



Exploring Changing Travel Trends

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Fundamentals on Interpreting NHTS Data

“If you torture the data long enough, nature will confess.”

Ronald Coase – 1991 Nobel Prize in Economics

“If you torture the data long enough you can make it confess to anything.”

Alan Pisarski – No Nobel Prizes

Simple Recipe for Using NHTS Data

1. Start with:

Sound
theory or
hypothesis

NHTS data

Other
data as
available

2. Add other
data as
necessary and
available

3. Blend with Statistical
package or various
analytical tools

4. Evaluate
Results

Confirm with
other survey,
count or field
data

Review MOEs (*margins of
error*) and
MORs (*measures of
relevance*)

5. Serve with good
graphics and
compelling story



Social and Economic Interactions Create Demand for Travel



Growth in

- Income
- Knowledge



Specialization in

- Employment
- Consumption
- Social Relationships
- Time Use



Growth in

- Person Travel
- Commerce
- Communication



1969 - FIRST NHTS

Population (millions) 203
 15,000 households surveyed
 In home interviews
 Person miles traveled (trillion) 1.40

Vehicles/100 people 52
 Gas /gallon \$ 0.35
 New house \$ 15,550
 Income per year \$ 8,550
 New car \$ 3,270

29 Oct 69	2:00	LOADED	OP. PROGRAM	CSK
		FEIZ	SEN BARKER	
		BBV		
	22:30	Talked to SRF		CSK
		Host to Host		

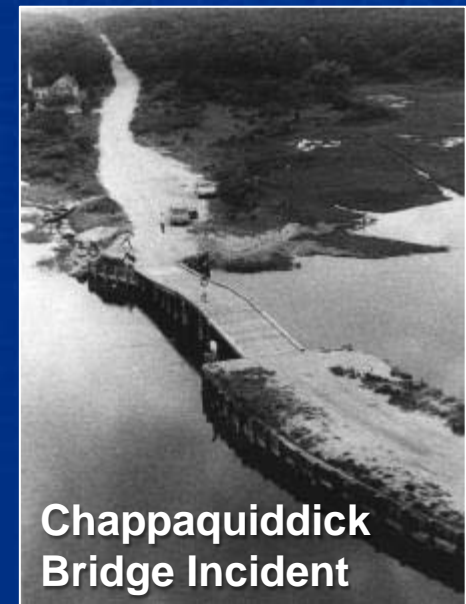
**First Computer to
Computer Message**



Man Walks on Moon



Eisenhower Passes



**Chappaquiddick
Bridge Incident**



Wal*Mart Incorporated



Woodstock Festival

1977 - SECOND NHTS

Population (millions) 216
18,000 households surveyed
In home interviews
Person miles traveled (trillion) 1.62

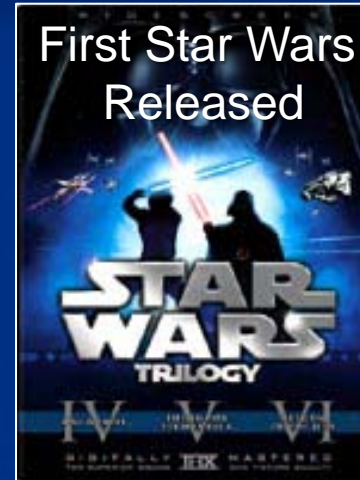
Vehicles/100 people 68
Gas /gallon \$ 0. 65
New house \$ 49,300
Income per year \$15,000
BMW 320i \$ 7,990



Apple Computer
Incorporated



Alaska Pipeline
Opens

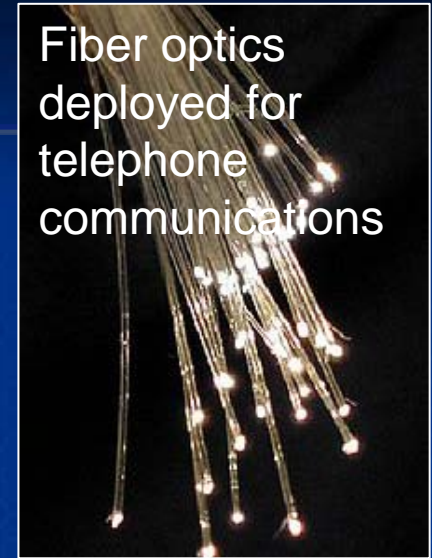


First Star Wars
Released



Elvis Died?

Fiber optics
deployed for
telephone
communications



Department of Energy
Created

1983 - THIRD NHTS

Population (millions)	234
6,500 households surveyed	
In home interviews	
Person miles traveled (trillions)	1.59
Vehicles/100 people	70
Gas /gallon	\$ 0. 79
New house	\$ 82,600
Income per year	\$ 21,070
Dodge RAM 50 Truck	\$ 5,665

ARPANET officially changes to use the Internet Protocol, creating the Internet

Microsoft Word and Lotus 1-2-3 first released.

Michael Jackson does Moon Walk

McNuggets Introduced



Top Seller Ford Escort



Modern Minivan Introduced



First mobile phones introduced to public by Motorola

1990 - FOURTH NHTS

Population (millions) 249
18,000 + 4,300 add-on Households
Computer Assisted Telephone Interview
Person miles traveled (trillions) 2.03

Vehicles/100 people 76
Gas /gallon \$ 1.34
New house \$ 123,000
Income per year \$ 28,960
Isuzu Rodeo \$ 12,4900



Exxon Valdez Spill



Honda Accord Top Seller



Hubble Deployed from Discovery



"The Simpsons" "Aired First Time"

1995 - FIFTH NHTS

Population (millions) 262
21,000 +21,000 add on households
Mail out with CATI
Person miles traveled (trillions) 3.11

Vehicles/100 people 77
Gas /gallon \$ 1.09
New house \$ 113,150
Income per year \$ 35,900
New car \$ 15,500



Play Station Released in U.S.



1995 Honda Civic, Most Commonly Stolen Car in 2007

DVD, Optical Disc
Storage Media
Announced.



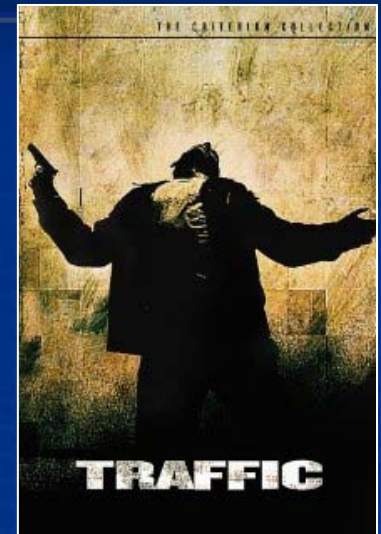
2001 - SIXTH NHTS

Population (millions) 281
26,000 + 44,000 add-on households
Two-stage CATI
Person miles traveled (trillions) 3.52

Vehicles/100 people 82
Gas /gallon \$ 1.46
New house \$ 136,150
Income per year \$ 42,350
New car \$ 27,958



**Segway Introduced to
Revolutionize
Transportation?**



Academy Award
Winning Movie
dealt with drugs
not cars



**SATELLITE
RADIO**

Satellite Radio Begins



September 11

2008-09 - SEVENTH NHTS

Population (millions) 305
 25,000 + 125,000 add-on households
 Two-stage CATI
 Person miles traveled (trillions) 3.30

Vehicles/100 people 80
 Gas /gallon \$ 3.39
 New house \$ 238,880
 Income per year \$ 40,523
 New car \$ 28,715



Richest Nations Agree to Halve
 Greenhouse Gas



Facebook Passes 100 Million
 Users

The top three Internet
 searches in 2008:

1. Britney Spears
2. World Wrestling
 Entertainment
3. Obama



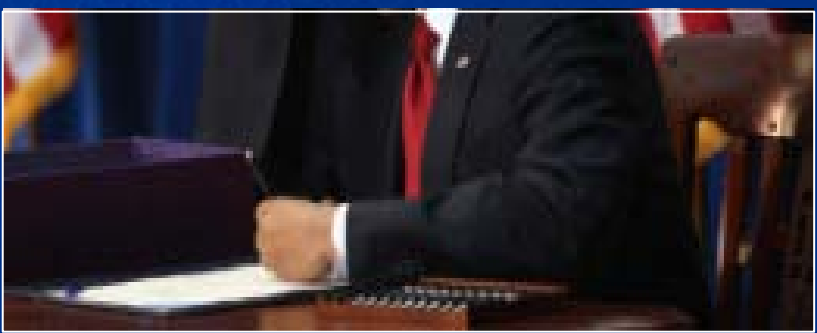
Automakers Beg for
 Washington Aid

2014 - NHTS

CANCELED

Population (millions) 323
 Person VMT (trillion) .23

Vehicles/100 people 8
 Gas /Gallon \$0.79
 New house \$165,000
 Income per year \$38,000
 New Car NA



President Signs Transportation
 Reauthorization Bill LATE-TEA



Apple iphone 7G iOS 8

Personal Teleportation App

2014 - NHTS

CANCELED

Population (millions)	323
Person VMT (trillion)	.23
Vehicles/100 people	8
Gas /Gallon	\$0.79
New house	\$165,000
Income per year	\$38,000
New Car	NA



THE KECK CENTER OF THE NATIONAL ACADEMIES

THE KECK CENTER

NATIONAL
ACADEMY OF
SCIENCES

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ENGINEERING

INSTITUTE
OF
MEDICINE

NATIONAL
RESEARCH
COUNCIL

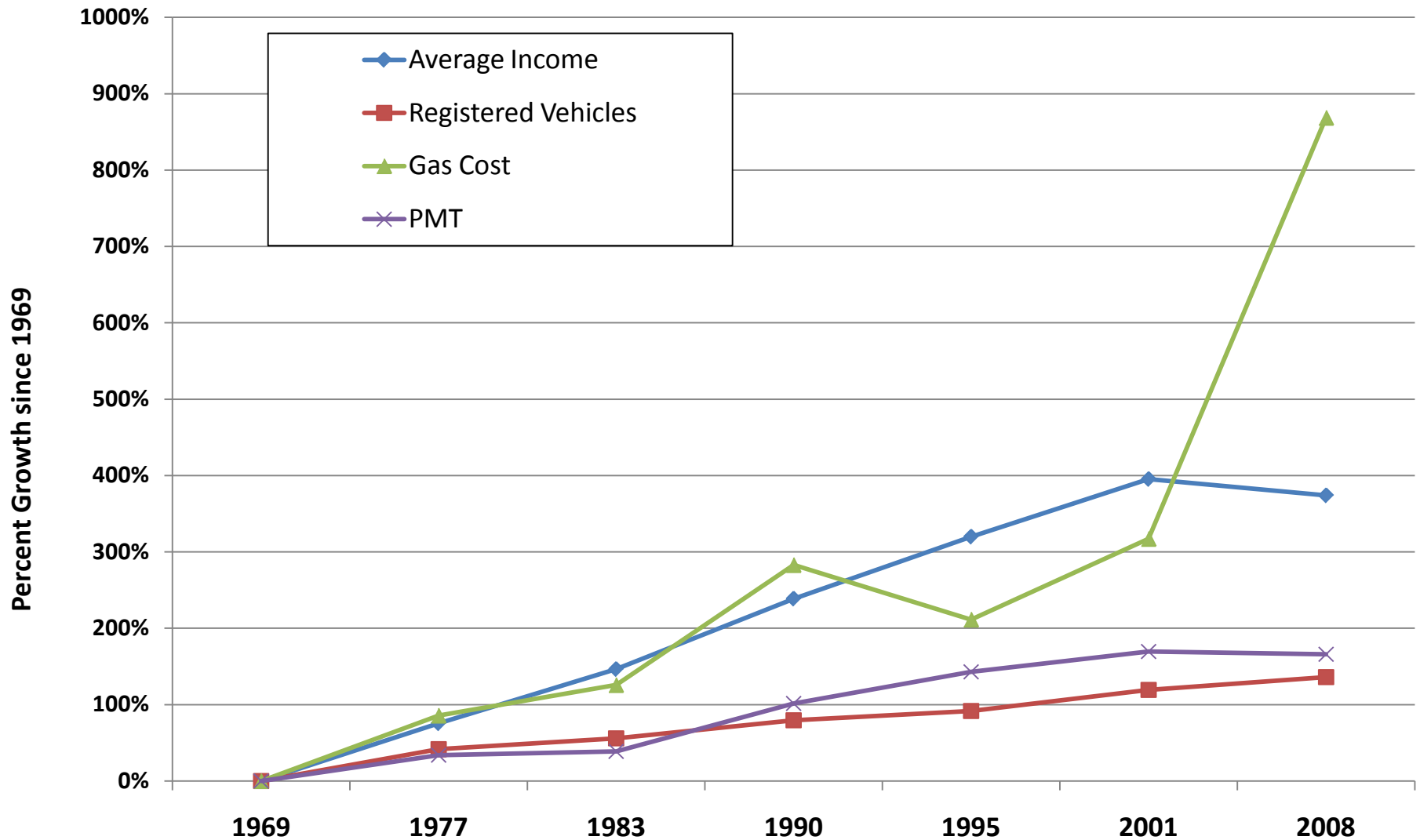
THE
NATIONAL ACADEMIES
500 FIFTH STREET
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NO
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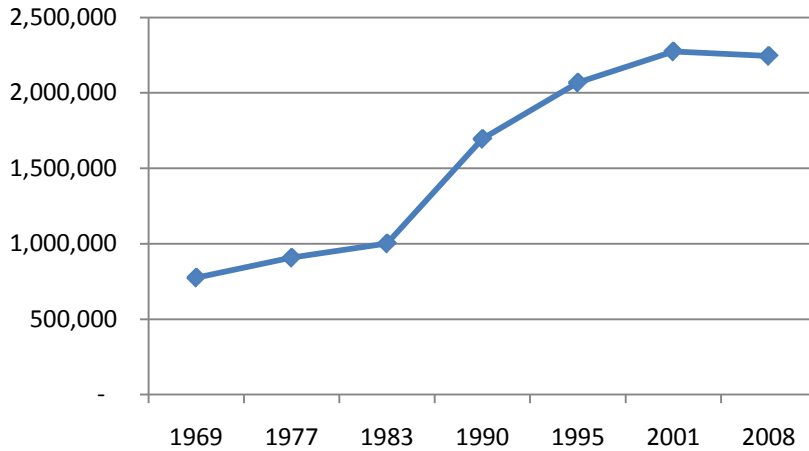
Fundamental Travel Trends

