The Persistence of Economic Factors in Shaping Regulation and Environmental Performance:
The Limits of Social License Pressures

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Regulation of dangerous emissions from heavy-duty trucks: two puzzles

- Explaining design of regulatory programs in the United States
- Explaining variation in environmental behavior of trucking firms

Economic Model of Regulatory Design

- Regulatory policies shaped by concentrated economic interests/dominant firms
- Diffuse, unorganized interests will bear costs of regulation

Political Science View of Regulatory Design

- More variables
- Policy entrepreneurs and diffuse interests
- Mobilization after disaster, scandals, scary research findings

Economic Model of Firm Environmental Behavior

- Compliance driven entirely by risk of detection and punishment
- Implies: No firms go ‘beyond compliance’

Sociolegal View of Firm Environmental Behavior

- Compliance is the norm, even when enforcement risk is relatively remote
- Many firms systematically take "beyond compliance" actions
- Firm behavior shaped by norms, social pressures, and environmental reputation

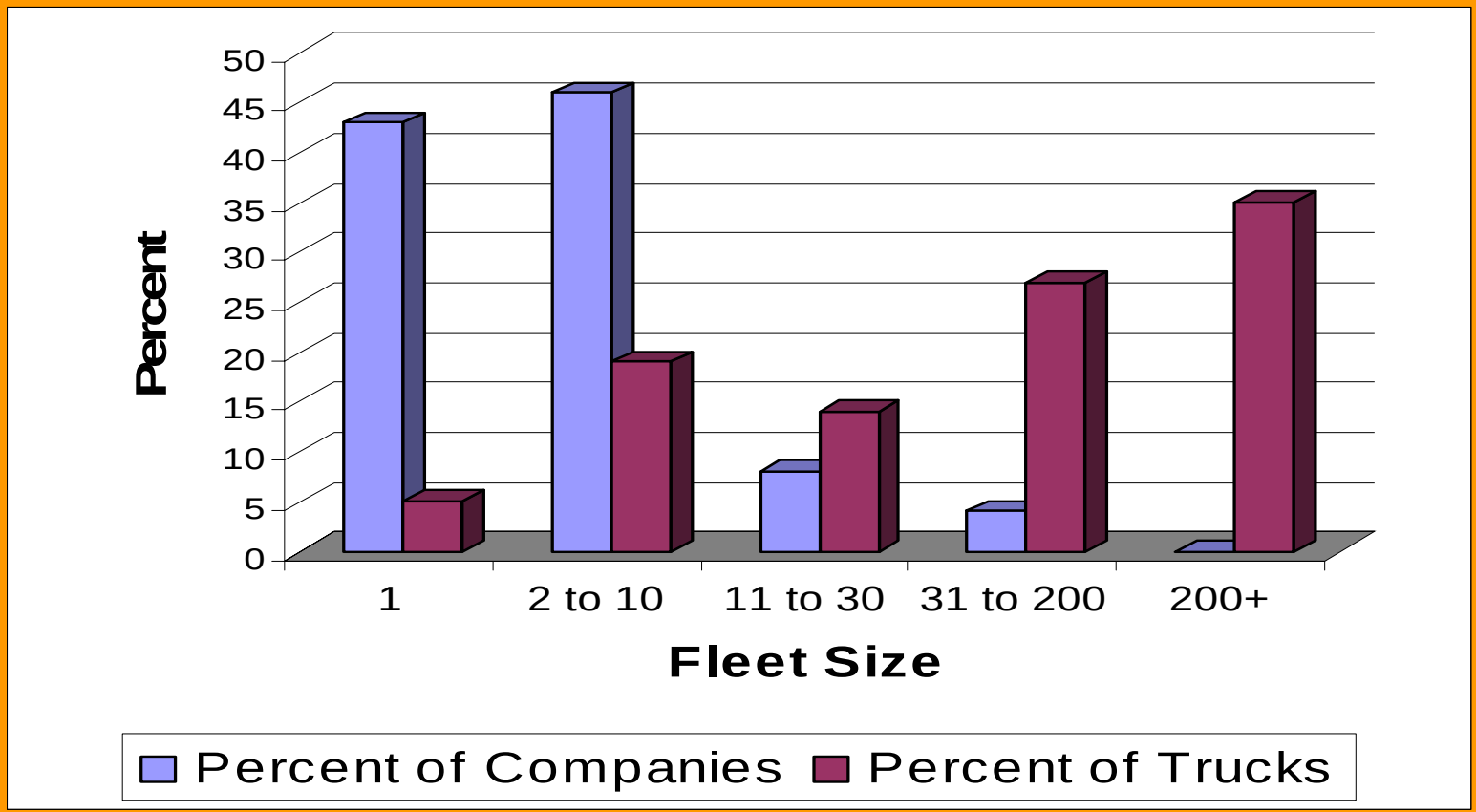
The limits of social license pressures?

