Transferable Model Parameters: NCHRP 8-61 and NCHRP 8-84

presented to
Southeast Florida Model Users Group

Presented by
Robert G. Schiffer, AICP and Quan Yuan, EIT
Cambridge Systematics, Inc.

June 1, 2012

Transportation leadership you can trust.
Overview of Projects

NCHRP 8-61/Report 716, Urban Travel Demand Forecasting: Parameters and Techniques
- Analysis of NHTS Data
- Data from existing MPO models
- What’s in NCHRP Report 716?
- Emerging modeling practices
Presentation Outline (Cont’d)

- NCHRP 8-84, Rural and Long-Distance Transferable Parameters
  - Differences in rural and long-distance travel
  - Statewide model statistics on rural and long-distance travel
  - Transferability of rural and long-distance model parameters
  - Consideration of other trip characteristics
  - Process for developing model parameters
  - Preliminary findings
Overview of Projects

Background

- NCHRP 8-61: Urban Parameters
  - 1978 – NCHRP Report 187
    - Quick Response Urban Travel Estimation Techniques and Transferable Parameters
  - 1998 – NCHRP Report 365
    - Travel Estimation Techniques for Urban Planning
  - 2011 – Project 8-61
    - Travel Demand Forecasting: Parameters and Techniques
Overview of Projects
Background (Cont’d)

- NCHRP 8-84: Rural/LD Parameters
  - Statewide Model Peer Exchange
    - September 2004, Longboat Key, FL
    - SWM information exchange
    - Identification of problem statements for future funding
    - Transportation Research Circular
  - Funded problem statements
    - National Model Scoping Project
    - Validation and Sensitivity Considerations for Statewide Models
    - Rural and Long-Distance Travel Parameters
Project Overview: Urban Travel Parameters

Objectives

- Revise and Update NCHRP Report 365
  - Current travel characteristics
  - Guidance on forecasting
    - Procedures
    - Applications

- Develop User-Friendly Guidebook
  - Range of approaches
    - Application of straightforward techniques
    - Optional use of default (transferable) parameters
  - References to more sophisticated techniques
  - Broad range of transportation planning issues
Project Overview: Rural/LD Travel Parameters
Objectives (cont’d)

- NCHRP 8-84 is focused on documenting, obtaining, and analyzing available data sources for rural and long-distance trips.
Project Overview: Rural/LD Travel Parameters

Objectives (cont’d)

- **Long-Distance travel surveys**
  - 1995 American Travel Survey (ATS)
  - 2001 National Household Travel Survey (NHTS) – includes large sample of long-distance trips
  - Statewide household surveys (Michigan, Ohio, Oregon)
  - Recent GPS HHTS data collection (Denver, Atlanta, Chicago, Massachusetts)
  - Tourism surveys (Florida, Hawaii, Oregon)
  - National and State Park surveys

