man or woman Versus Model

The Model



- Limited ability to accommodate complexity interactions
- Not very adaptable without reprogramming
- Limited intercity transferability
- Requires calibrating and validating
- Not too precise
- Hopefully replicable
- Subject to modal and other biases with operator assistance
- No interpersonal issues
- Requires upgrades/patches
- Requires well trained operator for best results
- Perceived as objective

Give Me

My choice of five people from this room
One helicopter
Three days
Input assumptions

I will Deliver

Highly reliable planning level transit demand forecast that will be better than 50% correct.

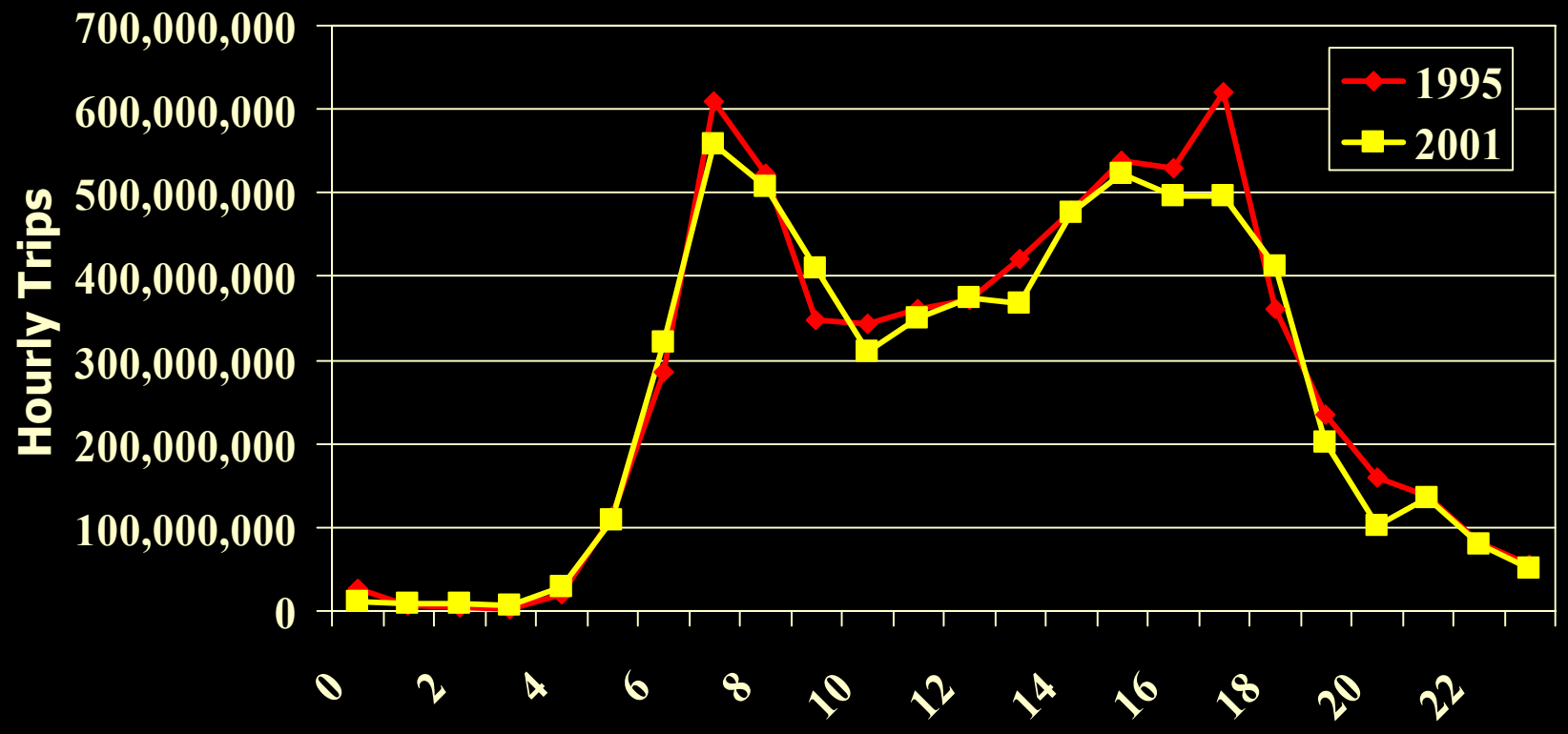
How are We Meeting the Basic Needs of Policy Makers

The Basics of Transit Service Allocation

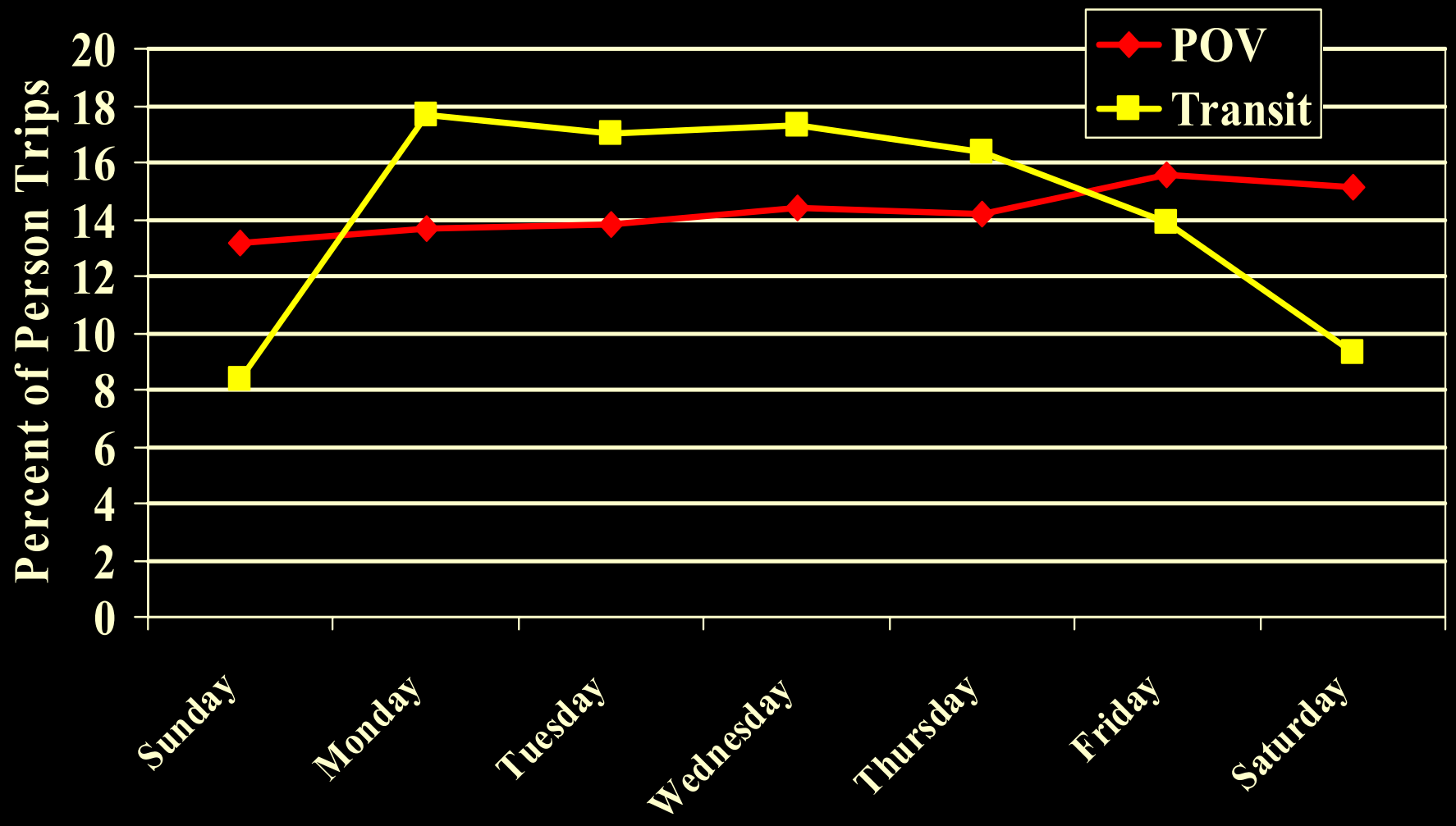
- Service Span ←
- Service Frequency ←
- Service Coverage ←
- Network Configuration ←

Sensitivity to Service Span?

- Time periods
- Weekends?
- Last trip?



Day of Week Travel Demand



Service Frequency

Sensitivity to frequency for 1st and 2nd wait

Impedance of demand for departure time limitations

- Last trip out
- Single trip commuter rail

"I'm not stealing it. I'm moving it closer to my house."

Service Coverage

Precision of zonal scale – movement toward parcel or address level data

Sensitivity to stop accessibility – walk path connectivity

Sensitivity to proximity to individual sites
(Joint development, TOD, Tax assessment districts)

Service Coverage

Homogenous zones may not represent transit access very well

Network Configuration

When and how do we evaluate major network reconfigurations:

- Evolution from radial to grid or transfer center based

How do we evaluate layering of service or technology types:

- Local, express, circulator, crosstown

Are Forecasting Tools Addressing Other Issues on our Agency Agendas?

