



Evaluating Equity in Transportation Finance: *Comparing Congestion Pricing and Sales Taxes in Southern California*

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*On the Road to Sustainability:
From Research to Practice*

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UCLA

Institute of Transportation Studies

Why are so many transportation analysts
obsessed with congestion pricing...



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...When the idea make so many elected
officials run for cover?



The frequently touted benefits of pricing...

- Time savings from faster travel
- Increase effective capacity of highways without major investment
- Reduce fuel use, tailpipe emissions
- Make alternative travel modes more attractive
- Improve reliability in arrival times for commuters, freight shippers
- Increase the attractiveness of central locations

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- Increase the attractiveness of central locations
- For years failed to persuade most elected officials to embrace congestion tolling

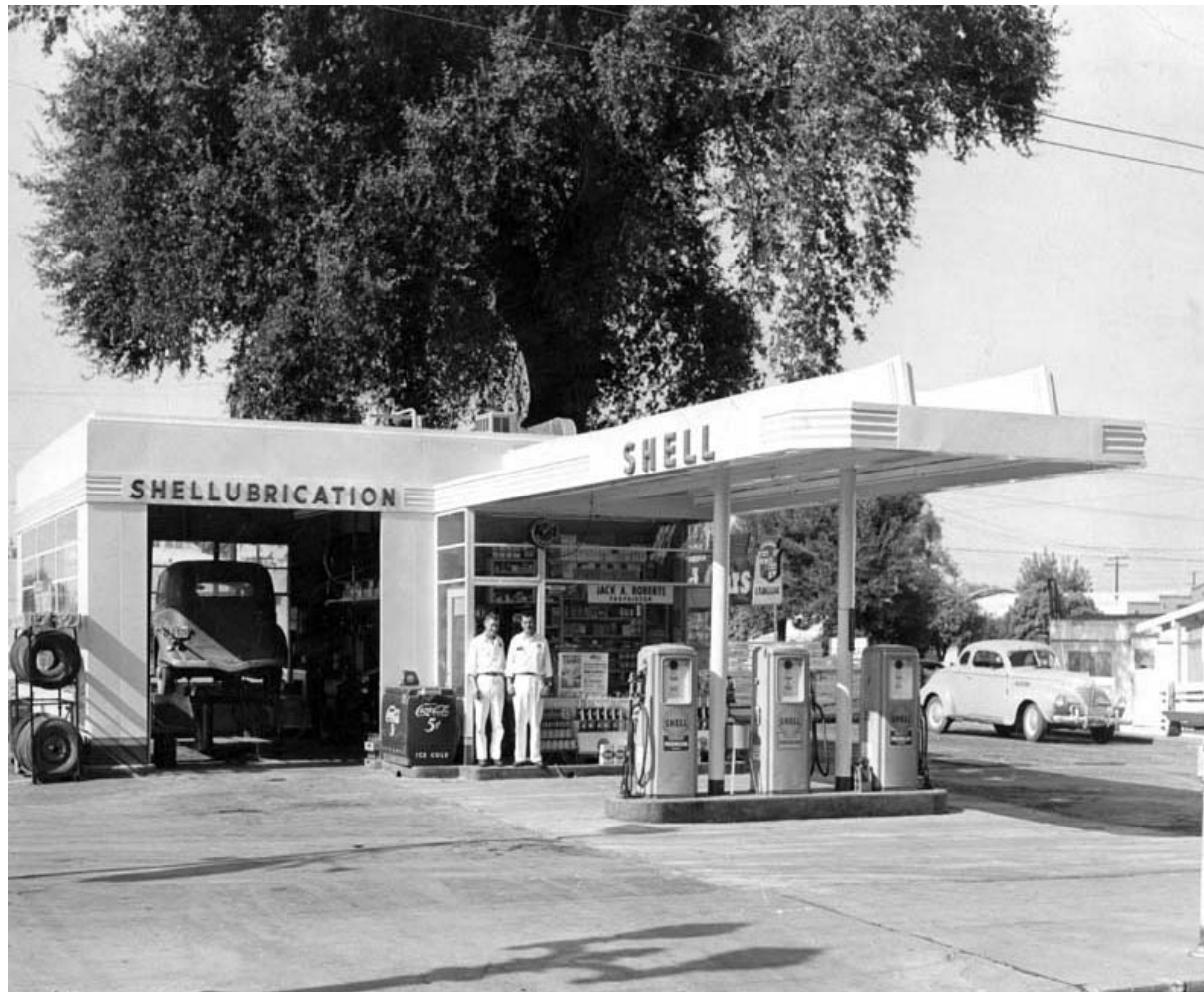
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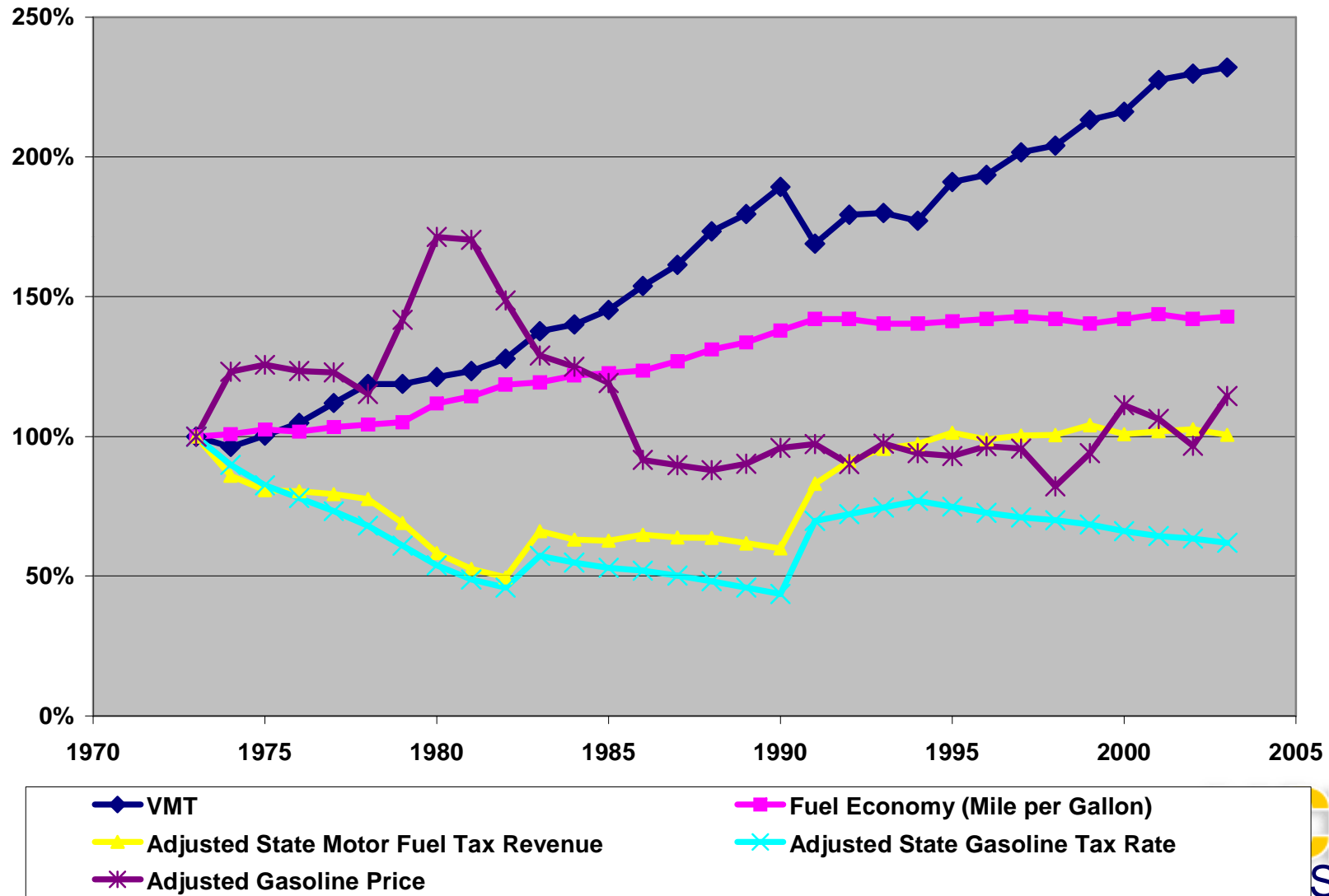
What's behind the recent upsurge
in rise of road pricing in cities
around the globe?