- *Are social license pressures meaningful in regulatory fields with many small firms, less closely watched, with fewer economic resources?*

Why Trucks?

- In aggregate, LARGE environmental impact
- Large numbers of small firms: a special regulatory challenge
- Do our theories of regulation and firm behavior still hold when applied to such sectors?

Texas Fleet Size Distribution, 2005



Research Design

- Study evolution of federal and state regulatory programs
- State level policy-tracing – focus on Texas & California
- Policy consequences: intensive case-studies of 16 small/medium firms, 8 each in TX and CA.

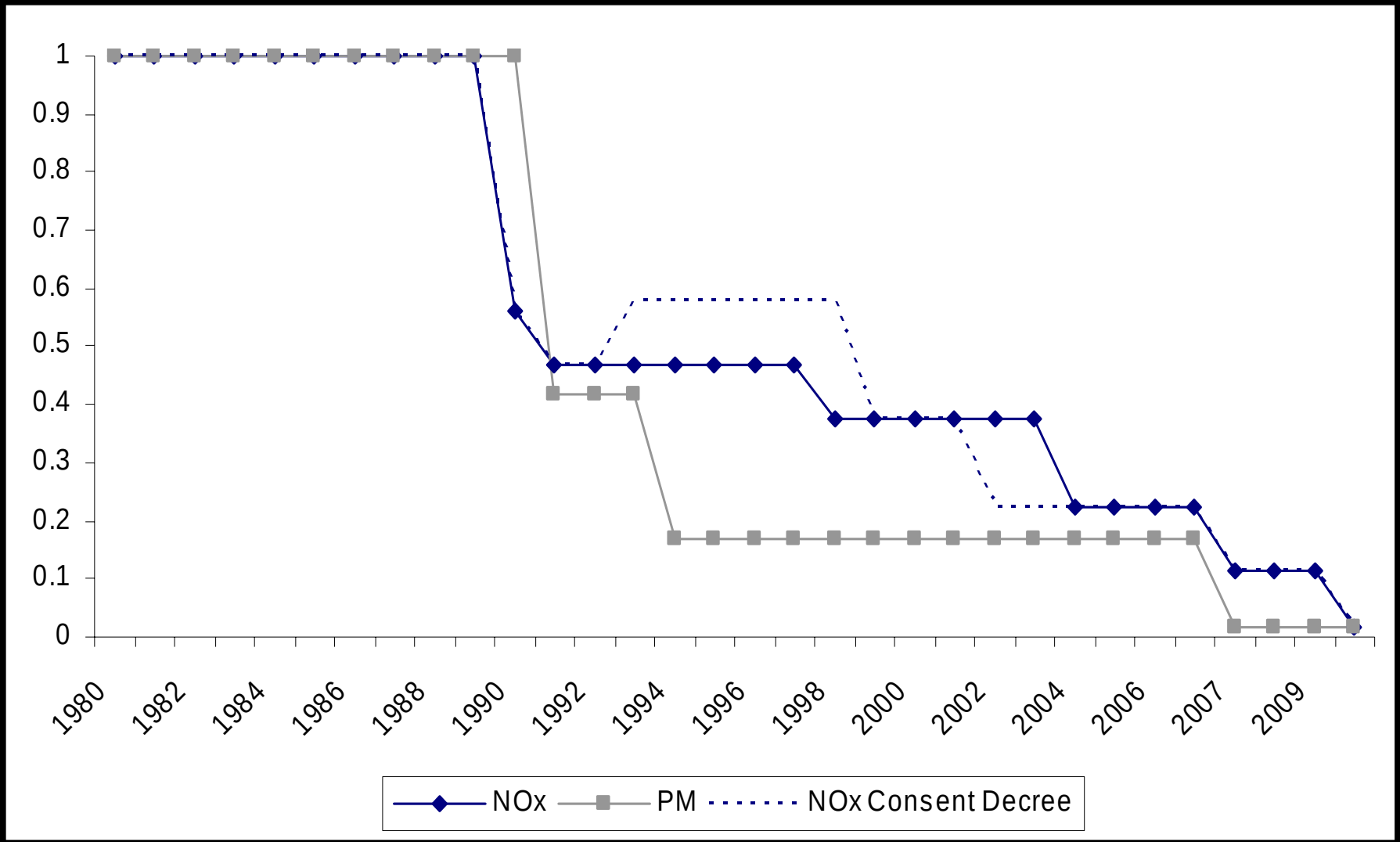
Many Trucks, Intense Competition

- 3 million heavy duty inter-state trucks + many more intra-state
- Engines can last 30 to 40 years
- New truck costs ~$150,000; Used truck ~$20,000
- Result: intense price competition