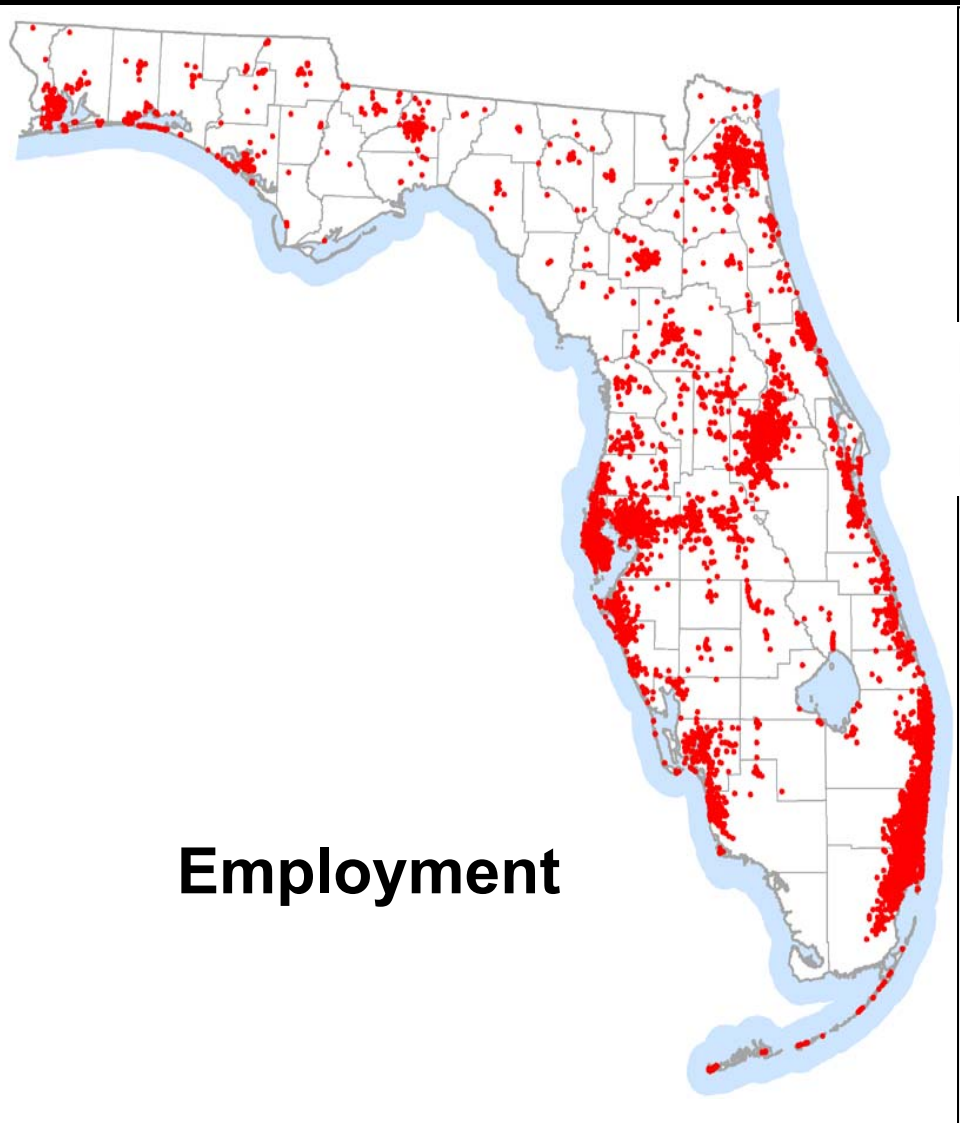
Sensitivity to Amenities/Features

- Pedestrian friendly
- Shelter
- Benches
- Aesthetics

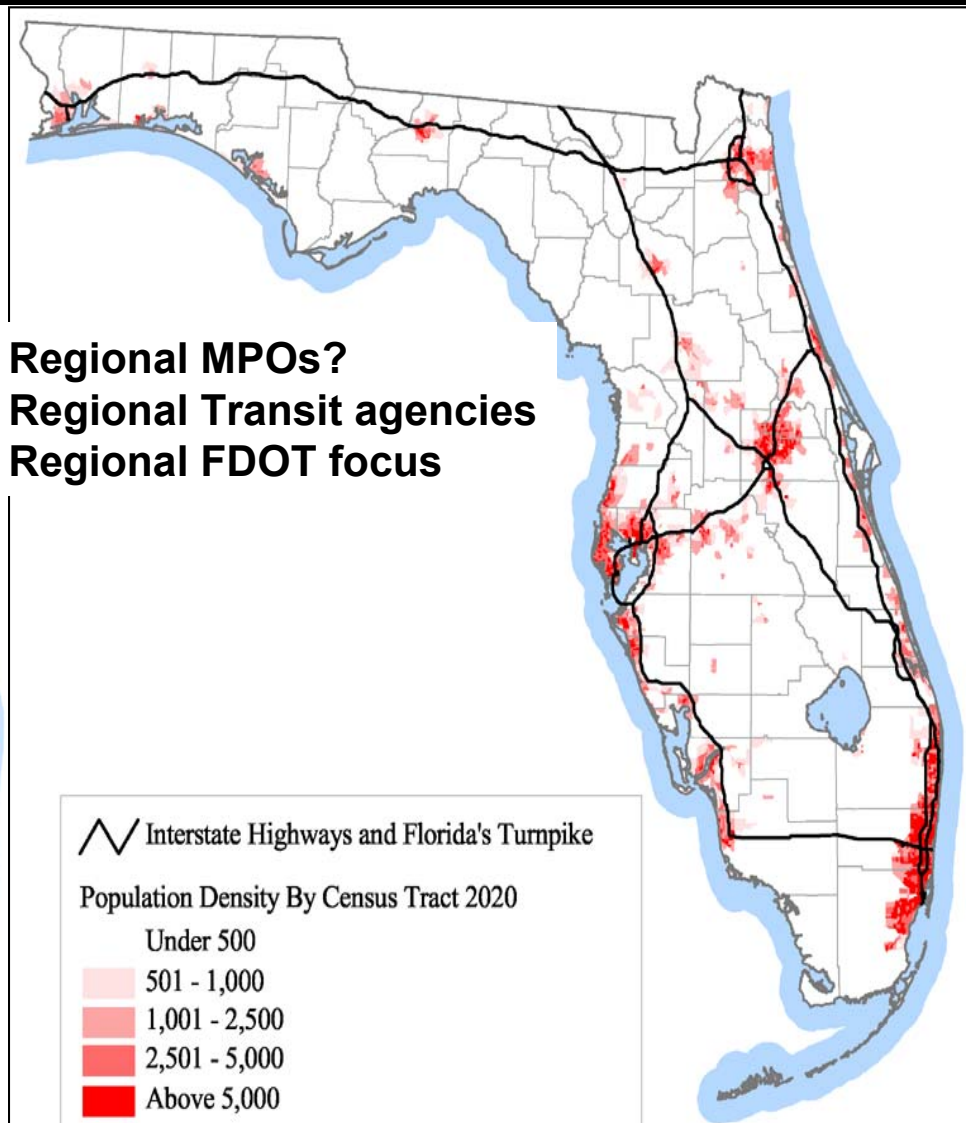
Ability to Address special Markets

- Universities
- Sports facilities
- Entertainment venues
- Regional intermodal facilities (airports etc.)
- Convention centers
- Bikes on buses
- Park-n-Ride Access

Regional Transit Demands?



Employment



Regional MPOs?
Regional Transit agencies
Regional FDOT focus

Sensitivity to APTS Investments
(project or program level)

Customer information

On-time arrival

Travel time reliability

Speed

Modern image

Sensitivity to Pricing Strategies

Fare free zones

Daily and other passes

Interregional transfer programs

Sensitivity to parking cost and availability

(at station and at destination for drivers)

Are Core Values Stable?

Special Considerations

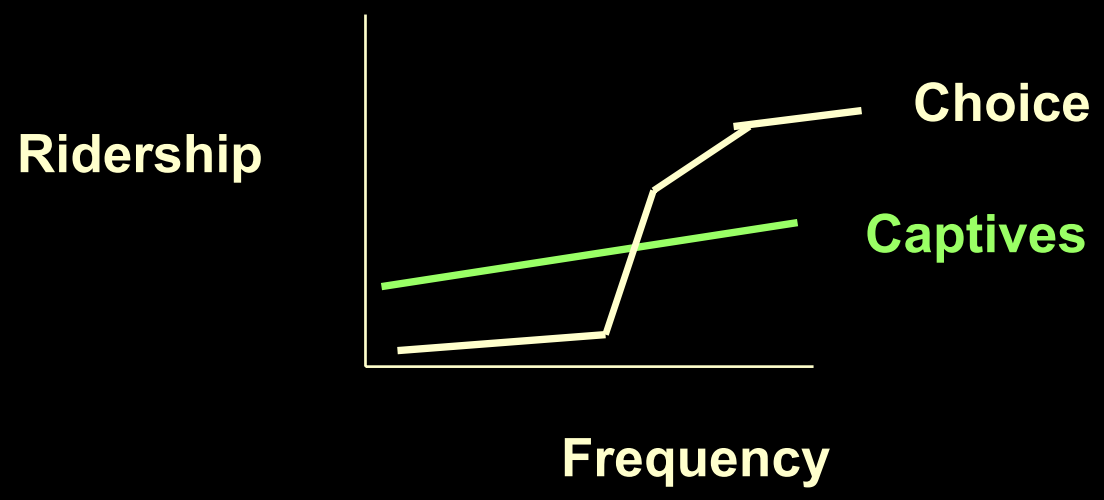
- Mode Bias?
  - When? How?
  - How stable temporally, geographically?
- Induced travel?

Non-Linear Relationships

Threshold levels of service?

Threshold levels of "choice" riders

Travel time competitiveness?



Forecasting for Captive Versus Choice Ridership

Captive ridership appears to have stabilized and is unlikely to grow

Transit growth is likely to be in choice riders

A 50% increase in total ridership requires a 100+% increase in choice riders

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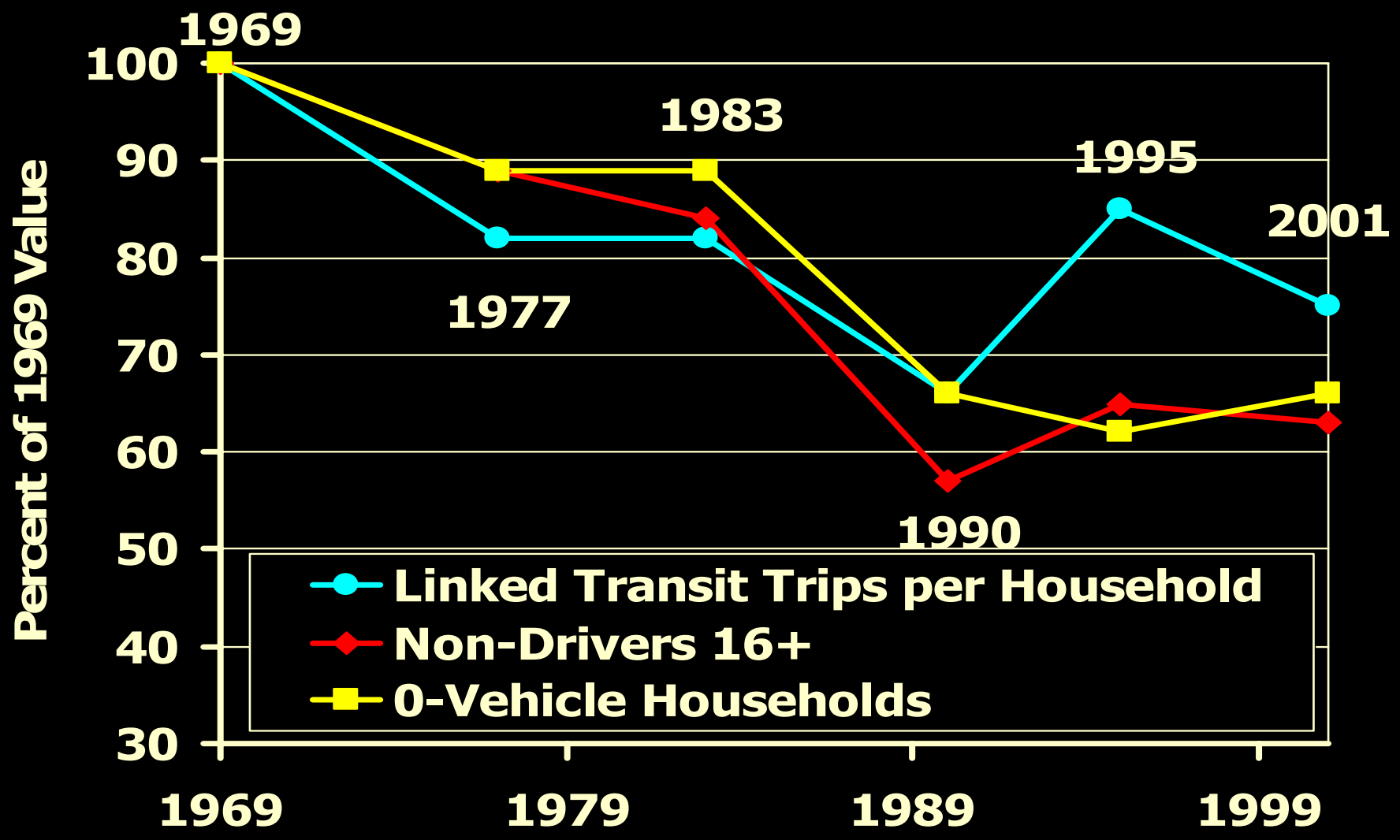
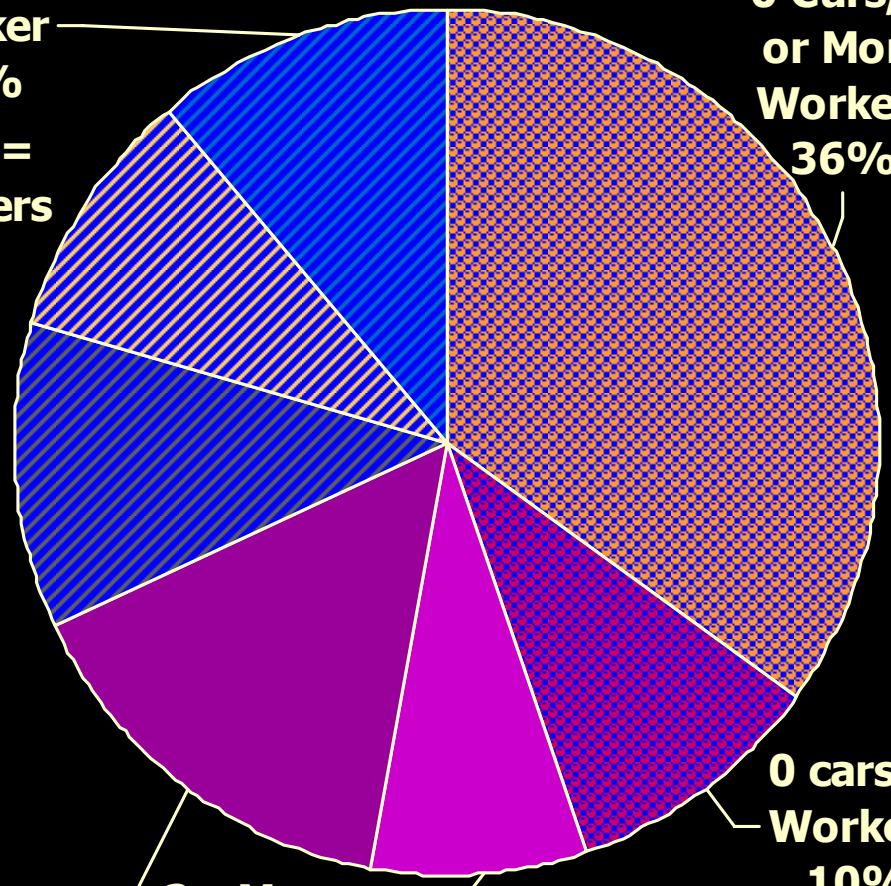
Transit Trips and Transit Dependency Trends