Traditional revenue sources – like motor fuels taxes – are running out of gas





The widening divide: Vehicle travel and fuel tax rates






Backfilling eroding fuel tax revenues

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Backfilling eroding fuel tax revenues

-  **Borrowing**
 - Worry about how to pay for it later
-  **Local consumption taxes earmarked for transportation**
 - Voter support of projects, but loss of user-fee logic
-  **Electronic tolling**
 - Equity/fairness concerns frequently raised

Is
congestion
pricing
unfair?



Premise

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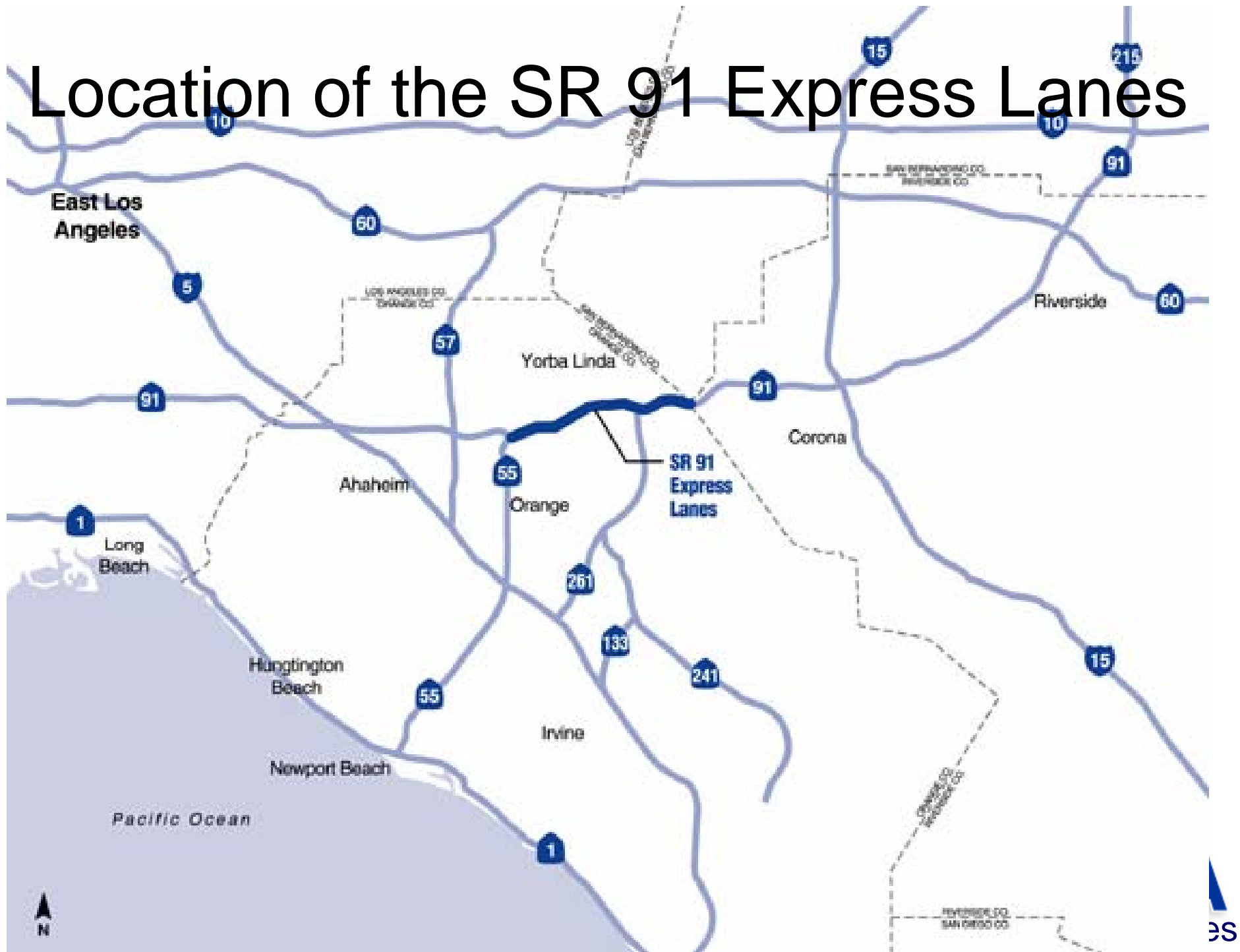
- Asking how travelers of various incomes respond to road pricing is a reasonable question
 - But the wrong question
- The more relevant question is how road pricing affects travelers of various incomes vis-à-vis other popular ways to pay for roads
 - Makes an abstract equity question concrete

