Comparison of Travel Measures

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Why is NHTS Important?

- NHTS is the only national source of data on total travel: daily trips, purpose, companions, mode, duration, travel extent and temporality that we have.
- It is the only recurring inventory of such data over time.

What is NYSDOT interested in?

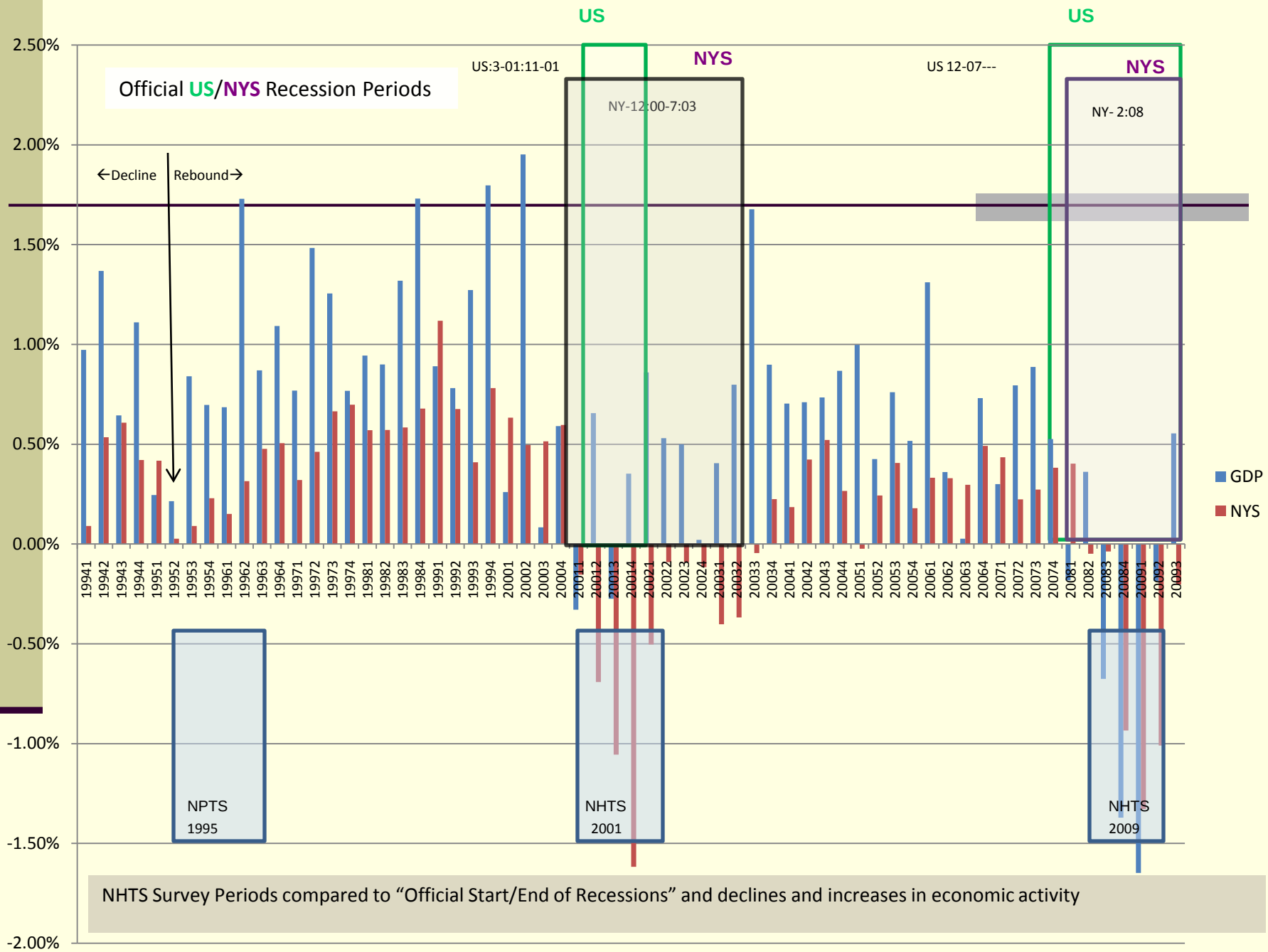
- What is our share of resident personal travel?
- How do we compare?
  - Is travel in NYS differently from the rest of the US?
  - Is travel outside of NYC differently from rest of the nation or state?
  - Do NYC residents skew travel patterns in the state?
  - Are there similarities between our UAs?
- How has NYS travel changed over time?
- What is the trend?

Observations

- Absent the NHTS, it is not possible to address any question related to total travel behavior
  - for NYS, or
  - metro areas within the state, or
  - how the state compares with the nation, or
  - who are we like
- People think these data just automatically exist.
- NHTS is versatile for addressing the ad hoc nature of policy questions.

Comparison of Travel Measures

- NHTS
  - 1995
    - Economic rebound
  - 2001
    - Recession
    - 9/11 Occurred during the survey
  - 2008
    - Recession
    - Worst economic decline since 1929


Official US/NYS Recession Periods
US
NYS
US:3-01:11-01
NY-12:00-7:03
US
NYS
US 12-07---
NY- 2:08
←Decline
Rebound→
2.50%
2.00%
1.50%
1.00%
0.50%
0.00%
-0.50%
-1.00%
-1.50%
-2.00%
GDP
NYS
NPTS
1995
NHTS
2001
NHTS
2009
NHTS Survey Periods compared to "Official Start/End of Recessions" and declines and increases in economic activity

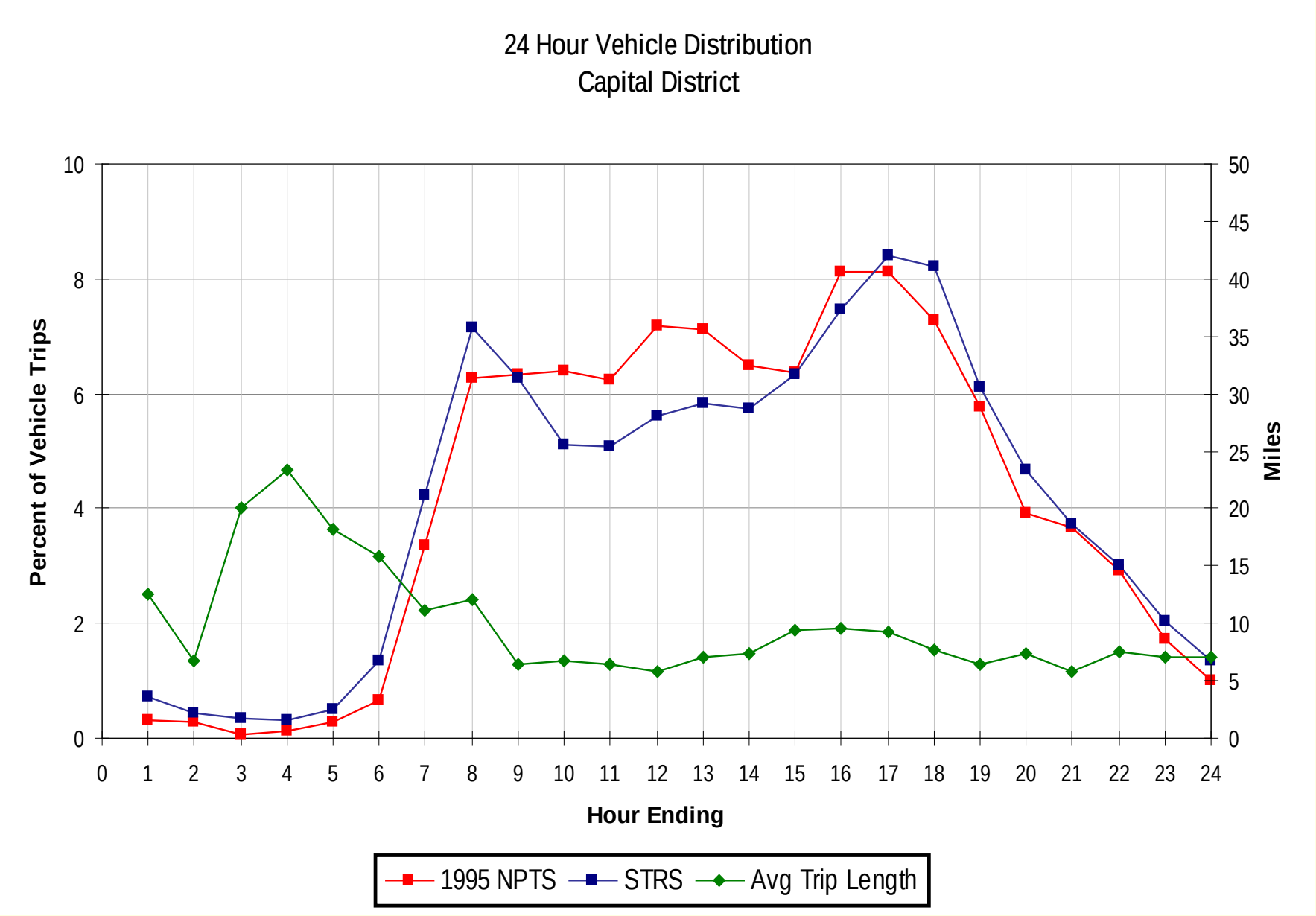
Comparison of Travel Measures

- NHTS VMT
  - Residential day travel
  - Not long distance travel
  - Not commercial or truck activity
    - Local, Long Distance or Overhead
  - An area-wide travel measure
    - All roadways, arterials and local streets