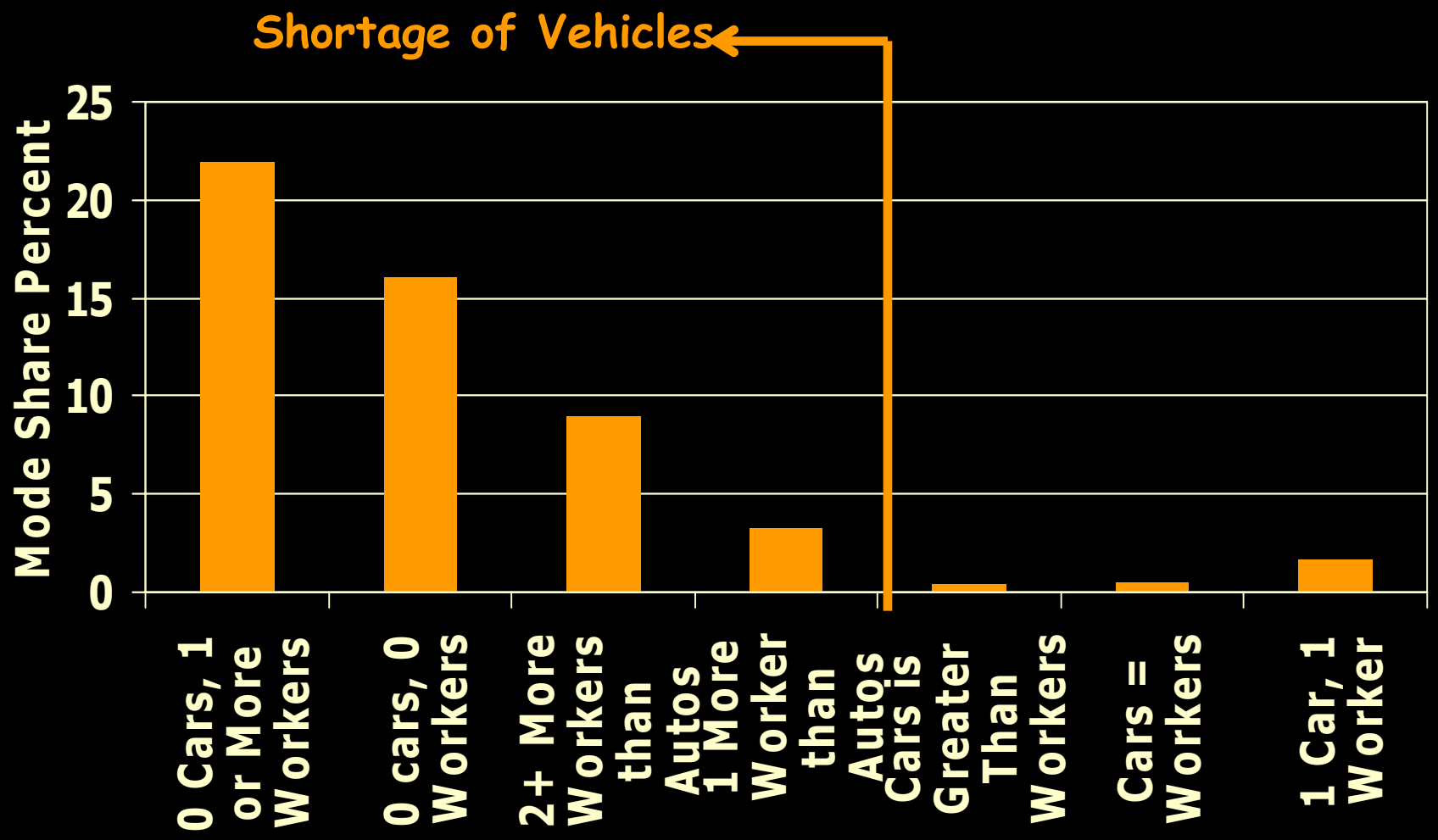
Transit Market Share by Car Availability