VMT, Registered Vehicles, Gas Cost, Average Income

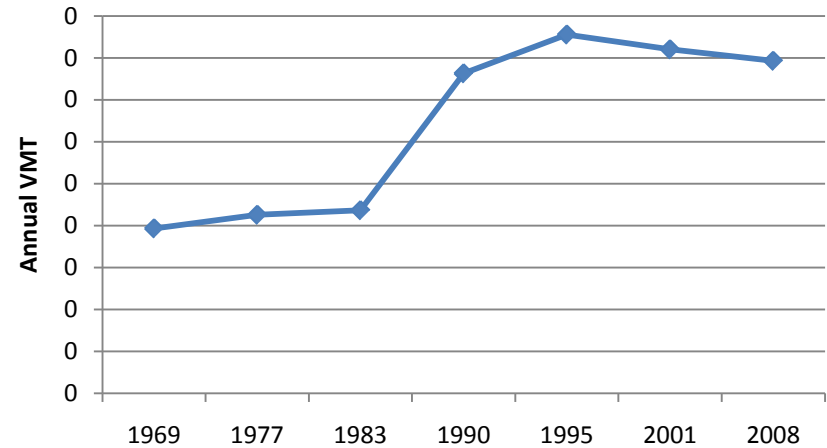


Travel Trends

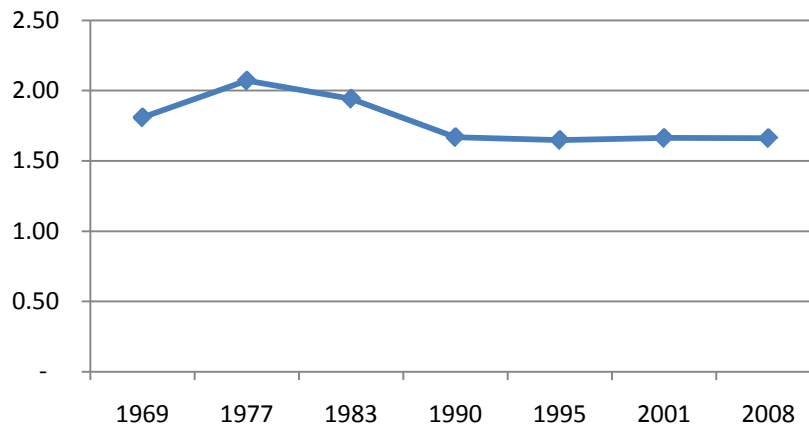
VMT in Millions



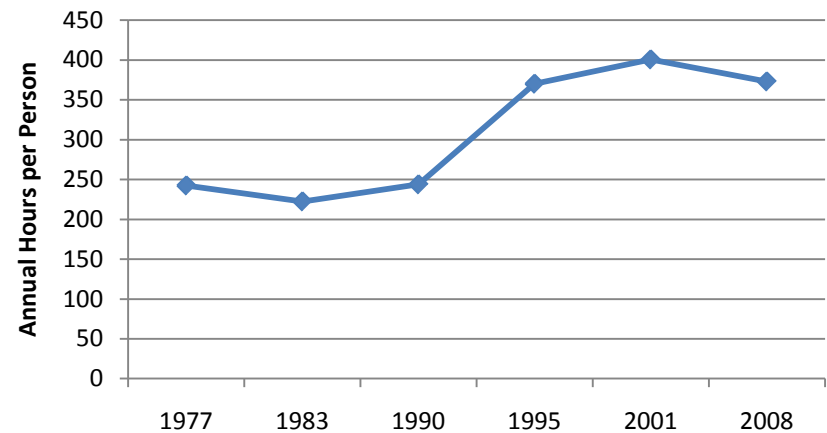
VMT per Person



PMT/VMT

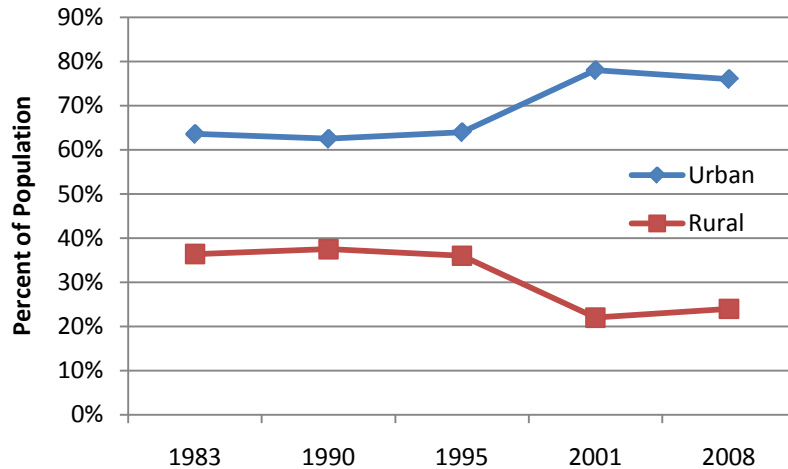


Travel Time per Capita

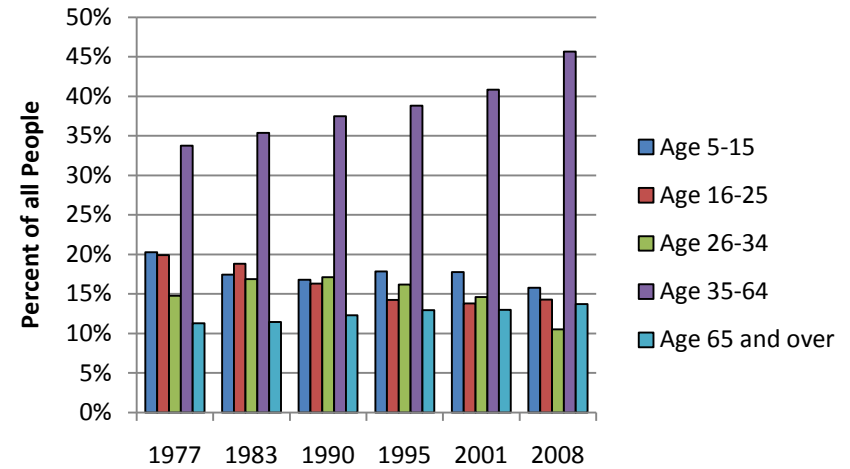


Demographic Trends

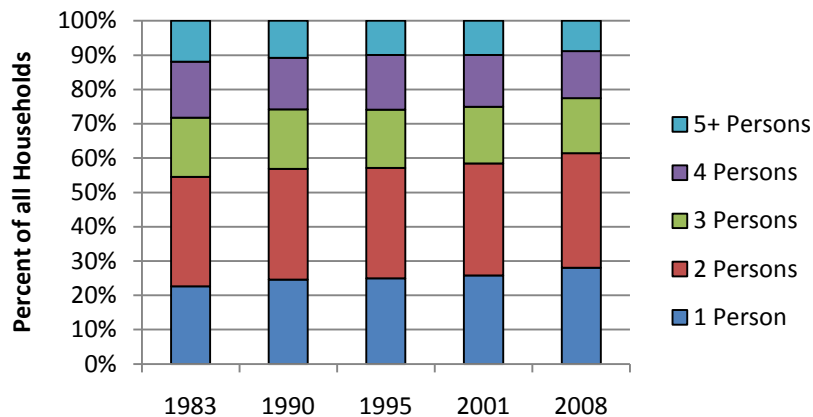
Population - Urban and Rural



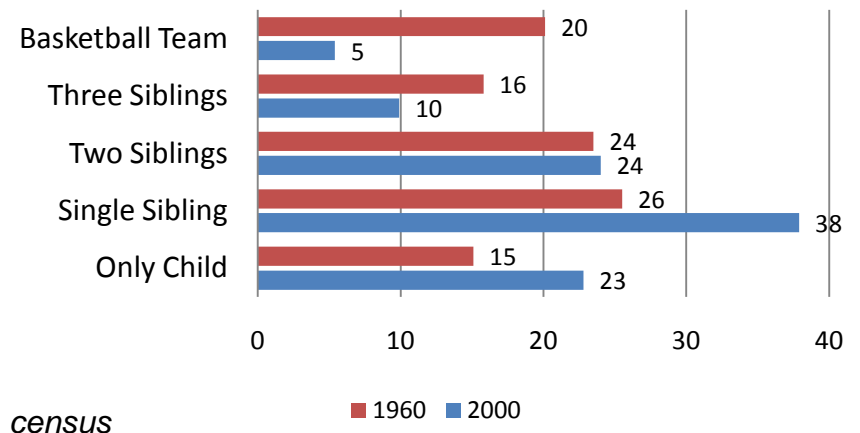
Population by Age



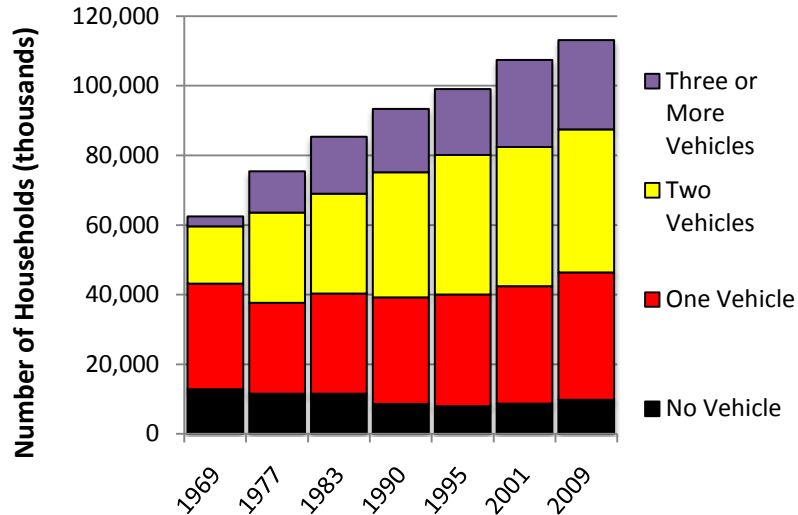
Household Size



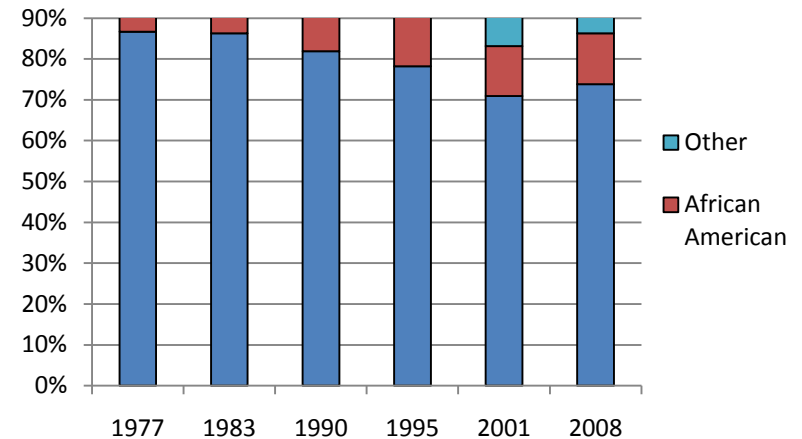
Households with Siblings



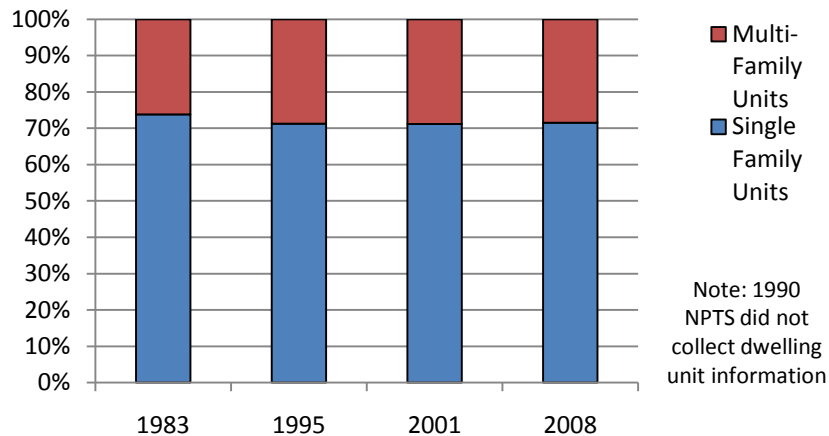
Demographic Trends



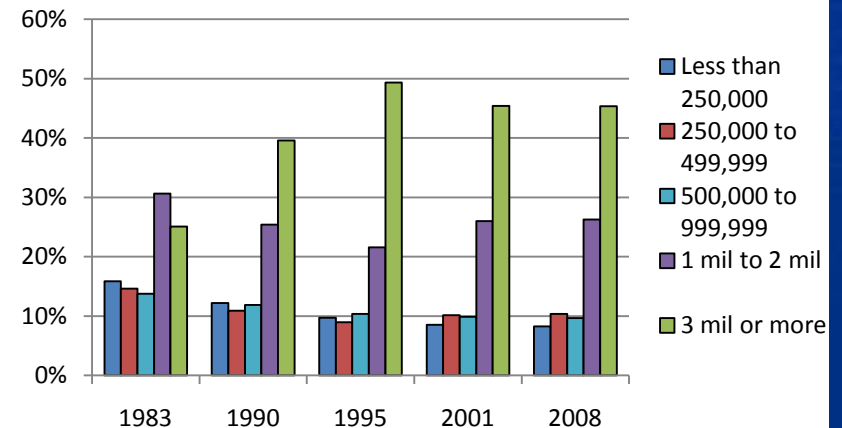
Population by Race



Housing Type



Population by MSA Size



VMT Basics

4 Step Modeler

Trip Generation

Trip Length

Mode

1. $\text{Pop} \times \text{Trip Rate} \times \text{Trip Length} \times \text{Vehicle Share} = \text{Vehicle Miles of Travel}$

