Thinking Outside the Bus
Behavior, subsidies, and transit use

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Game plan
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1. A quick overview of travel behavior
2. A thumbnail sketch of public transit today
3. Implications of transit subsidy and patronage research
4. Cost-effective ways to increase transit use
   1. Pricing transit services
   2. Reducing traveler uncertainty
Travel behavior 101

• Travel is a means, not an end
  – Most trips are to do something elsewhere
    • Activity participation is associated with subjective well-being
    • Trips are associated with activity participation
Travel behavior 101

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  – Most trips to do something elsewhere

• People think about “tours” and not trips
  – The easiest way to Point B, may not be the easiest to Points C, D, and E
    • “Trip chaining” harder to do on traditional transit
    • “Schlepping” one’s stuff harder too

• Risk/uncertainty, time, and money are most important
  – In that order!
    • Fear for safety trumps all
    • Reliability more important than speed
    • Out-of-pocket spending most noted
Travel behavior 101

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• Risk/uncertainty, time, and money are most important
  – In that order!
• People love car travel for good reason
  – Walking and biking share cars’ flexibility
  – Traditional transit less so

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Public transit?

• Can take many forms:
  – Buses, streetcars, subways, and ferries operating in most urban areas on fixed-routes with fixed-schedules for a nominal fare
  – Paratransit and taxis share much with cars, bikes, and feet, but are unfortunately viewed by many as mere niche players
Public transit?

• 75 years ago:
  – Almost exclusively private, for-profit systems
  – Today, almost entirely public

• With shift to public ownership
  – Ever expanding public agenda for transit
  – Service and subsidies growing faster than ridership

Public transit?

• Transit’s strengths
  – Moving large numbers of people from a few origins to a few destinations at the same time
Public transit?

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  – Moving large numbers of people from a few origins to a few destinations at the same time

• Metropolitan person trips 2009
  – Private vehicles = 83.5%
  – Public transit = 3.9%

What are transit’s primary markets?
What are transit’s primary markets?

• People who – because of age, income, or disability – have limited access to and use of automobiles
  – Most transit users are low-income

• Trips to and from places where parking is limited and/or expensive
  – Downtowns, universities, airports, etc..

• In sum:
  – The central parts of the oldest, and largest cities
But transit use is climbing of late
(up 36% since 1995 and 9% since 2001)

Source: American Public Transit Association

Metropolitan areas are growing (up 85 million since 1990)
but transit trips per urban resident are down 27%

Source: Author's Calculations from American Public Transit Association data
Why aren’t major investments in public transit “buying” more new riders?

Behind the eight-ball

• Transit increasingly operates in places that were designed around the automobile
  – Low densities
  – Lots of streets and roads
  – Lots and lots of free parking
Why so much driving?

- **Average journey-to-work time in 2010**
  - Public transit: 56.0 minutes
  - Private vehicles: 22.9 minutes

Why all of this driving?

- **Average journey-to-work time in 2010**
  - Public transit: 56.0 minutes
  - Private vehicles: 22.9 minutes

- **Goods movements and personal business travel growing fastest**
  - Errands now outnumber work trips by more than 2.5:1
  - Increasing share of peak hour trips are chained into tours
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So What Explains Overall Transit Ridership?
Nature and Nurture

• Nature
  – Bakersfield is never going to have as much transit use as San Francisco

• Nurture
  – Fare and service policies can double (or halve) patronage in a given area
Of the things that transit managers’ control, fares and headways have the most effect on ridership

<table>
<thead>
<tr>
<th></th>
<th>5th Percentile</th>
<th>95th Percentile</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Fare per Unlinked Boarding</td>
<td>$0.95</td>
<td>$0.20</td>
<td>-78.9%</td>
</tr>
<tr>
<td>Predicted Per Capita Boardings</td>
<td>7.1</td>
<td>15.6</td>
<td>119.7%</td>
</tr>
<tr>
<td>Average Headways</td>
<td>2,340</td>
<td>12,803</td>
<td>447.2%</td>
</tr>
<tr>
<td>Predicted Per Capita Boardings</td>
<td>6.4</td>
<td>15.1</td>
<td>135.9%</td>
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So are there any cost-effective ways to boost transit ridership?

Yes!