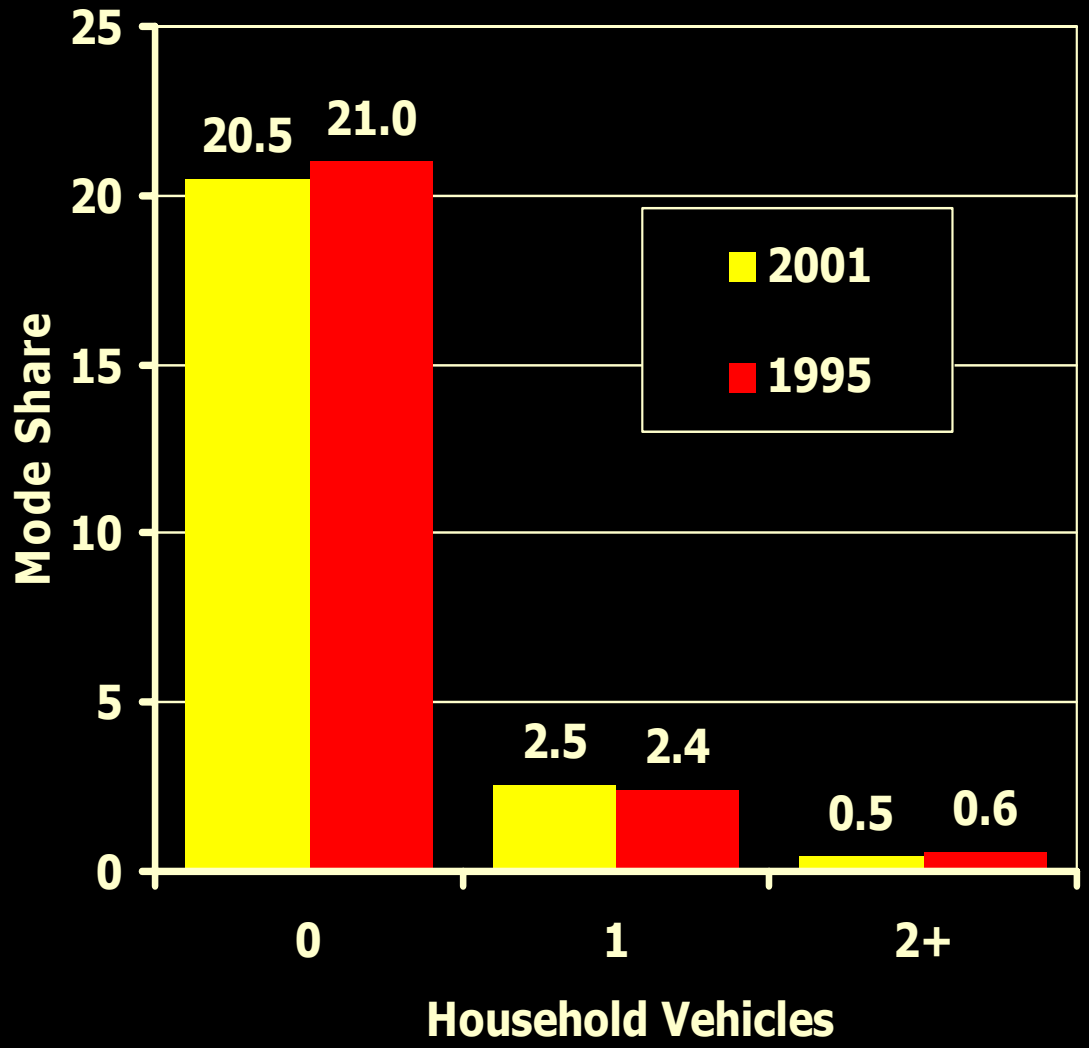
46% zero car HH

23% car shortage HH

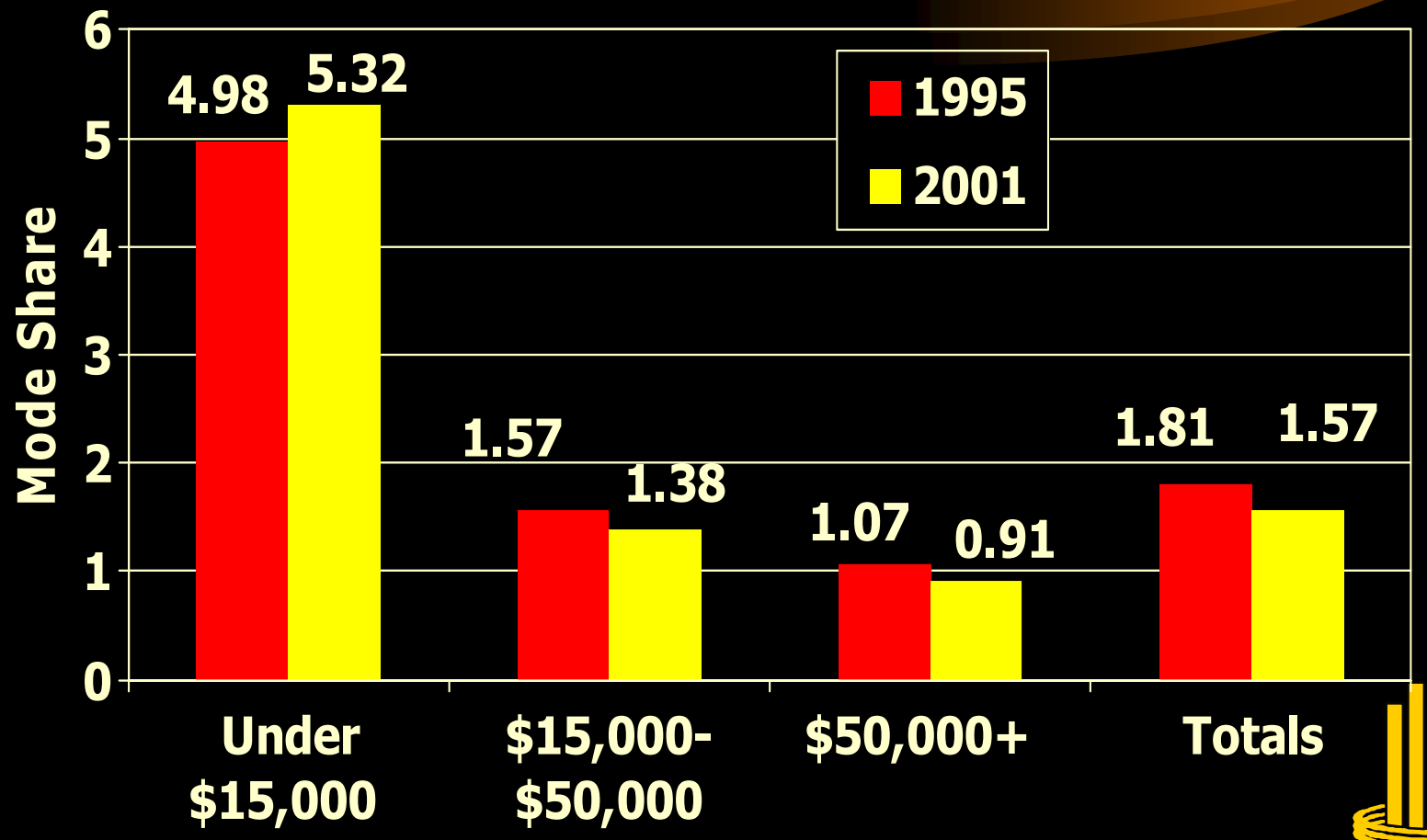
Transit Mode Share by Vehicle Availability



A Highly Polarized, Very Predictable Market?



Transit Mode Share by Income



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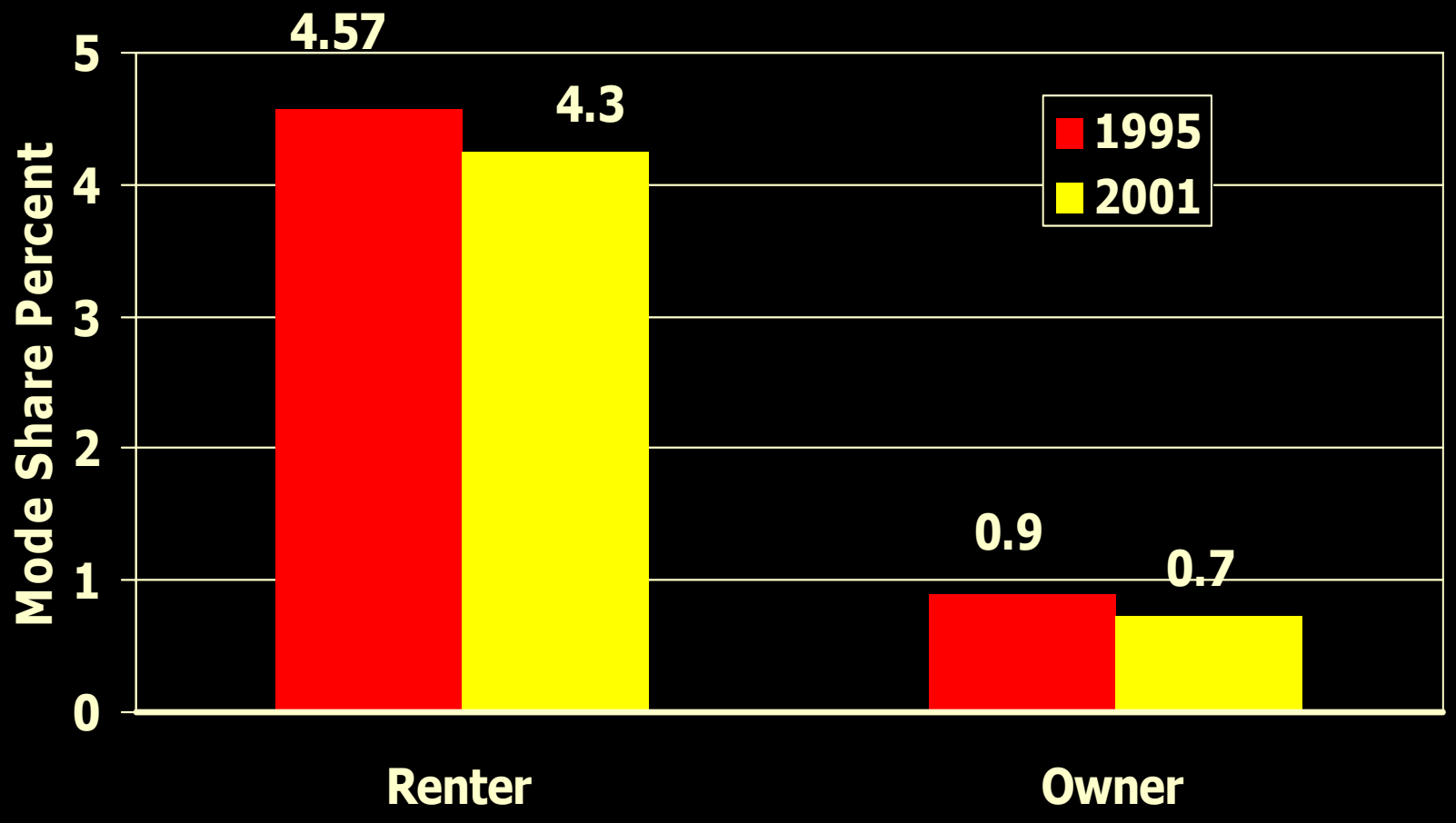
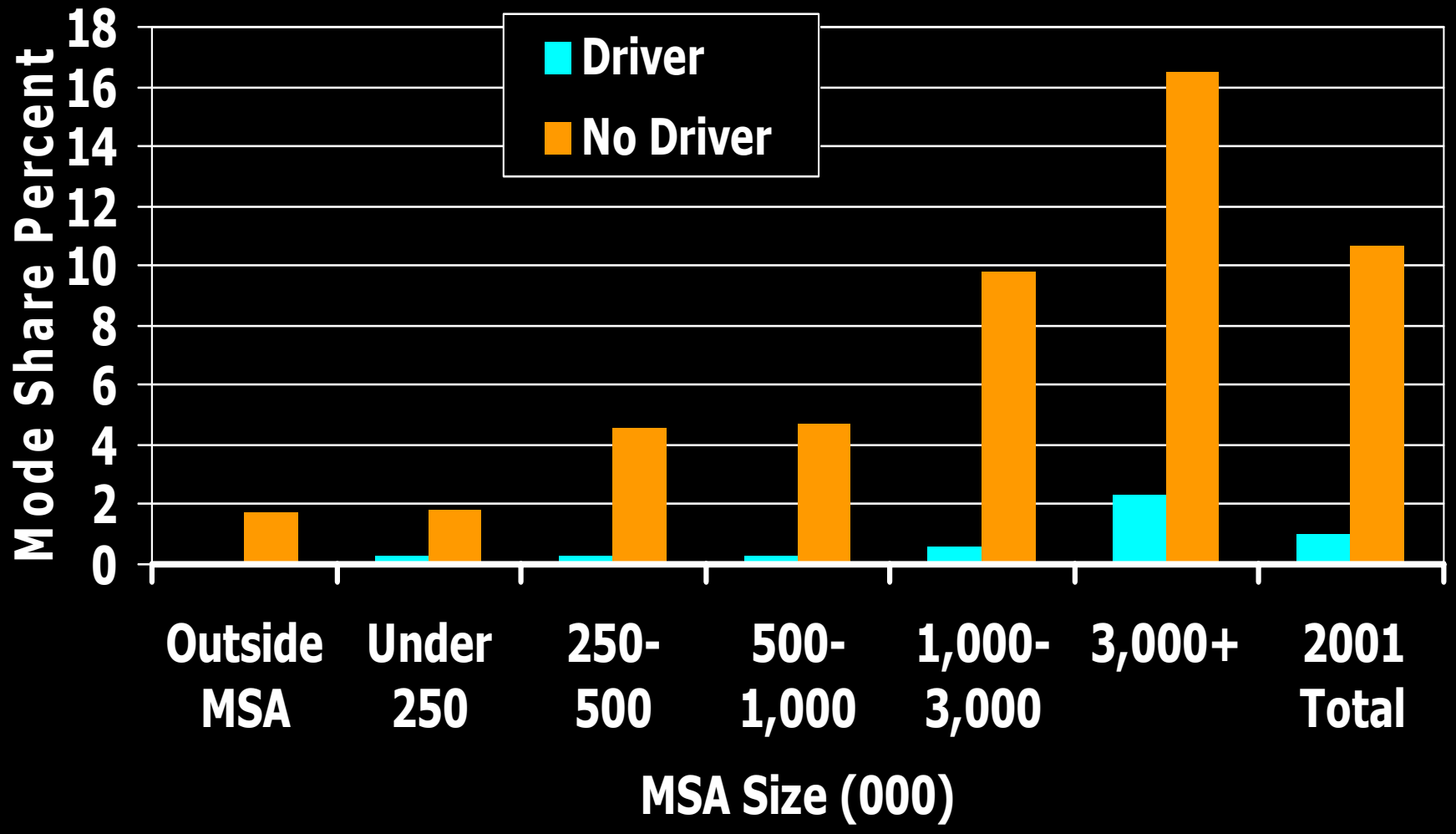
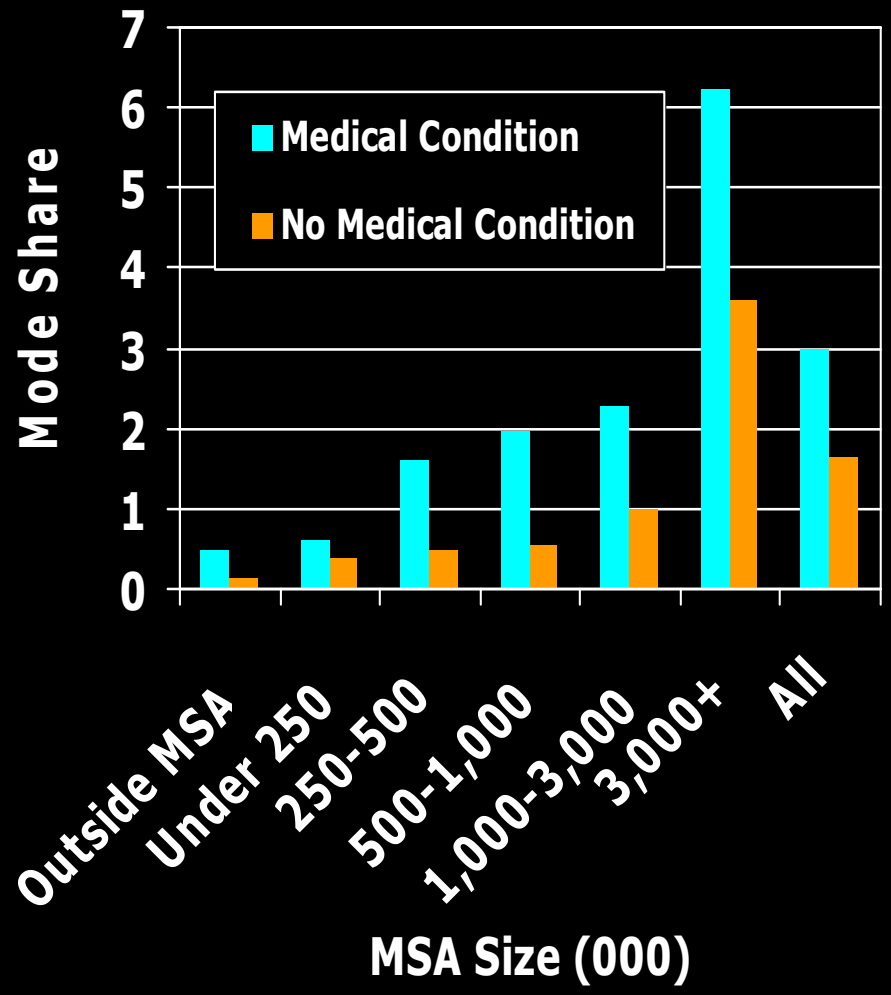
Transit Mode Share by Home Ownership Status