Health and Environmental Impacts of Diesel Emissions

- Particulates (PM), Nitrous oxides (NOx), and Carbon (CO_2)
- California Air Resources Board (CARB) estimates 2,880 premature deaths in CA per year due to diesel emissions

Federal Regulation of Diesel Truck Emissions -- Technology Forcing for Engine Manufacturers



No Direct Federal Regulation of Truck Owners and Operators

- No requirement for owner/ operators to buy new, lower polluting models
- no “best available control technology (BAT)” requirement
- i.e, older, dirtier trucks “grandfathered in”

Explaining the Federal Regulatory Gap I: the Economic Problem

- Traditional “polluter pays” theory assumes regulatory compliance costs will be passed on to product/service users
- Not in trucking: a market with many small, precariously-capitalized companies, perfect competition

Explaining the Regulatory Gap II: The Political Problem

- BAT requirement → political risk of driving many thousands of small firms out of business, driving up costs of all goods and services
- Where were the large trucking companies? Immobilized by conflicting interests

The Federal Govt's Choice: Push States to Get Old Trucks Off the Road

- Tighten NAAQSs for Ozone (NOx) and PM
- State Implementation Plans (SIPs) must meet NAAQS
- Tie federal highway funds to meeting SIP requirements and 'transportation conformity'
- Offer federal funds for state/local subsidy programs

State Actions: TX

- TX: few non-attainment areas
- No SIP requirements that apply directly to trucking companies
- Subsidy program

CA Regulations

- 2000: Diesel Risk Reduction Plan, based on CA toxics law:
- Fleet emissions reduction requirements for: (1) transit buses, (2) garbage trucks, (3) public truck fleets, (4) drayage fleet, then (5) remaining private truck fleets
- Subsidies – esp. urban bus fleets

The limited reach of subsidy programs: economics again

- Texas subsidies dispersed through 2005: $57 Million
- Old trucks replaced=1,300.
  Cost per truck $44,000
- 2005 Texas trucks with 1990 or earlier MY =40,000
- Cost to replace 38,000 trucks @ 44k/trk = $1.7 Billion

Regulatory Policy Bottom Line: Economics Again

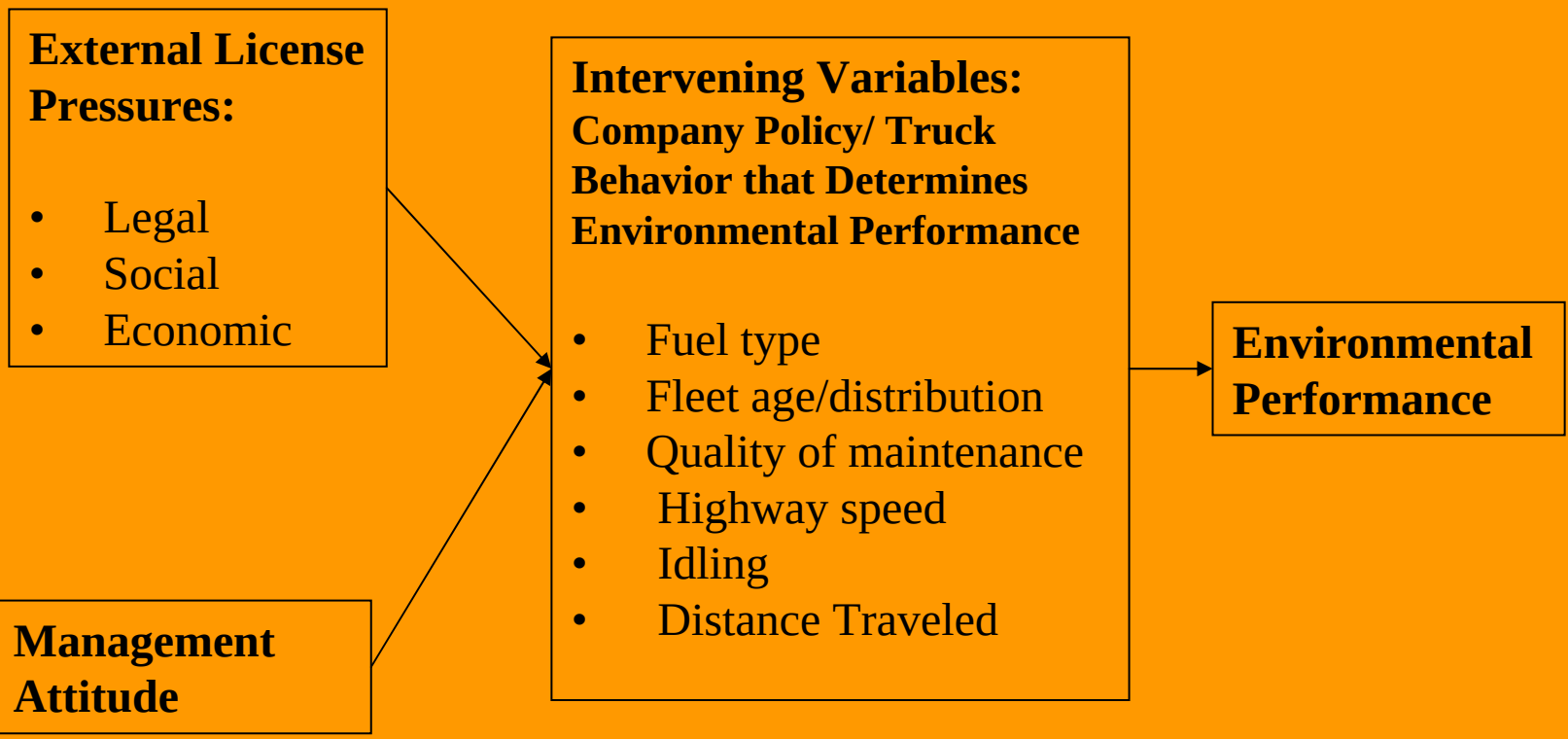
- Slow motion retirement of dirty trucks
- Subsidy programs → minor impact
- Why? mandatory BAT →