Activity Modeler

Travel Time Budget

Travel Speed

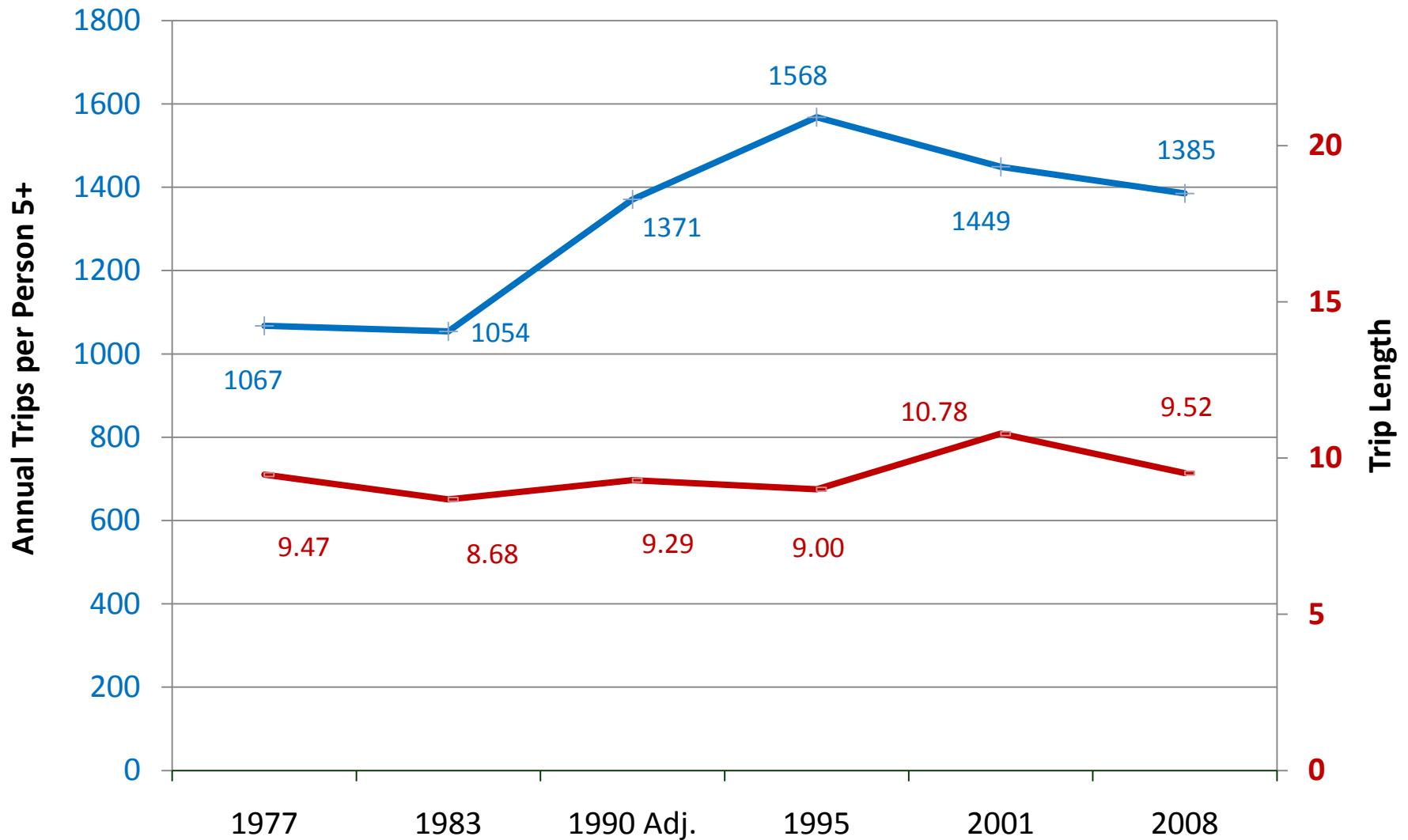
2. $\text{Pop} \times \text{Time in SOV Travel} \times \text{Speed} = \text{Vehicle Miles of Travel}$

Economist

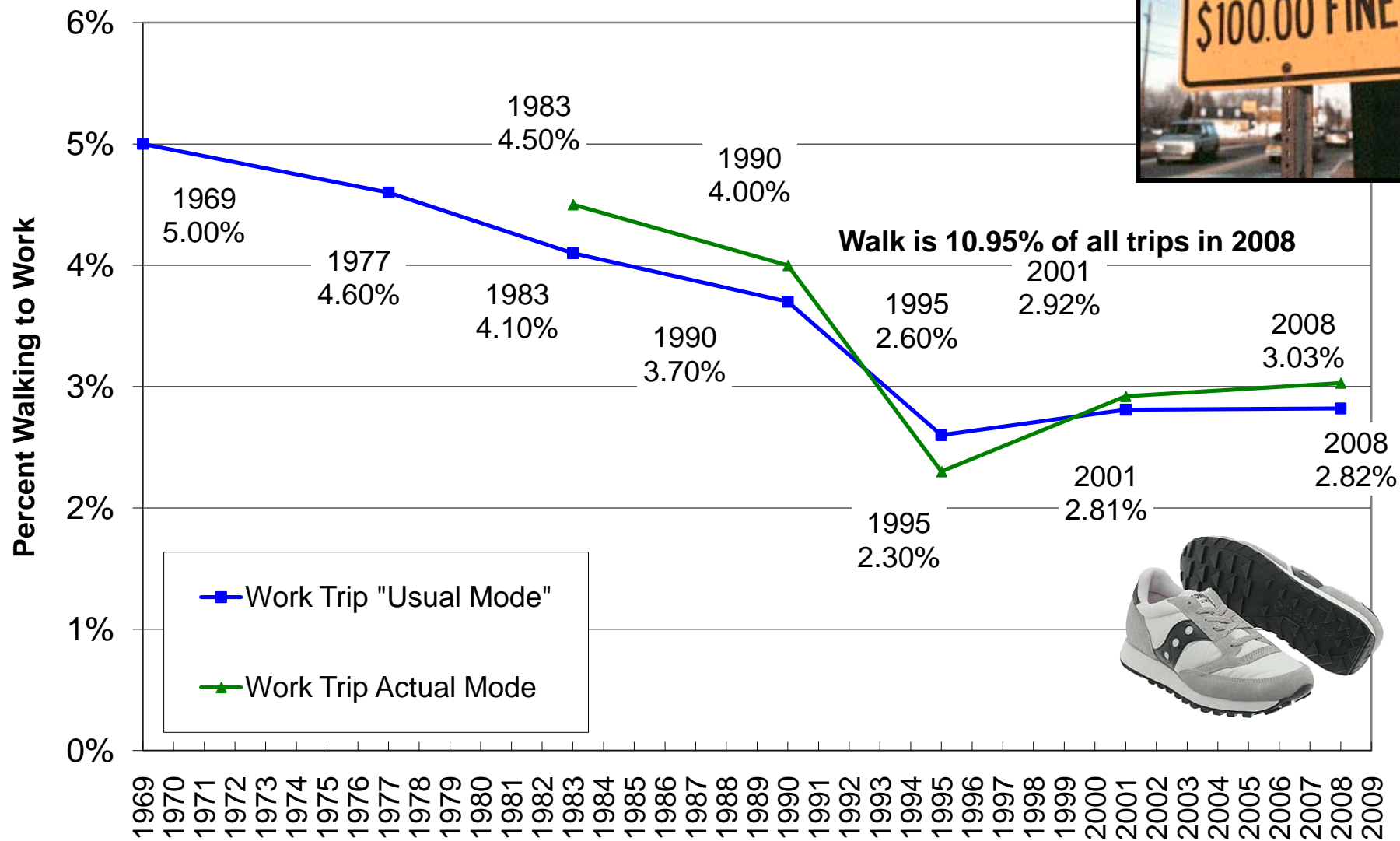
Income

3. $\% \Delta \text{Population} + 1/3 \times \% \Delta \text{Personal Income} = \% \Delta \text{Vehicle Miles of Travel}$