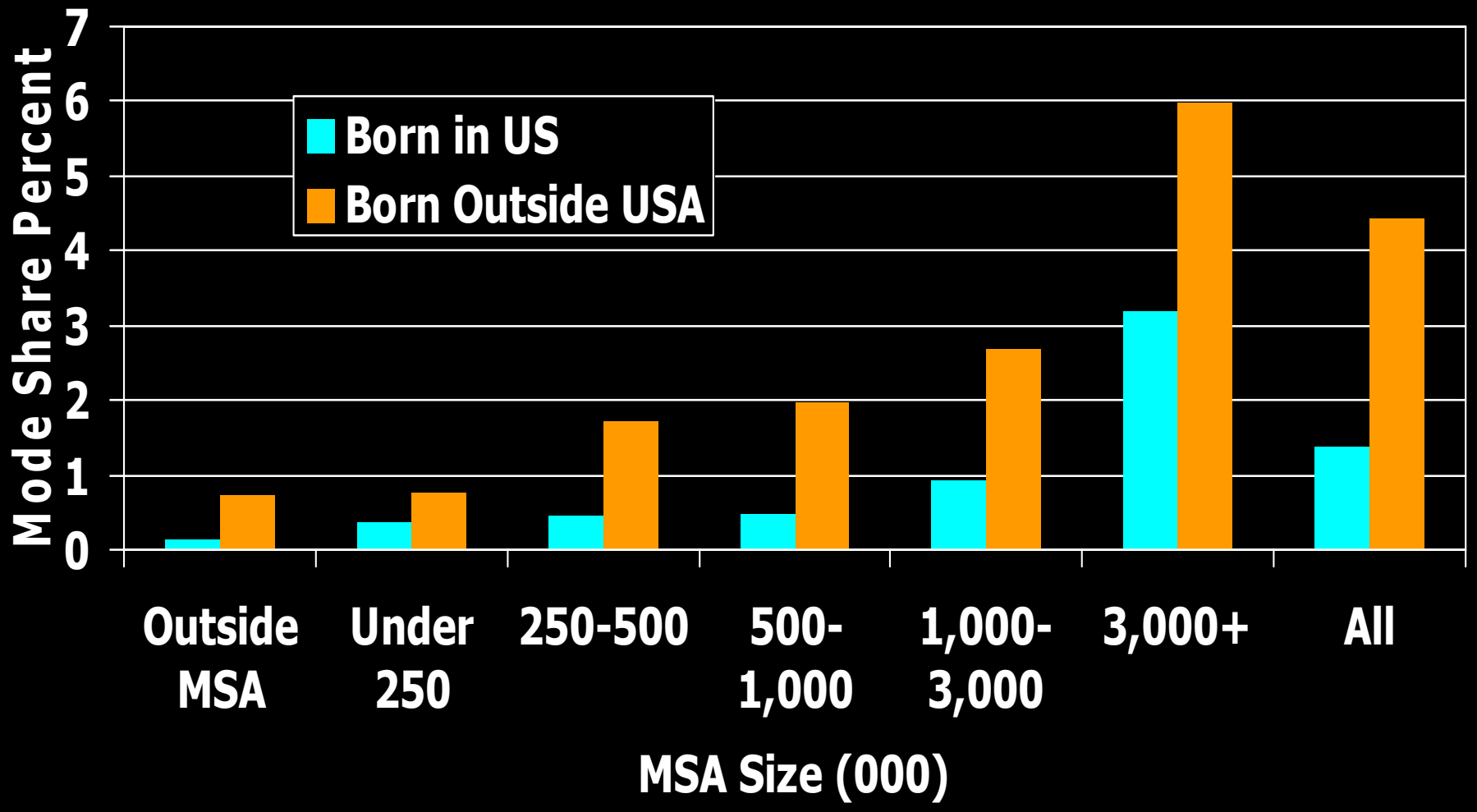
Transit Mode Share and Driver Status



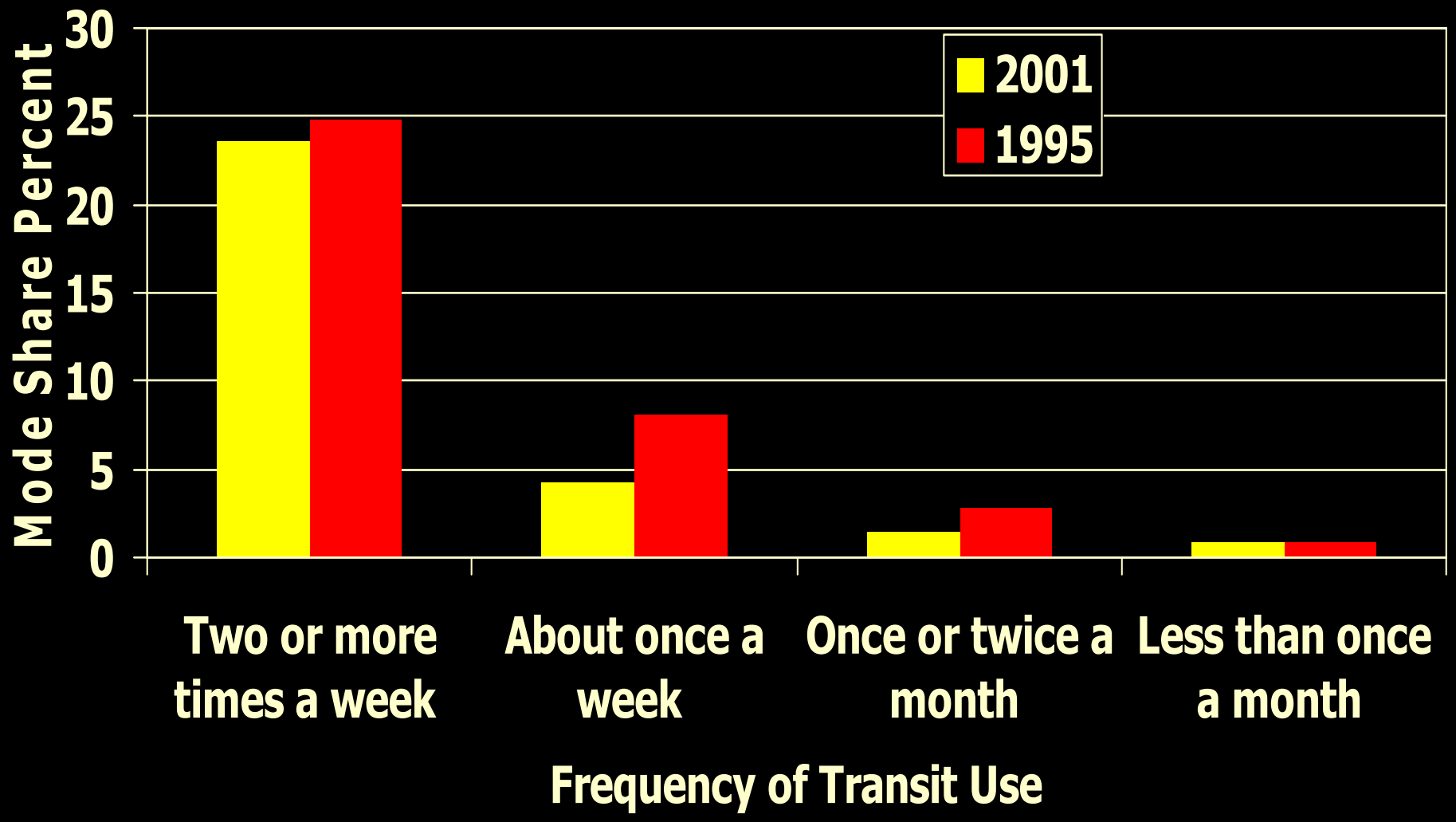
Transit Mode Share by Medical Condition



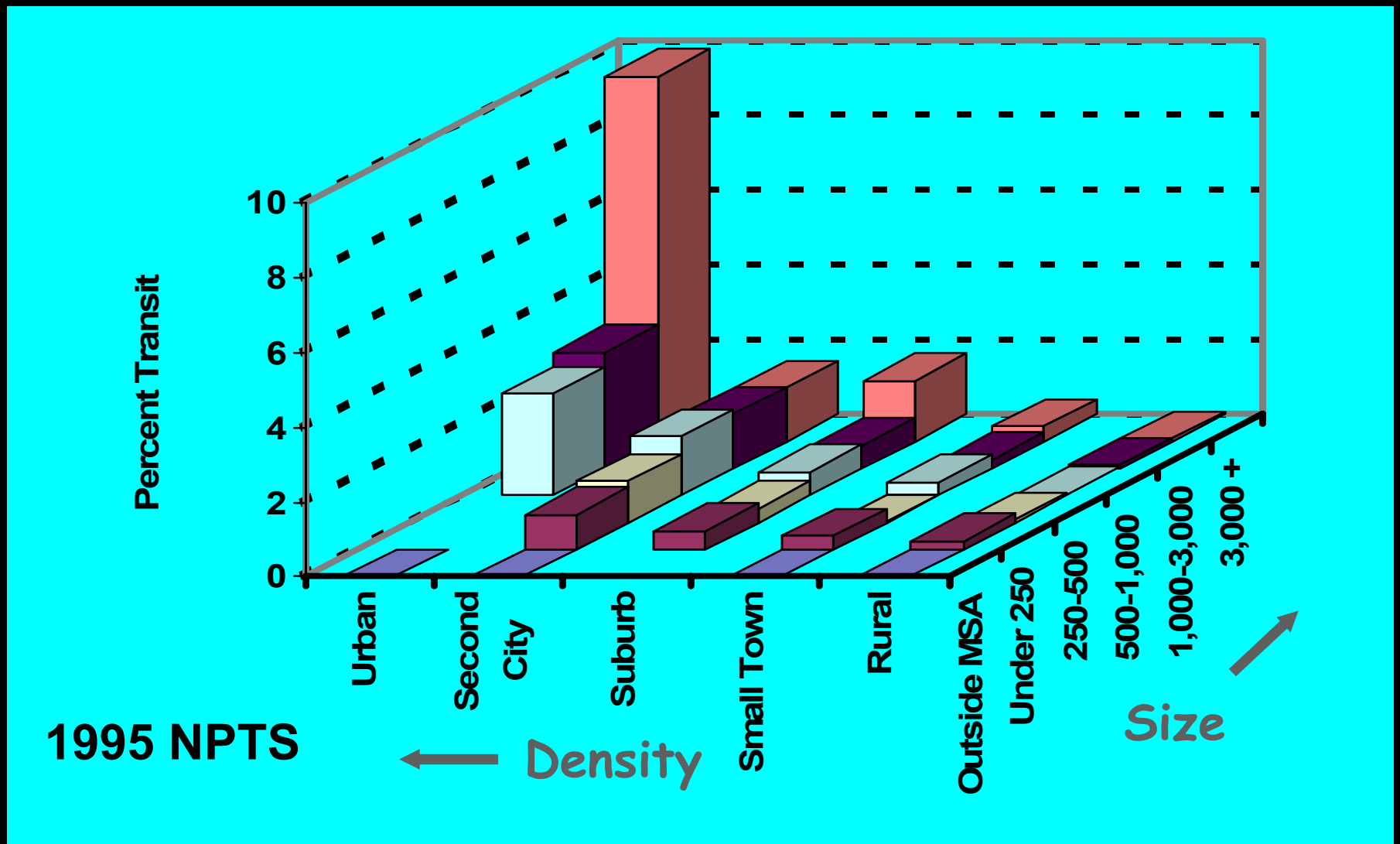
Transit Mode Share by Immigration Status