### Table 2.1 Preliminary Comparative Statistics from ATS and NHTS

<table>
<thead>
<tr>
<th>Parameter Summary</th>
<th>1995 ATS More Than 100 Miles</th>
<th>2001 NHTS More Than 100 Miles*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Trips by Mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Vehicle</td>
<td>78.51</td>
<td>87.13</td>
</tr>
<tr>
<td>Air</td>
<td>16.02</td>
<td>9.23</td>
</tr>
<tr>
<td>Other</td>
<td>3.47</td>
<td>3.64</td>
</tr>
<tr>
<td>Percent of Trips by Purpose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business and Shop/Pleasure</td>
<td>22.42</td>
<td>25.66</td>
</tr>
<tr>
<td>Visit Friends/Relatives</td>
<td>32.50</td>
<td>26.31</td>
</tr>
<tr>
<td>Leisure</td>
<td>30.53</td>
<td>26.31</td>
</tr>
<tr>
<td>Personal/Family or Medical</td>
<td>11.93</td>
<td>9.56</td>
</tr>
<tr>
<td>Other</td>
<td>3.94</td>
<td>3.64</td>
</tr>
<tr>
<td>Overall Mean Trip Length in Miles (One-Way All Modes)</td>
<td>411.66</td>
<td>439.57</td>
</tr>
<tr>
<td>Mean Trip Length – Air</td>
<td>1,000.21</td>
<td>2,000.78</td>
</tr>
<tr>
<td>Mean Trip Length – Private Vehicle</td>
<td>379.73</td>
<td>301.54</td>
</tr>
<tr>
<td>Mean Trip Length – All Other</td>
<td>404.02</td>
<td>420.62</td>
</tr>
<tr>
<td>Mean Trip Length by Purpose in Miles (One-Way All Modes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business and Shop/Pleasure</td>
<td>467.80</td>
<td>489.63</td>
</tr>
<tr>
<td>Visit Friends/Relatives</td>
<td>396.77</td>
<td>470.60</td>
</tr>
<tr>
<td>Leisure</td>
<td>406.70</td>
<td>510.44</td>
</tr>
<tr>
<td>Personal/Family or Medical</td>
<td>376.03</td>
<td>409.60</td>
</tr>
<tr>
<td>Other</td>
<td>216.03</td>
<td>276.28</td>
</tr>
<tr>
<td>Overall Travel Party Size (All Modes)</td>
<td>3.10</td>
<td>N/A</td>
</tr>
<tr>
<td>Travel Party Size – Air</td>
<td>2.96</td>
<td>N/A</td>
</tr>
<tr>
<td>Travel Party Size – Private Vehicle</td>
<td>2.42</td>
<td>N/A</td>
</tr>
<tr>
<td>Travel Party Size – All Other</td>
<td>9.84</td>
<td>N/A</td>
</tr>
<tr>
<td>Travel Party Size by Purpose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business and Shop/Pleasure</td>
<td>2.12</td>
<td>N/A</td>
</tr>
<tr>
<td>Visit Friends/Relatives</td>
<td>2.01</td>
<td>N/A</td>
</tr>
<tr>
<td>Leisure</td>
<td>3.05</td>
<td>N/A</td>
</tr>
<tr>
<td>Personal/Family or Medical</td>
<td>2.91</td>
<td>N/A</td>
</tr>
<tr>
<td>Other</td>
<td>6.24</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* NHTS 2001 includes trips of 50 miles and more. For this analysis only trips of 100 miles and longer one-way were included.
Analysis of NHTS Data: Urban Parameters Process

- Information developed for four variables of interest
  - Person trip production rates
    - Per household by trip purpose
  - Reported average trip durations
    - By mode and trip purpose
  - Time of day of travel distributions
    - By trip purpose
  - Vehicle occupancy
    - By trip purpose

- Variables selected based on potential for transferability
Analysis of NHTS Data: Urban Parameters Classifications

- Trip purposes used for data summaries
  - Home based work
  - Home based school
  - Home based other
  - Non-home based

- Urban area population classifications (from 2009 NHTS)
  - 1 million + with subway/rail; 1 million + without subway/rail
  - 500k to 1 million
  - 200k to 500k
  - 50k to 200k
  - Not in urban area
### Sample trip production tabulation (2009)
**Home based work - MSA population less than 250,000**

<table>
<thead>
<tr>
<th>Workers</th>
<th>0 Autos</th>
<th>1 Autos</th>
<th>2 Autos</th>
<th>3+ Autos</th>
<th>Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.0</td>
<td>1.2</td>
<td>2.3</td>
<td>1.6</td>
<td>0.6</td>
</tr>
<tr>
<td>1</td>
<td>0.0</td>
<td>1.0</td>
<td>1.7</td>
<td>4.7</td>
<td>0.7</td>
</tr>
<tr>
<td>2</td>
<td>0.0</td>
<td>1.3</td>
<td>2.5</td>
<td>2.8</td>
<td>1.7</td>
</tr>
<tr>
<td>3+</td>
<td>0.0</td>
<td>1.2</td>
<td>2.5</td>
<td>3.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Avg</td>
<td>0.0</td>
<td>1.1</td>
<td>2.4</td>
<td>3.6</td>
<td>1.5</td>
</tr>
</tbody>
</table>
### Sample trip length tabulation (2009)

**Home based work – Average travel time in minutes**

<table>
<thead>
<tr>
<th>MSA Population18</th>
<th>Auto</th>
<th>Transit</th>
<th>Non-Motorized</th>
<th>All Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 3 million</td>
<td>29</td>
<td>56</td>
<td>18</td>
<td>31</td>
</tr>
<tr>
<td>Between 1 and 3 million</td>
<td>24</td>
<td>48</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>Between 500,000 and 1 million</td>
<td>24</td>
<td>53</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>Between 250,000 and 500,000</td>
<td>21</td>
<td>30</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>Less than 250,000</td>
<td>20</td>
<td>59</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>Not in MSA</td>
<td>21</td>
<td>57</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>All trips</td>
<td>25</td>
<td>55</td>
<td>15</td>
<td>26</td>
</tr>
</tbody>
</table>
Data from Existing MPO Models: Urban Parameters Process