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Two promising paths forward

1. Pricing services like businesses do would increase cost-efficiency, service-effectiveness, and social equity

2. Thinking outside of the bus to reduce uncertainty of transit travel
Current approaches to transit pricing

- While the costs of transit trips vary dramatically by time of day, distance, direction, and travel mode
  - Most transit operators do not carefully analyze their “marginal” costs

- As a result, fares tend to be “flat”
  - That is, they don’t vary much (if at all) by time, distance, or mode
  - Result: Lots of inefficient (and inequitable) “cross-subsidies”
“Marginal cost” pricing…

• Encourages riders to consume more “cheap to provide” service
  – Off-peak trips
  – Backhaul trips
  – Short trips
  – Bus trips
• And to “co-pay” for more “expensive to provide” trips
  – Demand for these trips is more “inelastic”
  – Riders tend to be wealthier

Responses of “choice” and “dependent” riders to fare changes

<table>
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<tr>
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<th>Fare Decreases</th>
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<tr>
<td>Lower-Income Riders</td>
<td>Relatively inelastic; have relatively few alternatives</td>
<td>Relatively elastic; limited incomes and few alternatives creates latent demand for transit travel</td>
</tr>
<tr>
<td>Higher-Income Riders</td>
<td>Relatively elastic; typically have many alternatives</td>
<td>Relatively inelastic; higher incomes and plenty of alternatives means that transit remains an inferior good for most</td>
</tr>
</tbody>
</table>
THINKING OUTSIDE THE BUS

LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY
All-Mode Unlinked Passenger Trips 1980-2013

Source: Thomas Rubin

UCLA
Institute of Transportation Studies
Out-Of-Vehicle Experience

- Public transit passengers must typically wait for and transfer between buses and trains
- Rider behavior tells us that this “out-of-vehicle” is 1.5 to 4 times more important than “in-vehicle” travel

Conclusions

- The most important determinant of user satisfaction is frequent and reliable service in an environment of personal safety
Conclusions

- Reliability, safety, and security factors outweighed other attributes of stops/stations
- Reliability, safety, and security were consistently important regardless of wait time
- Cleanliness, schedule/route info, shelter, guards, restroom, seating, food/drink become more important with increased wait times

Example

- Bus-only lanes in congested, high-ridership corridors…
  - Increase vehicle speeds and reduce in-vehicle travel times
  - But also reduce headways, which may have an even greater effect on patronage
Thinking outside the bus about transit passenger needs

The transit users' hierarchy of needs

Let's Recap
OK, so it’s complicated. But what’s most important?

• #1: Travel time reliability
  – Travelers like speed, but they like reliability even more
  – Wait and transfer times are especially burdensome (1.5 to 4 times more than in-vehicle time)
    • Frequent service with few transfers will beat fast service with transfers every time
  – Lesson: Increasing service frequency and schedule adherence attracts lots of riders
Thinking outside the bus

• #1: Travel time reliability
  – Lesson: Increasing service frequency and schedule adherence attracts lots of riders
  – Cost-effective ways to improve reliability
    • Better tracking and management of vehicle spacing
    • Realistic schedule setting
    • Real-time “Next Bus” information at major stops and on smart phones
    • Transit signal prioritization
    • Queue jumper and, in limited cases, bus-only lanes

OK, so it’s complicated. But what’s most important?

• #2: Price
  – The cost of providing transit varies a lot
    • Peak hour, peak direction, and rail service cost a lot more than off-peak, contra-flow, and bus service
  – But transit fares tend to be “flat,” per trip or even per month
    • Long-distance, peak hour, peak direction rail passengers get the biggest government subsidies, while short bus trips in the off-peak tend to require little subsidy
    • This encourages inefficiency
What’s a fair fare?

• #2: Price
  – Conventional wisdom holds that lowering fares is a costly way to add riders
  – Fare elasticity research:
    • Fare increases chase away higher-income riders (who can switch to cars)
    • Fare reductions attract lower-income riders (who have fewer choices)

OK, so it’s complicated. But what’s most important?

• #2: Price
  – Lesson: Use smartcards to vary fares to reflect costs
    • Lower fares for inexpensive-to-provide trips (short, off-peak, backhaul trips)
    • Higher fares for expensive-to-provide trips (long, peak-period, peak direction, express and rail trips)
    • Would encourage better utilization of existing capacity, such as by adding rapid turnover short trips
      – Would add riders without adding much to costs
Make transit smarter

• #2: Price
  – Lesson: Use smartcards to vary fares to reflect costs
    • Would increase both system performance and social equity
    • since higher-income riders disproportionately consume expensive-to-provide trips and lower-income riders disproportionately consume inexpensive-to-provide trips

There is low-hanging fruit out there to cost-effectively increase transit use
Thank you

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