

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

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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



Photo credit: Wikimedia Commons

- Future potential

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



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

OR

2
Pay in-lieu
fee of
roughly
\$47/worker

OR

3
Purchase emissions
credits from the
state's carbon
market

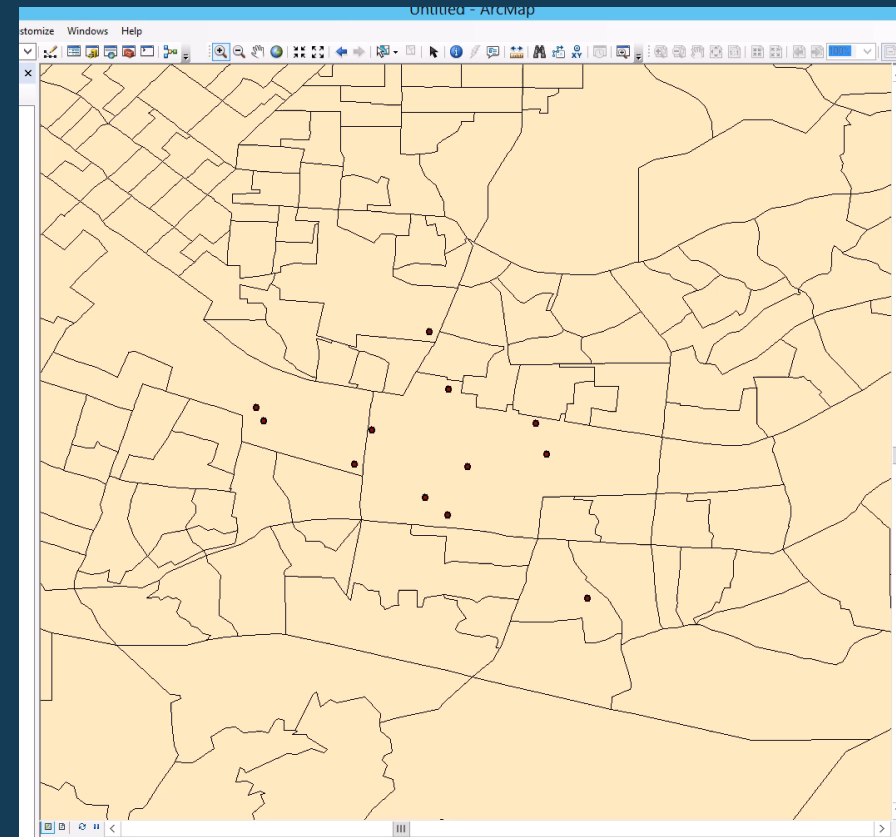
- Program perceptions
 - Dill (1998): Rule 2202 watered down. Limited effectiveness, implementation costs ... onerous to employers and workers?
 - Zuehlke & Geunsler (2007): Atlanta's EBTR program similarly criticized

- 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.

- 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 1/2–mi, EPA)
 - Population density (block groups within 1/2–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 1/2–mi



