Employer TDM Data: What can this scarce commodity reveal about mode shift?

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w/ Joseph Cryer, Jenneille Hsu, & Marco Anderson
Southern California Association of Governments
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Introduction to presentation

• Travel Demand Management (TDM) strategies important to southern California’s long-range regional plan:
  • Congestion management
  • Air quality
  • State greenhouse gas emissions (GHG) targets

• This presentation is a study of a longstanding employer-based trip reduction (EBTR) program in the region
  • Administered by the South Coast Air Quality Management District (SCAQMD)
  • Longitudinal program data (2004–2016)

• Research objectives:
  • Understand the participation rates, characteristics, and spatial distribution of regulated employers
  • Examine the role of intraurban location and employer characteristics in average vehicle ridership (AVR)
  • Examine which employers, locations, and TDM/mitigation strategies are most effective at improving AVR

What are EBTR’s potential contributions to GHG reduction targets?
Employer-Based Trip Reduction (EBTR)

- **History in California**
  - “During the 1980s and 1990s, California witnessed the widespread adoption and rejection of a policy known as mandatory EBTR” (Dill and Wardell 1997)
  - Focus on congestion management and criteria air pollutants
  - Pushback from business community

- **Future potential**
  - Renewed interest in GHG reduction strategies
  - 2018: new legislation allows LA Metro to mandate some TDM for employers above 50

*Photo credit: Wikimedia Commons*
Rule 2202 – EBTR program in Southern California

- Administered by the South Coast Air Quality Management District (SCAQMD)
  - Covers most, but not all of the SCAG region
- Rule 2202
  - Currently applies to worksites with more than 250 employees
  - ~1,340 employers and 1.2 million workers (~15% of the region’s workforce)
- Employers have 3 options:
  1. Survey employee's commutes against an AVR target, implement commute reduction program if not met
  2. Pay in-lieu fee of roughly $47/worker
  3. Purchase emissions credits from the state's carbon market
Prior EBTR Research

- Program perceptions
  - Dill (1998): Rule 2202 watered down. Limited effectiveness, implementation costs ... onerous to employers and workers?
  - Zuehlke & Geunsler (2007): Atlanta's EBTR program similarly criticized

- Kniesel’s (2001) empirical analysis of Rule 2202
  - "Natural experiment" when threshold increased from 100 to 250 in 1997
  - Modest AVR dip at “freed” employers suggests some effectiveness
  - No change at employers who implemented commute reduction programs
  - Some employers are self-motivated, but the “stick” had some effect...

- Dill and Wardell’s (2007) cross-sectional analysis of Portland’s 50-employee rule:
  - Importance of downtown, mixed-use, transit access, & street connectivity to non-SOV share
  - Transit pass discounts, guaranteed ride home programs, flextime, compressed work weeks associated with higher transit ridership

Causality challenging to establish, in part owing to the lack of longitudinal program data.
Data

- Rule 2202 panel data, 2004–2016
  - 18,300 employer-year records
  - Only for employers who chose Option 1:
    - Average vehicle ridership (AVR)
    - Number of workers
    - Industry code
    - TDM/mitigation strategies
  - Between 1,341 and 1,519 worksites chose Option 1 in any given year

- Urban environment surrounding the worksite
  - Pedestrian connectivity (block groups within ½-mi, EPA)
  - Population density (block groups within ½-mi, ACS/Census)
  - Land use within 1/8-mi (SCAG parcel database)
    - Percent residential, single-family residential, commercial, open space
  - Transit accessibility
    - Within a SCAG-defined high quality transit areas (HQTAs)
    - Light/commuter rail station within ½-mi
Research Methods

1. Program statistics– compliance option chosen, AVR

2. Employer–level correlation between AVR and nearby land use/transportation characteristics

3. Employer–level regression models, pooled cross–sectional
   i. Drivers of AVR

\[
AVR_t = \alpha + \beta_1 LOC_t + \beta_2 EMP_t + \beta_3 MIT_t + \beta_4 YR_t + \varepsilon_t
\]

ii. Drivers of year–over–year AVR change (improvement)

\[
\Delta AVR_{t,t+1} = \alpha + \beta_1 LOC_t + \beta_2 EMP_t + \beta_3 MIT_t + \beta_4 YR_t + \varepsilon_{t,t+1}
\]
Are employers electing travel behavior change, or financial contributions to air quality/GHG improvement elsewhere?

