Analyzing the Market Share of Commuter Rail Stations using LEHD Data

Using Census Data for Transportation Applications Conference,
Irvine, CA
October 26, 2011
1. What is the size of Metrolink’s commute market?
2. What share of the market does Metrolink capture?
3. What is the latent demand and what factors influence it?
Metrolink – Southern California’s Regional Railroad

- 7 routes serving 6 counties
- 55 stations
- 512 route miles
- 164 weekday trains
- 42,000 avg. weekday trips
The travel shed represents the competitive market.

Station catchment area methodology:

1. Analyze travel data for current riders
   - Origin-Destination survey of current riders. (Sample size needs to be large enough to provide enough observations for each station).
   - GIS analysis of home and work locations for Metrolink riders.

2. Define station catchment areas based on trip origins/destinations
   - Catchment area covers no less than 90% of trip origins or destinations for a particular station.
   - Catchment areas based on census tract or TAZ geography.
Commuter Rail Travel Shed Analysis

Metrolink Station Catchment Areas:

55 home catchment areas
- Average size: 73 square miles
- Station access mode: 87% drive
- Average travel distance from home: 6 miles (median 3 miles)

55 work catchment areas
- Average size: 32 square miles
- Station access mode: 54% transit, 23% walk/bike
- Average travel distance to work: 5 miles (median 1.5 miles)
LEHD provides opportunity to estimate latent demand.

- On-The-Map
- Data download

The structure of the OD files is as follows:

<table>
<thead>
<tr>
<th>Pos</th>
<th>Variable</th>
<th>Type</th>
<th>Length</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>w_geocode</td>
<td>Char</td>
<td>15</td>
<td>Workplace Census Block Code</td>
</tr>
<tr>
<td>2</td>
<td>h_geocode</td>
<td>Char</td>
<td>15</td>
<td>Residence Census Block Code</td>
</tr>
<tr>
<td>3</td>
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<td>Num</td>
<td>8</td>
<td>Total number of jobs</td>
</tr>
<tr>
<td>4</td>
<td>SA01</td>
<td>Num</td>
<td>8</td>
<td>Number of jobs of workers age 29 or younger</td>
</tr>
<tr>
<td>5</td>
<td>SA02</td>
<td>Num</td>
<td>8</td>
<td>Number of jobs of workers age 30 to 54</td>
</tr>
<tr>
<td>6</td>
<td>SA03</td>
<td>Num</td>
<td>8</td>
<td>Number of jobs of workers age 55 or older</td>
</tr>
<tr>
<td>7</td>
<td>SE01</td>
<td>Num</td>
<td>8</td>
<td>Number of jobs with earnings $1250/month or less</td>
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<tr>
<td>8</td>
<td>SE02</td>
<td>Num</td>
<td>8</td>
<td>Number of jobs with earnings $1251/month to $3333/month</td>
</tr>
<tr>
<td>9</td>
<td>SE03</td>
<td>Num</td>
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<td>Number of jobs with earnings greater than $3333/month</td>
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<tr>
<td>10</td>
<td>SI01</td>
<td>Num</td>
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<td>Number of jobs in Goods Producing industry sectors</td>
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<tr>
<td>11</td>
<td>SI02</td>
<td>Num</td>
<td>8</td>
<td>Number of jobs in Trade, Transportation, and Utilities industry sectors</td>
</tr>
<tr>
<td>12</td>
<td>SI03</td>
<td>Num</td>
<td>8</td>
<td>Number of jobs in All Other Services industry sectors</td>
</tr>
<tr>
<td>13</td>
<td>createdate</td>
<td>Char</td>
<td>8</td>
<td>Date on which data was created, formatted as YYYYMMDD</td>
</tr>
</tbody>
</table>

- Data includes both home and work census block codes, and selected age, income, and industry classifications.
Link LEHD data with station catchment areas

- 6 million records of primary jobs within Metrolink travel shed.
- Each record includes both work and residence census block code.
- Aggregate census blocks by station catchment area.
For jobs in the Metrolink travel shed:

Competitive commute trips:

• 25% of trips have residence and work within travel shed and require no Metrolink transfer.
For jobs in the Metrolink travel shed:

**Competitive commute trips:**

- 25% of trips have residence and work within travel shed and require no Metrolink transfer.
- 10% of trips have residence and work within travel shed but require Metrolink transfer.
For jobs in the Metrolink travel shed:

Competitive commute trips:
- 25% of trips have residence and work within travel shed and require no Metrolink transfer.
- 10% of trips have residence and work within travel shed but require Metrolink transfer.