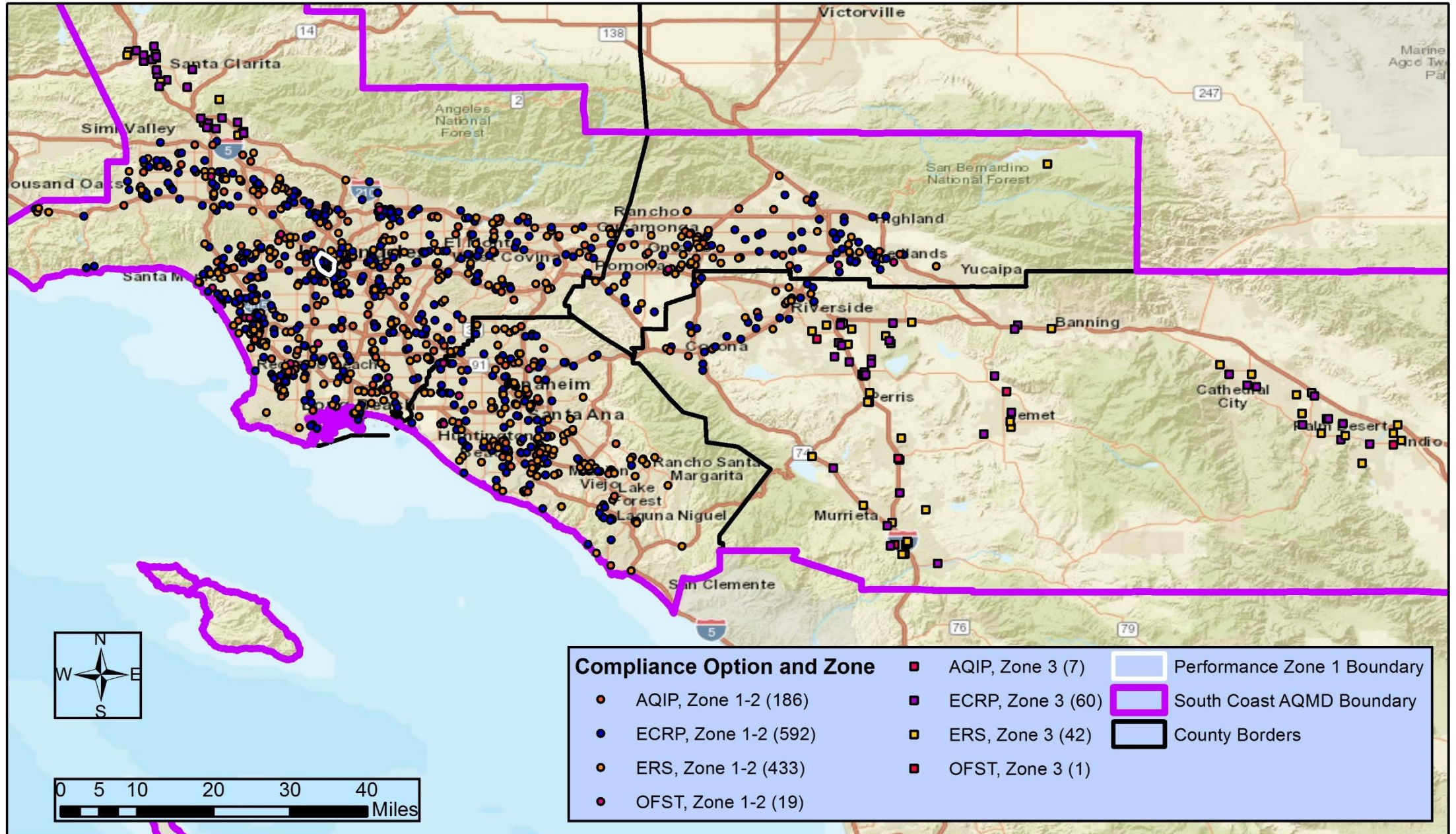
1. Program statistics– compliance option chosen, AVR
2. Employer–level correlation between AVR and nearby land use/transportation characteristics
3. Employer–level regression models, pooled cross–sectional
 - i. Drivers of AVR

$$(1) \text{AVR}_t = \alpha + \beta_1 \text{LOC}_t + \beta_2 \text{EMP}_t + \beta_3 \text{MIT}_t + \beta_4 \text{YR}_t + \varepsilon_t$$

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

$$(2) \Delta \text{AVR}_{t,t+1} = \alpha + \beta_1 \text{LOC}_t + \beta_2 \text{EMP}_t + \beta_3 \text{MIT}_t + \beta_4 \text{YR}_t + \varepsilon_{t,t+1}$$