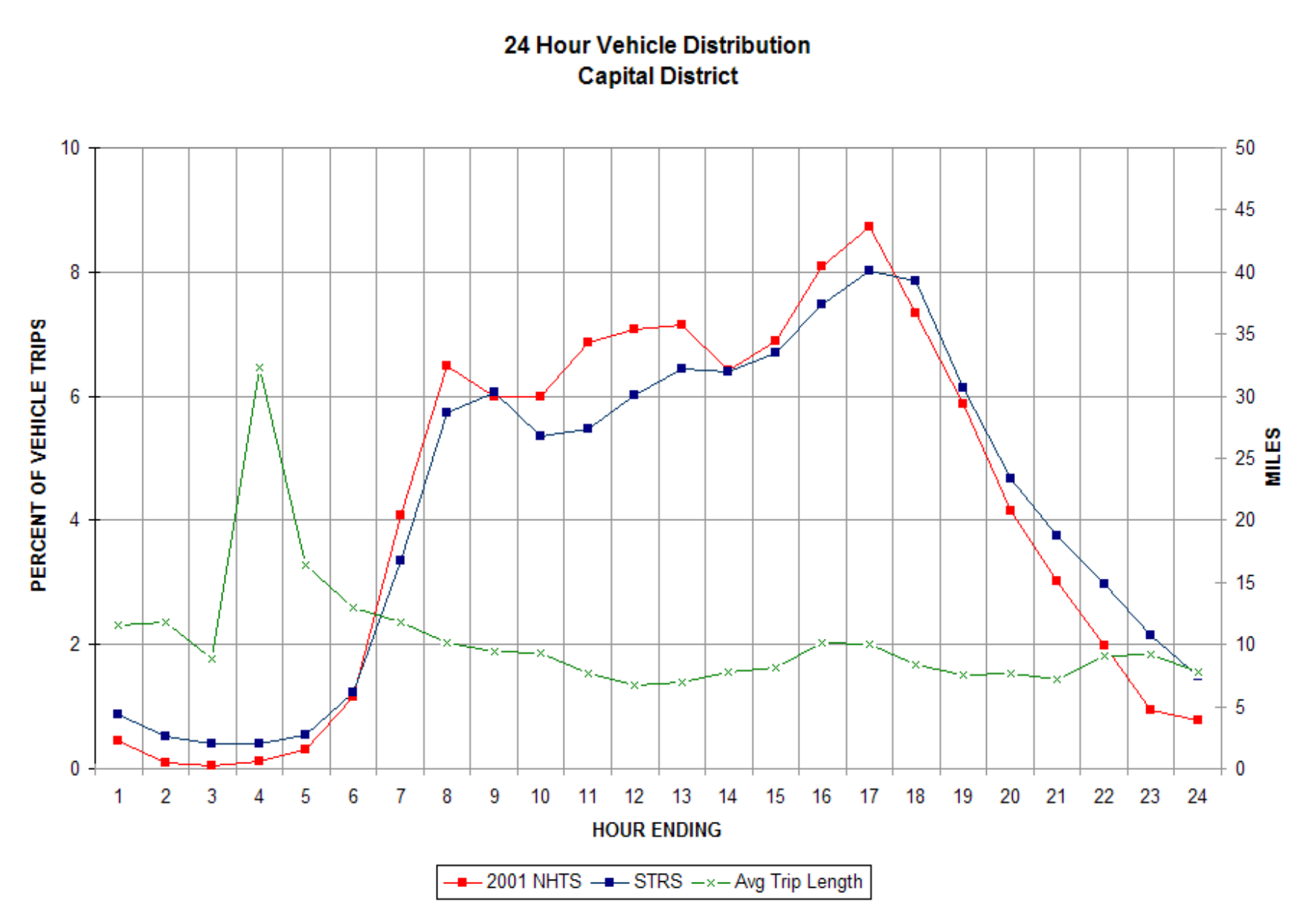
Comparison of Travel Measures

- System Level Measures of Travel
  - Short & Continuous Counts
  - Typically upper functional classes
    - All vehicle travel
    - Consistent with HPMS
    - Residential & commercial activity
    - Local, long distance and overhead travel
  - Typically not area-wide

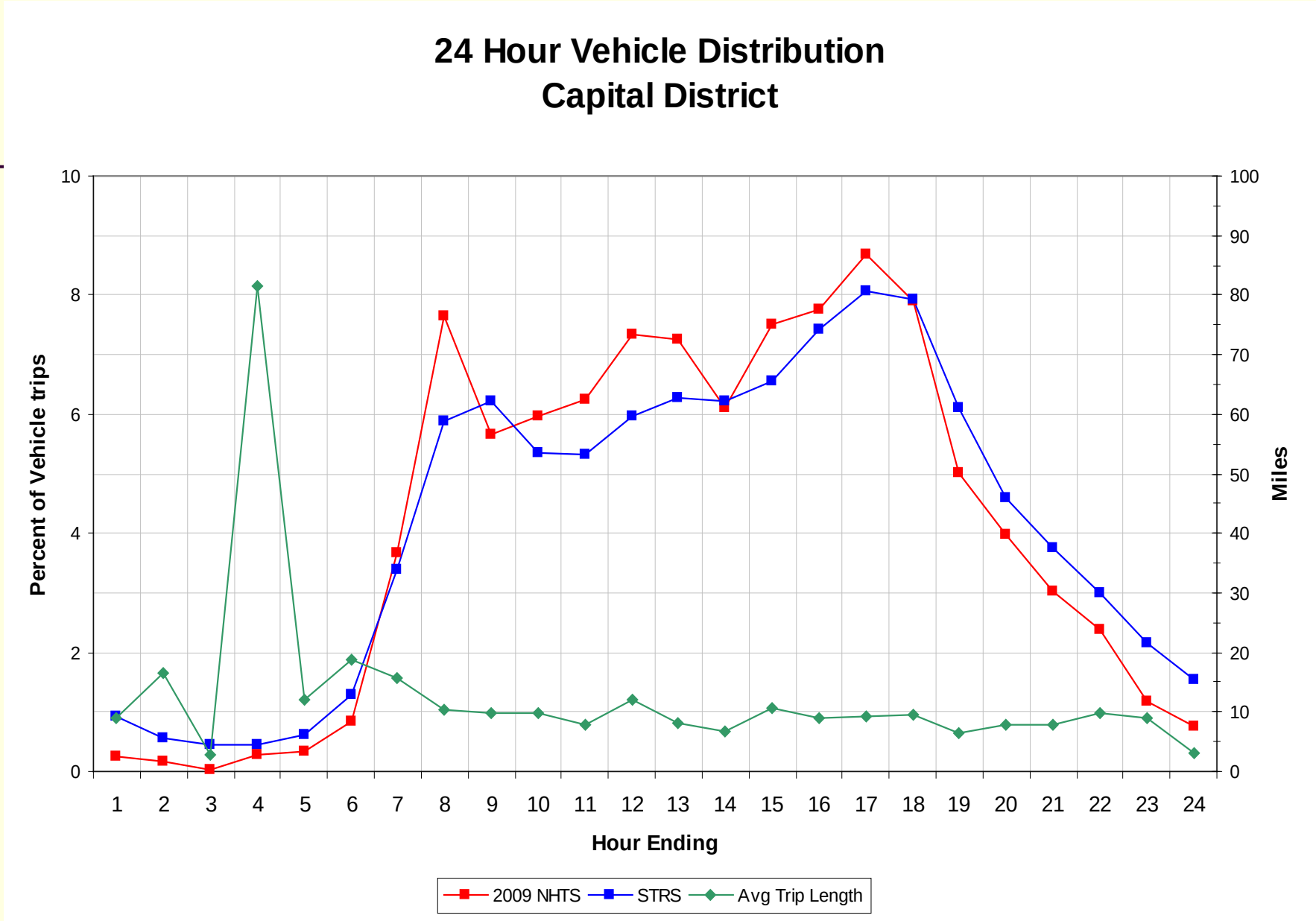
- NHTS v. System Travel
  - Mid day peak(s)
    - Observed in all sub-state strata
    - More consistent with ozone production than arterial counts
    - Likely reflecting off system travel



Note: Mileage Scale 0-50



Note: Mileage Scale 0-50

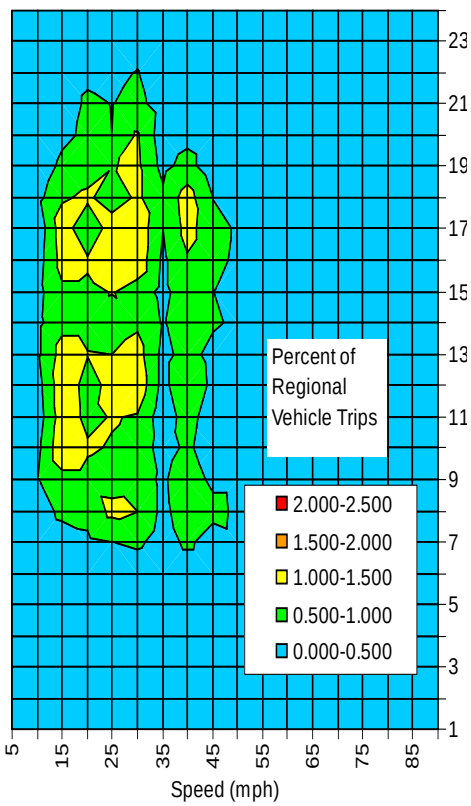


Note: Mileage Scale 0-100

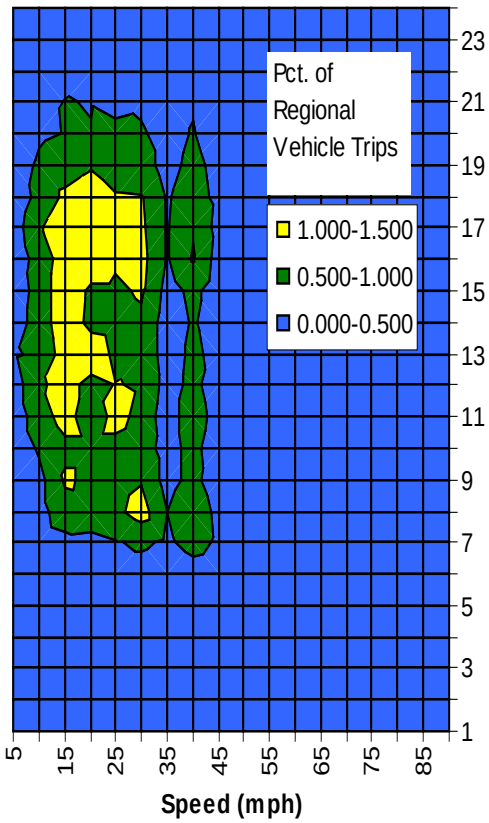
Comparison of Travel Measures

- NHTS
  - Topographical representation of DVMT & speed
    - Evolution of travel over time (95,01,09)
    - Changes in regional trip making
    - Visual performance measure