Uncompetitive commute trips:
- 4% have spatially uncompetitive origin-destination patterns.
For jobs in the Metrolink travel shed:

Competitive commute trips:
• 25% of trips have residence and work within travel shed and require no Metrolink transfer.
• 10% of trips have residence and work within travel shed but require Metrolink transfer.

Uncompetitive commute trips:
• 4% have spatially uncompetitive origin-destination patterns.
• 13% live and work within same station catchment area.
For jobs in the Metrolink travel shed:

Competitive commute trips:
- 25% of trips have residence and work within travel shed and require no Metrolink transfer.
- 10% of trips have residence and work within travel shed but require Metrolink transfer.

Uncompetitive commute trips:
- 4% have spatially uncompetitive origin-destination patterns.
- 13% live and work within same station catchment area.
- 48% of workers commute from outside the Metrolink travel shed.
Corridor Analysis

- Trip tables for all origin-destination pairs
  a. Ridership
  b. LEHD commute trip data
  c. Market share calculated for each O-D pair

### NUMBER OF COMMUTE TRIPS (OVER 10 MILES)

<table>
<thead>
<tr>
<th>Origin Station</th>
<th>LAUS</th>
<th>NORWLK</th>
<th>BUENAPK</th>
<th>FULRTN</th>
<th>ANAHEIM</th>
<th>ORANGE</th>
<th>SNTANA</th>
<th>TUSTIN</th>
<th>IRVINE</th>
<th>MVLNGL</th>
<th>SCLEMTE</th>
<th>SJNCAP</th>
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<tbody>
<tr>
<td>LAUS</td>
<td></td>
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<td>6821</td>
<td>9637</td>
<td>4787</td>
<td>1856</td>
<td>641</td>
<td>794</td>
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</tbody>
</table>
Corridor Analysis

- Metrolink’s market share is 1.1% systemwide
- Ranges from 0.6% to 2.7% by corridor

Factors influencing market share:
- CBD share
- Cost
- Travel time
- Service availability
- Station access/parking
- other
## Level of Service Analysis (LOS)

Level of Service Analysis (LOS) is a tool to evaluate station characteristics from the customer perspective.

Ref: Transit Capacity and Quality of Service Manual ([http://www.trb.org/Main/Blurbs/153590.aspx](http://www.trb.org/Main/Blurbs/153590.aspx))