Rule 2202-eligible worksites by compliance option and performance target zone



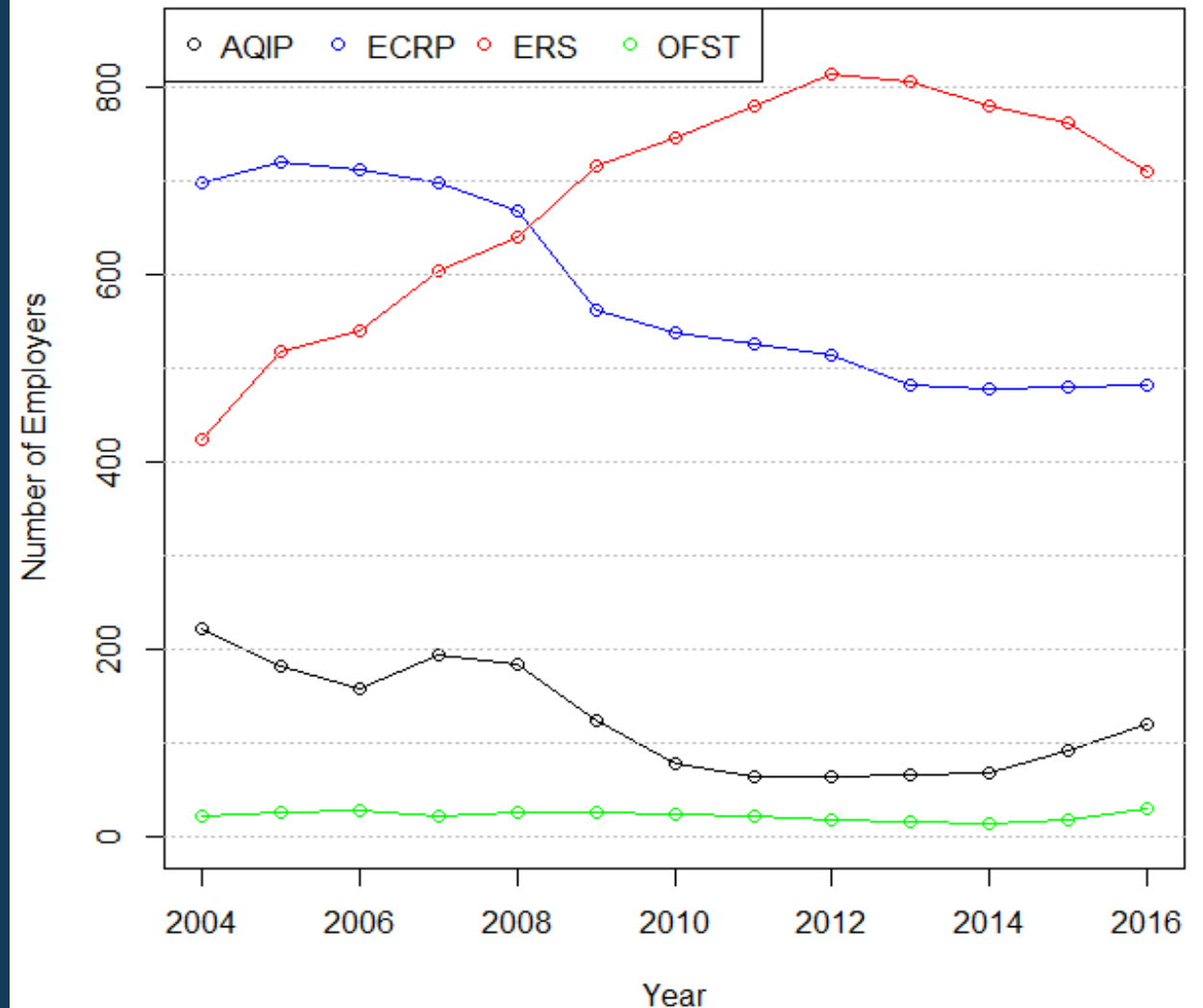
Results – Compliance Options Chosen

Are employers electing travel behavior change, or financial contributions to air quality/GHG improvement elsewhere?

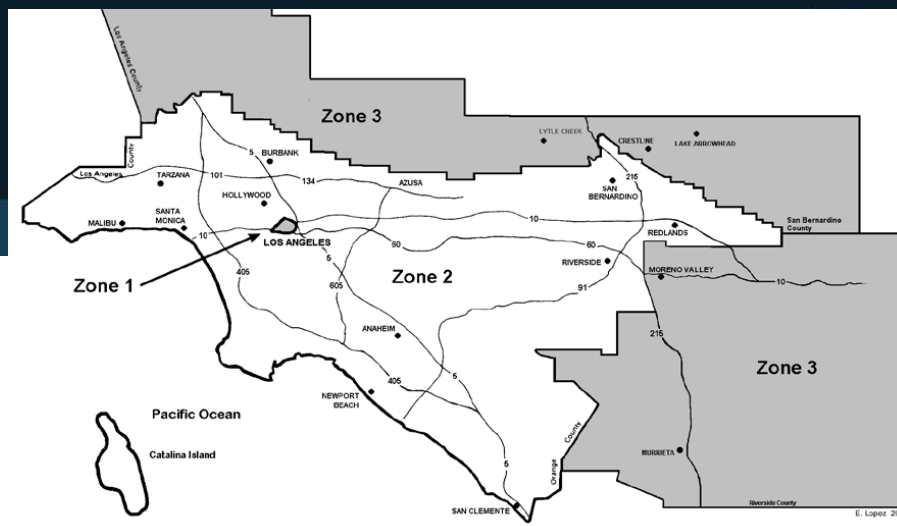
1. Employee Commute Reduction Program (ECRP)
2. Air Quality Investment Program (AQIP)
3. Emission Reduction Strategies (ERS)