1. Employee Commute Reduction Program (ECRP)
2. Air Quality Investment Program (AQIP)
3. Emission Reduction Strategies (ERS)

ECRP decreased from 51% of employers in 2004 to 35% in 2016
Results – AVR and mode share by zone

- AVR for most employers fairly steady
- Zone 1 increases
- Post-recession:
  - Zone 3 AVR drop
  - SOV share up
- SOV share lower than (larger) SCAG region
Results – Mitigation Strategies

- Survey option has a menu of 26 TDM strategies for employers who miss their AVR target:
  - Parking incentives, rideshare/vanpooling, support for bicycle commuters,
  - Flex/compressed schedules, guaranteed ride home, transit subsidies, etc.

- Guaranteed Ride Home
  - 60.1% (2015) to 73.0% (2009) of Option 1 employers offer this
  - 2016: 72.6%

- Offers/coordinates vanpool
  - 16.1% (2008) to 26.2% (2016)
  - 6.9% increase from 2015–2016

- Flextime, as TDM
  - 6.5% (2006) to 12.5% (2009)
  - Data only available 2004–2012
AVR and the employer’s built environment

**Correlation between AVR and nearby built environment characteristics**

- **Nearby commercial land use**: higher AVR
- **Transit quality**: higher AVR
- **Pedestrian friendliness**: weak, higher AVR
- **Nearby open space**: lower AVR
- **Rail station**: lower AVR

Employee, and travel distance characteristics unavailable.
### Model 1 – Drivers of AVR

- Pooled sample of 2004–2016, control for year
- Interpretation of results time-invariant
- Annual controls & industry categories not shown
- All employers, and separate by intraurban zone

<table>
<thead>
<tr>
<th>TABLE 2: OLS models of AVR</th>
<th>All Employers</th>
<th>Employers in Zone 1</th>
<th>Employers in Zone 2</th>
<th>Employers in Zone 3</th>
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Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

^Categorical variable for industrial category. Reference category is Ag/mining/construction/mfg
### Model 2 – AVR Change

- **Year-over-year change measured**
  - E.g. 2004 characteristics explain 2004–2005 AVR change
  - Fit statistics far weaker, but some significant estimates
  - Annual controls & industry categories not shown

#### TABLE 2: OLS models of year-over-year AVR change

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<td>Employees (log)</td>
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<td><strong>Location Characteristics</strong></td>
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<td>Pop. Density (Pop/acre)</td>
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<td>% Commercial LU nearby</td>
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<td>Guar. Ride Home (1/0)</td>
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<td>0.037</td>
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^Categorical variable for industrial category. Reference category is Ag/mining/construction/mfg
Conclusions I

- EBTR intended as congestion management/criteria pollutant abatement.
  - Since 2008, GHG reductions also important

- Declining program participation since 2004
  - Fee/emissions credits less costly than administrative burden + cost of program implementation
  - Less “true TDM” taking place through Rule 2202 – onus placed on non-transportation sectors

- Evidence of recent rebound in driving
  - But, employers electing to survey show lower SOV shares than the region.
  - Evidence of self-motivated employers?

- Vanpool promising
  - ~7% increase in vanpool offerings from 2015–2016
  - Models show they are related to AVR
  - A good fit for larger employers

- Guaranteed ride home shows AVR improvement
  - Peace of mind may be worthwhile, likely inexpensive to provide
Conclusions II

- Employer’s built environment matters
  - Commercial districts promising
  - Proximity of transit related to AVR (not AVR gain), but future job location could target transit-rich areas
  - Small employers not analyzed

- Study shortcomings
  - AVR/strategy data only available if employers choose survey option → Selection bias
  - No residential location or commute distance data

- Future research should
  - Consider employers’ financial vs. altruistic motivation more closely

- LA Metro and AB 2548
  - Mandatory, but weaker EBTR passed in Fall 2018 for LA County employers between 50–249 workers
  - Pre-tax transit & carpool benefits required, plus performance monitoring
  - Opportunity to promote Metro’s employer passes, other programs
Thank you

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