Case study: The SR 91 Express Lanes

- 10 miles of 4 congestion-priced lanes in the median of State Route 91 between “job-rich” Orange County and the “housing-rich” Inland Empire



Location of the SR 91 Express Lanes



SR 91 Express Lanes





Toll Schedule

Effective July 1, 2007

Eastbound
SR-55 to Riverside Co. Line

	Sun	M	Tu	W	Th	F	Sat
Midnight	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20
1:00 am	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20
2:00 am	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20
3:00 am	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20
4:00 am	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20
5:00 am	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20
6:00 am	\$1.20	\$1.90	\$1.90	\$1.90	\$1.90	\$1.90	\$1.20
7:00 am	\$1.20	\$1.90	\$1.90	\$1.90	\$1.90	\$1.90	\$1.20
8:00 am	\$1.55	\$1.90	\$1.90	\$1.90	\$1.90	\$1.90	\$1.90
9:00 am	\$1.55	\$1.90	\$1.90	\$1.90	\$1.90	\$1.90	\$1.90
10:00 am	\$2.35	\$1.90	\$1.90	\$1.90	\$1.90	\$1.90	\$2.35
11:00 am	\$2.35	\$1.90	\$1.90	\$1.90	\$1.90	\$1.90	\$2.35
Noon	\$2.80	\$1.90	\$1.90	\$1.90	\$1.90	\$2.90	\$2.80
1:00 pm	\$2.80	\$2.65	\$2.65	\$2.65	\$2.90	\$4.50	\$2.80
2:00 pm	\$2.80	\$3.80	\$3.80	\$3.80	\$3.90	\$5.10	\$2.80
3:00 pm	\$2.35	\$4.10	\$4.70	\$4.95	\$4.95	\$9.25	\$2.80
4:00 pm	\$2.35	\$6.85	\$8.00	\$8.50	\$9.25	\$9.50	\$2.80
5:00 pm	\$2.35	\$6.65	\$8.50	\$8.50	\$9.25	\$8.00	\$2.80
6:00 pm	\$2.35	\$4.10	\$5.45	\$4.95	\$5.75	\$4.90	\$2.35
7:00 pm	\$2.35	\$2.90	\$2.90	\$2.90	\$4.15	\$4.55	\$1.90
8:00 pm	\$2.35	\$1.90	\$1.90	\$1.90	\$2.65	\$4.15	\$1.90
9:00 pm	\$1.90	\$1.90	\$1.90	\$1.90	\$1.90	\$2.65	\$1.90
10:00 pm	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.90	\$1.20
11:00 pm	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20