Mode Share by Frequency of Use



Influence of MSA Scale and Area Density on Transit Market Share



Sensitive to Trends that Appear to have Played Themselves Out

Socio-Economic Conditions

- Average Household Size
- Women Labor Force Participation Rates
- Women Share of Licensed Drivers
- Share of Zero Vehicle Households

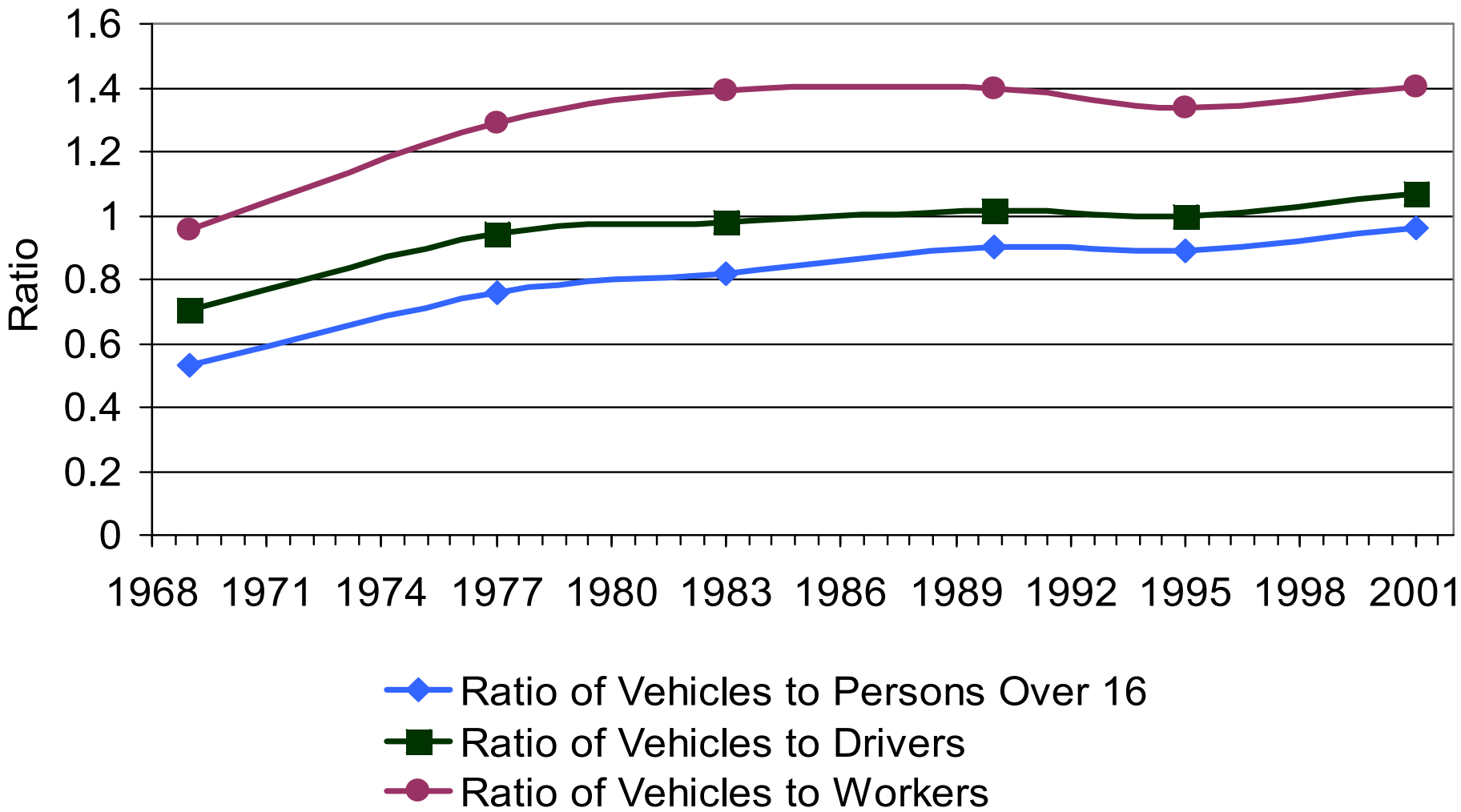
Transportation System

- Travel Speed
- Travel Cost

Travel Trends

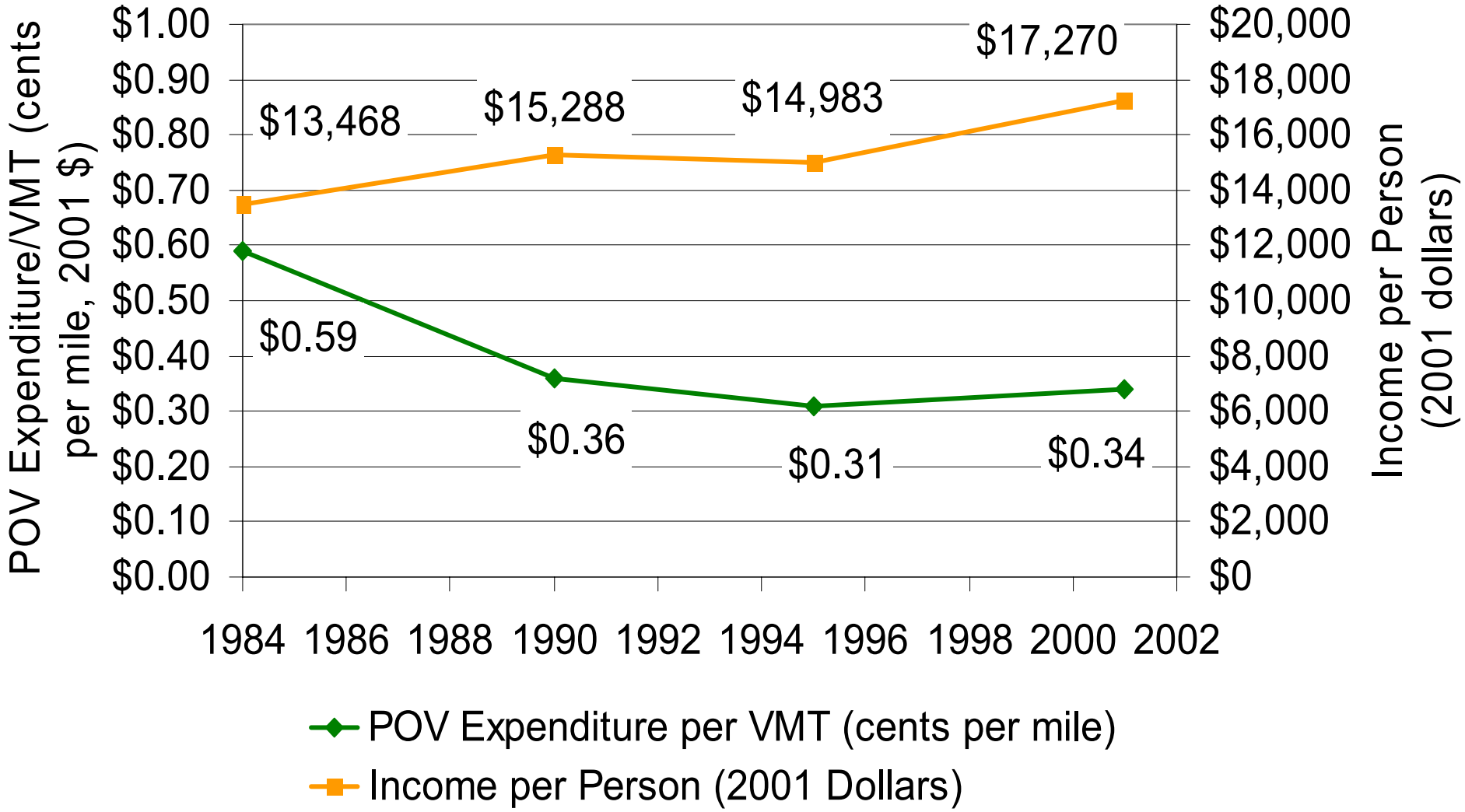
- Mode Share of Public Transportation
- Vehicle Occupancies
- VMT per PMT

Vehicle Saturation? Vehicle Gluttony?