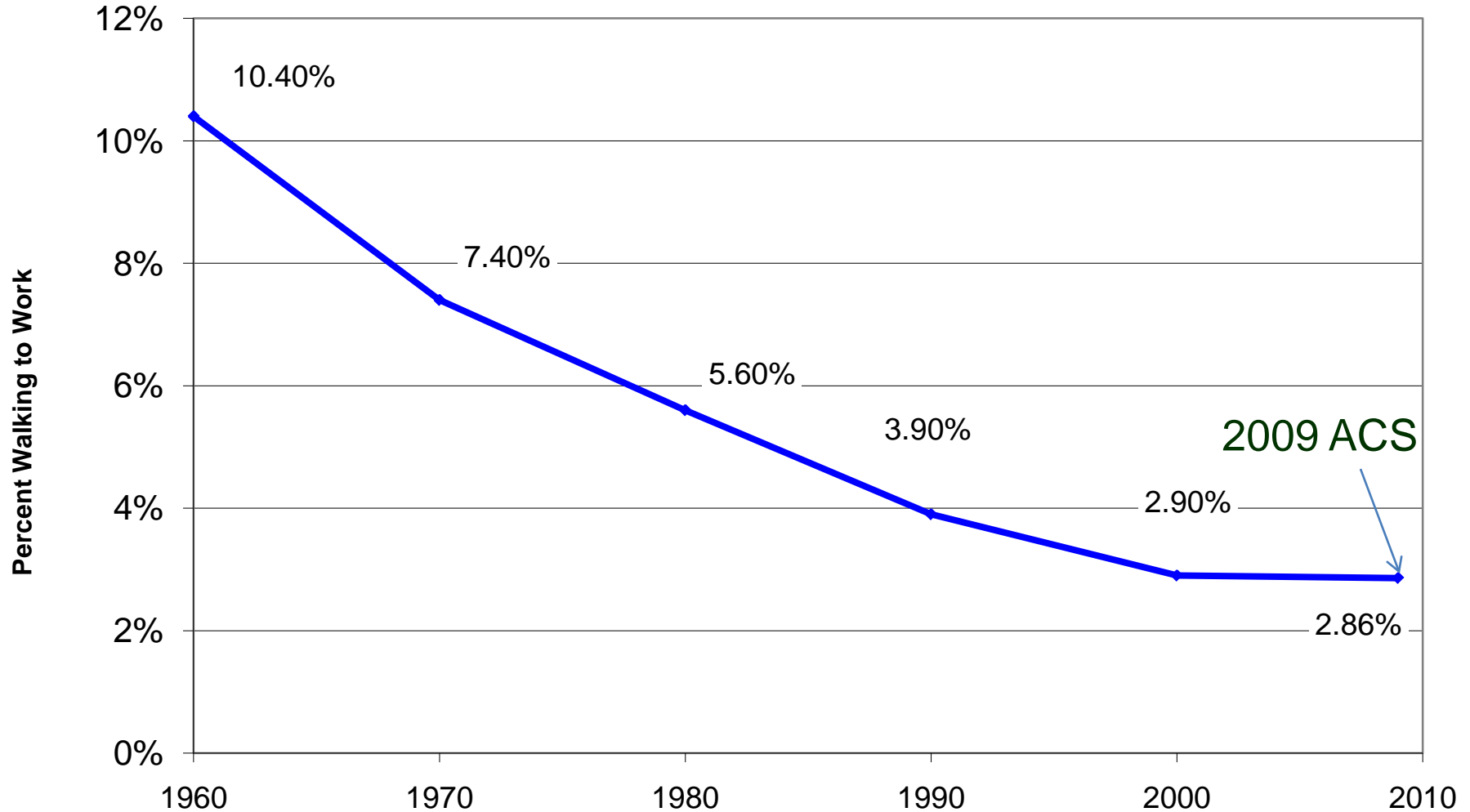
Trip Rate and Length



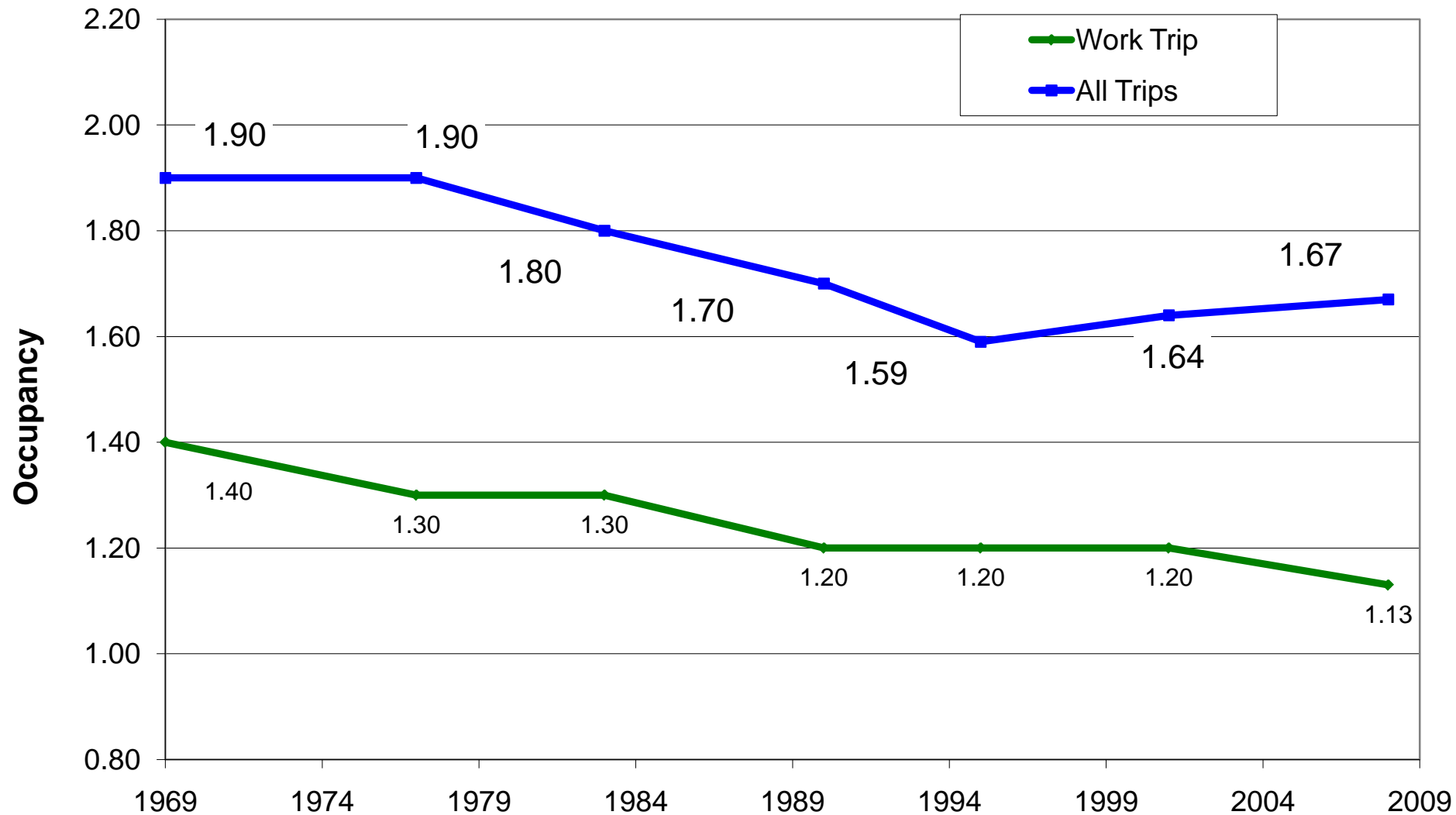
NPTS and NHTS Work Trip Walking Mode Shares



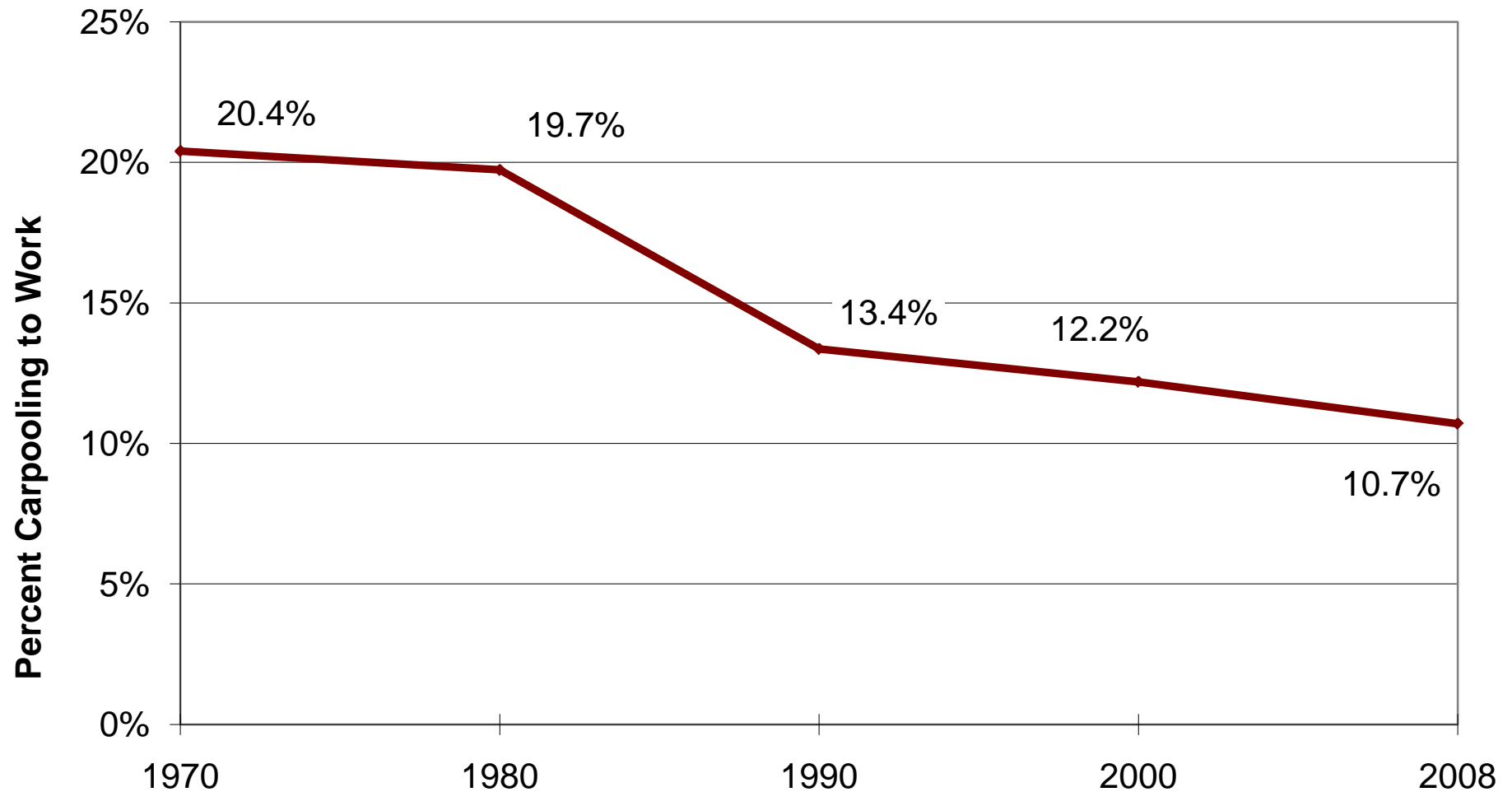
Census/ACS Work Trip Percent Walking Mode Share



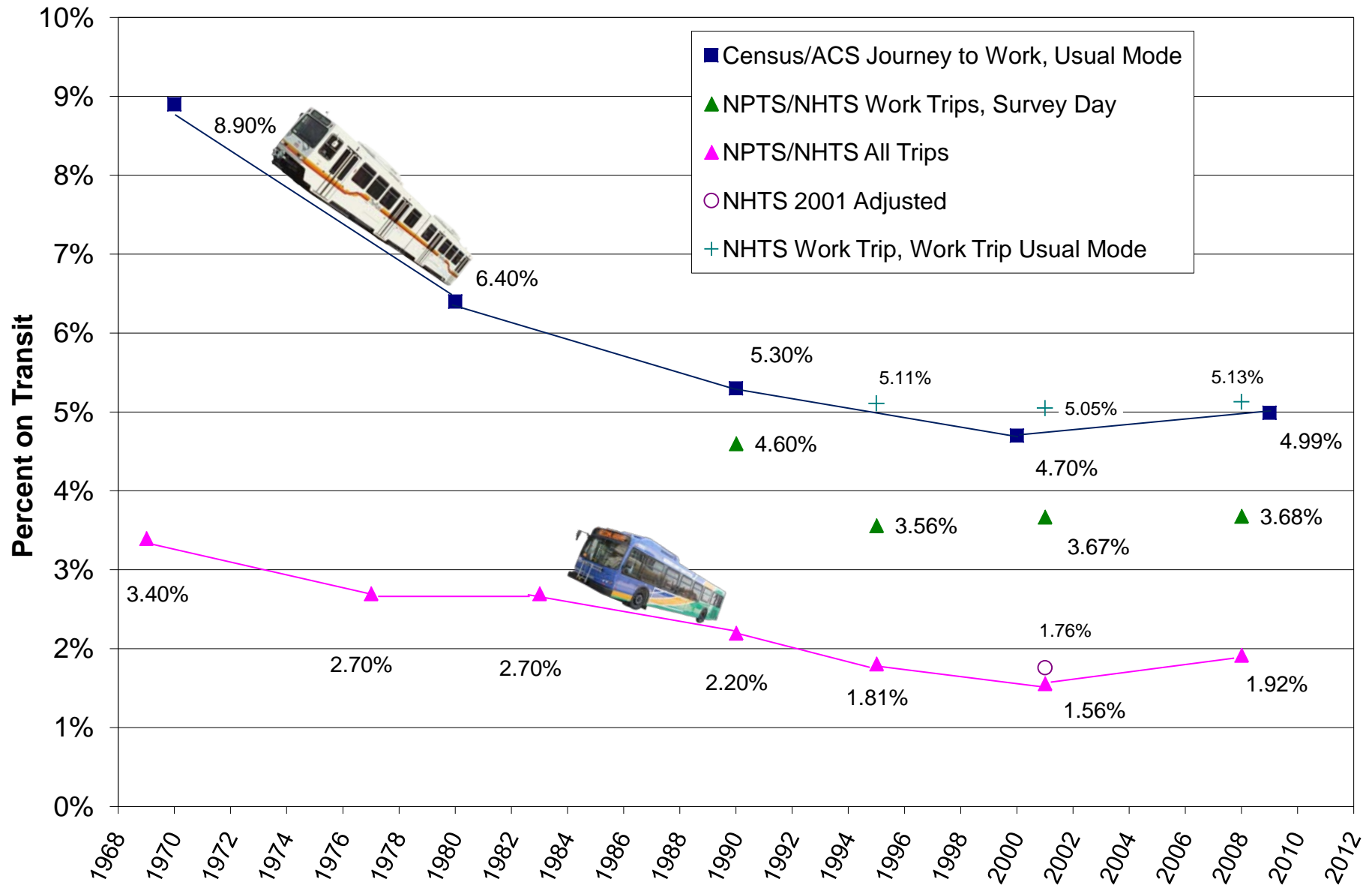
Vehicle Occupancies - NHTS



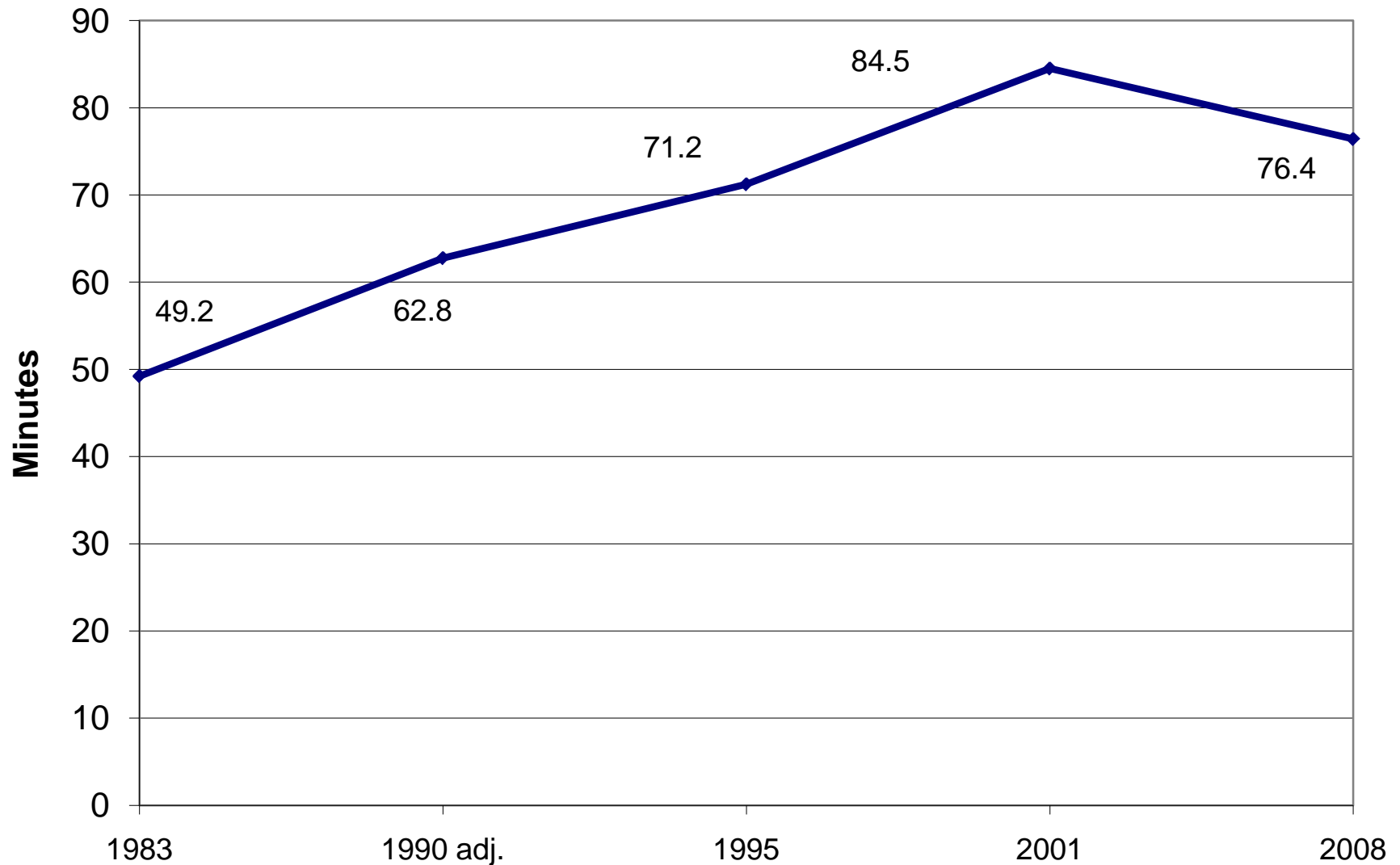
Carpooling Mode Share (ACS)