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1:00 am	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20
2:00 am	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20
3:00 am	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20
4:00 am	\$1.20	\$2.25	\$2.25	\$2.25	\$2.25	\$2.25	\$1.20
5:00 am	\$1.20	\$3.70	\$3.70	\$3.70	\$3.70	\$3.55	\$1.20
6:00 am	\$1.20	\$3.80	\$3.80	\$3.80	\$3.80	\$3.70	\$1.20
7:00 am	\$1.20	\$4.20	\$4.20	\$4.20	\$4.20	\$4.10	\$1.65
8:00 am	\$1.65	\$3.80	\$3.80	\$3.80	\$3.80	\$3.70	\$1.90
9:00 am	\$1.65	\$3.05	\$3.05	\$3.05	\$3.05	\$3.05	\$2.35
10:00 am	\$2.35	\$1.90	\$1.90	\$1.90	\$1.90	\$1.90	\$2.35
11:00 am	\$2.35	\$1.90	\$1.90	\$1.90	\$1.90	\$1.90	\$2.70
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4:00 pm	\$2.85	\$1.90	\$1.90	\$1.90	\$1.90	\$2.35	\$2.85
5:00 pm	\$2.85	\$1.90	\$1.90	\$1.90	\$1.90	\$2.35	\$2.85
6:00 pm	\$2.85	\$1.90	\$1.90	\$1.90	\$1.90	\$2.80	\$2.35
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Research Question

- What if the 4 lanes added to SR 91 by the Express Lanes project had instead been funded by Orange County's Measure M transportation sales tax?