- Information from over 70 MPOs
  - Small, medium, large
  - Direct contact or publicly available reports
- Information collected
  - Model parameters
    - Trip attraction rates
    - Friction factor parameters
    - Mode choice parameters
    - Volume-delay function parameters
  - Model methods used

| Table 4.4. Trip attraction rates from selected MPOs (person trips per unit). |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Number of MPO Models Summarized | Households*     | School Enrollment* | Employment       | Total            |
| Model 1                          | 10              | 12              | 2               | 50              | 1.2             |
| Model 2                          | 8               | 10              | 2               | 50              | 1.2             |
| Model 3                          | 6               | 8               | 2               | 50              | 1.2             |

* The number of households in a zone.

Source: MPO Documentation Database.
### Data from Existing MPO Models: Urban Sample Tabulation

#### Sample gamma function gravity model parameters (home based work)

<table>
<thead>
<tr>
<th>Model Type</th>
<th>&quot;b&quot;</th>
<th>&quot;c&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large MPO 1</td>
<td>0.503</td>
<td>-0.078</td>
</tr>
<tr>
<td>Large MPO 2</td>
<td>-1.650</td>
<td>-0.040</td>
</tr>
<tr>
<td>Large MPO 3</td>
<td>-0.156</td>
<td>-0.045</td>
</tr>
<tr>
<td>Medium MPO 1</td>
<td>0.812</td>
<td>-0.037</td>
</tr>
<tr>
<td>Medium MPO 2</td>
<td>-0.388</td>
<td>-0.117</td>
</tr>
<tr>
<td>Medium MPO 3</td>
<td>-0.020</td>
<td>-0.123</td>
</tr>
<tr>
<td>Small MPO 1</td>
<td>-0.265</td>
<td>-0.040</td>
</tr>
<tr>
<td>Small MPO 2</td>
<td>0.850</td>
<td>-0.200</td>
</tr>
</tbody>
</table>
Data from Existing MPO Models: Urban Sample Gamma Function Comparison (Home Based Work)

“Small 1”

“Small 2”

SAMPLE
What’s in Report 716 on Urban Parameters?

- **Chapter 1. Introduction**
  - Purpose, objectives, and roadmap
  - Summary of modeling process
  - How parameters used

- **Chapter 2. Planning Applications Context**
  - Planning context affect on model
  - Examples from urban areas
Chapter 3. Development of Data

- Purposes
  - Model development
  - Model validation
  - Model application

- Considerations
  - Limitations of typical data
  - Primary and secondary data sources
  - Conversion of data from secondary sources
  - Network coding procedures

Table 3.2 ACS Data Releases

<table>
<thead>
<tr>
<th>Data Product</th>
<th>Population Threshold</th>
<th>Geographic Threshold</th>
<th>Planned Year of Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-year Estimates</td>
<td>65,000+</td>
<td>PUMAs, counties, large cities</td>
<td>2009  2010  2011  2012</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau.
*Five-year estimates will be available for areas as small as census tracts and block groups.
What’s in Report 716 on Urban Parameters? (cont’d)

Chapter 4. Model Components

- Discusses each model component
- Each subsection presents:
  - A brief description of best practice(s)
  - Basis for development of parameters
  - Parameters classified by urban area category
  - Explanations of use in model
    ♦ Estimation
    ♦ Validation
  - Parameter transfer
What’s in Report 716 on Urban Parameters? (cont’d)

Chapter 4 subsections

- Vehicle Availability
- Trip Generation
- Trip Distribution
- External Travel
- Mode Choice
- Automobile Occupancy
- Time-of-Day Characteristics
- Truck/Freight Modeling
- Highway Assignment
- Transit Assignment
Chapter 4 appendices

- % of HHs by number of vehicles by U.S. metro area

- Coefficients for logit vehicle availability models
  - 1 vehicle HHs
  - 2 vehicle HHs
  - 3+ vehicle HHs

- Mean trip length in minutes by purpose and mode by population range

- Trip production rates by population size and purpose:
  - HBW
  - HBNW
  - NHB
  - HBSC
  - HBO (nonwork, nonschool)

- Time-of-day distributions by purpose and direction
What's in Report 716 on Urban Parameters? (cont’d)