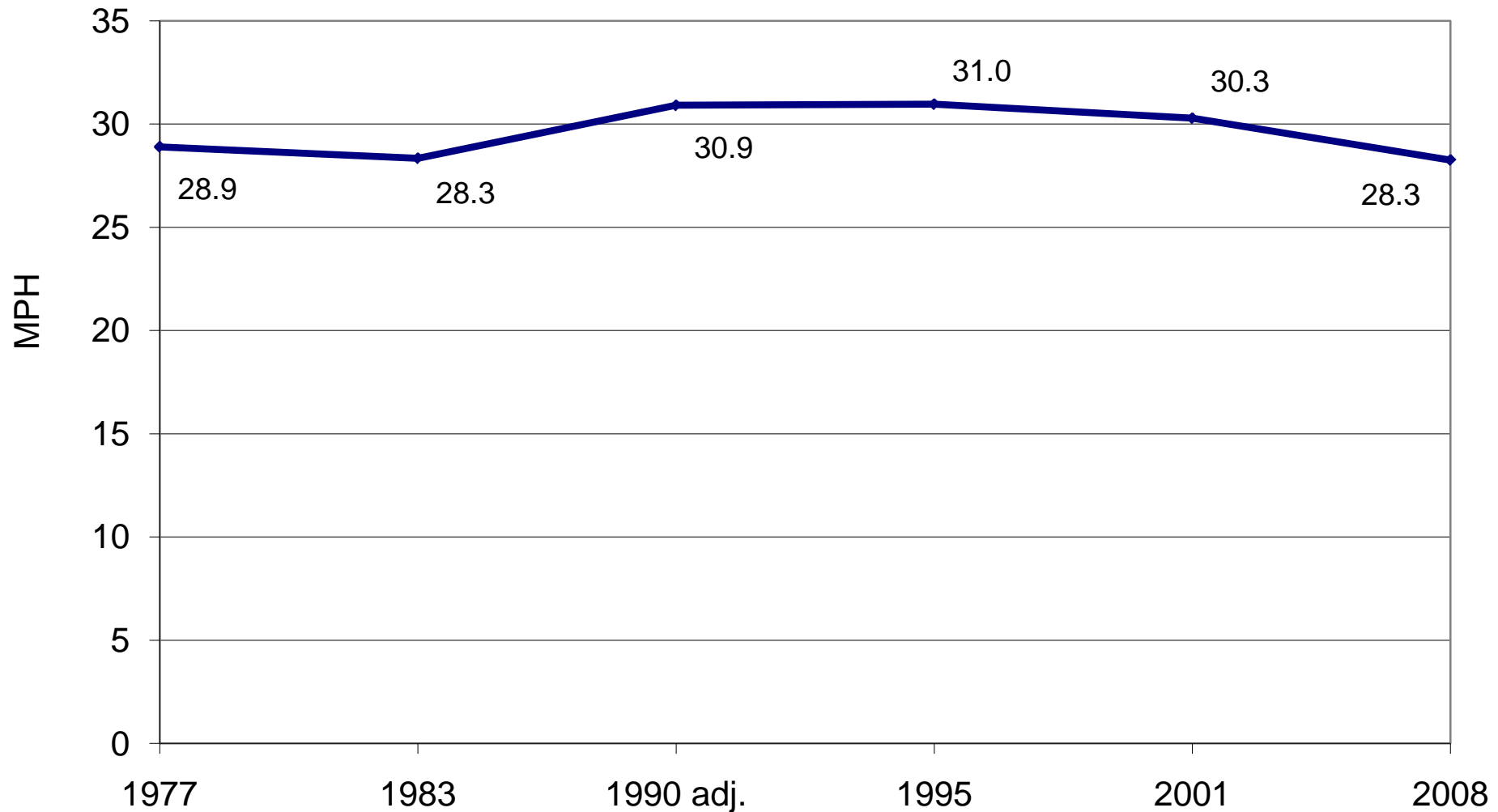
Transit Mode Share Trends



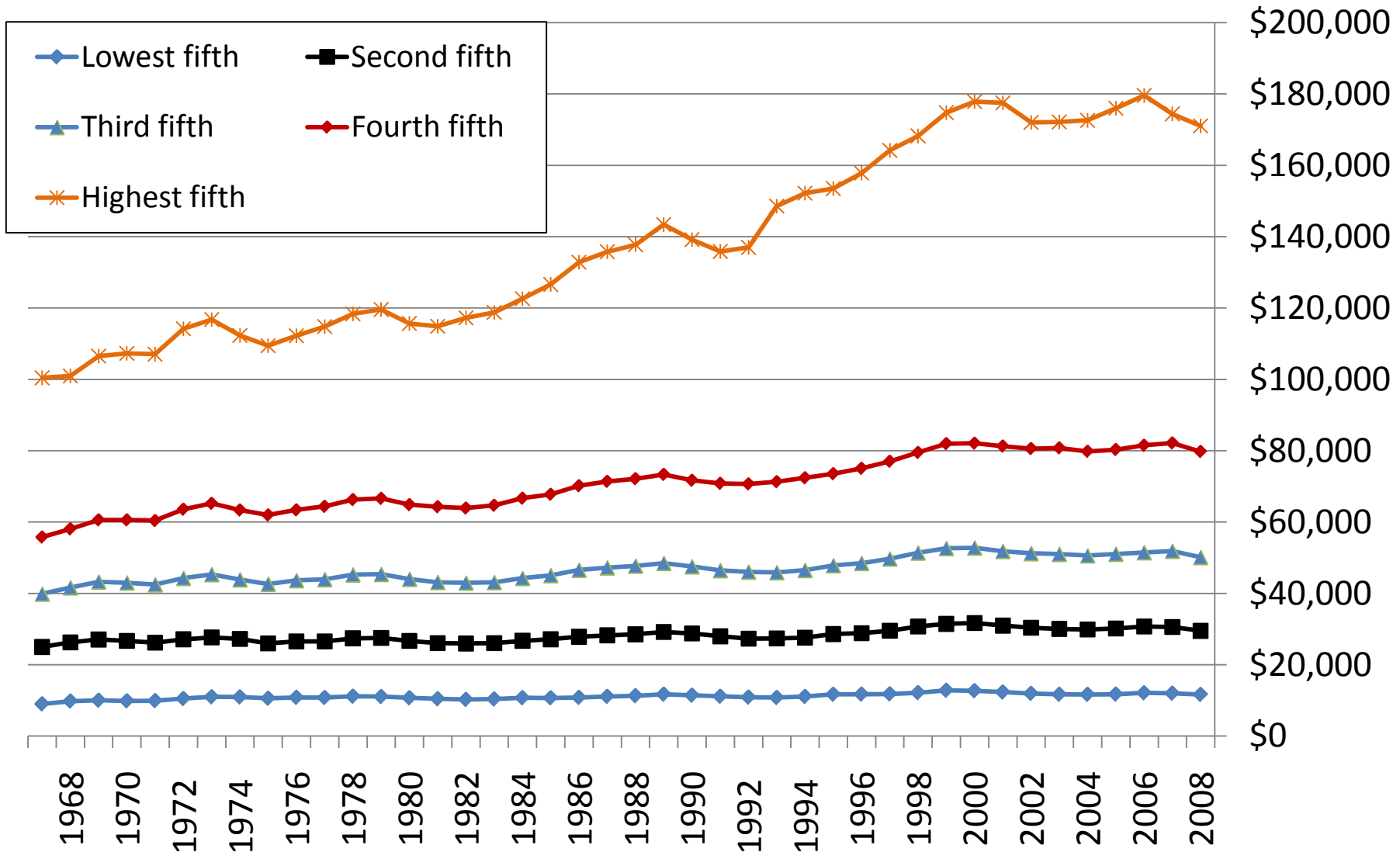
Time Spent in Travel per Day



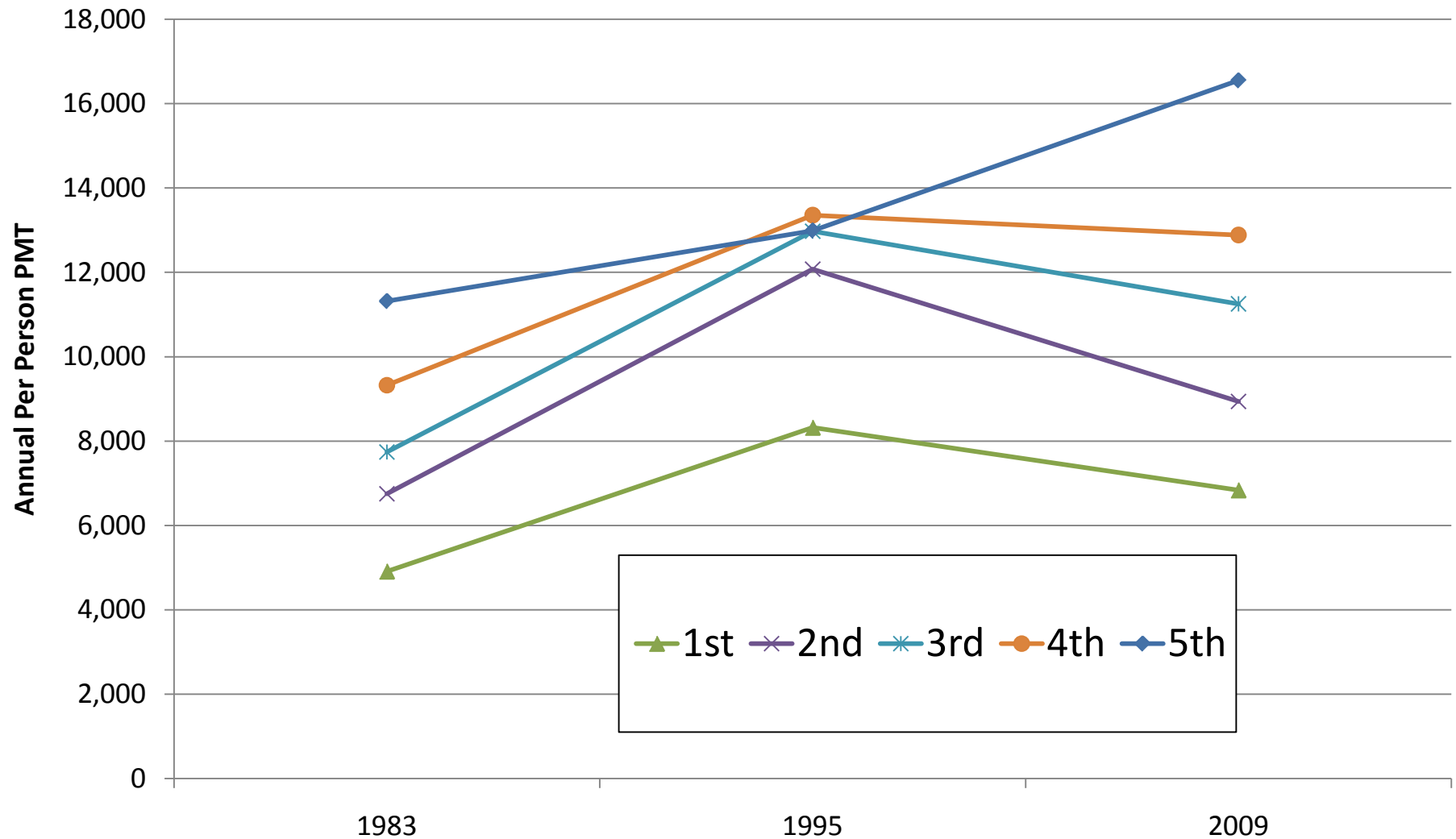
Person Miles of Travel per Hour (speed, all trips)