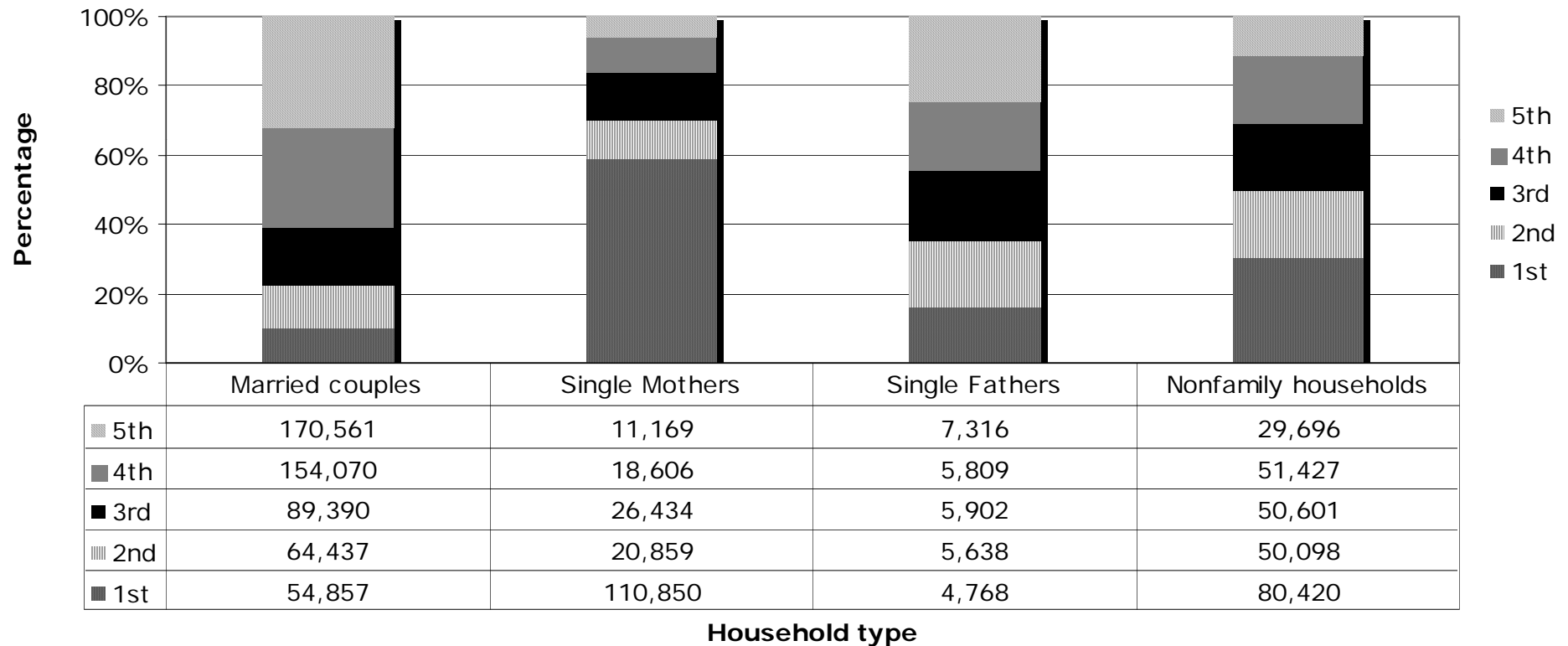
Research Question

- What if the 4 lanes added to SR 91 by the Express Lanes project had instead been funded by Orange County's Measure M transportation sales tax?
- Who would win? Who would lose?

Data and Methodology

- Data drawn from 3 sources:
 - 1999 SR 91 user survey data on who pays the tolls
 - Sales tax payment data estimated by:
 - 2000 U.S. Census data for Orange County
 - 1999 and 2002 national Consumer Expenditure Survey data
 - Adjust expenditure data to fit the socio-demographic distribution of households in Orange County
 - Estimate sales tax payments by applying California sales taxation rules to adjusted Consumer Expenditure Survey data

Distribution of household types in Orange County by income group



Asymmetric income categories used in this analysis

Distribution of Orange County Households by Income Category		
Income Category	OC Population	Percent
<i>Lowest</i>	250,895	23%
<i>Low-Mid</i>	141,032	13%
<i>Middle</i>	247,333	23%
<i>Mid-High</i>	229,912	21%
<i>Highest</i>	218,742	20%
<i>Total</i>	1,087,914	100%

Who would win and who would lose if SR 91 had been financed with sales taxes?

Household income category	Median category income	Annual sales taxes paid	Annual tolls paid	Gain/loss-sales taxes vis-à-vis tolls	Average gain/loss per family per year
Lowest	\$7,126	\$3,353,241	~ \$0	- \$3,353,242	- \$66.60
Low-mid	\$22,221	\$1,789,375	\$3,906,577	+ \$2,117,202	+ \$36.72
Middle	\$40,902	\$3,977,632	\$7,345,369	+ \$3,367,737	+ \$42.47
Mid-high	\$67,427	\$10,798,820	\$12,731,744	+ \$1,932,924	+ \$14.60
Highest	\$180,830	\$14,080,930	\$10,006,040	- \$4,074,890	- \$27.46

How would the switch to sales taxes affect particular households?

Married household -- Upper-middle income (8th decile)
N = 154,070

Heavy Peak User		Moderate Peak User		Light Peak User		Non SR 91 User	
Gain/loss	% of Inc	Gain/loss	% of Inc	Gain/loss	% of Inc	Gain/loss	% of Inc
\$671.00	1.1%	\$275.00	0.5%	\$23.00	0.0%	-\$49.00	-0.1%

How would the switch to sales taxes affect particular households?