### Corridor Analysis

<table>
<thead>
<tr>
<th>LEVEL OF SERVICE</th>
<th>LOS A</th>
<th>LOS B</th>
<th>LOS C</th>
<th>LOS D</th>
<th>LOS E</th>
<th>LOS F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric Value</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>COST COMPARED TO DRIVING</td>
<td>&lt;90%</td>
<td>90% - 99%</td>
<td>100% - 124%</td>
<td>125% - 149%</td>
<td>150% - 199%</td>
<td>&gt; 199%</td>
</tr>
<tr>
<td>TRAVEL TIME COMPARED TO DRIVING</td>
<td>&lt;50%</td>
<td>50% - 74%</td>
<td>75% - 89%</td>
<td>90% - 109%</td>
<td>110% - 149%</td>
<td>&gt; 149%</td>
</tr>
<tr>
<td>SERVICE SPAN</td>
<td>&gt; 14 HRS</td>
<td>12 - 14 HRS</td>
<td>10 - 12 HRS</td>
<td>8 - 10 HRS</td>
<td>2 - 8 HRS</td>
<td>&lt; 2 HRS</td>
</tr>
<tr>
<td>WALK SCORE</td>
<td>&gt; 90</td>
<td>70 - 89</td>
<td>60 - 69</td>
<td>50 - 59</td>
<td>40 - 49</td>
<td>&lt; 40</td>
</tr>
<tr>
<td>PARKING UTILIZATION</td>
<td>&lt; 40%</td>
<td>40% - 59%</td>
<td>60% - 69%</td>
<td>70% - 79%</td>
<td>80% - 99%</td>
<td>&lt; 99%</td>
</tr>
<tr>
<td>AVERAGE HEADWAY PEAK</td>
<td>21 - 50 MIN</td>
<td>51 - 59 MIN</td>
<td>60 - 79 MIN</td>
<td>80 - 109 MIN</td>
<td>110 - 160 MIN</td>
<td>&gt; 160 MIN</td>
</tr>
<tr>
<td>TRANSIT CONNECTIONS (AT DESTINATION)</td>
<td>Multiple (3+) bus agencies, with multiple (6+) bus routes and/or rail lines.</td>
<td>One or more bus agencies with multiple (6+) bus routes and/or rail lines.</td>
<td>At least 1 bus agency with 3+ bus routes and/or rail lines.</td>
<td>1-2 transit agencies with 1-2 routes.</td>
<td>One or two bus or rail lines.</td>
<td>0 - 1 bus routes</td>
</tr>
<tr>
<td>FREWAY ACCESS (AT ORIGIN)</td>
<td>1+ freeway less than 1 mile</td>
<td>1 freeway less than 1 mile AND 1+ freeways greater than 1 mile</td>
<td>1 freeway less than 1 mile</td>
<td>1+ freeway greater than 1 mile</td>
<td>1 freeway greater than 1 mile</td>
<td>0 freeways</td>
</tr>
</tbody>
</table>

### Key Points

- **Level of Service** is a tool to evaluate station characteristics from the customer perspective.
- **COST COMPARED TO DRIVING**
  - <90%
  - 90% - 99%
  - 100% - 124%
  - 125% - 149%
  - 150% - 199%
  - > 199%
- **TRAVEL TIME COMPARED TO DRIVING**
  - <50%
  - 50% - 74%
  - 75% - 89%
  - 90% - 109%
  - 110% - 149%
  - > 149%
- **SERVICE SPAN**
  - > 14 HRS
  - 12 - 14 HRS
  - 10 - 12 HRS
  - 8 - 10 HRS
  - 2 - 8 HRS
  - < 2 HRS
- **WALK SCORE**
  - > 90
  - 70 - 89
  - 60 - 69
  - 50 - 59
  - 40 - 49
  - < 40
- **PARKING UTILIZATION**
  - < 40%
  - 40% - 59%
  - 60% - 69%
  - 70% - 79%
  - 80% - 99%
  - < 99%
- **AVERAGE HEADWAY PEAK**
  - 21 - 50 MIN
  - 51 - 59 MIN
  - 60 - 79 MIN
  - 80 - 109 MIN
  - 110 - 160 MIN
  - > 160 MIN
- **TRANSIT CONNECTIONS (AT DESTINATION)**
  - Multiple (3+) bus agencies, with multiple (6+) bus routes and/or rail lines.
  - One or more bus agencies with multiple (6+) bus routes and/or rail lines.
  - At least 1 bus agency with 3+ bus routes and/or rail lines.
  - 1-2 transit agencies with 1-2 routes.
  - One or two bus or rail lines.
  - 0 - 1 bus routes
- **FREWAY ACCESS (AT ORIGIN)**
  - 1+ freeway less than 1 mile
  - 1 freeway less than 1 mile AND 1+ freeways greater than 1 mile
  - 1 freeway less than 1 mile
  - 1+ freeway greater than 1 mile
  - 1 freeway greater than 1 mile
  - 0 freeways

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Ref: Transit Capacity and Quality of Service Manual ([http://www.trb.org/Main/Blurbs/153590.aspx](http://www.trb.org/Main/Blurbs/153590.aspx))

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**Using Census Data for Transportation Applications Conference, Irvine, October 26, 2011**

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Corridor Analysis

- LOS ratings were coded numerically, weighted by LEHD data, and averaged for each station to help identify service quality issues.