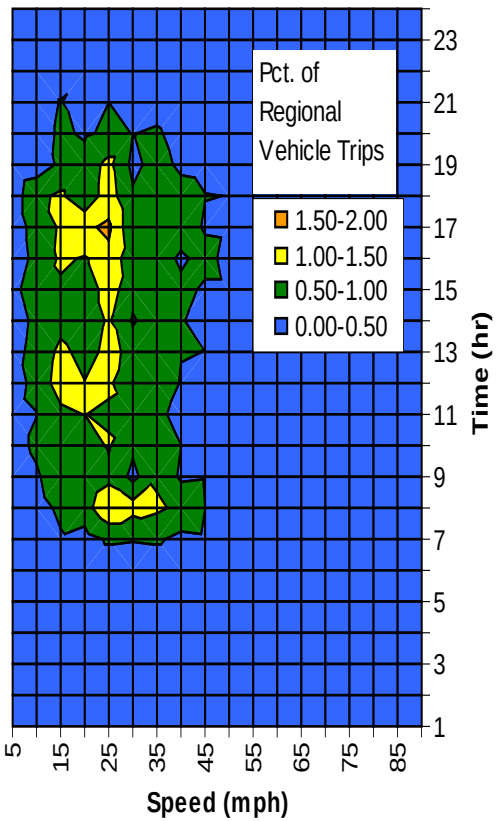
1995Capital District

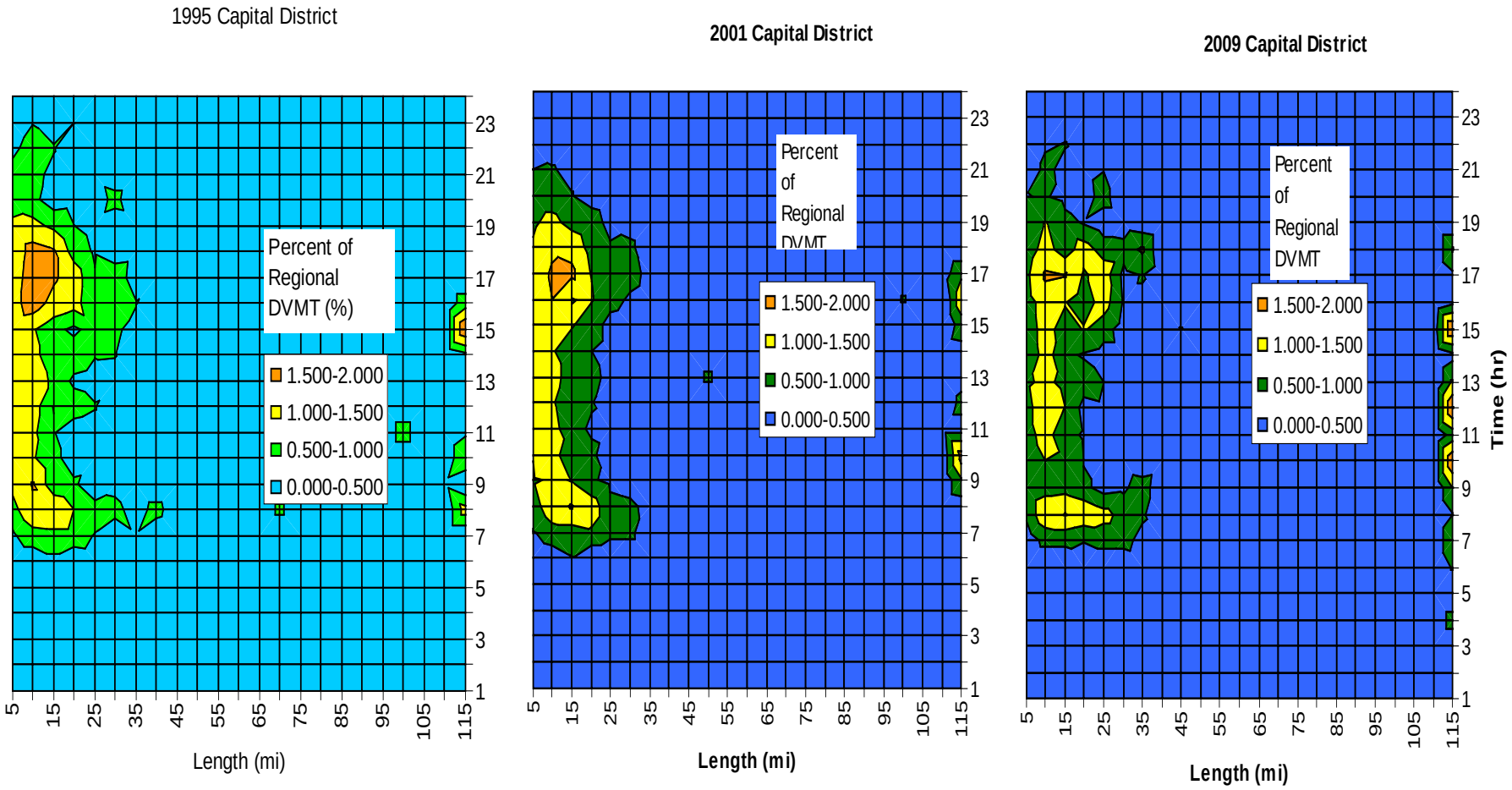


2001 Capital District



2009 Capital District

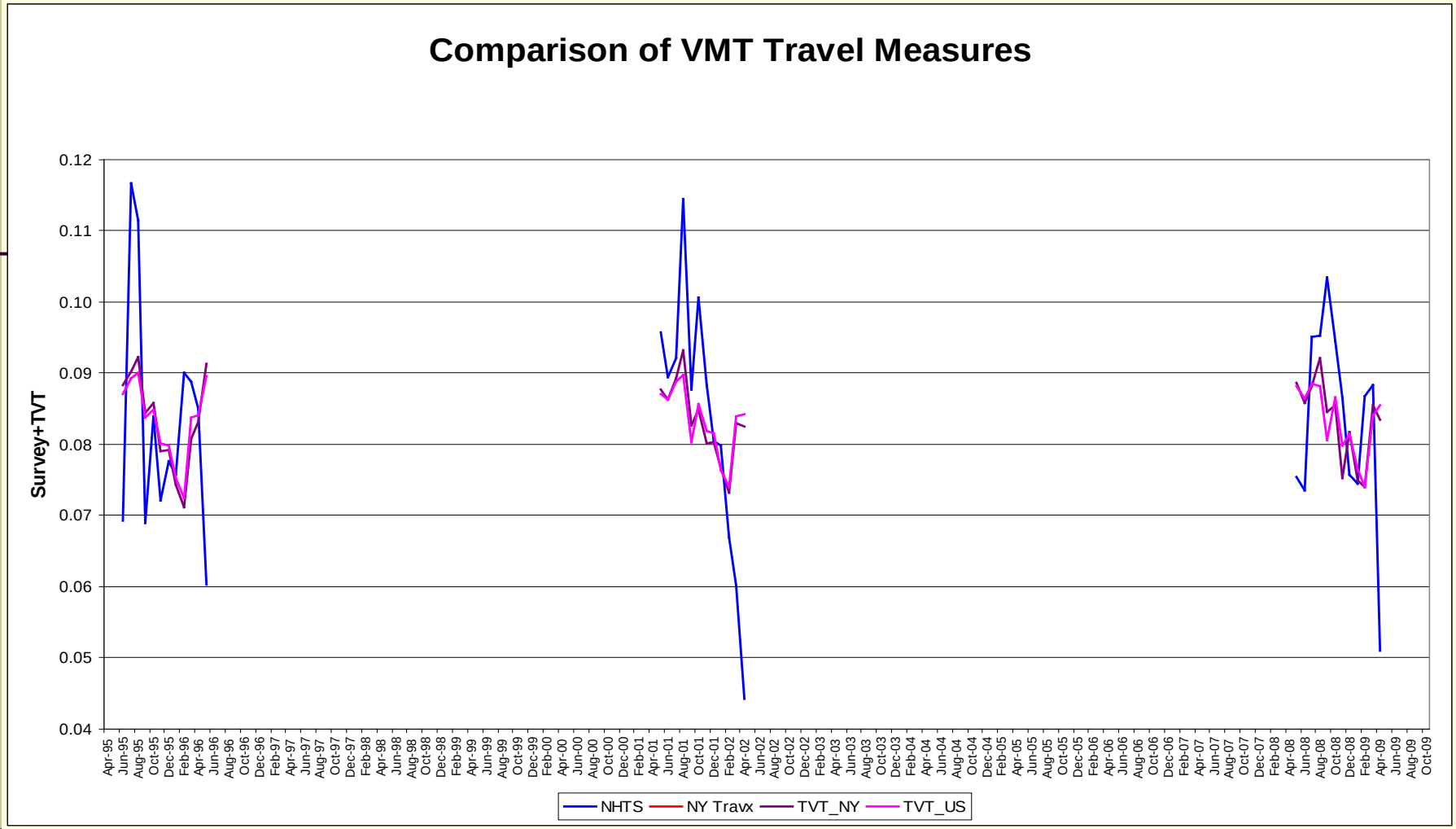



1995 Capital District
2001 Capital District
2009 Capital District
Percent of Regional DVMT (%)
Percent of Regional DVMT
1.500-2.000
1.000-1.500
0.500-1.000
0.000-0.500
Length (mi)
Time (hr)
5
15
25
35
45
55
65
75
85
95
105
115
1
3
5
7
9
11
13
15
17
19
21
23

Comparison of Travel Measures

Continuous Count Based Measures

- All traffic - 24/7
  - car, trucks; personal and commercial
  - typically arterial and higher functional classes
- NYS Traffic Index
  - Laspeyres Index of all continuous counting sites revenue & volumetric
- TVT (NY, US)
  - FHWA estimate of VMT from continuous sites



VMT Estimates from the three surveys and the corresponding TVT for NY and the US as well as the NY Traffic Count Index are used to create the monthly share of VMT for each period. For each survey a consistent 12 month period within the survey (typically dropping the begiing or ending month(s) without duplication of month) is summed for the annual total and each month is then divided by that total. The 12 month period for the shares for each separate survey is then replicated to the corresponding traffic measure.

1995

	NHTS	*Nytrav*	*TVTNY*	*TVTUS*
NHTS	1			
Nytrav	0.35623	1		
TVT_NY	0.2055	0.92498	1	
TVTUS	0.22459	0.88377	0.98593	1

2001

	NHTS	*Nytrav*	*TVTNY*	*TVTUS*
NHTS	1			
Nytrav	0.70653	1		
TVTNY	0.59425	0.8756	1	
TVTUS	0.46699	0.82459	0.96116	1

2008

	NHTS	*Nytrav*	*TVTNY*	*TVTUS*
NHTS	1			
Nytrav	0.38736	1		
TVTNY	0.20188	0.80326	1	
TVTUS	-0.0058	0.81801	0.91795	1

Comparison of Travel Measures

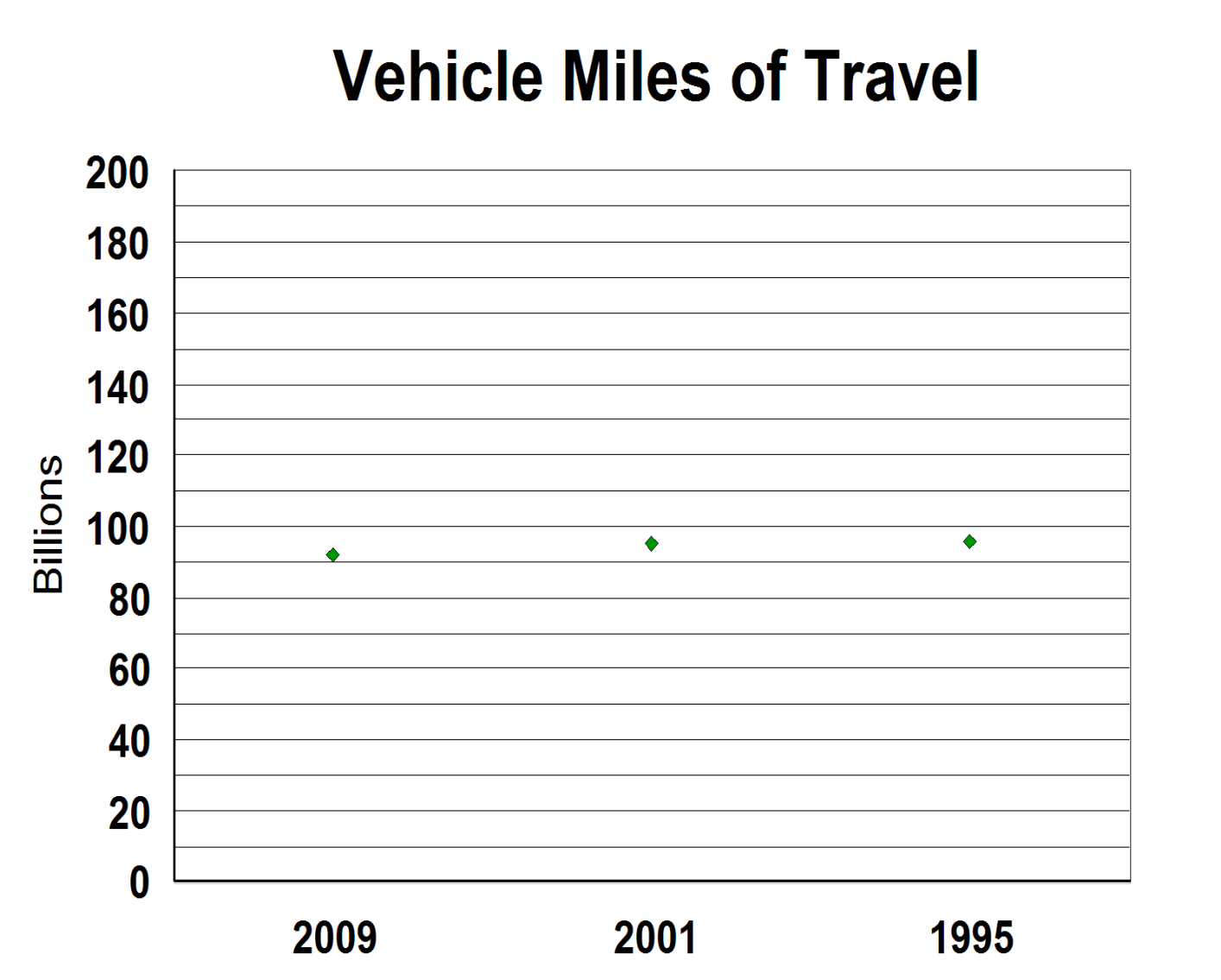
- Correlation Analysis
  - NHTS not well correlated with continuous count arterial measures of travel
  - Survey may not look like arterial ground counts
- Why?
  - Residential v. all travel
  - Area-wide v. System level
  - Hard to benchmark
    - NHTS but NO VIUS
    - NO Long Distance Travel
  - Nationally
    - No Monthly Residential v. Commercial Travel Index
    - No Monthly Long Distance Travel Index