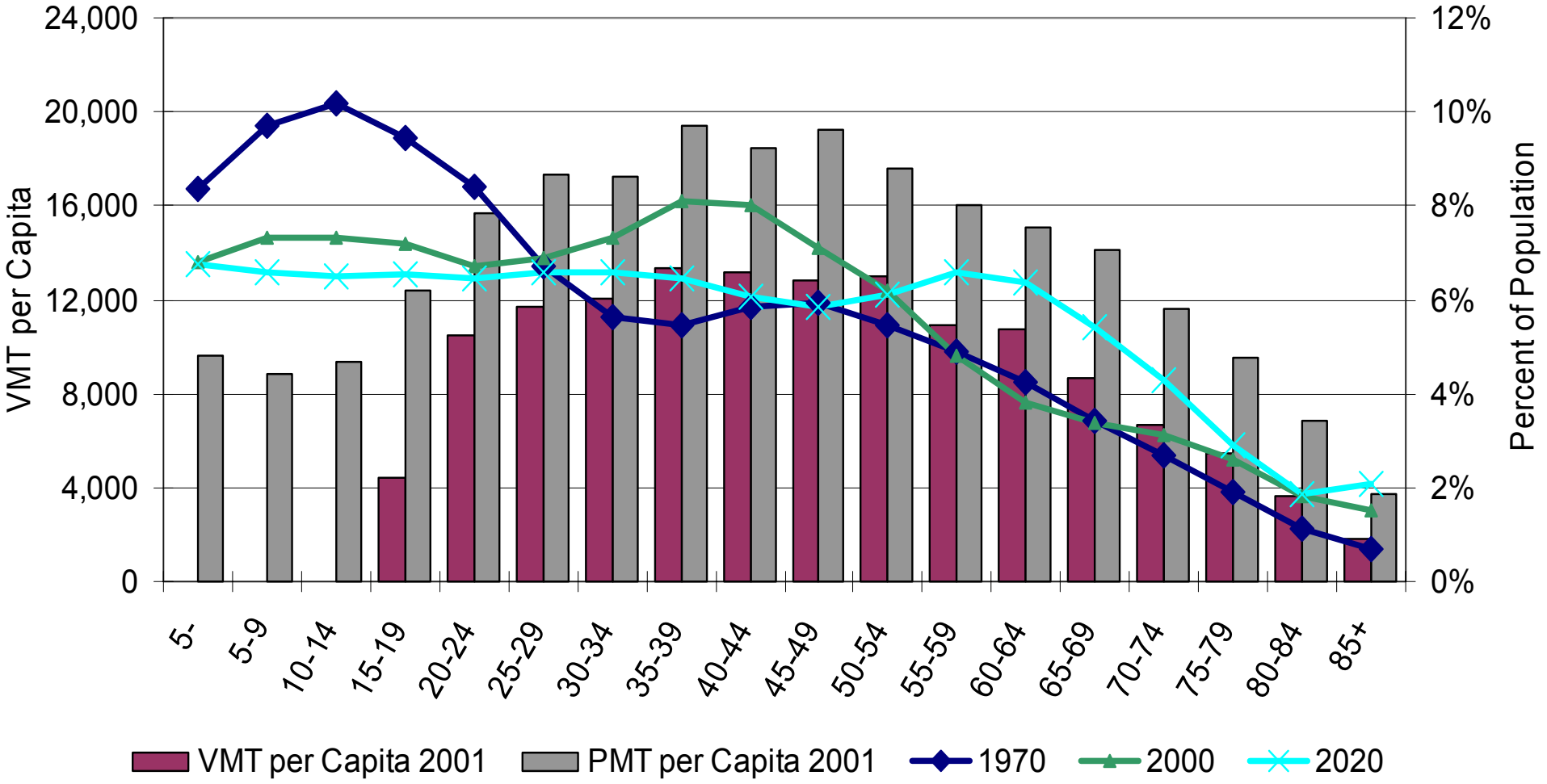


Source: FHWA, Highway Statistics Series

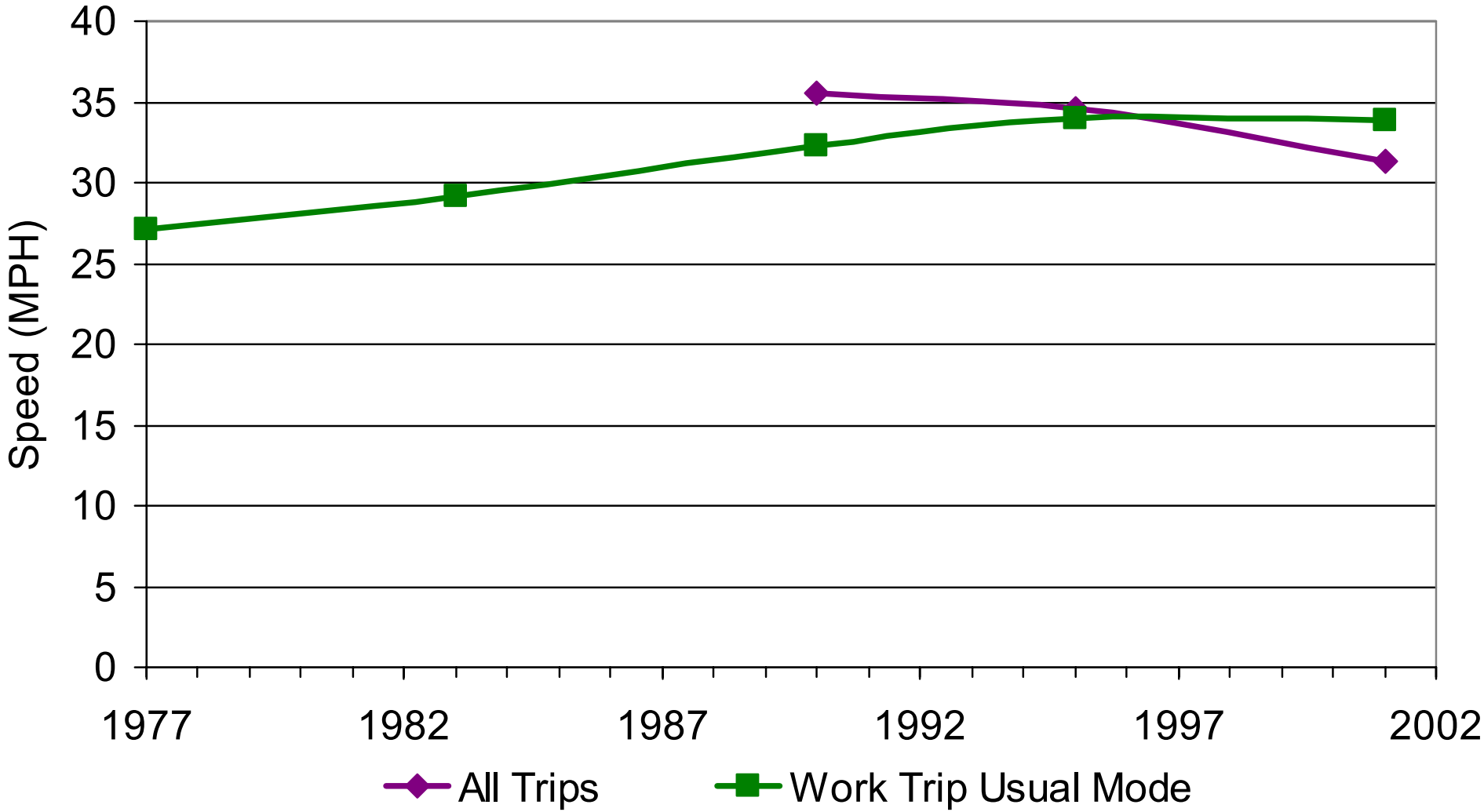
Are Income and Travel Cost Driving VMT Growth?



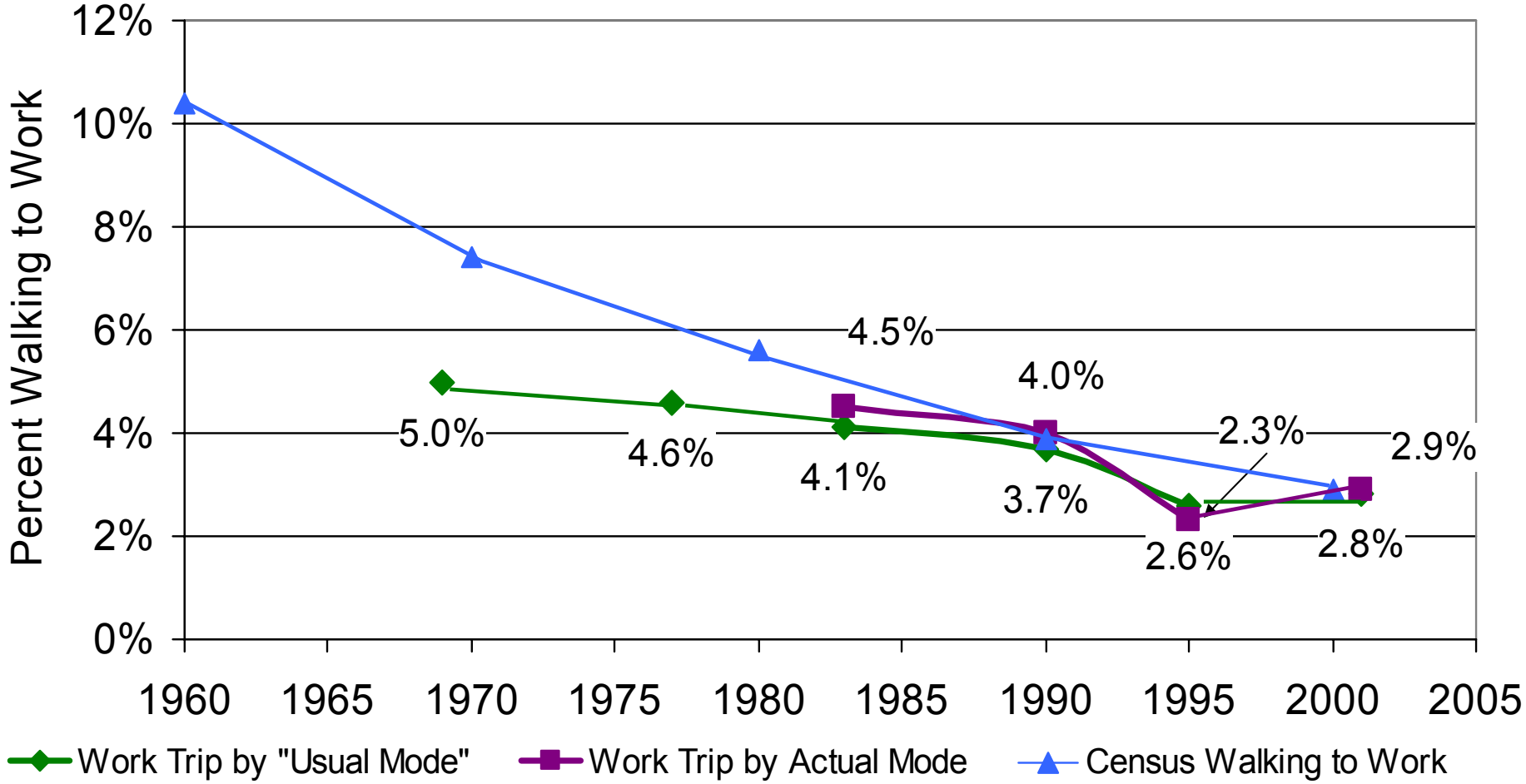
U.S. Population is Concentrated in Peak Travel Age Cohorts



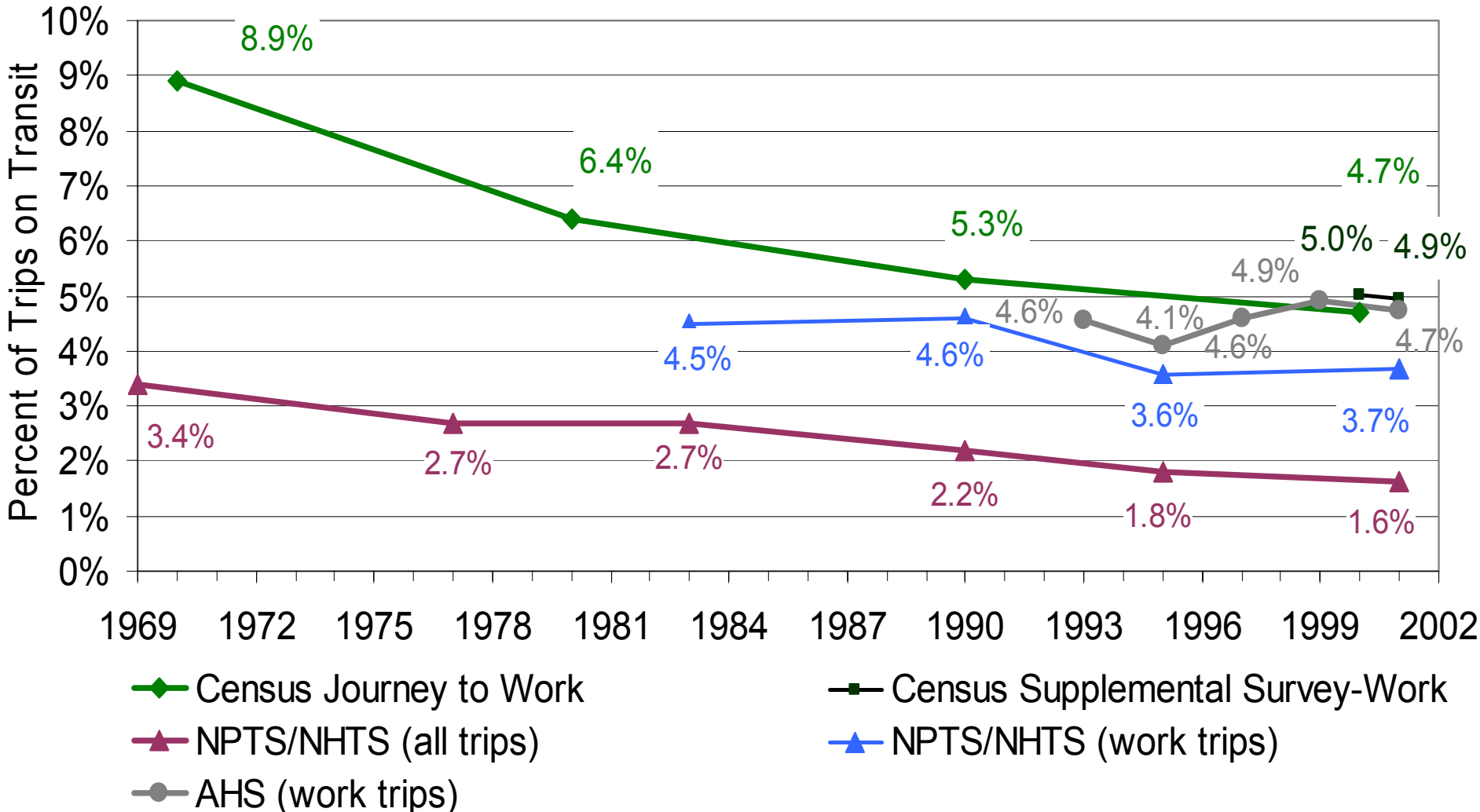
NHTS/NPTS Data Suggest Travel Speeds are Now Slowing