Female-headed household -- Lower-middle income (3rd decile)
N = 20,859

Heavy Off-peak User		Moderate Off-pk User		Light Off-peak User		Non SR 91 User	
Gain/loss	% of Inc	Gain/loss	% of Inc	Gain/loss	% of Inc	Gain/loss	% of Inc
\$353.00	2.8%	\$155.00	1.2%	\$15.00	0.1%	-\$19.00	-0.2%

Findings

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 - Whose members rarely travel in peak hours in the peak direction on either the free or toll lanes of SR 91

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- The poorest Orange County households
 - Whose members rarely travel in peak hours/direction on either the free or toll lanes of SR 91
 - Would pay over \$3 million of the \$34 million in annual sales tax revenues needed for the SR 91 project

3 types of transfers

- Financing the added capacity on SR 91 with sales taxes instead of tolls would entail 3 types of cost burden transfers

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 2. From middle-income households >> highest income households

3 types of transfers

- Financing the added capacity on SR 91 with sales taxes instead of tolls would entail 3 types of cost burden transfers:
 1. From middle-income households >> lowest income households
 2. From middle-income households >> highest income households
 3. From regular users of the road facility >> people who rarely or never use it

The biggest loser(s)

- The highest income non-users would bear the largest added burden in absolute terms

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 - Because they spend so much on taxable purchases

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 - Because they spend the most on taxable purchases
- The lowest income non-users would bear the largest added burden in relative terms

The biggest loser(s)

- The highest income non-users would bear the largest added burden in absolute terms
 - Because they spend the most on taxable purchases
- The lowest income non-users would bear the largest added burden in relative terms
 - Because they spend the largest share of their income on taxable purchases

Findings in a nutshell

- In comparison to transportation sales taxes, the SR 91 Express Lanes...
 - Are relatively income progressive among lower income households

Findings in a nutshell

- In comparison to transportation sales taxes, the SR 91 Express Lanes...
 - Are relatively income progressive among lower income and middle income households
 - But income regressive among the highest income households

Findings in a nutshell

- With respect to direct benefits received by heavy, moderate, infrequent, and non-users of the facility...

Findings in a nutshell

- With respect to direct benefits received by heavy, moderate, infrequent, and non-users of the facility...
 - the SR 91 congestion tolls are progressive vis-à-vis sales taxes for all income classes

Conclusions

- Do poor drivers pay a larger share of their income for congestion tolls when they drive in toll lanes, *ceteris paribus*?

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- Yes

Conclusions

- Do lower income drivers pay relatively more for congestion tolls when they drive in toll lanes, *ceteris paribus*?
- Yes
- But all else is not equal

All else is not equal

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All else is not equal

- One of the most popular new revenue sources (transportation sales taxes) is also one of the most regressive
 - Regressive with respect to income for all but the highest income class (because poor people spend a larger share of their income on purchases subject to the sales tax)
 - Regressive with respect to transportation benefits received from new capacity (because poor people tend to drive less)

Conclusions

- Those concerned with social equity should subject transportation sales taxes to far more scrutiny

Implications

- If Orange County's Measure M had financed the SR91 facility, it would significantly lower the direct costs of driving on the SR 91

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 - Because the facility would have been unpriced, the new lines would likely have quickly re-congested, eroding the time-savings benefits

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- Adding freeway capacity with sales tax revenues is a pro-driving policy that taxes all residents to provide individual benefits to a sub-set of drivers and their passengers
 - While not all of these drivers and passengers are well-to-do, the overall burden transfer is in general regressive

To sum...

- The operational and environmental arguments for marginal social cost road pricing are many



To sum...