- Chapter 5. Model Validation Process
  - Validation overview
    - Consistent with other sources
    - Appropriate out-references
    - Not duplication of existing references
  - Basic guidance
    - Focus on information in the guidebook

### Table 5.8 Comparison of Shares of Trips by Trip Purpose

<table>
<thead>
<tr>
<th>Urbanized Area Population</th>
<th>NCHRP Report 187&lt;sup&gt;a&lt;/sup&gt; (Published 1973)</th>
<th>NCHRP Report 365&lt;sup&gt;b&lt;/sup&gt; (Published 1998)</th>
<th>2009 NHTS Data&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HBW</td>
<td>HBW</td>
<td>NHR</td>
</tr>
<tr>
<td>50,000 to 100,000</td>
<td>10</td>
<td>51</td>
<td>23</td>
</tr>
<tr>
<td>100,000 to 200,000</td>
<td>20</td>
<td>57</td>
<td>23</td>
</tr>
<tr>
<td>200,000 to 500,000</td>
<td>20</td>
<td>55</td>
<td>25</td>
</tr>
<tr>
<td>500,000 to 1,000,000</td>
<td>25</td>
<td>54</td>
<td>21</td>
</tr>
<tr>
<td>1,000,000 to 3,000,000</td>
<td>25</td>
<td>54</td>
<td>21</td>
</tr>
<tr>
<td>More than 3,000,000</td>
<td>25</td>
<td>54</td>
<td>21</td>
</tr>
</tbody>
</table>

Notes:  
- Shares by purpose are based on person trips in motorized vehicles.  
- Shares by purpose are based on person trips by all modes.  
- Because of differences between urban area categories in the three reports, the rates shown were chosen from the closest matching category.

What’s in Report 716 on Urban Parameters? (cont’d)

Chapter 6. Emerging Modeling Practices

- Overview
- Tour and activity based approaches
- Traffic microsimulation

Chapter 7. Case Study Application(s)

- Two studies
  - Smaller urban area with little transit
  - Larger area with transit
- Illustrate use of the information from Chapters 4 and 5
- Draw on concepts presented guidebook
  - Similar to approach in NCHRP Report 365
Emerging Modeling Practices (cont’d)

- ABM parameters were outside the scope of NCHRP 8-65

- That said, Chapter 6 of Report 716 includes discussion of this topic

- Transferability of ABMs may be valid in at least some limited circumstances…

- But what those limits are is somewhat unknown (lack of research/guidance)

- Transferability is asserted through SHRP C-10A (Sacramento-Jax-Tampa); should learn lessons from this effort
Differences in Rural and Long-Distance Travel vs. Urban Trips

- Rural/long-distance trips have small impact on most* urban models but great impact on statewide/national models.

- While the greatest percent of trips occurs within urban model geography, percent of miles extends way beyond.

*however, long-distance and rural travelers have a significant impact on Florida’s regional models; use of these transferable parameters could enhance our regional models.
Differences in Rural and Long-Distance Travel (Cont’d)

- Long-distance travel surveys
  - 1995 ATS + 2001 NHTS
  - Statewide household surveys
  - Recent GPS HHTS data collection
Differences in Rural and Long-Distance Travel (Cont’d)

- Rural travel surveys
  - 2009 NHTS
  - Statewide household surveys
  - Recent GPS HHTS data collection

Table 2.2  NHTS 2009 Sample of Rural Households

<table>
<thead>
<tr>
<th>Item</th>
<th>Rural Samples*</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Rural (National)</td>
<td>43,583</td>
</tr>
<tr>
<td>New England</td>
<td>1,560</td>
</tr>
<tr>
<td>Mid-Atlantic</td>
<td>5,721</td>
</tr>
<tr>
<td>East North Central</td>
<td>2,355</td>
</tr>
<tr>
<td>West North Central</td>
<td>2,684</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>19,293</td>
</tr>
<tr>
<td>East South Central</td>
<td>1,570</td>
</tr>
<tr>
<td>West South Central</td>
<td>6,228</td>
</tr>
<tr>
<td>Mountain</td>
<td>1,268</td>
</tr>
<tr>
<td>Pacific</td>
<td>2,445</td>
</tr>
</tbody>
</table>

* Includes Add-on samples.