Comparison of Travel Measures

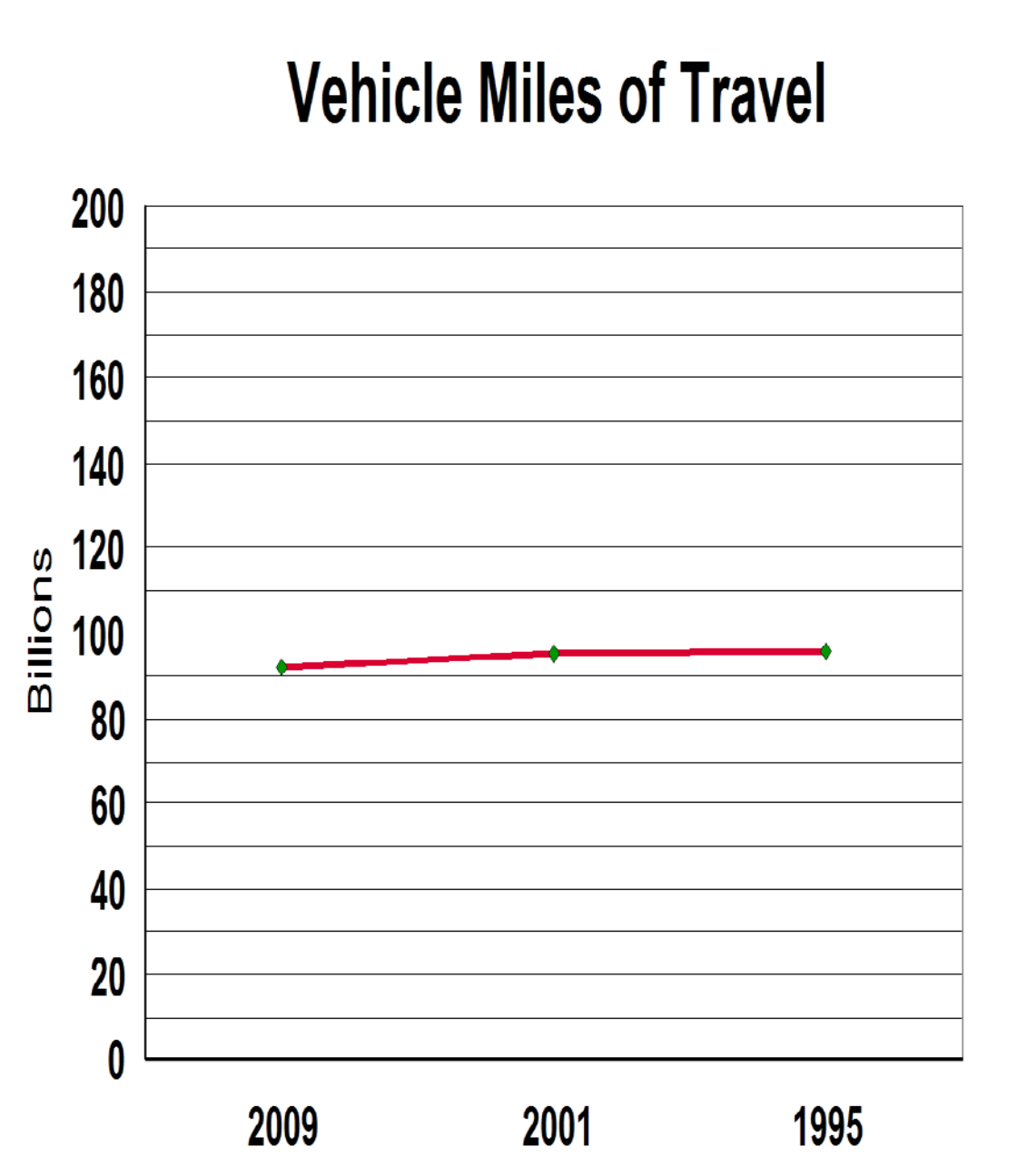
- Survey data are samples
- Any measure is an estimate
- Estimates have error
- Confidence Interval or MOE reflects uncertainty
- ACS presents estimates and MOEs
- NHTS must do same
- We assume data follows normal distribution

Comparison of Travel Measures

- The lies in powerpoint presentation of data and the choices we make


Vehicle Miles of Travel
Billions
200
180
160
140
120
100
80
60
40
20
0
2009
2001
1995

Is it the same or did it go down?


Vehicle Miles of Travel
Billions
200
180
160
140
120
100
80
60
40
20
0
2009
2001
1995

Sure looks the same

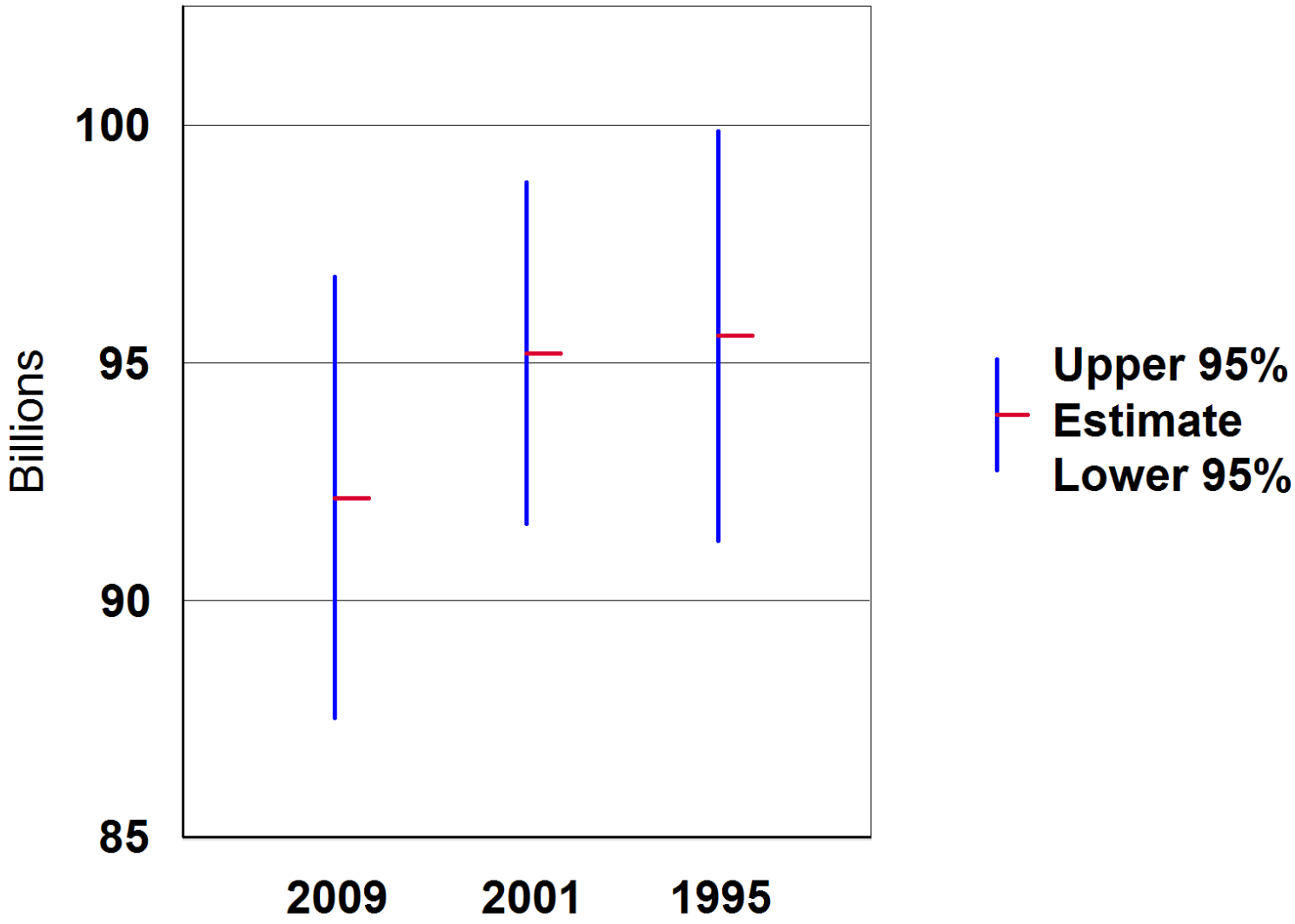
Vehicle Miles of Travel

Or, it went down!

Vehicle Miles of Travel

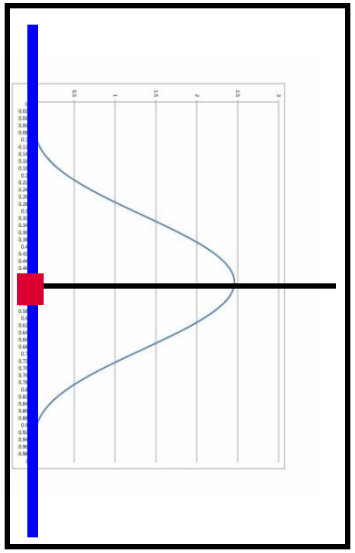
Did it really?