ECRP decreased from 51% of employers in 2004 to 35% in 2016

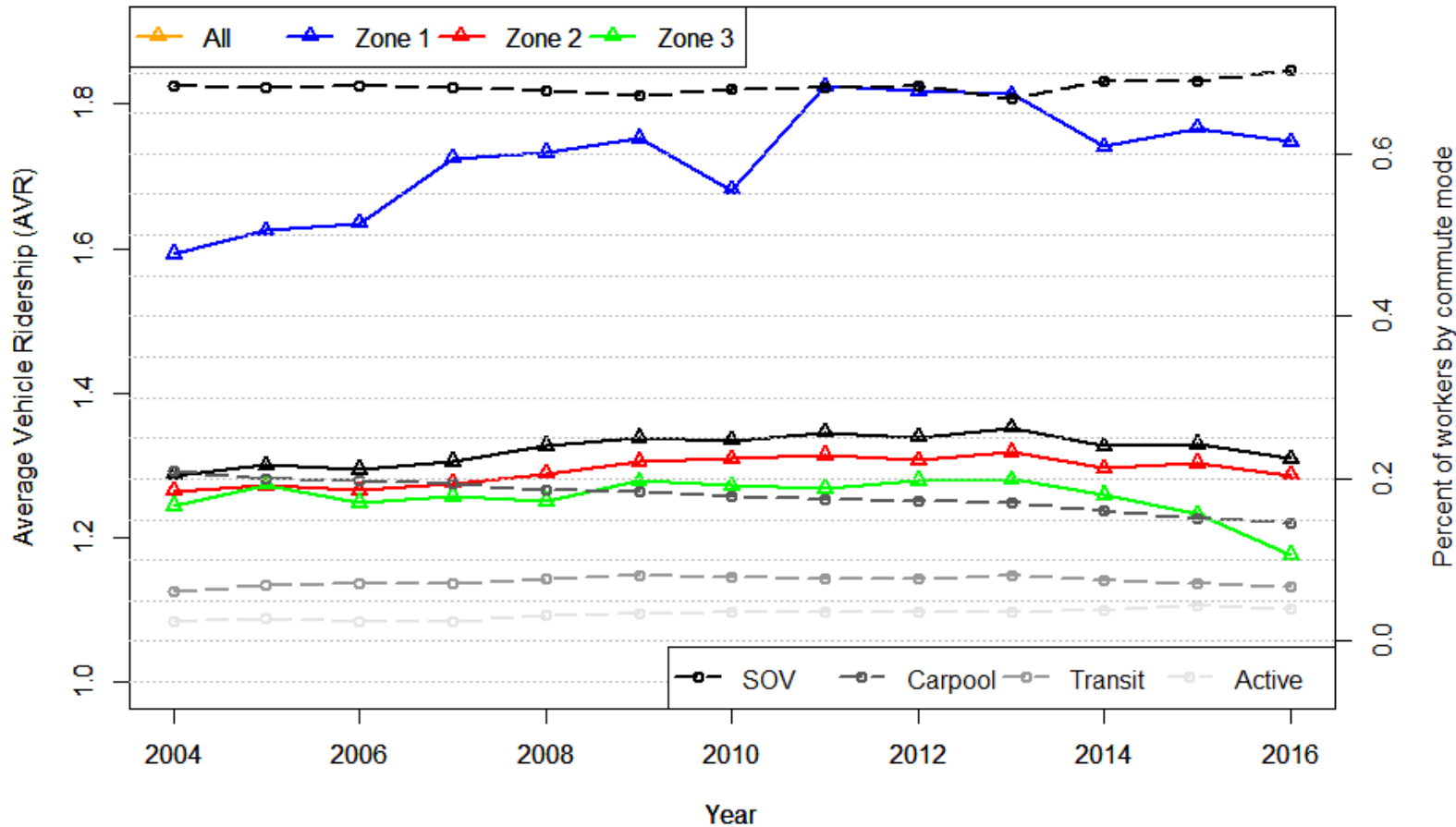
AQMD Rule 2202 Compliance Options Chosen



Results – AVR and mode share by zone



AVR by Target Zone and Overall Employee Mode Share



- 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.