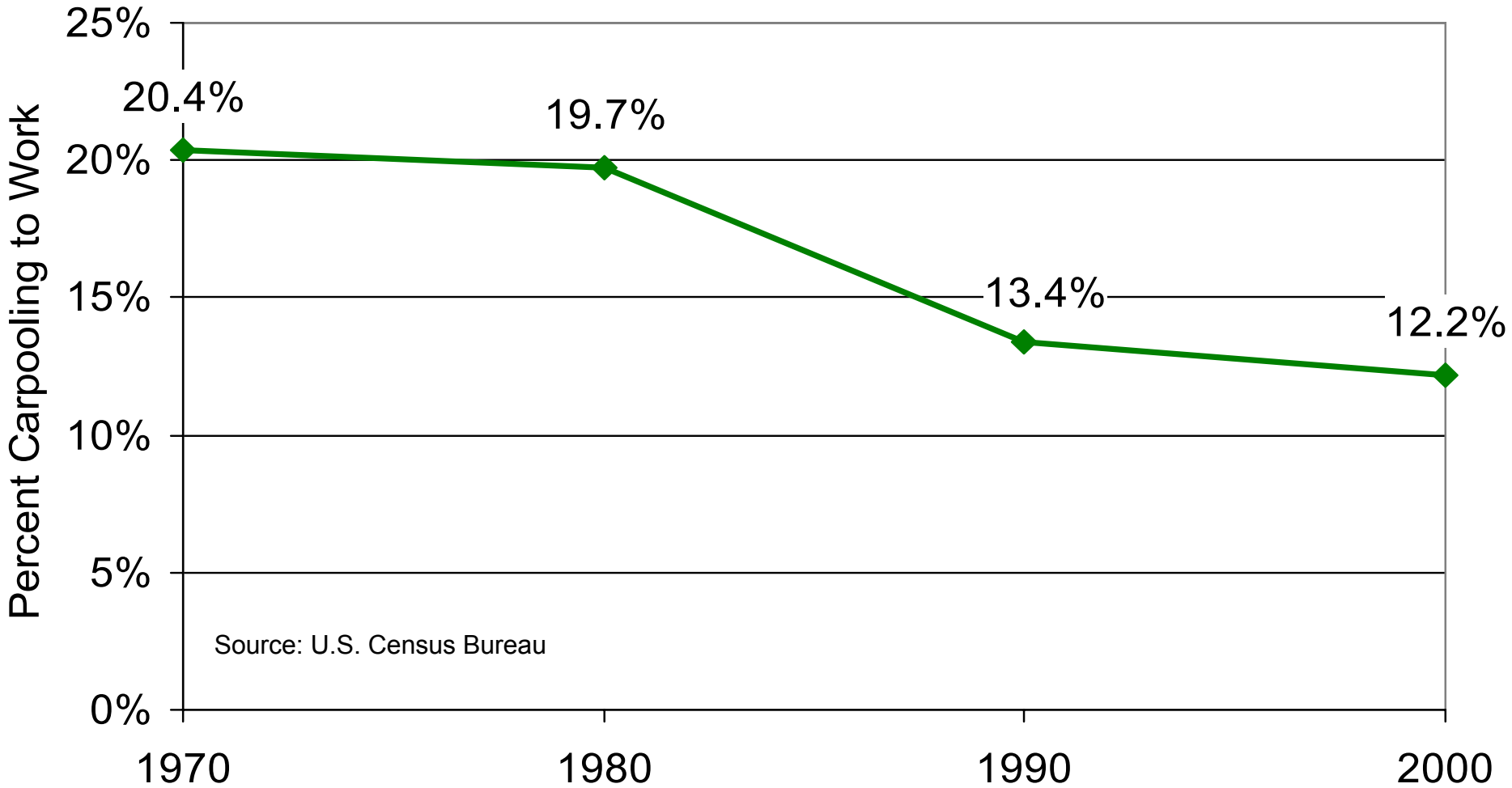
Declining Walk Shares



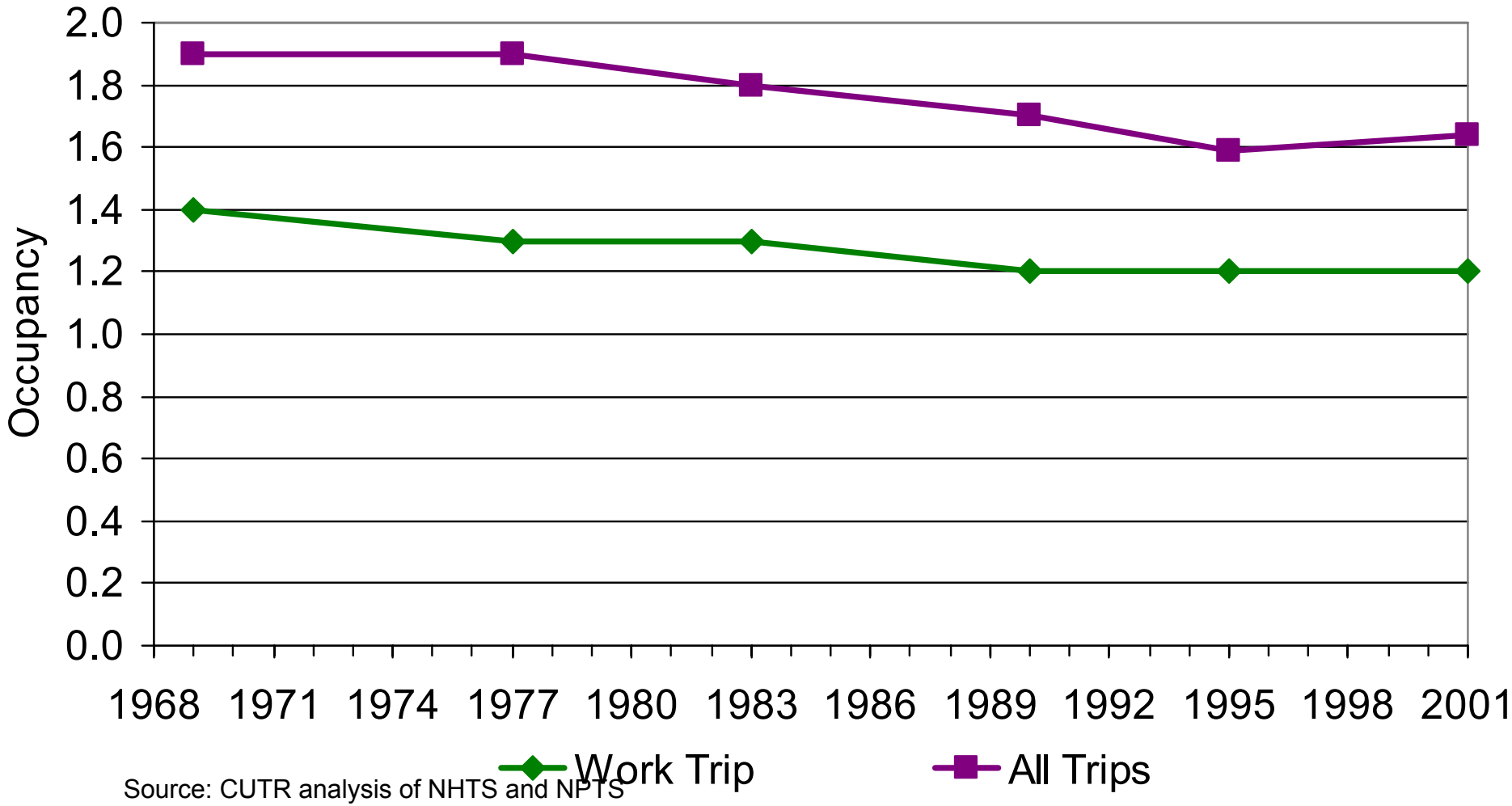
Ending the Decline in Transit Mode Share – Survey Data



Census Work Trip Carpooling Mode Share



Stabilizing Vehicle Occupancies –NHTS and NPTS



Source: CUTR analysis of NHTS and NPTS

What are We Assuming/Forecasting

- Will capacity undersupply result in more rapid deterioration of roadway travel speeds?
- Will retiring baby boomers break the mold and move to urban condos?
- Will the pace of trip growth abate?
- Will retiring baby boomers dampen travel demand growth?
- Will energy cost availability begin to be a factor?
- Will trip chaining behaviors remain the same?
- Will security become a mode choice factor?
- Will Cell phone availability dampen the impact of travel time/reliability?

Percent Teen Auto "Ownership"

Age	1999			2003		
	New	Used	Total	New	Used	Total
16-17	1	14	15	9	36	45
18-19	5	12	17	11	47	58

Source: Teenage Research Unlimited, Associated Press, September 14, 2003.

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And Oh, by the Way

Transit Data Comprehension

Work Travel Usual Versus Actual Mode Choice Percent 2001 NHTS

		Actual Mode on Travel Day					
Usual Mode		Drive Alone	Carpool	Transit	Walk	Bike	Other/ non-report
Mode	Share						
Drive Alone	83.2	89.8	9.4	0.1	0.4	0.1	0.2
Carpool	9.1	21.7	75.7	1.0	1.3	0.1	0.2
Transit	5.0	8.4	10.0	69.3	8.5	0.4	3.3
Walk	2.3	10.3	9.0	2.7	77.3	0.2	0.5
Bike	0.4	8.1	10.1	1.4	7.7	72.7	0.1
Share	100	77.4	15.4	3.7	2.7	0.4	0.4

*Analysis by CUTR. Concept source: Final Report, Travel Patterns of People of Color, June 30, 2000, Prepared for Federal Highway Administration, Chapter 4 Work, Automobility, and Commuting, **Nancy McGuckin.** Based on January 2004 release for NHTS data.*

Transit Data Comprehension

Commuting Mode Share Percent Comparisons

	Census 2000 Usual Mode	ACS 2002 Usual Mode	---------- 2001 NHTS-------	
			Usual Mode	Actual Mode
Drive Alone	79.0	81.0	83.2	77.4
Carpool	12.7	10.8	9.1	15.4
Transit	4.8	5.0	5.0	3.7
Walk	3.0	2.6	2.3	2.7
Bike	0.4	0.4	0.4	0.4

Source: CUTR analysis of January 2004 release of NHTS. Census shares adjusted to exclude "other," "work at home," Motorcycle included in Drive Alone. ACS PUMS Sample, Taxi and Other excluded and shares adjusted.

Glad to See A Few Wise Folks Gathered to Meet these Challenges