Introduction

- Travel and Activity are Two Sides of the Same Coin
- Time in Travel = f (Time at Activity, # Trips)
- Primary Activities Considered: Home, Work, Shop and Other
- Daily Activity Budget (24 hrs)
Data

1990/91 and 1995/96 Nationwide Personal Transportation Survey

1990 and 1995 Federal Highway Administration Highway Statistics

Individuals whose total activities did not add to 1440 minutes (24 hrs), excluded

This study looks only at adults, 18-65 years of age

Excluded travelers with a daily shopping time greater than 420 minutes
Comparison of Travel and Activity Patterns of 1990 and 1995 NPTS

- Time spent at home decreased for non-workers and female workers.
- Time at home in 1990 was substituted for work in 1995, especially for female workers.
- Time spent at other declined for workers but increased for non-workers.
- Overall travel times have either remained stable or increased, but not significantly.
<table>
<thead>
<tr>
<th>S1: Supply before</th>
<th>S2: Supply after</th>
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</thead>
<tbody>
<tr>
<td>Quantity of Travel (VMT)</td>
<td>Price of Travel</td>
</tr>
<tr>
<td>Q1</td>
<td>P1</td>
</tr>
<tr>
<td>Q2</td>
<td>P2</td>
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How does Highway Expansion affect Travel and Activity Patterns

- Makes the network faster, leading to time savings in travel
- Increases accessibility
- Broadens commuters' travel choices
- More non-travel activities become possible
- Individuals maximize their utility
Time Spent at Activities Decreases

Utility Increases with Expansion

Travel and Activity Duration Production Function
Model Estimation

Seemingly Unrelated Regression Estimation (SURE) is used.

They use asymptotically efficient, feasible generalized least squares estimation.

It overrules the assumption of OLS that error residuals are not interrelated.
Description of Variables

T
  90i
  Time spent at activity “i” in 1990

i
  Index of activities (travel to and duration at home, work, shop and other)

A
  Age

D
  Local population Density

G
  Gender

H
  Household Income levels

L
  Family lifecycle characteristics

M
  Month of year interview was conducted

S
  State specific variables

W
  Day of week interview was conducted
Methodology

Since the NPTS was not conducted as a panel survey, we first estimate a model of 1990 individuals, and then apply that model to 1995 individuals in the form of estimated travel behavior for 1990 individuals. We then estimated a difference model of change in travel behavior between the 1995 individuals and their best estimate of 1990 behavior.
change in time at activity "i" between 1995 and 1990 (estimated)
<table>
<thead>
<tr>
<th>Workers Travel to Big Box Stores</th>
<th>Time Savings From Travel</th>
<th>Pleasure Oriented</th>
<th>Reduced Peak Spreading</th>
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</table>
Hypothesis for Non Workers

TRAVEL TO

TIME SPENT AT

More # of Home-Shop Trips Faster Network

Less Discretionary Pleasure Oriented
Elasticity of Time with respect to Capacity

* Indicates significance at 95% confidence level
Due to Highway Capacity Expansion

- Workers spend more time at home and other, less time at work and shop.
- Non-workers spend more time at home and other, less time at other.
- Non-workers take more home to shop trips.
Conclusions

- Overall Travel Times have remained stable while Activity Durations changed significantly.
- Increase in highway capacity has a small but significant impact on individual people's activity and travel patterns.
- Effect on Workers and Non-Workers are different.
Time Budgets and Induced Demand: How Access Affects Activity

By David M Levinson

University of Minnesota

CTS Research Conference

25th May 2000
Time Budgets and Induced Demand: How Access Affects Activity

By David M Levinson

Symposium on Induced Traffic Research
University of California, Berkeley
June 8-9, 2000
Time Budgets and Induced Demand: How Access Affects Activity

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9th International Association For Travel Behavior Research Conference
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