Figure 2.3  VMT per Person for Urban and Rural Households by Census Division

Vehicle Miles (VMT) per day

- All
- New England
- Mid Atlantic
- East North Central
- West North Central
- South Atlantic
- East South Central
- West South Central
- Mountain
- Pacific

Urban  Rural
Statewide Model Statistics on Rural/LD Travel

- SWM statistics on rural and long-distance travel
  - Fill data gaps
  - Identify long-distance trip thresholds used
  - Assess reasonableness of survey analysis

### Table 3.2 Average Trip Length of Long-Distance Trips in Statewide Models

<table>
<thead>
<tr>
<th>State</th>
<th>Business</th>
<th>Tourist</th>
<th>Other</th>
<th>Total Minutes</th>
<th>Total Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona (Passenger)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>213</td>
<td>206</td>
</tr>
<tr>
<td>Arizona (Truck)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>228</td>
<td>257</td>
</tr>
<tr>
<td>Florida</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>127</td>
<td>–</td>
</tr>
<tr>
<td>Georgia</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>131</td>
<td>–</td>
</tr>
<tr>
<td>Indiana</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>121</td>
<td>–</td>
</tr>
<tr>
<td>Louisiana</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>168</td>
<td>–</td>
</tr>
<tr>
<td>Texas (Miles)</td>
<td>200</td>
<td>–</td>
<td>100</td>
<td>–</td>
<td>200</td>
</tr>
<tr>
<td>Utah</td>
<td>89</td>
<td>–</td>
<td>81</td>
<td>85</td>
<td>–</td>
</tr>
<tr>
<td>Virginia (Interstate)</td>
<td>284</td>
<td>308</td>
<td>318</td>
<td>303</td>
<td>–</td>
</tr>
<tr>
<td>Virginia (IntraState)</td>
<td>117</td>
<td>124</td>
<td>126</td>
<td>126</td>
<td>136</td>
</tr>
</tbody>
</table>

* Listed in minutes unless indicated otherwise.

### Table 3.3 Auto Occupancy Rates in Statewide Models

<table>
<thead>
<tr>
<th>State</th>
<th>Business</th>
<th>Tourist</th>
<th>Other</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1.34</td>
</tr>
<tr>
<td>Florida</td>
<td>1.10</td>
<td>2.60</td>
<td>–</td>
<td>1.85</td>
</tr>
<tr>
<td>Indiana</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>3.00</td>
</tr>
<tr>
<td>Louisiana</td>
<td>1.56</td>
<td>3.44</td>
<td>2.64</td>
<td>2.65</td>
</tr>
<tr>
<td>Mississippi (Interstate)</td>
<td>1.39</td>
<td>2.50</td>
<td>2.03</td>
<td>2.09</td>
</tr>
<tr>
<td>Mississippi (IntraState)</td>
<td>1.50</td>
<td>2.55</td>
<td>2.26</td>
<td>2.10</td>
</tr>
<tr>
<td>Utah</td>
<td>1.33</td>
<td>–</td>
<td>2.06</td>
<td>1.70</td>
</tr>
<tr>
<td>Virginia</td>
<td>1.62</td>
<td>2.69</td>
<td>2.09</td>
<td>1.62</td>
</tr>
</tbody>
</table>
Transferability of Rural/LD Parameters

- Conditions conducive to transferability
  - Population densities
  - Median income
  - Available transportation modes
  - Key employment types/industries
  - Proximity to tourist destinations
  - Source of model parameters relative to where being used

![Table 2.3 Travel Parameters for Urban and Rural Households by Census Division, 2009 NHTS]

![Figure 2.3 VMT per Person for Urban and Rural Households by Census Division]
Transferability of Rural/LD Parameters (Cont’d)

- Parameters considered for transferability
  - Daily rural trip rates per HH by rural trip purpose
  - Annual long-distance trips per HH by long-distance trip type/purpose
  - Friction factors for rural and long-distance purposes
  - Auto occupancy rates by rural trip purposes
  - Party size by long-distance types/purposes

- Reasonableness values/benchmarks
  - Percent rural trips by purpose
  - Percent long-distance trips by type
  - Average trip length by mode and rural trip purpose
  - Average trip length by mode and LD trip type
  - Percent of rural and LD trips by mode and travel distance