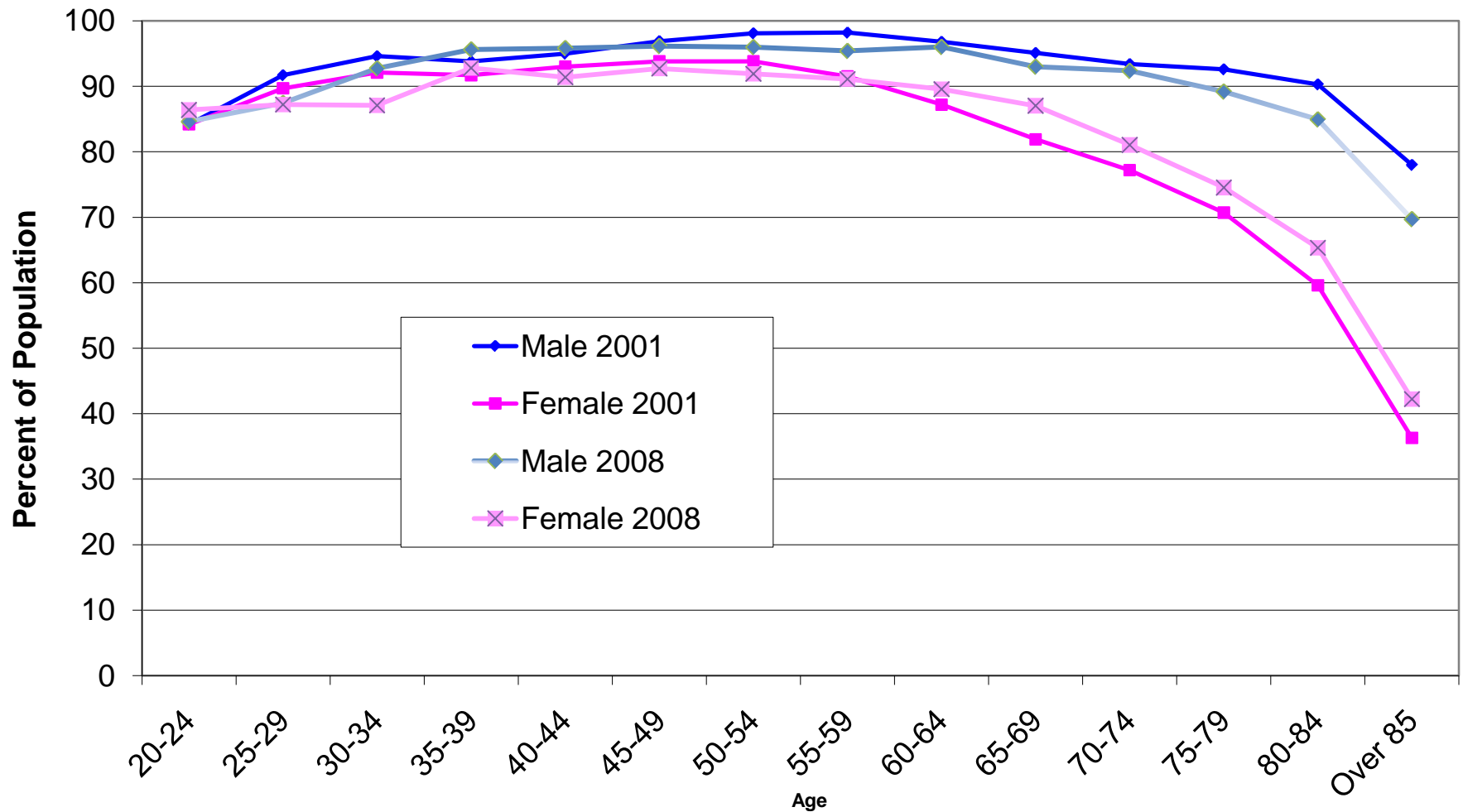
Mean Household Income Received by Each Quintile 1967 to 2008



