Evaluating Transportation Equity with Accessibility

A Case Study of Detroit

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Main Message

• An outdated model of the problem is leading to insufficient solutions with transit
• Low-income central-city residents are not disadvantaged by their geographic position but by severe lack of access to automobiles
• Helping poor people gain access to cars may be the best hope for this urgent problem

Why Accessibility?

A person's job prospects depend on so much more than simply distance:
• The land-use patterning of housing and jobs;
• The availability of a car;
• The location of competing workers in filling a job;
• The effectiveness of transportation infrastructure and services.

What is Accessibility?

• Long history in planning scholarship
• Commonly used, but poorly understood

Accessibility Defined

• “The ease of reaching destinations”
  • As opposed to mobility: “the ease of movement”
• Considers both transportation and land use
  • As opposed to mobility: transportation alone

Current Approach: Mobility is the Goal

Ends

Means

Capacity Expansion

Demand Management

Intelligent Transportation Systems
Needed Approach: Accessibility is the Goal

<table>
<thead>
<tr>
<th>Ends</th>
<th>Accessibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means</td>
<td>Mobility</td>
</tr>
<tr>
<td></td>
<td>Proximity</td>
</tr>
<tr>
<td></td>
<td>Connectivity</td>
</tr>
</tbody>
</table>

Geographic Shift in Number of Jobs, 1990 - 2000
3-Mile Cells, Detroit 3-County Region

<table>
<thead>
<tr>
<th>Change in Jobs (Count)</th>
<th>3,500 - 12,166</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 2,499</td>
<td>-12,166</td>
</tr>
<tr>
<td>2,500 - 5,999</td>
<td>-8,500</td>
</tr>
<tr>
<td>6,000 - 11,999</td>
<td>-8,501</td>
</tr>
</tbody>
</table>

Note: Cells of no data contain no jobs.

3-D View of Geographic Shift in Number of Jobs, 1990 - 2000
3-Mile Cells, Detroit 3-County Region

Poverty
By Census Tract Detroit 7-County Region 1999

<table>
<thead>
<tr>
<th>Percent in Poverty</th>
<th>0 - 5.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 - 10.0</td>
<td>5.1 - 10.0</td>
</tr>
<tr>
<td>10.1 - 20.0</td>
<td>20.1 - 30.0</td>
</tr>
<tr>
<td>20.1 - 30.0</td>
<td>30.1 - 40.0</td>
</tr>
<tr>
<td>30.1 - 40.0</td>
<td>40 - 50</td>
</tr>
</tbody>
</table>

African American Population
By Census Tract Detroit 7-County Region 2000

<table>
<thead>
<tr>
<th>Percent Black</th>
<th>0 - 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1 - 20.0</td>
<td>20.1 - 30.0</td>
</tr>
<tr>
<td>30.1 - 40.0</td>
<td>40 - 50</td>
</tr>
<tr>
<td>40.1 - 60</td>
<td>60.1 - 80</td>
</tr>
<tr>
<td>60.1 - 80</td>
<td>80.1 - 100</td>
</tr>
</tbody>
</table>

Ends
City of Detroit

Area of Study

Source: 2000 Census.
Questions

1) Are inner-city residents disadvantaged in accessing metropolitan jobs?
2) How much difference does a car make?
3) How do disadvantaged populations experience accessibility to jobs throughout the region?

Accessibility Index

\[ A_{\text{max}}^{\text{max}} = \sum_f \sum_i \left[ \alpha_f P_i f(c_{ij}^{\text{max}}) + (1-\alpha_f) P_i f(c_{ij}^{\text{max}}) \right] \]

\[ A_{\text{max}}^{\text{ran}} = \sum_f \sum_i \left[ \alpha_f P_i f(c_{ij}^{\text{ran}}) + (1-\alpha_f) P_i f(c_{ij}^{\text{ran}}) \right] \]

\[ A_{\text{general}} = \alpha_A A_{\text{max}}^{\text{max}} + (1-\alpha) A_{\text{max}}^{\text{ran}} \]
Questions

1) Are inner-city residents disadvantaged in accessing metropolitan jobs?
2) How much difference does a car make?
3) How do disadvantaged populations experience accessibility to jobs throughout the region?
Comparing Transit to Auto Accessibility

Accessibility Indices by Distance From Central Business District,
Detroit 3-County Region, 2000

Each TAZ has a pair of accessibility indices.

Distribution of Automobile vs. Transit Accessibility

Detroit 3-County Region, 2000

Questions
1) Are inner-city residents disadvantaged in accessing metropolitan jobs?
2) How much difference does a car make?
3) How do disadvantaged populations experience accessibility to jobs throughout the region?

PUMS Data
- Microdata offer the advantage of investigating highly specific cases:
  - (1) blacks who are carless, unemployed, and living in poverty;
  - (2) carless and receiving public assistance income;
  - (3) women heading a household without a married partner and with children, carless, and living below the poverty line.
- Disadvantage: loss of resolution

Distribution of Automobile vs. Transit Accessibility

Transportation-Disadvantaged Populations

Detroit 3-County Region, 2000

Number of Carless Blacks, Unemployed and in Poverty

By PUMA
Detroit 3-County Region 2000

Proportional Symbol by Count

Conclusion

- Inner city offers substantial advantage in reaching jobs – with a car.
- Prospects for serving disadvantaged people with transit are limited.
- Gaining access to cars would shift vulnerable populations from the most-disadvantaged to an advantaged position in the regional geography.

Comments

- Accessibility model offers a refined measure of jobs access
  - Underscores the importance of mode
  - Orient our attention to the most disadvantaged
- The problem facing poor people in Detroit is mostly an “automobile mismatch” rather than a “spatial mismatch”
- Recent proposals to use public funds to help poor people gain access to cars have merit in Detroit and policy makers ought to consider them.

Caution

- Strictly focused on the piece of the puzzle that transportation planners care about.
- I’m not saying that public transit has no role.

Policies To Support These Findings: Increase access to cars for the poor

- Eliminate “vehicle asset tests” in work support programs.
- Allow greater flexibility in using JARC funds to support non-profits providing cars.
- Expand credit for car purchases to low-income households.
- Address insurance disparities.
- TANF: incentives for subsidized car ownership programs; financial education for household budgeting for cars.
Policies To Support These Findings:
*Ensure that transit serves the most disadvantaged*

- Refocus funding for public transit to fill pockets of inaccessibility
- Ensure TOD and rail also serve low-income households