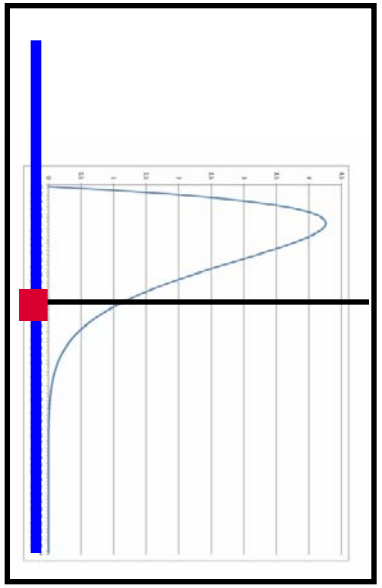
Vehicle Miles of Travel

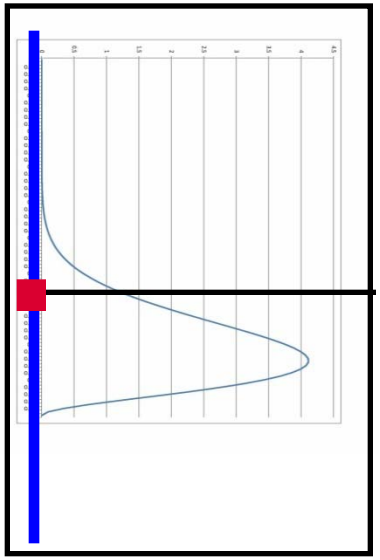


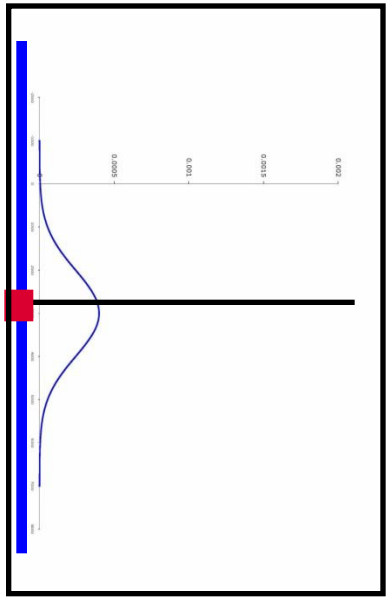
Beware of the Mean

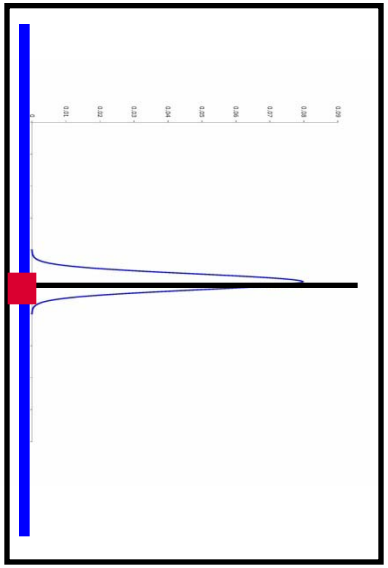
The assumption is that the distribution is always normal and that the confidence intervals are calculated as if it were normal. However, if the distribution isn't normal, then it is a very different ball game and you can be misled. You need to understand the distribution of the measure being analyzed.

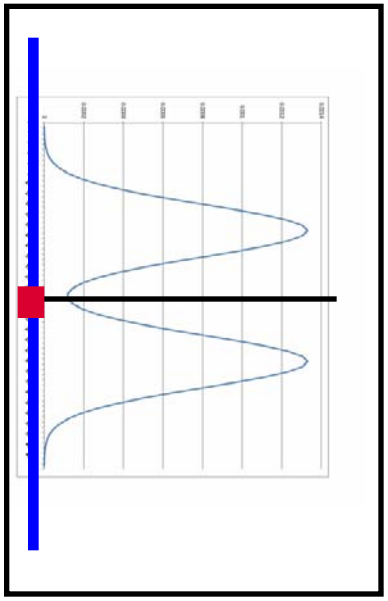










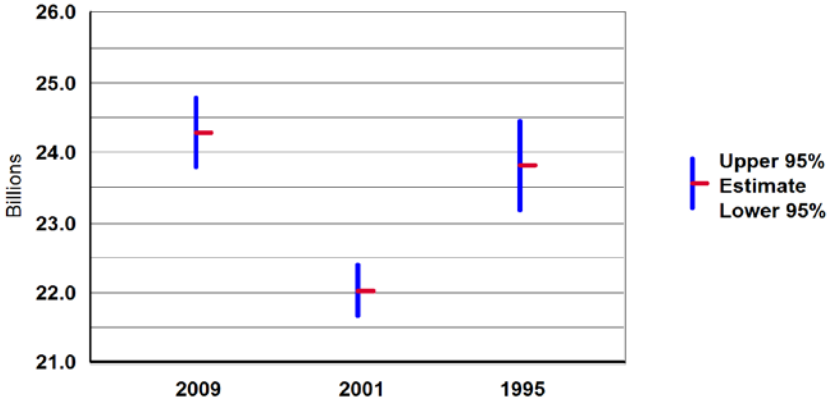


Statewide Confidence Interval Band

HH Sample Size: 2009=16,165 2001=13,423 1995=11,004

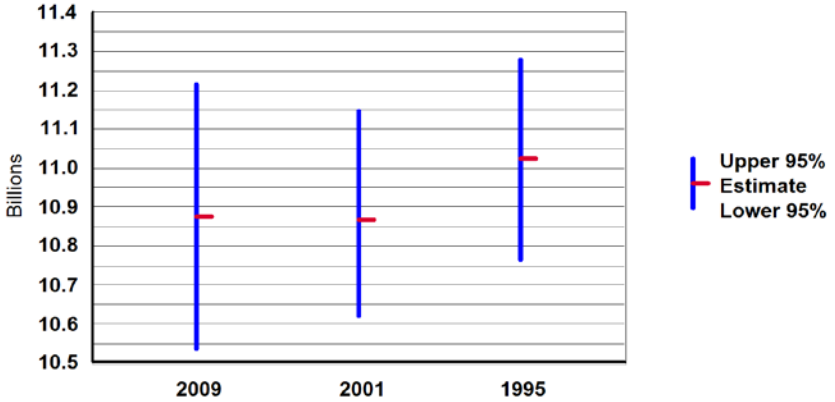
(Difference between years <u>is not</u> significant at the 95% level unless indicated)
2001 has been adjusted for age not in (<5 yrs) for comparability with 1995 and 2009