Table 3.7 2001 Long-Distance Trips by Purpose and Mode

<table>
<thead>
<tr>
<th>LD Purpose</th>
<th>Percent by Purpose</th>
<th>Percent Trips by Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Personal Vehicle</td>
<td>Air</td>
</tr>
<tr>
<td>Pleasure</td>
<td>55.5%</td>
<td>90.4%</td>
</tr>
<tr>
<td>Business</td>
<td>15.5%</td>
<td>79.3%</td>
</tr>
<tr>
<td>Commuting</td>
<td>12.6%</td>
<td>96.4%</td>
</tr>
<tr>
<td>Personal Business</td>
<td>12.6%</td>
<td>89.5%</td>
</tr>
<tr>
<td>Other</td>
<td>3.4%</td>
<td>96.6%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>89.5%</td>
</tr>
</tbody>
</table>
Consideration of Other Rural/LD Trip Characteristics

- Temporal analysis considerations
  - Seasonal variations
  - Daily, monthly, or annually (for long-distance trips)
  - AADT (include weekends) vs. PSWADT (exclude weekends)
  - Time-of-day

- Other aspects of trip definition
  - Person vs. vehicle
  - Per capita vs. Household
  - Long-distance thresholds
  - Dealing with intermediate stops
  - Tours vs. trips

| Table 3.8  2001 Long-Distance Trips by Trip Distance |
|-----------------------------|-----------------------------|
| Distance                  | Trips                      |
| 50-499 Miles              | 90.0%                      |
| 500-999 Miles             | 5.0%                       |
| More Than 1,000 Miles     | 5.0%                       |

| Table 3.9  2001 Long-Distance Trips by Geography and Mode |
|-----------------------------|-----------------------------|
| Urban                       | Personal Vehicle | Air | Other Modes |
|                            | 87.0%            | 9.0%| 4.0%         |
| Rural                      | 95.0%            | 3.0%| 2.0%         |

| Table 3.11  2001 Long-Distance Trips by Income and Mode |
|-----------------------------|-----------------------------|
| Income                     | Personal Vehicle | Air | Bus* |
| Less Than $75,000          | 91.0%           | 5.0%| 4.0% |
| More Than $75,000          | 84.0%           | 14.0%| 2.0% |

*Income range of less than $25,000 and more than $25,000 were used for bus trips.
Process for Developing Rural/LD Parameters

- Process for developing transferable parameters
  - Comparisons – rural vs. urban vs. long-distance
  - Typologies – household characteristics, density, proximity, purpose/type, length of trip
  - Geographies – proximity to urbanized areas, small urban vs. agrarian, tourist, etc.
  - Time periods – weekday vs. weekend, daily vs. annual
Process for Developing Rural/LD Parameters (Cont’d)

- Limitations of datasets – ATS, NHTS 2001, NHTS 2009, Michigan, Ohio, GPS surveys

- Minimum amount of local data required – comparisons against statistics from statewide models, local surveys

Next steps (in progress or recently completed)

- Refine statistical analysis for each survey
- Refine preliminary findings/recommendations
- Prepare Guidebook/Final Report
Preliminary Findings... some might be obvious

- Long distance trip rates are generally consistent among different databases; *pleasure trips land in the middle*

- Long distance trips are generally longer for business and shortest for personal business

- Auto occupancy rates are considerably higher for long-distance trips than urban or rural travel

- Auto is the primary mode for long distance trips, especially within a 300 mile range. Air travel begins to increase significantly over 300 miles
Preliminary Findings (Cont’d)

- Rural trip rates vary somewhat among different sources; statewide HH survey trip rates (e.g., OH, MI) are generally lower than 2009 NHTS trip rates

- Rural trip rates are generally lower than suburban area trip rates but otherwise not that different from urban rates

- Rural work trips are a smaller percentage than found in most urban settings

- Auto occupancy rates for rural areas are generally higher than small-to-medium sized urbanized areas, but lower than the largest metropolitan areas
Contact Information

Nanda Srinivasan, Senior Program Officer
National Cooperative Highway Research Program
Transportation Research Board of the National Academies
500 Fifth Street, NW
Washington, DC 20001
202-334-1896
nsrinivasan@nas.edu

NCHRP 8-61 – Thomas Rossi, Principal
Cambridge Systematics, Inc.
100 CambridgePark Drive, Suite 400
Cambridge, MA 02140
617-354-0167
trossi@camsys.com

NCHRP 8-84 – Rob Schiffer, Principal
Cambridge Systematics, Inc.
1566 Village Square Boulevard, Suite 2
Tallahassee, FL  32309
850-219-6388
rschiffer@camsys.com
Transferable Model Parameters: NCHRP 8-61 and NCHRP 8-84

Questions?