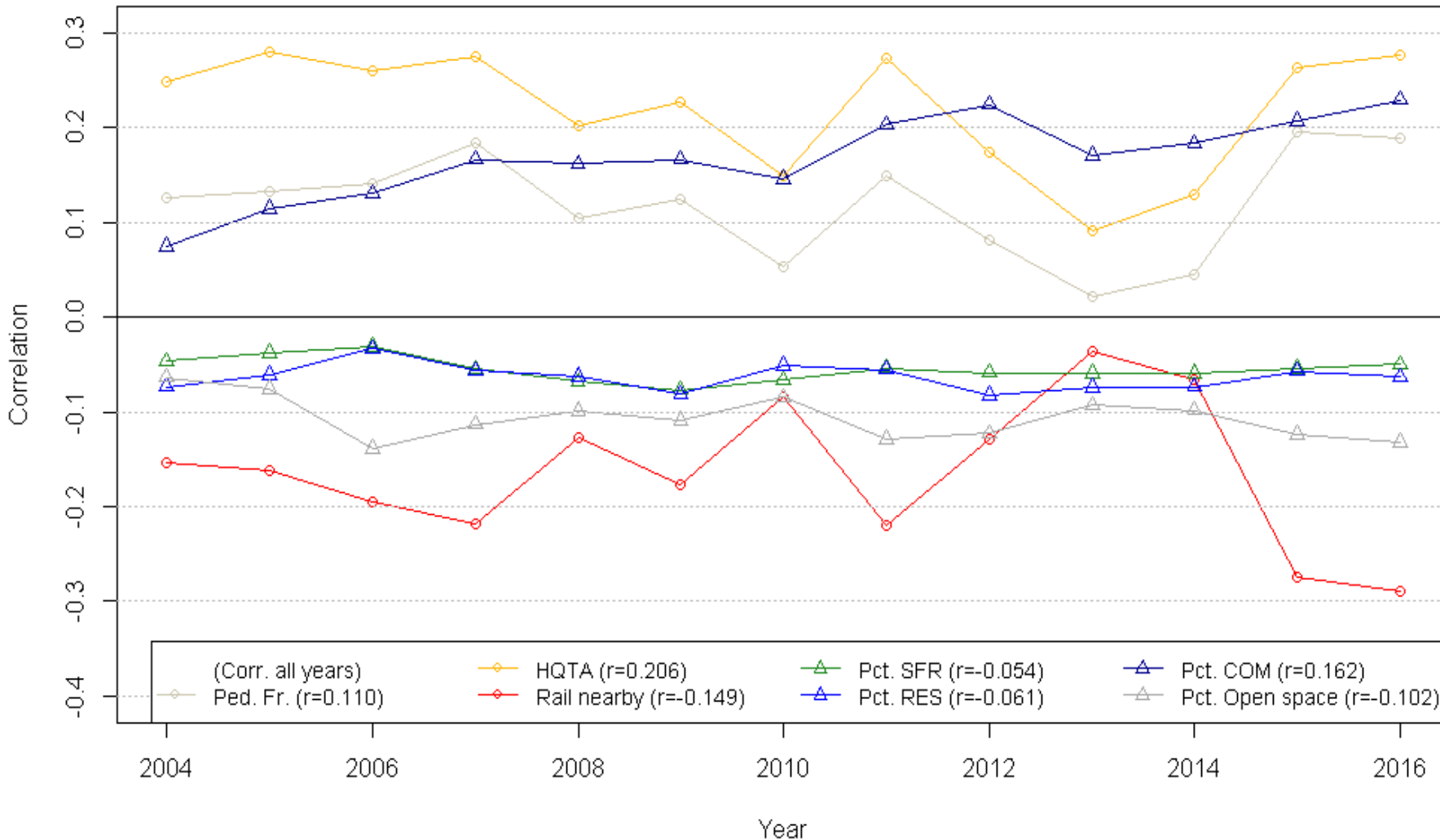
- **Guaranteed Ride Home**
 - 60.1% (2015) to 73.0% (2009) of Option 1 employers offer this
 - 2016: 72.6%

- **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



Employee, and travel distance characteristics unavailable.