Person Trips

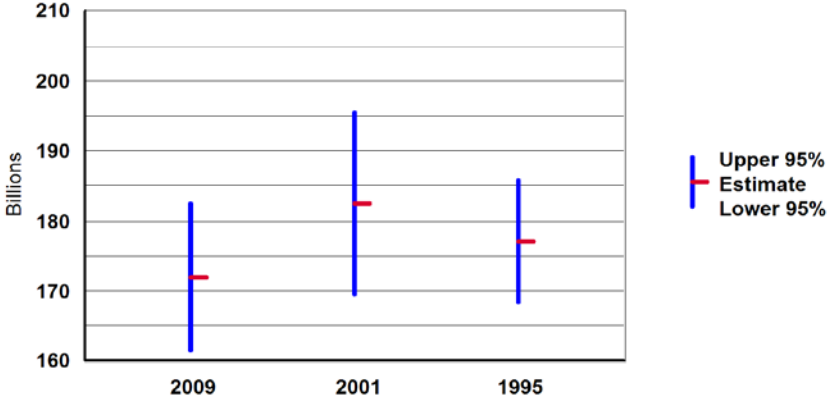


2009-2001, 2001-1995 significant at 95% level

Vehicle Trips

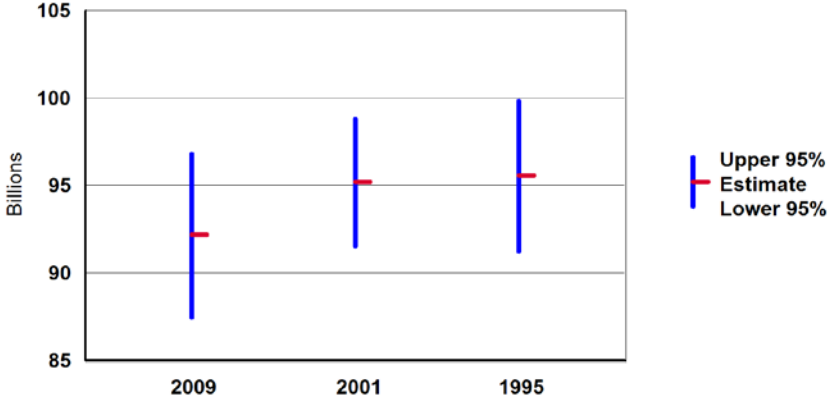


Person Miles of Travel

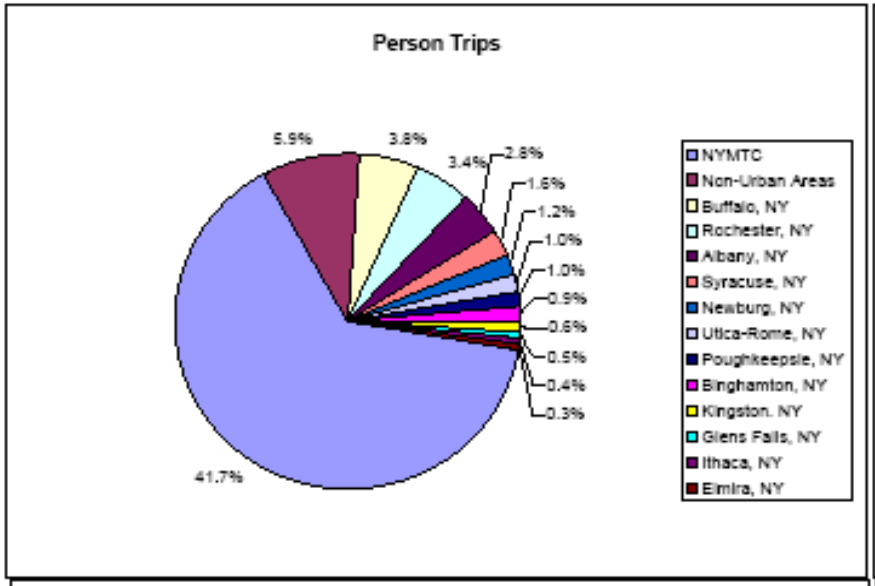


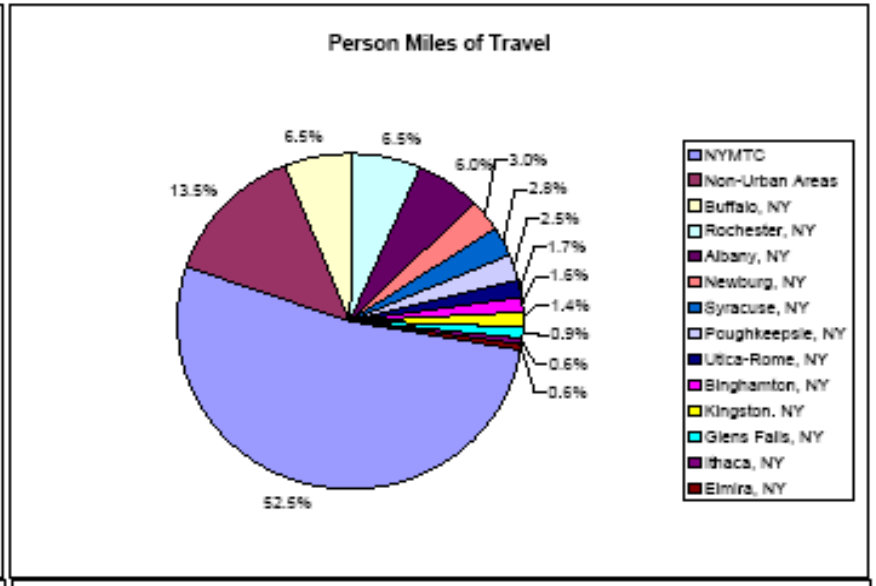
2009-2001 signifciant at 90%

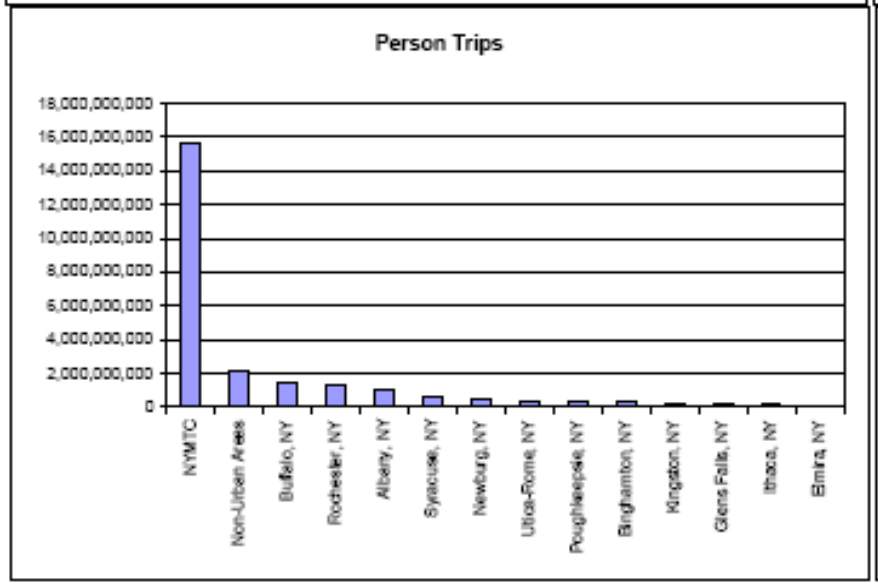
Vehicle Miles of Travel

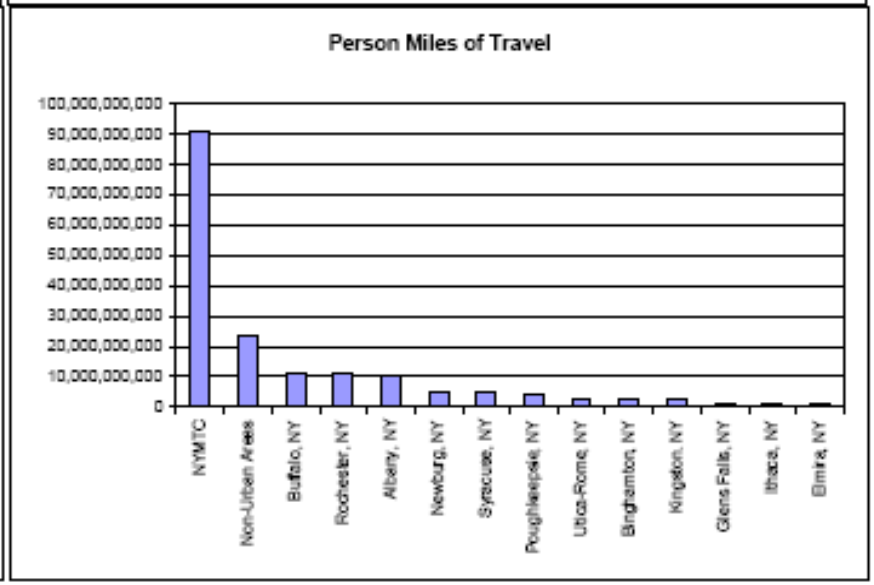


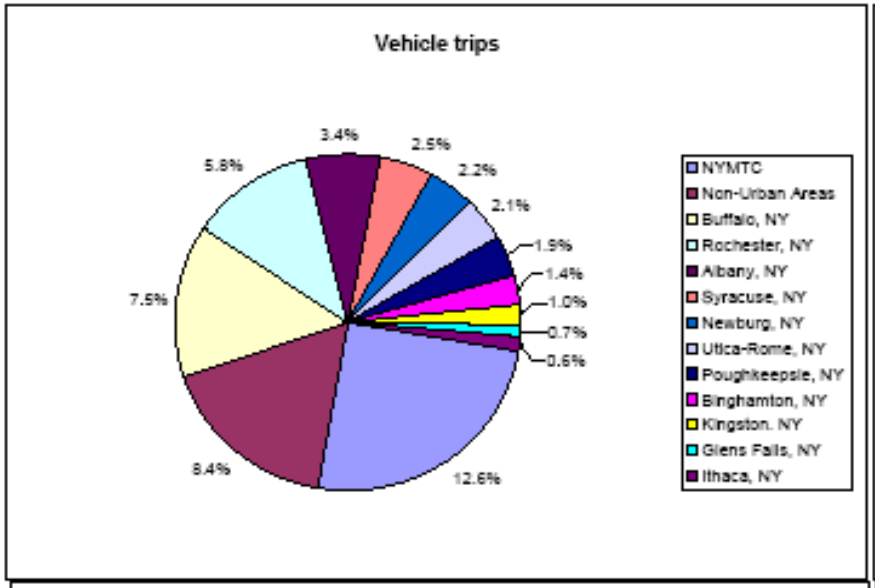
How well is the data distributed?
Is state total representative?


Person Trips
5.9%
3.8%
3.4%
2.8%
1.6%
1.2%
1.0%
1.0%
0.9%
0.6%
0.5%
0.4%
0.3%
41.7%
NYMTC
Non-Urban Areas
Buffalo, NY
Rochester, NY
Albany, NY
Syracuse, NY
Newburg, NY
Utica-Rome, NY
Poughkeepsie, NY
Binghamton, NY
Kingston, NY
Glens Falls, NY
Ithaca, NY
Elmira, NY


Person Miles of Travel
6.5%
6.5%
6.0%
3.0%
2.8%
2.5%
1.7%
1.6%
1.4%
0.9%
0.6%
0.6%
13.5%
52.5%
NYMTC
Non-Urban Areas
Buffalo, NY
Rochester, NY
Albany, NY
Newburg, NY
Syracuse, NY
Poughkeepsie, NY
Utica-Rome, NY
Binghamton, NY
Kingston, NY
Glens Falls, NY
Ithaca, NY
Elmira, NY


Person Trips
18,000,000,000
16,000,000,000
14,000,000,000
12,000,000,000
10,000,000,000
8,000,000,000
6,000,000,000
4,000,000,000
2,000,000,000
0
NYMTC
Non-Urban Areas
Buffalo, NY
Rochester, NY
Albany, NY
Syracuse, NY
Newburg, NY
Utica-Rome, NY
Poughkeepsie, NY
Binghamton, NY
Kingston, NY
Glens Falls, NY
Ithaca, NY
Elmira, NY


Person Miles of Travel
100,000,000,000
90,000,000,000
80,000,000,000
70,000,000,000
60,000,000,000
50,000,000,000
40,000,000,000
30,000,000,000
20,000,000,000
10,000,000,000
0
NYMTC
Non-Urban Areas
Buffalo, NY
Rochester, NY
Albany, NY
Newburg, NY
Syracuse, NY
Poughkeepsie, NY
Utica-Rome, NY
Binghamton, NY
Kingston, NY
Glens Falls, NY
Ithaca, NY
Elmira, NY


Vehicle trips
3.4%
2.5%
2.2%
2.1%
1.9%
1.4%
1.0%
0.7%
0.6%
5.8%
7.5%
8.4%
12.6%
NYMTC
Non-Urban Areas
Buffalo, NY
Rochester, NY
Albany, NY
Syracuse, NY
Newburg, NY
Utica-Rome, NY
Poughkeepsie, NY
Binghamton, NY
Kingston, NY
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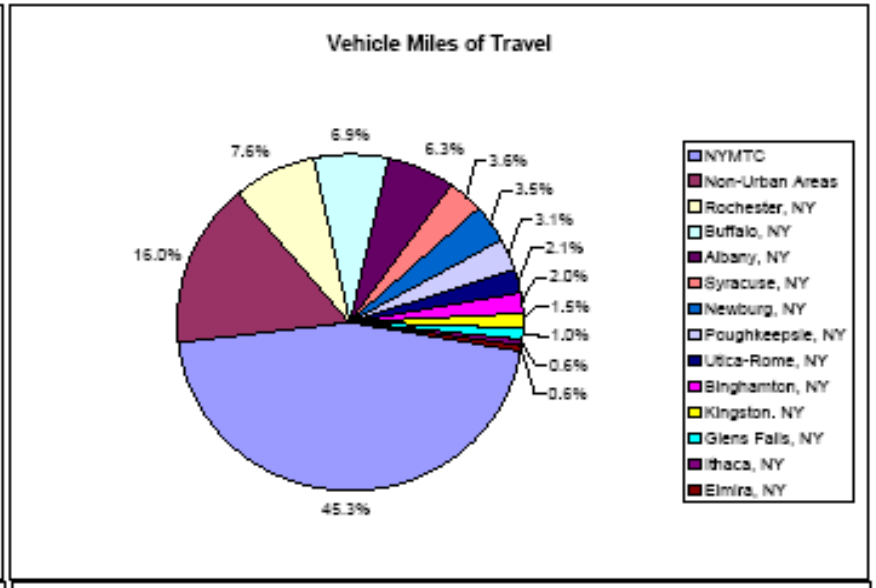
Ithaca, NY