  enormous compliance costs →

  many firms out of business, higher shipping costs →

  high political risk

Intervening Variables in the Relationship Between External License Pressures, Management Attitude and Environmental Performance



Firm-Level Environmental Performance: Sampling Companies

- 16 firms, sample stratified by state, location, fleet size (small or very small), estimated environmental performance
- In-depth interviews + technical fleet analysis

Environmental License Requirements for Truck Companies

- Regulatory License Pressures: minimal
- Social license Pressures: minimal
- Economic License Pressures: drive environmental performance

In Summary: There are three Levels of Economic License Pressures

- (1) *Market conditions:* state of economy, price of labor, price of fuel.
- (2) *Profitability* (self-described as ‘strained’ to ‘excellent’)
- (3) *Economic Niche* - e.g. long haul vs port drayage

The Impact of Economic License Pressures on Company-Level Fleet Characteristics that Determine Truck Fleet Emissions

Economic Factors		Effect of Economic Factors on the Determinants of Environmental Performance	
		Better Emissions	**Worse Emissions**
General Economy	Expanding Economy → higher revenues, More capital*	• Younger fleet (more capital) within niche limits*	• More miles***
	More Expensive Diesel Fuel → Incentive for fuel cost controls** Less capital**	• Less idling • Better maintenance • Better logistics (fewer miles for same deliveries) • Lower highway speed	• Older fleet (higher costs, less capital)
	More Expensive Labor, Workers' Compensation, etc. → Less available capital*, more incentive for fuel cost controls**	Fuel cost controls viz.: • Less idling • Better maintenance • Better logistics (fewer miles for same deliveries) • Lower highway speed	• Older fleet
Market Niche	Long Trips → need for more reliable trucks**	• Younger fleet • Better maintenance	• More idling • More miles
	Sensitive goods More reliable trucks**	• Younger fleet • Better maintenance	
	Customers demand speedy delivery More reliable trucks**	• Newer fleet • Better maintenance	• Faster highway speeds
Company Financial Condition	Company doing well (more capital)**	• Better maintenance • Newer fleet within niche limits • Able to install idling-control equipment	

The Impact of Economic License Pressures on Company-Level Fleet Characteristics that Determine Environmental Performance

- Each economic factor has both negative and positive effects on emissions.
- The net effect is unpredictable and depends on the specific market conditions and management attitude of a particular firm.

Measuring Environmental Performance

- Est. emissions: CA (EMFAC) model
- Used average rank of 5 different measures of environmental performance
  - average grams/mile for NOx and PM.
  - total grams/truck emissions NOx and PM
  - fuel economy

Firm-Level Study: Conclusion I

- In a highly competitive market with little direct regulation or surveillance:
- *Environmental behavior* of small firms is driven by *economic pressures*. Better environmental performance is unintended consequence of economically-motivated behavior.
- *Economic pressures* play out on three different levels: (a) the general market, (b) the economic niche, and (c) company-level financial condition.
- policies must take this economic reality into account.

Firm-Level Study: Conclusion II.

- *Social license* has no direct impact on small companies unless communities (like those adjacent to the Los Angeles or Oakland ports) can exert economic pressures that result in regulatory action.