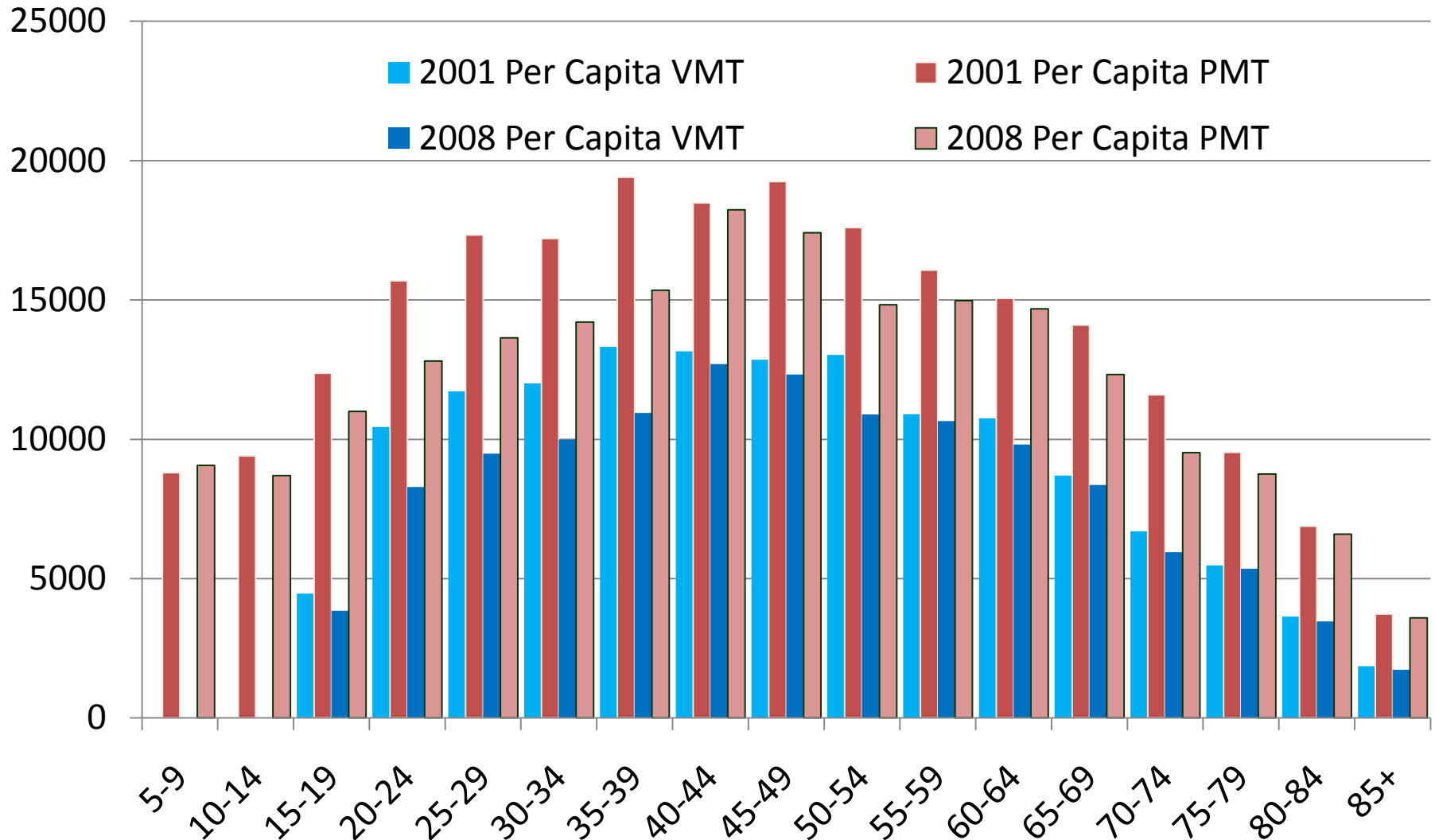
PMT by Income Quintile



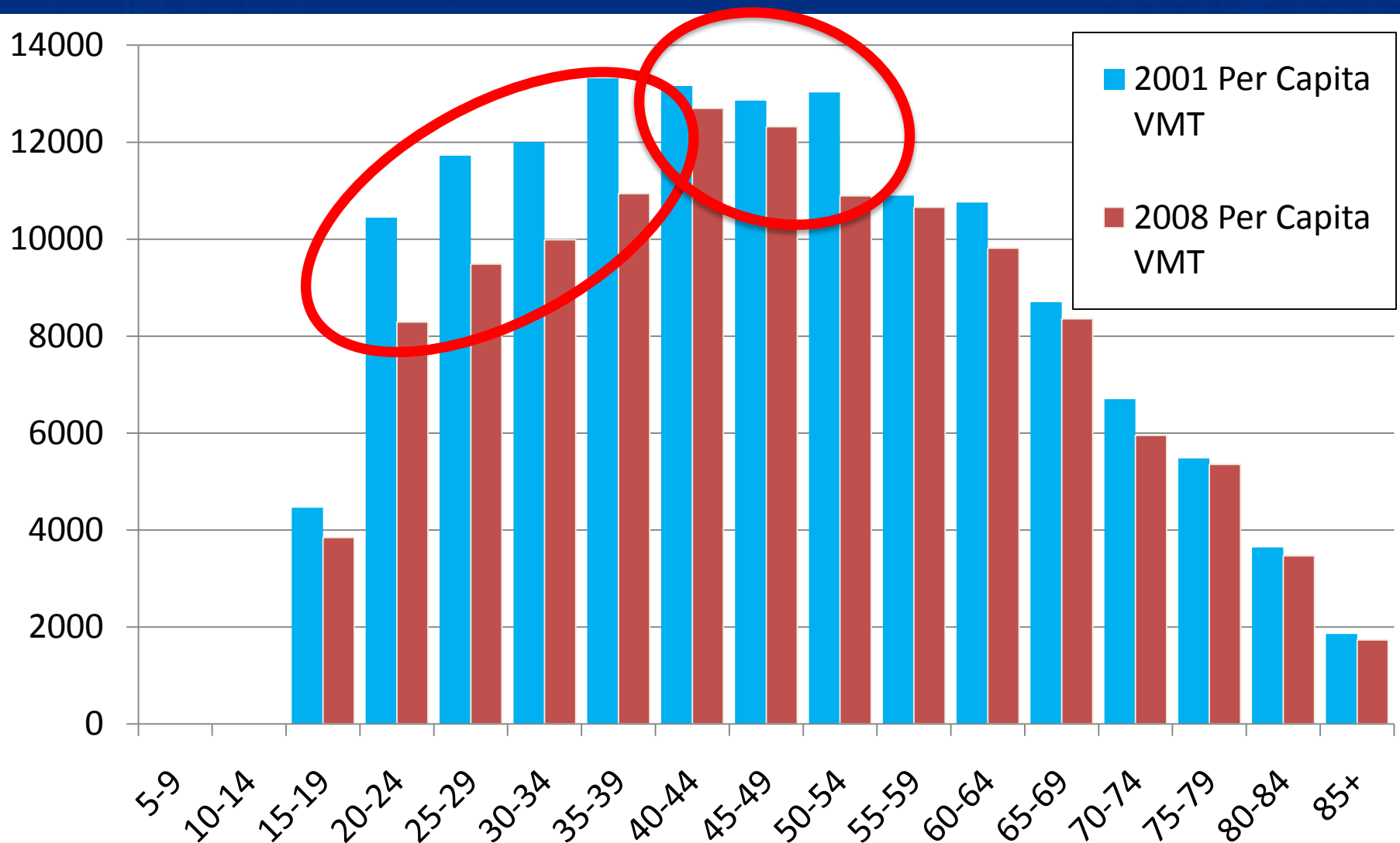
Driving Population by Age and Gender



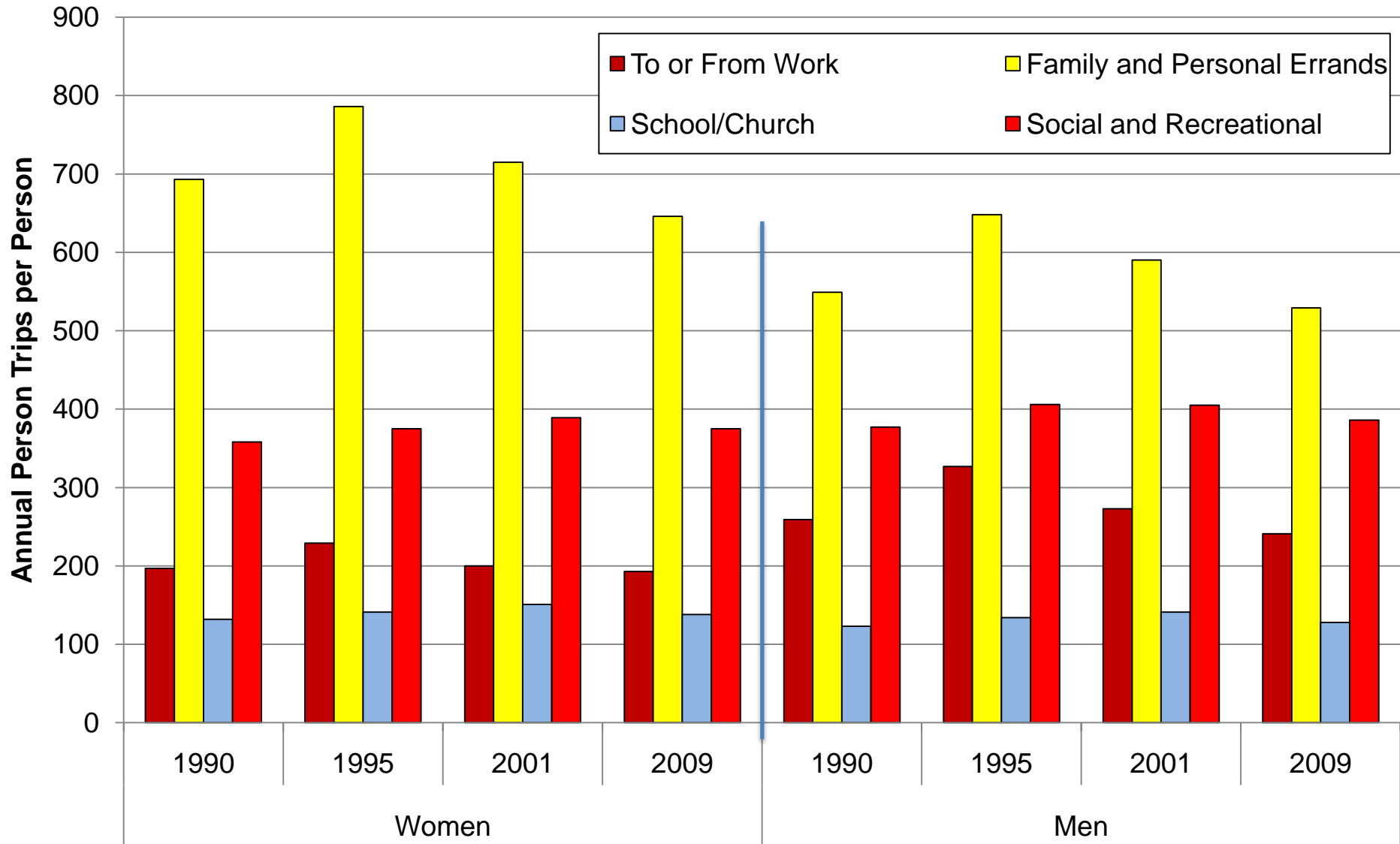
PMT and VMT per Capita by Age



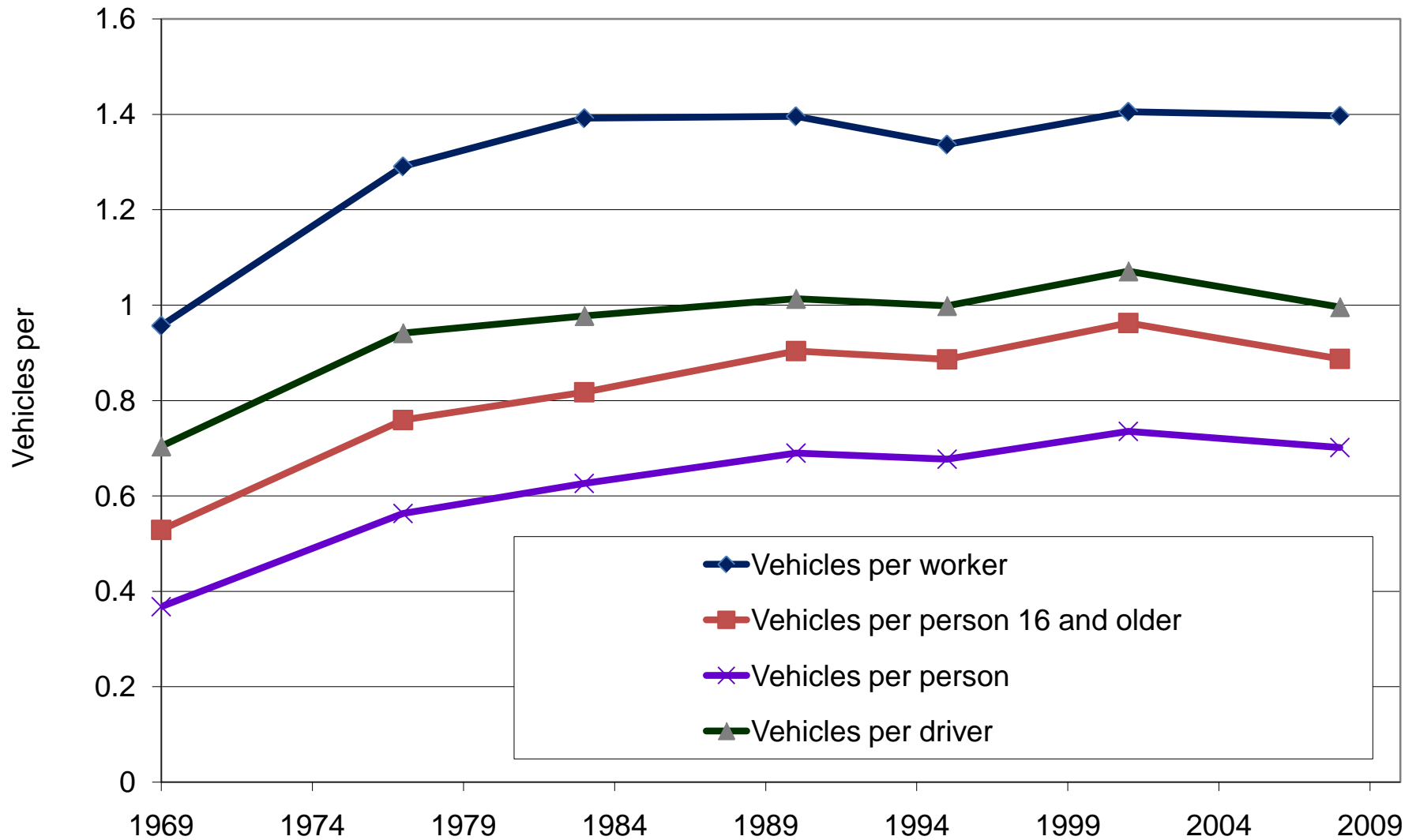
PMT and VMT per Capita by Age



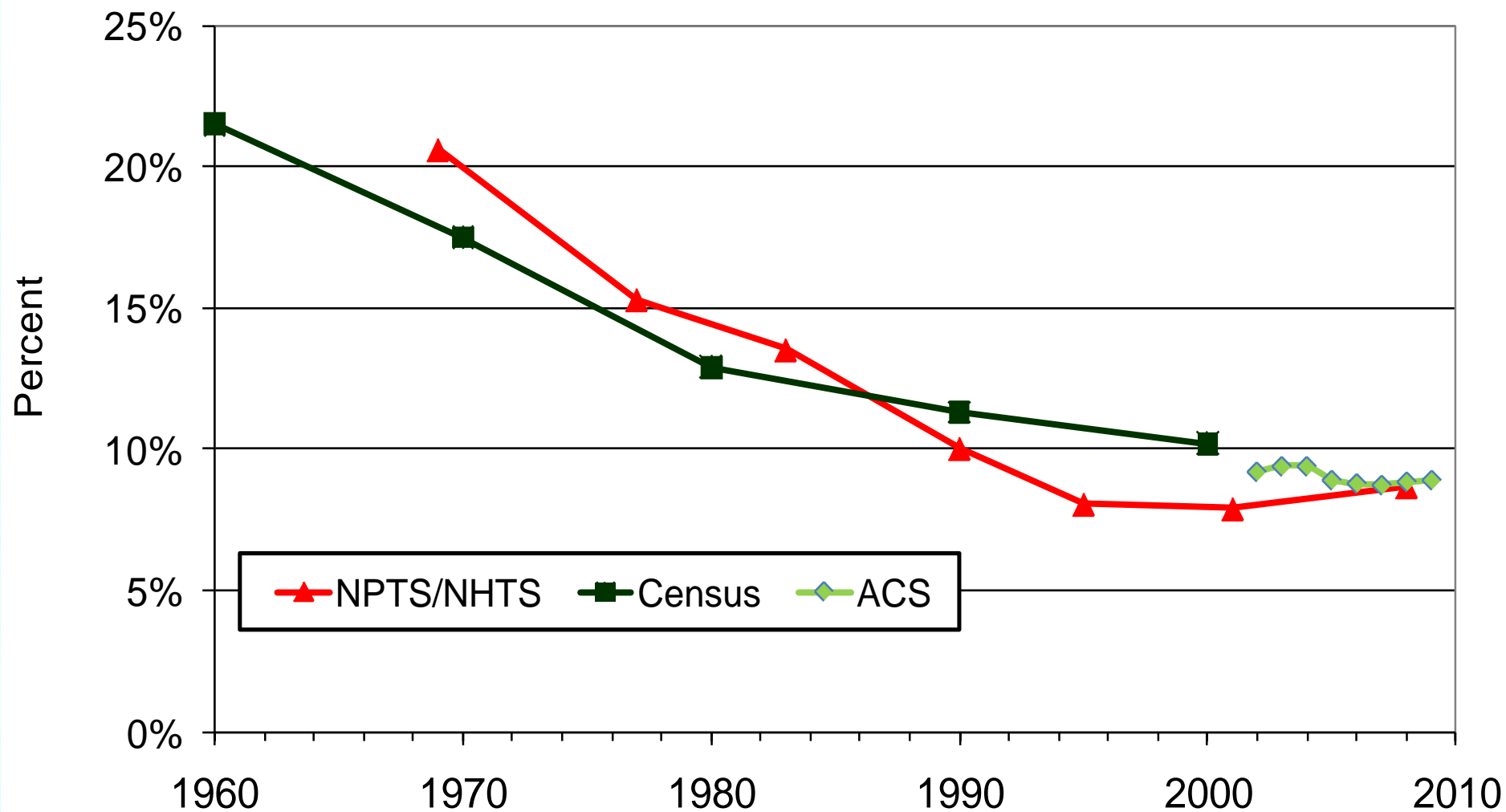
Trip Purpose Changes by Gender



Vehicle Availability



Declining Zero-Vehicle Households?



Source: CUTR analysis of NHTS ,NPTS,U.S. Census Bureau and 2002-09 ACS

Household Vehicle Ownership Distribution

Household Percents

National Household Vehicle Ownership Distribution, 2009

HH Vehicles	Number of Adults in HH					
	1	2	3	4	5+	All
0	5.79%	2.28%	0.38%	0.19%	0.05%	8.69%
1	20.40%	10.18%	1.31%	0.33%	0.06%	32.28%
2	3.66%	29.04%	2.92%	0.62%	0.08%	36.32%
3	0.74%	9.06%	3.72%	0.78%	0.09%	14.39%
4	0.21%	2.58%	1.54%	0.82%	0.13%	5.30%
5+	0.14%	1.40%	0.82%	0.49%	0.17%	3.02%
All	30.96%	54.54%	10.69%	3.23%	0.58%	100.00%