Vehicle Miles of Travel
6.9%
6.3%
3.6%
3.5%
3.1%
2.1%
2.0%
1.5%
1.0%
0.6%
0.6%
7.6%
16.0%
45.3%
NYMTC
Non-Urban Areas
Rochester, NY
Buffalo, NY
Albany, NY
Syracuse, NY
Newburg, NY
Poughkeepsie, NY
Utica-Rome, NY
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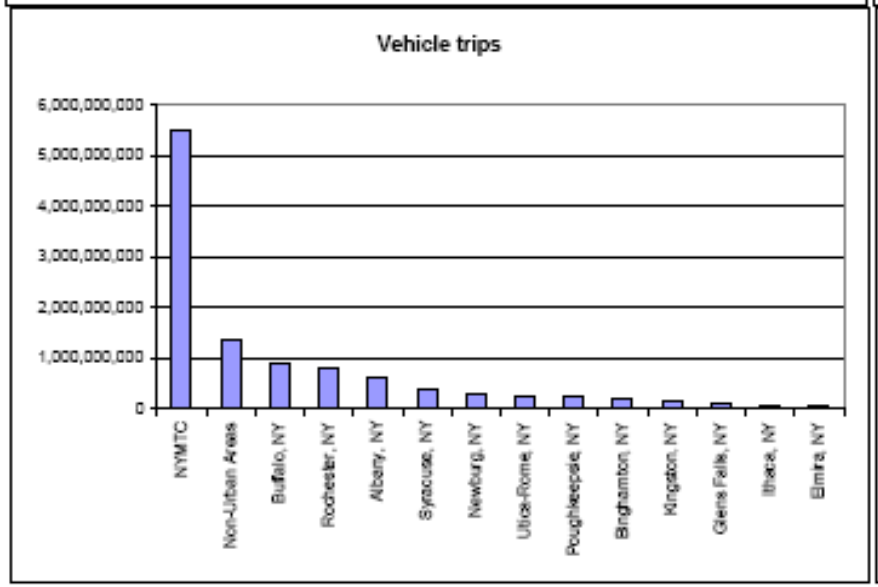
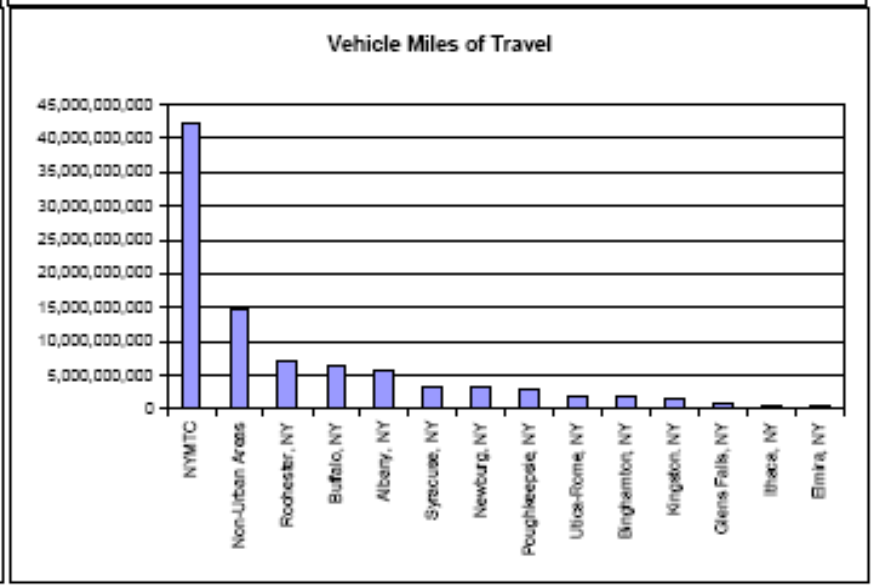
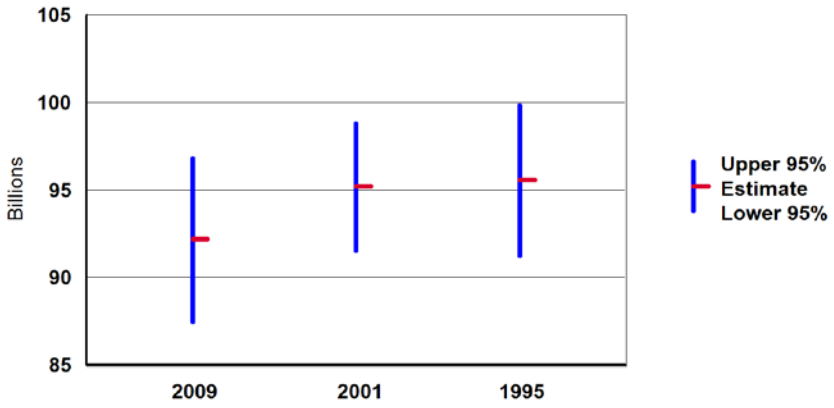
Kingston, NY
Glens Falls, NY
Ithaca, NY
Elmira, NY


Vehicle trips
6,000,000,000
5,000,000,000
4,000,000,000
3,000,000,000
2,000,000,000
1,000,000,000
0
NYMTC
Non-Urban Areas
Buffalo, NY
Rochester, NY
Albany, NY
Syracuse, NY
Newburg, NY
Utica-Rome, NY
Poughkeepsie, NY
Binghamton, NY
Kingston, NY
Glens Falls, NY
Ithaca, NY
Elmira, NY

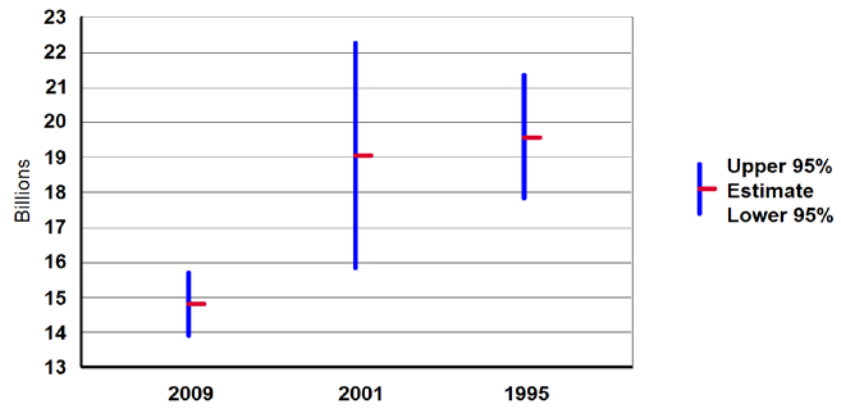

Vehicle Miles of Travel
45,000,000,000
40,000,000,000
35,000,000,000
30,000,000,000
25,000,000,000
20,000,000,000
15,000,000,000
10,000,000,000
5,000,000,000
0
NYMTC
Non-Urban Areas
Rochester, NY
Buffalo, NY
Albany, NY
Syracuse, NY
Newburg, NY
Poughkeepsie, NY
Utica-Rome, NY
Binghamton, NY
Kingston, NY
Glens Falls, NY
Ithaca, NY
Elmira, NY

Lets sub set it by geography

Statewide - Vehicle Miles of Travel

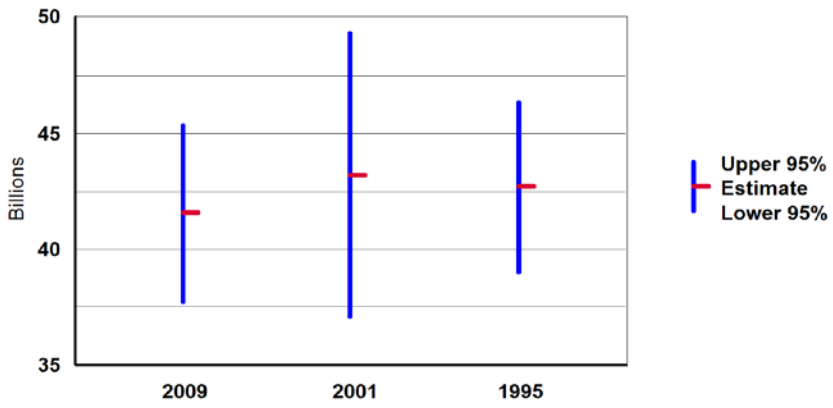


Non- Urban Vehicle Miles of Travel

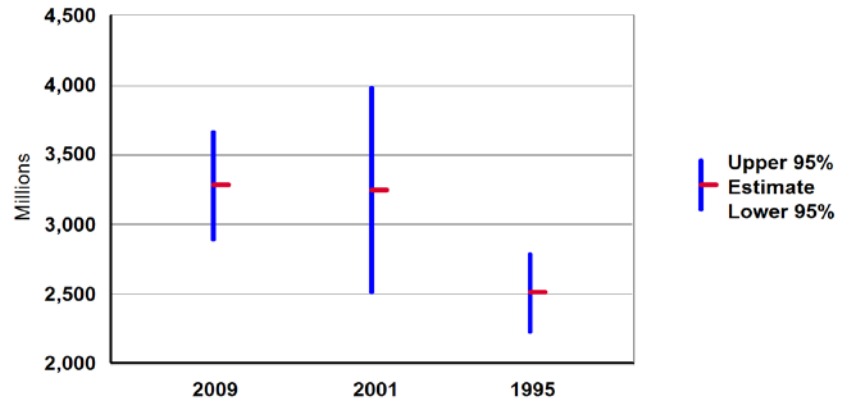


2009-2001 signifciant at 90%

NYMTC - Vehicle Miles of Travel



Newburg -Vehicle Miles of Travel



2001-1995 signifciant at 90%

Observations

One measure may not work for all areas

- Devil is in the details
- Sub set data provides explanation

- Margin of Error is the first clue
- Distribution = Normal? Is the second
- Can the trend be verified? Is the third
  - Is the trend intuitive and/or explainable?
- What do you do next?

What have we done with the NHTS?

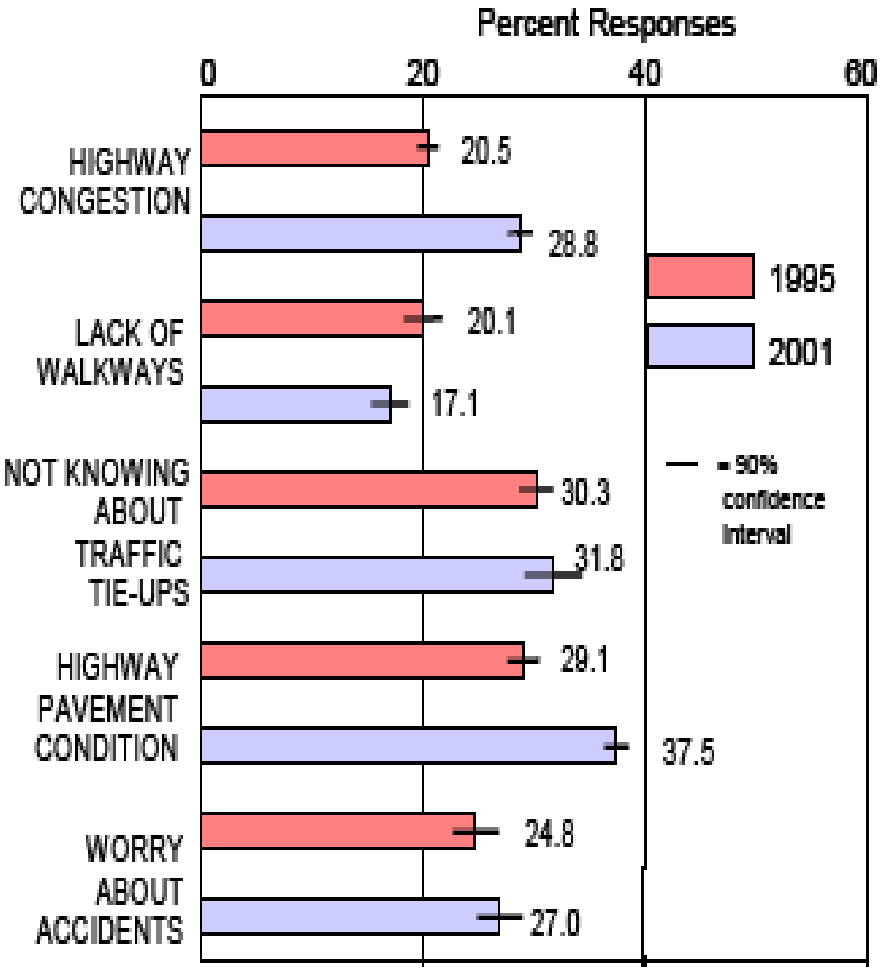
- Specific web page
  - https://www.nysdot.gov/divisions/policy-and-strategy/darb/dai-unit/ttss/nhts

What have we done with the NHTS?