- Nearby commercial land use → higher AVR
- Transit quality → higher AVR
- Pedestrian friendliness → weak → higher AVR
- Nearby open space → lower AVR
- Rail station → lower AVR?

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 2:	OLS models of AVR			
	<i>All Employers</i>	<i>Employers in Zone 1</i>	<i>Employers in Zone 2</i>	<i>Employers in Zone 3</i>
Constant	1.320*** (-0.0636)	1.492*** (-0.192)	1.262*** (-0.0319)	2.035** (-0.795)
<i>Employer Characteristics</i>				
Employees (log)	-0.0213** (-0.0085)	-0.0869** (-0.0359)	-0.00534 (-0.0047)	-0.132 (-0.129)
Employer hit AVR target (1/0)	0.482*** (-0.0281)	0.661*** (-0.0547)	0.395*** (-0.0166)	0.325*** (-0.103)
<i>Location Characteristics</i>				
Pop. Density (Pop/acre)	1.82E-09 (0)	-3.38E-08 (0)	-2.00E-09 (0)	1.80E-08 (0)
% Commercial LU nearby	0.109*** (-0.0278)	-0.0552 (-0.128)	0.0129 (-0.0111)	0.449 (-0.404)
In HQTA (1/0)	0.0693*** (-0.0129)	0.383*** (-0.0919)	0.0275*** (-0.0077)	-0.286 (-0.215)
Pedestrian Connectivity	-0.000391 (-0.0024)	0.000513 (-0.0076)	0.00206*** (-0.0008)	-0.0272 (-0.0234)
<i>Mitigation Strategies</i>				
Guar. Ride Home (1/0)	-0.0212 (-0.015)	-0.0304 (-0.0538)	-0.0112 (-0.0081)	-0.106 (-0.0744)
Flextime (1/0)	0.0226 (-0.0159)	0.0831 (-0.079)	0.00499 (-0.0097)	-0.0454 (-0.0624)
Vanpool support (1/0)	-0.00372 (-0.009)	0.00305 (-0.0444)	0.0131* (-0.0075)	-0.0862 (-0.0916)
N	7505	653	6376	476
R-sq	0.400	0.499	0.517	0.197
<i>Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01</i>				
^ 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

	<i>All Employers</i>	<i>Employers in Zone 1</i>	<i>Employers in Zone 2</i>	<i>Employers in Zone 3</i>
Constant	-0.00474 (-0.0111)	0.199*** (-0.0714)	-0.011 (-0.007)	0.0668 (-0.144)
<i>Employer Characteristics</i>				
Employees (log)	-0.00225 (-0.0014)	-0.0225** (-0.0097)	-0.000255 (-0.0009)	-0.0157 (-0.018)
Employer hit AVR target (1/0)	0.0382*** (-0.0042)	0.0640*** (-0.0137)	0.0336*** (-0.0036)	0.0468*** (-0.0166)
<i>Location Characteristics</i>				
Pop. Density (Pop/acre)	1.01E-09 (0)	-1.77e-08* (0)	4.64E-11 (0)	6.23E-09 (0)
% Commercial LU nearby	0.00796** (-0.004)	-0.0362 (-0.0406)	0.00332 (-0.0028)	0.0718 (-0.0507)
In HQTA (1/0)	-0.000312 (-0.0019)	0.00927 (-0.0453)	-0.00132 (-0.0016)	-- --
Pedestrian Connectivity	-0.000438 (-0.0003)	0.000838 (-0.0024)	-0.000306 (-0.0002)	-0.00255 (-0.0034)
<i>Mitigation Strategies</i>				
Guar. Ride Home (1/0)	0.00299 (-0.0032)	-0.0327 (-0.0235)	0.00648*** (-0.0024)	0.0146 (-0.0153)
Flextime (1/0)	0.0012 (-0.0034)	0.00261 (-0.0172)	0.0015 (-0.0034)	-0.0211 (-0.0171)
Vanpool support (1/0)	-0.000363 (-0.002)	-0.00054 (-0.0256)	-0.000531 (-0.0018)	-0.0337 (-0.0208)
N	6221	508	5319	394
R-sq	0.037	0.063	0.038	0.086
<i>Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01</i>				
^ 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

An aerial photograph of a coastal city, likely San Diego, showing a dense grid of streets and buildings. The city is situated along a coastline with a large body of water on the left. The background features rolling hills and mountains under a clear blue sky with some light clouds.

Thank you

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