- The operational and environmental arguments for marginal social cost road pricing are many
- This analysis suggests that the social equity arguments against it are weak



Thank you



Presentation drawn from:

Schweitzer, Lisa A. and Brian D. Taylor. 2007. *Just Pricing: Comparing the Effects of Congestion Pricing and Transportation Sales Taxes on Low-Income Households*

Manuscript available from the authors

Thinking about equity in transportation finance

	Type of Equity		
Unit of Analysis	<i>Market Equity</i>	<i>Opportunity Equity</i>	<i>Outcome Equity</i>
Geographic States, counties, legislative districts, etc.	Transportation spending in each jurisdiction matches revenue collections in that jurisdiction	Transportation spending is proportionally equal across jurisdictions	Spending in each jurisdiction produces equal levels of transportation capacity/service
Group Modal Interests, racial/ethnic groups, etc.	Each group receives transportation spending/benefits in proportion to taxes paid	Each group receives a proportionally equal share of transportation resources	Transportation spending produces equal levels of access or mobility across groups
Individual Residents, voters, travelers, etc.	The prices/taxes paid by individuals for transportation should be proportional to the costs imposed	Transportation spending per person is equal	Transportation spending equalizes individual levels of access or mobility



	Type of Equity		
Unit of Analysis	<i>Market Equity</i>	<i>Opportunity Equity</i>	<i>Outcome Equity</i>
Geographic States, counties, legislative districts, etc.	<i>Congestion Toll:</i> <u>High</u> if expenditures are targeted to where they are collected <i>Sales Taxes:</i> <u>High</u> if expenditures are targeted to where they are collected	<i>Congestion Toll:</i> <u>High</u> if revenues are used to improve transportation service in jurisdiction where they are collected <i>Sales Taxes:</i> <u>Moderate</u> because revenues collected from all consumers are likely to improve service for travelers where taxes are collected	<i>Congestion Toll:</i> <u>Low</u> unless expenditures targeted to areas with low levels of mobility <i>Sales Taxes:</i> <u>Low</u> unless expenditures are targeted to areas with low levels of mobility
Group Modal Interests, racial/ethnic groups, etc.	<i>Congestion Toll:</i> <u>High</u> if revenues are targeted to groups in rough proportion to their collection <i>Sales Taxes:</i> <u>Low</u> because light-users of transportation systems are almost certain to cross-subsidize heavy transportation system users	<i>Congestion Toll:</i> <u>High</u> if the revenues are spent to improve transportation services for groups from whom the tolls are collected. <i>Sales Taxes:</i> <u>Moderate</u> if the revenues collected from all consumers are used to improve transportation services for the groups from whom taxes are collected	<i>Congestion Toll:</i> <u>Low</u> unless expenditures are targeted to groups with low levels of mobility <i>Sales Taxes:</i> <u>Low</u> unless expenditures are targeted to groups with low levels of mobility
Individual Residents, voters, travelers, etc.	<i>Congestion Tolls:</i> <u>High</u> if revenues are targeted to improve facilities, communities occupied by toll payers <i>Sales Taxes:</i> <u>Low</u> because tax payments unrelated to transportation system cost imposed or benefits received	<i>Congestion Toll:</i> <u>Moderate</u> because transportation toll revenues are likely to indirectly benefit individual travelers <i>Sales Taxes:</i> <u>Low</u> because transportation expenditures are unlikely to be returned to taxpayers in proportion to payments	<i>Congestion Toll:</i> <u>Low</u> unless expenditures are targeted to individuals with low levels of mobility <i>Sales Taxes:</i> <u>Low</u> unless expenditures are targeted to individuals with low levels of mobility



Data and Methodology

- The annual revenues generated by SR 91 were \$34.7 million in 2003 and \$39.0 million in 2005
 - We used \$34 million in 2003 dollars as the revenue target

Some details on the methodology

- Estimated sales tax and toll payments by different household types and income categories
 - Consumer expenditures were summed to estimate the cost burden on representative consumers at each income level
 - For the sales tax, a consumer expenditure model was estimated using the Bureau of Labor Statistics Consumer Expenditure Survey (CES) data for 2002
 - National data were adjusted to reflect the distributions of household types and income groups in Orange County

Some more details on methodology

- Excluded goods and services in California not subject to sales taxes
 - groceries, medicine, etc.
- Payment of tolls by household type and income level was much easier
 - Directly measured in survey data