- Contract Analysis (Oak Ridge Labs)
  - Metropolitan Level Tabular Summaries
  - Comparison Reports 2009/2001/1995
    - NY v. US; Urban v. Rural
    - Manhattan v Remainder of NYC v ROS v US
    - Transferability of data across MPOs/UAs
      - UA v UA; Tract level Density Comparison
  - NYS Resident's Views of Highway Travel
  - Travel Patterns of Special Populations
  - Impact of 9/11
  - Long Distance Travel
- Air Quality Analyses
  - Hot/Cold
  - EMFAC Analyses

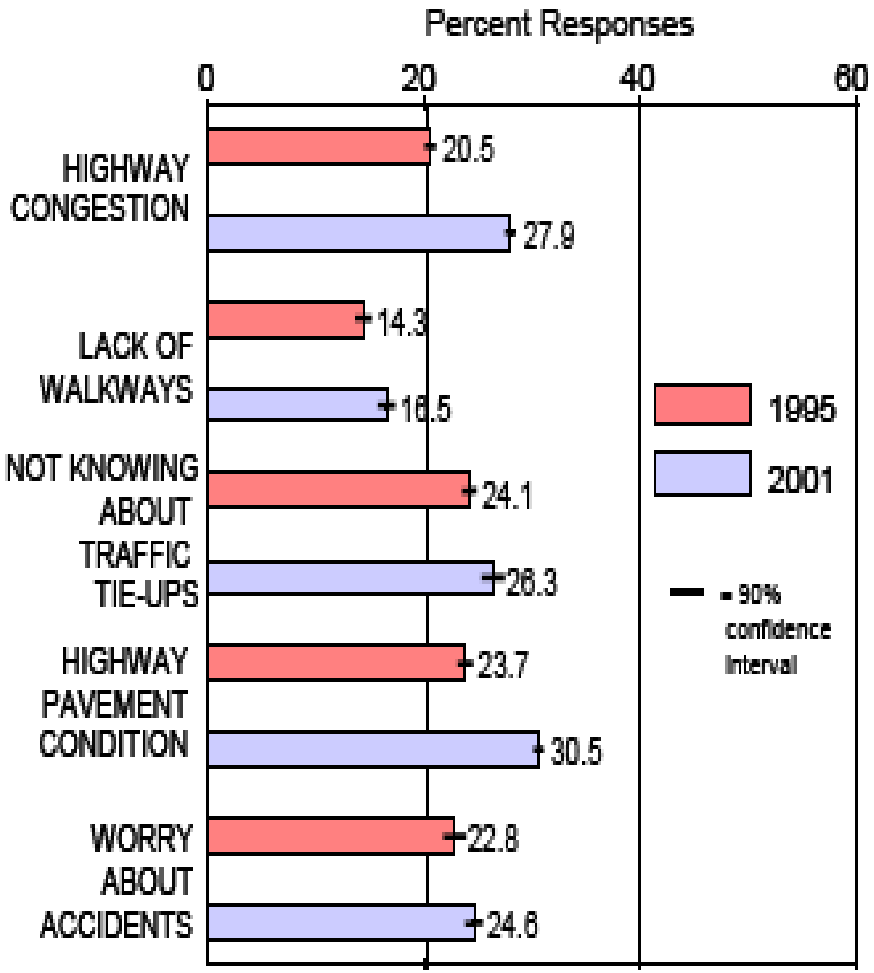
Resident Views of Highway Travel

NYS



Numbers at end of bars =% of negative responses
(= '4' or '5' in 2001; = '1' in 1995)

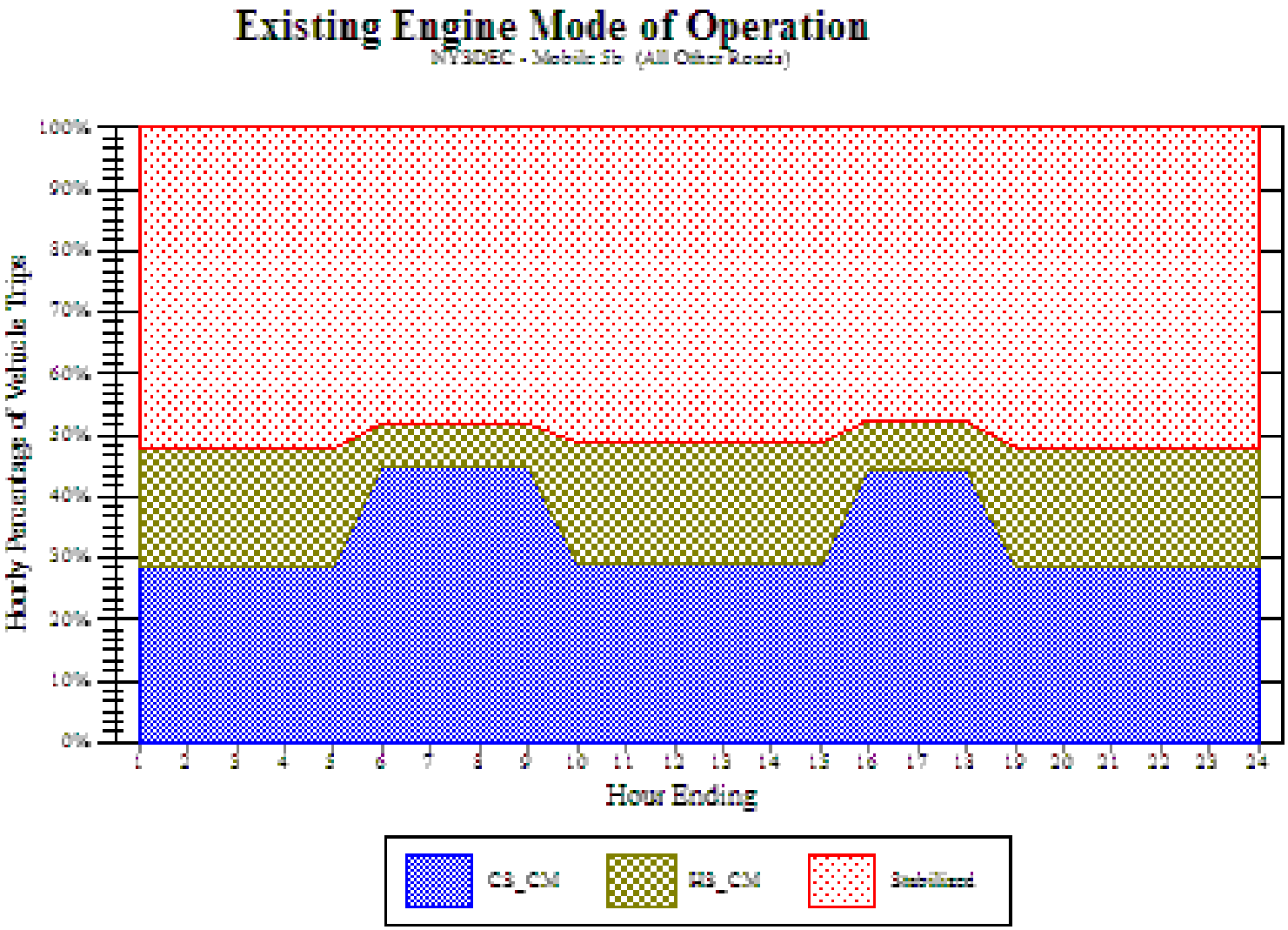
Rest of US



Engine Mode of Operation

Before 1995
NHTS
Count based

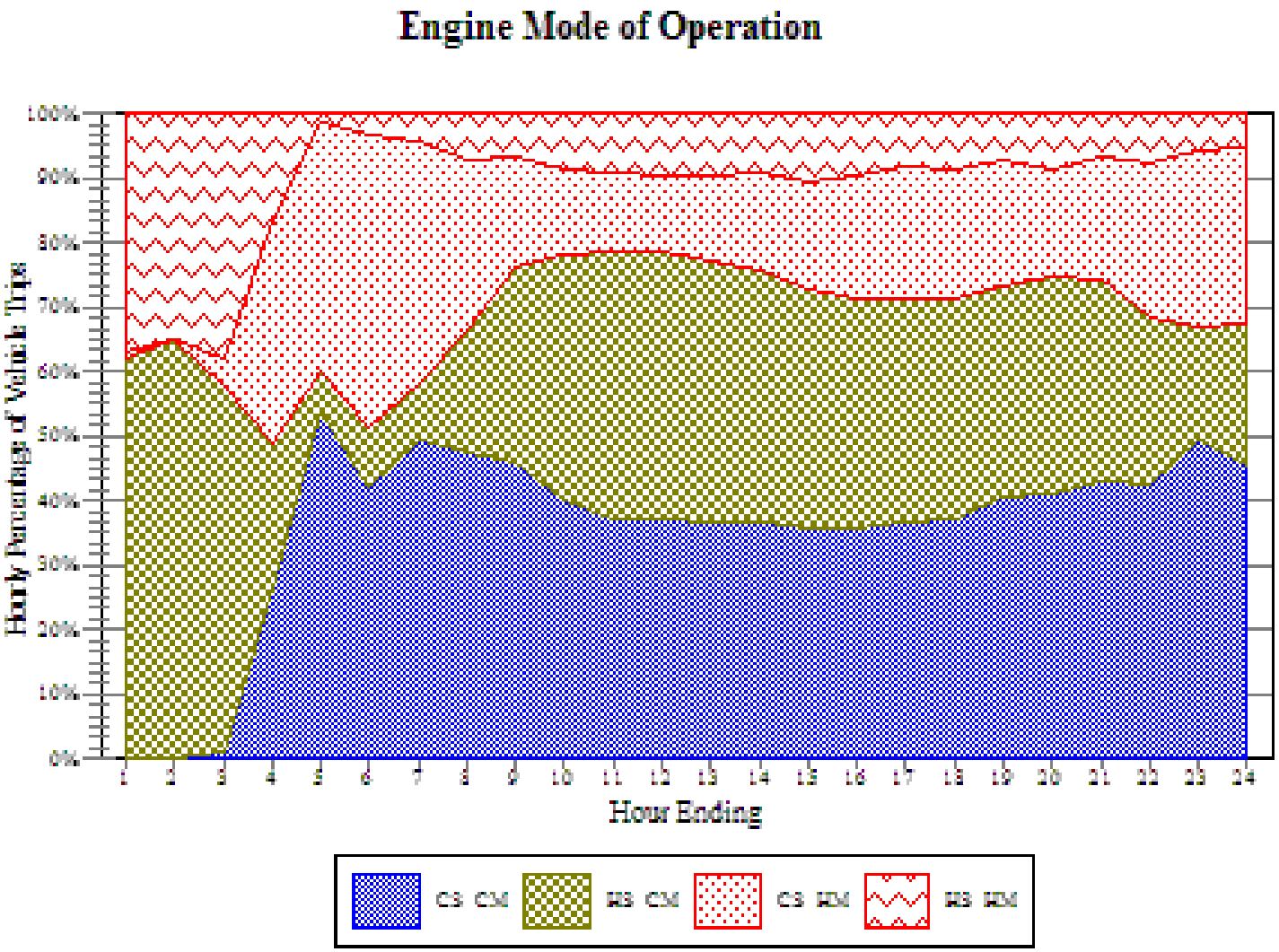
- Hourly Percentage of Vehicle Trips



Engine Mode of Operation

After 1995 NHTS Driver /Vehicle based

- Hourly Percentage of Vehicle Trips



Recommendations

- How much money is available?
  - Is the funding continuous and sustainable?
- What problem needs to be solved or questions answered & what does the practitioner need?
  - What is the trend?
  - Who are we like?
  - How much & where has it changed?
  - What is our share?
  - Can we use it for revenue estimation?
  - Can we measure performance or utilization?
  - Are we trying to prepare for the future?
  - Are we building models for projection?
  - Are we doing exploratory research?

Recommendations

- Survey Based Performance Measurement?
  - Focus on key measures
  - Do they need to be benchmarked?
  - Ascertained continually?
  - Cross-sectional data collection?
  - Data representative & normally distributed?
  - Sub-set data?
  - Beware of the average!

Recommendations

- Travel Behavior/Lifestyle
  - Capture travel paradigm shifts
  - Model development
- Marry survey efforts with allied endeavors
- Must translate to practical applications
  - Data you have may be all the data you will get