<table>
<thead>
<tr>
<th>Origin Station</th>
<th>Ridership</th>
<th>Capture Rate</th>
<th>Level of service: Travel time</th>
<th>Level of service: Cost</th>
<th>Level of service: Service span</th>
<th>Level of service: Transit connections</th>
<th>Level of service: Freeway access</th>
<th>Level of service: Walk access</th>
<th>Level of service: Parking availability</th>
<th>Level of service: Service frequency (headway)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAUS</td>
<td>7.7%</td>
<td>1.0</td>
<td>1.7</td>
<td>2.0</td>
<td>3.0</td>
<td>2.0</td>
<td>3.5</td>
<td>3.5</td>
<td>6.0</td>
<td>1.5</td>
</tr>
<tr>
<td>NORWLK</td>
<td>823</td>
<td>0.6%</td>
<td>2.0</td>
<td>3.2</td>
<td>2.0</td>
<td>3.3</td>
<td>3.0</td>
<td>3.0</td>
<td>6.0</td>
<td>1.5</td>
</tr>
<tr>
<td>BUENAPK</td>
<td>611</td>
<td>1.3%</td>
<td>2.2</td>
<td>4.3</td>
<td>2.0</td>
<td>2.7</td>
<td>4.0</td>
<td>3.0</td>
<td>6.0</td>
<td>1.7</td>
</tr>
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<td>1,477</td>
<td>2.8%</td>
<td>2.5</td>
<td>3.2</td>
<td>2.0</td>
<td>2.4</td>
<td>2.0</td>
<td>3.9</td>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>ANAHEIM</td>
<td>556</td>
<td>4.5%</td>
<td>2.2</td>
<td>3.1</td>
<td>2.4</td>
<td>2.2</td>
<td>2.0</td>
<td>3.9</td>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>ORANGE</td>
<td>820</td>
<td>3.1%</td>
<td>2.1</td>
<td>3.8</td>
<td>2.0</td>
<td>2.3</td>
<td>3.0</td>
<td>4.2</td>
<td>4.0</td>
<td>1.0</td>
</tr>
<tr>
<td>SNTANA</td>
<td>867</td>
<td>1.4%</td>
<td>2.1</td>
<td>3.0</td>
<td>2.0</td>
<td>2.4</td>
<td>2.0</td>
<td>3.5</td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td>TUSTIN</td>
<td>844</td>
<td>2.5%</td>
<td>2.5</td>
<td>3.1</td>
<td>2.0</td>
<td>2.6</td>
<td>2.0</td>
<td>2.9</td>
<td>5.0</td>
<td>1.1</td>
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<td>1,318</td>
<td>1.7%</td>
<td>2.2</td>
<td>3.3</td>
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<td>2.9</td>
<td>2.0</td>
<td>2.8</td>
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<td>1.3</td>
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<td>1.6%</td>
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<td>1.2</td>
<td>2.9</td>
<td>1.0</td>
<td>3.7</td>
<td>2.0</td>
<td>1.7</td>
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<tr>
<td>SJNCAP</td>
<td>187</td>
<td>2.8%</td>
<td>2.9</td>
<td>3.2</td>
<td>2.2</td>
<td>2.6</td>
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<td>3.9</td>
<td>5.0</td>
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<td>140</td>
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<td>2.8</td>
<td>2.4</td>
<td>2.7</td>
<td>3.0</td>
<td>3.6</td>
<td>1.0</td>
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<tr>
<td>OCNSIDE</td>
<td>561</td>
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<td>1.0</td>
<td>2.4</td>
<td>2.5</td>
<td>3.0</td>
<td>3.4</td>
<td>4.0</td>
<td>2.8</td>
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</tbody>
</table>
Thank you

Henning Eichler, AICP, PRC
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Southern California Regional Rail Authority (Metrolink)
EichlerH@scrra.net