20.66%

More cars than adults

54.16%

Cars equals adults

16.50%

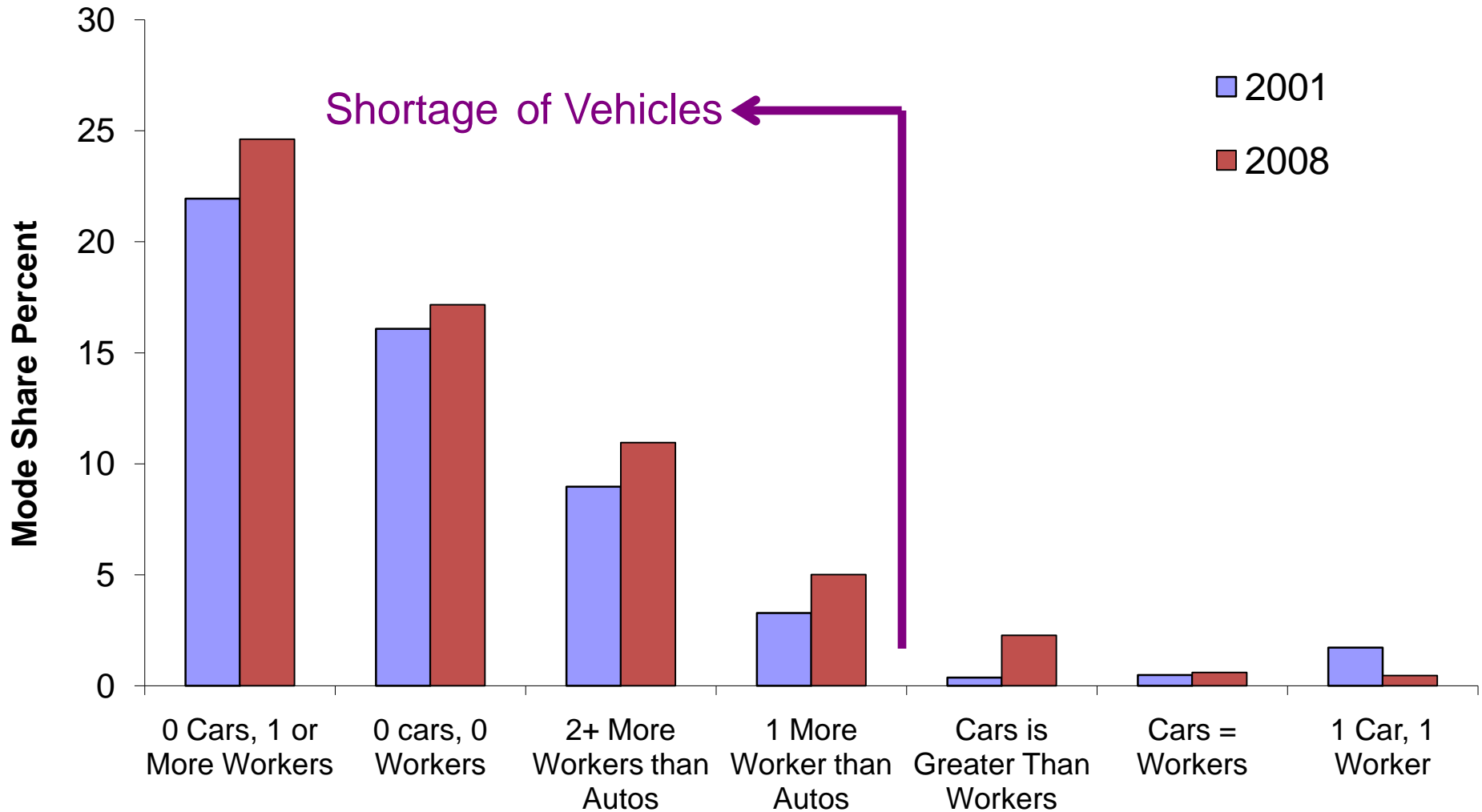
Fewer cars than adults

8.69%

Zero cars

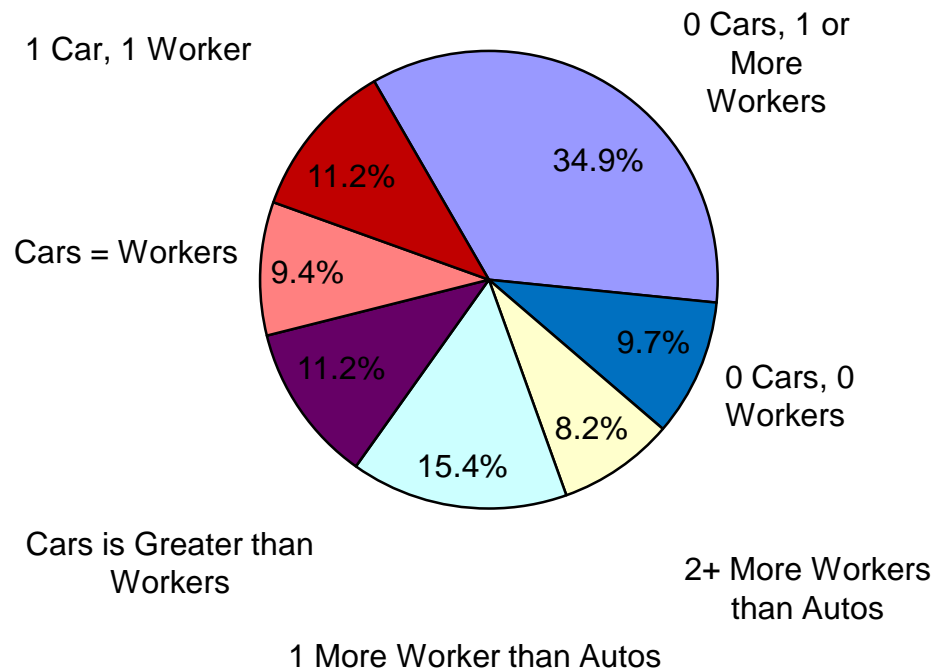


Transit Mode Share by Vehicle Availability

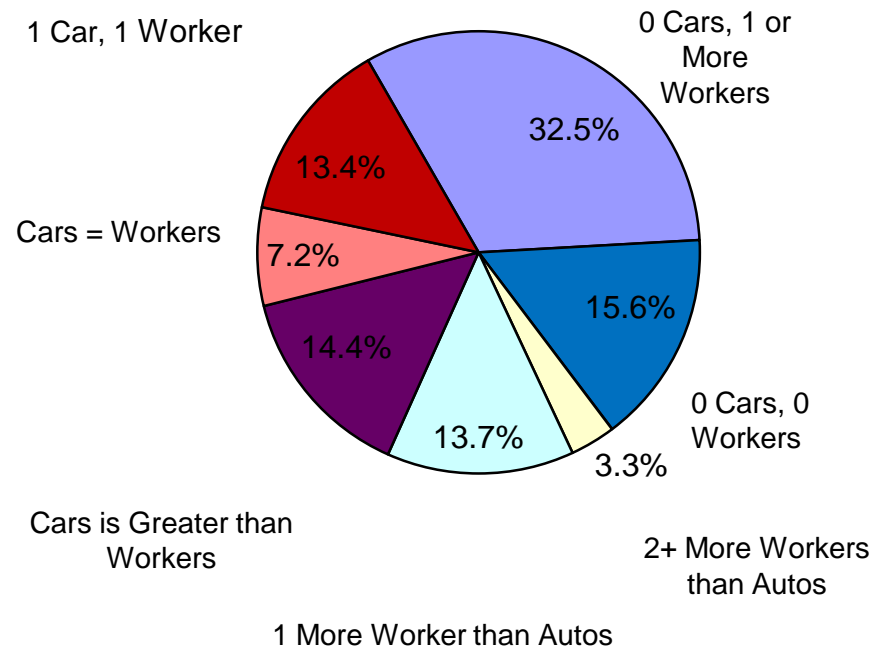


Transit Market Share by Car Availability

2001



2008

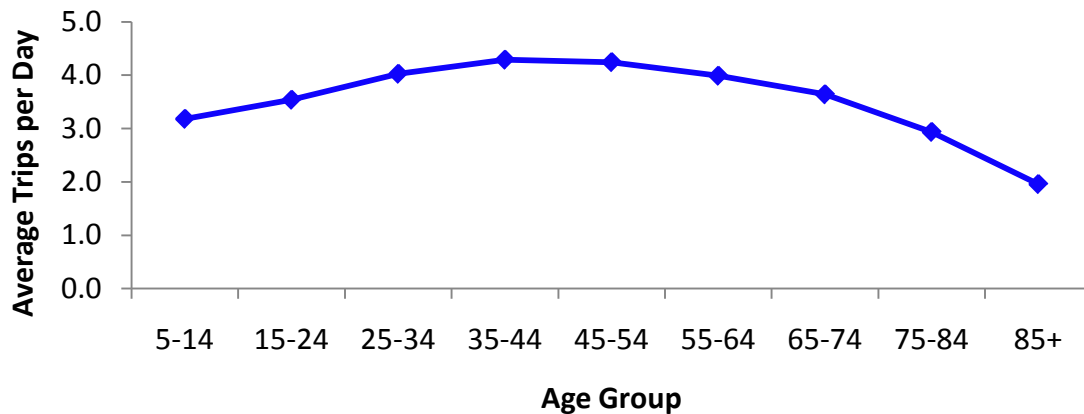


Transit Mode Share by Income

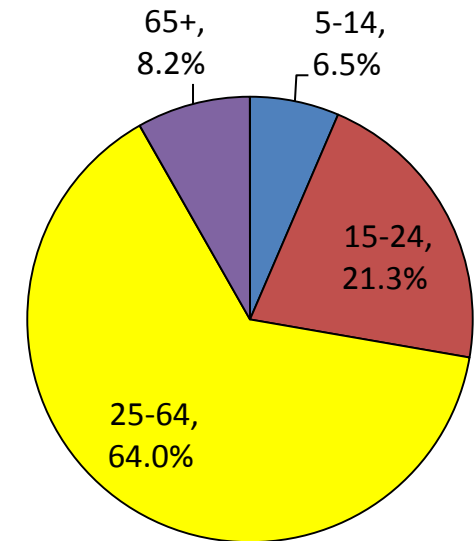


Transit and Elderly

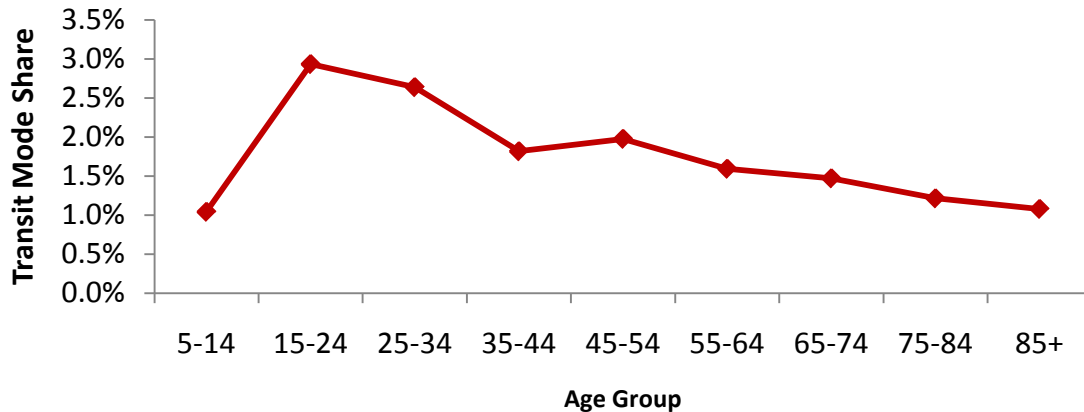
Person Trips per Day by Age



Share of Transit Trips by Age Groups



Transit Mode Share by Age

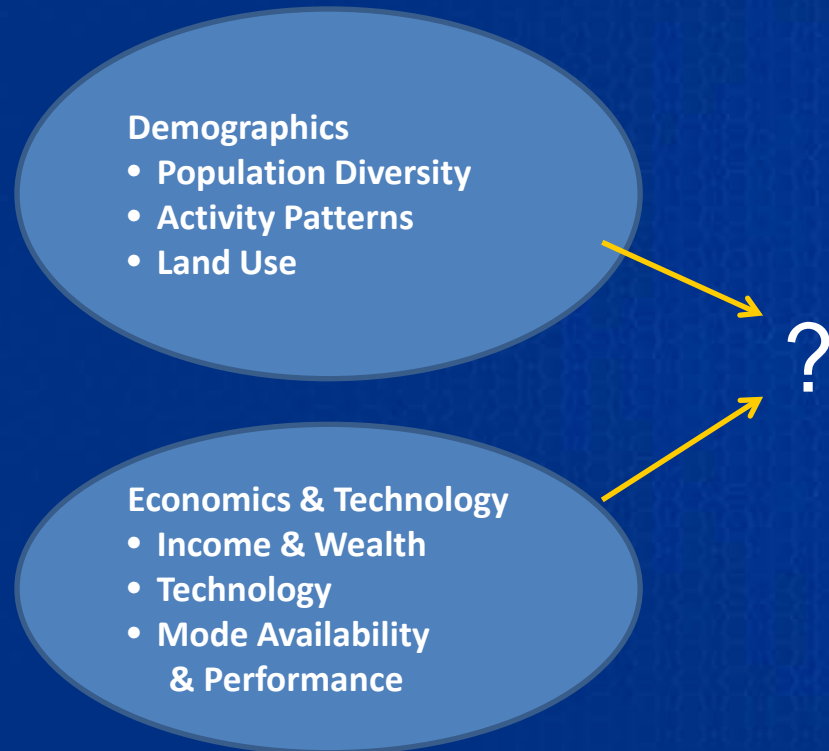


Where Have We Been

Changes 2001-2009

Population.....,,.....	+8.7%
Person VMT	-1.6%
VMT/Population.....	-10.4%
Trip Rate.....	-4.4%
Trip Length	-6.2%
SOV Share.....	+6.4%
Travel Speed	-6.7%

Where are We Going?



Fundamental Economic and Demographic Changes Continue

Traditional Households
Waning ...
*Atlantic Journal-
Constitution, May 2011*

Home Ownership Levels at
New Lows ...
*The New York Times,
May 2011*

..... the average graduate
finishes school with
\$24,000 of debt ...
*Institute for College Access
and Success,
May 2011*

... 85 percent of this year's
college graduating class will
be forced to move back
home.
*Twentysomething Inc.,
May 2011*

Hispanics account for half
of US population growth.
*Census,
May 2011*

*Could Housing Market Stay
Down For 14 More Years?*
The Consumerist, June 2011

Fundamental Economic and Demographic Changes Continue

As the economy tightens, younger car buyers are staying out of the new car market.

*The Consumerist,
May 2011*

Americans got used to staycations during the recession, but as the economy begins to recover many are now ready to graduate to the short-stay getaway...

AP, May 2011

U.S. Reports Continuing Drop in Birth Rate—

Data show broad-based decline among all races, nearly all ages, and in all states.

Healthday, March 2011

Women now hold nearly half of all paid U.S. jobs (49.8 percent)...narrowing the male-female wage gap to its lowest point in history.

-UNC News, Jan 2011

*UPDATE: Gas Prices,
Economy Leave Retailers
With Mixed May Sales
WSJ, 2011*

Role of Communications Technology

- 30% of couples meet online, eHarmony is responsible for 5% of all marriages
- Holiday shoppers spent 12% more on line in 2010 than 2009
- 85% of Americans own cell phones, 25% of households have gone cell phone only
- 51% of Americans 12 years of age or older have a Facebook account
- There was a 21% increase in online course enrollment in colleges across the country in 2010.
- Households with teenage children had 5.2 online purchases and 4.2 home deliveries per month according to NHTS.

Socio-Demographic Issues

- Aging population
- Saturation of female labor force participation
- Different young adult behaviors
- Slowing migration - locked in homes/less mobile
- Reduced immigration
- Income/wealth impact
- Changing household composition
- Slowing of suburbanization?

System Supply Issues

- Future system supply and speed
- Energy and other costs
- Environment/climate concerns
- Evolving technology impacting travel
- Etc.

How can the current and future NHTS
help us address transportation
planning and policy issues going
forward?

NHTS - A FIX FOR DATA ADDICTS AND INOCULATION AGAINST UNINFORMED DECISIONS



Thank
You