
Product Market Competition and Lobbying Coordination in U.S. Mobile Telecommunications

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5th Conference on Applied Infrastructure Research (INFRADAY)

Motivation

The Political Economy of Regulation

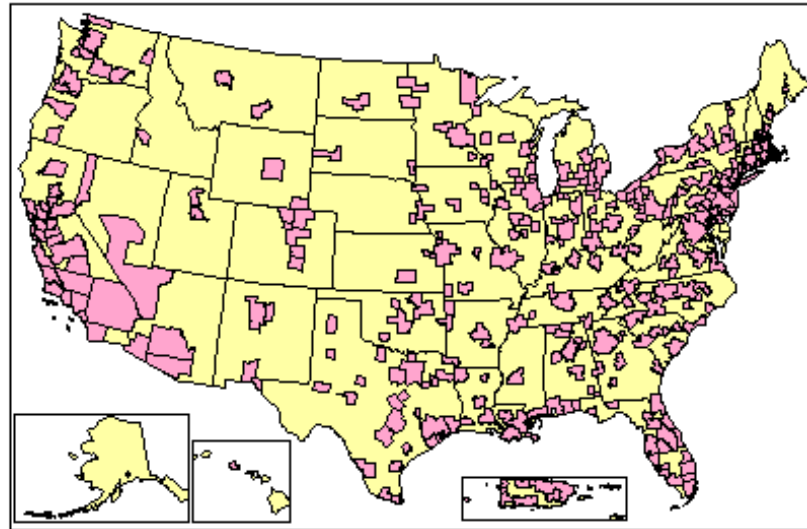
- Do firms coordinate in lobbying? How do they achieve coordination?



- Does our assessment of market conduct change after taking into account the endogeneity of lobbying?
- Policy implications: Competition policy, and Regulation design (in both “markets”)
- Trade-off in defining the scope of empirical research: endogeneity bias vs. complexity and misspecification bias

The Market: The Early U.S. Cellular Industry

- Several product markets (MSAs) in one industry: monopoly followed by duopoly
- Several “political market” (States): 50% applied price regulation



The Data

- 122 product markets (MSAs) (Parker and Röller, 1997)
- 40 states: either no price regulation or price caps (explicit or implicit)
cost-related regulation
- Yearly observations (unbalanced panel), 1985-1988 (Book of the States):
125 at state level, 288 at market level
- Lobbying: operators' campaign contributions aggregated to the state level
(Center for Responsive Politics)

Previous Results

Duso (2005)

- Regulation is endogenous with respect to market outcome: possible source of endogeneity are firms' lobbying activities

Duso and Jung (2006)

- Competition is more severe in markets that are located in states where the industry's aggregated campaign contributions have been high.
- Campaign contributions from cellular service providers are not exogenous with respect to product market conduct.

A Theoretical Model of the US Cellular Services Market

Profit of firm i in state s :

$$\Pi_{is} = \sum_{m=1}^{M_{is}} \left[P(Q_{ms}, X_{ms}^D) Q_{ims} - C_i(Q_{ims}, L_s, X_{ms}^C) \right] - L_{is}$$

Price-cap regulation within regulated states ($R_s \in \{0, 1\}$):

$$R_s \left[\bar{P}(L_s, X_s^P) - P(Q_{ms}, X_{ms}^D) \right] \geq 0$$

Q_{ims} : quantity of firm i in market m and state s ($Q_{ms} = \sum_i Q_{ims}$)

L_{is} : lobbying expenditures of firm i in state s ($L_s = \sum_i L_{is}$)

M_{is} : number of markets within state s where i is active

$X_{ms}^D, X_{ms}^C, X_s^P$: exogenous variables

Solution Concept

Sequential game of lobbying and quantity setting (two stage conjectural variations game):

1. Firms choose simultaneously their lobbying expenditures at the state level

They observe immediately politicians' reaction

2. Firms choose simultaneously the produced quantity at the market level

We solve the model backward and introduce at each stage a conjectural variation parameter in order to allow for the possibility of different degrees of cooperation in both stages.

Stage 2: Quantities

- Kuhn-Tucker Conditions (firm i in market m and state s):

$$0 = \frac{\partial P(\cdot)}{\partial Q_{ms}} \theta_{ims}^Q I_{ms} (Q_{ims} - \phi_{ims} R_s) + P(\cdot) - \frac{\partial C_i(\cdot)}{\partial Q_{ims}}$$

inequality constraint

Lagrange multiplier: $\phi_{ims} \geq 0$

- θ_{ms}^Q is a measure of conduct for the quantity game:

$$\theta_{ims}^Q = \frac{1}{I_{ms}} \frac{dQ_{ms}}{dQ_{ims}} = \frac{1}{I_{ms}} \left(1 + \sum_{j \neq i} \frac{I_{ms}}{\partial Q_{jms}} \frac{\partial Q_{jms}}{\partial Q_{ims}} \right)$$

$(\theta_{ims}^Q = 0 \Rightarrow$ perfect competition, $\theta_{ims}^Q = \frac{1}{I_{ms}} \Rightarrow$ Nash, $\theta_{ims}^Q = 1 \Rightarrow$ cartel)

Stage 1: Lobbying Expenditures

- FOC (firm i in state s) reflects that quantities react to lobbying expenditures:

$$\frac{dQ_{ims}^*}{dL_s} \neq 0$$

- Conduct parameter for lobbying:

$$\theta_{is}^L = 0 \Rightarrow \text{"perfect competition"}, \quad \theta_{is}^L = \frac{1}{I_s} \Rightarrow \text{Nash}, \quad \theta_{is}^L = 1 \Rightarrow \text{cartel}$$

Empirical Implementation

Functional Forms

Inverse Demand: $P_{ms} = \beta_0 + \beta_1 \ln Q_{ms} + \beta_2 X_{ms}^D$

Marginal Costs: $\frac{\partial C_i(\cdot)}{\partial Q_{ims}} = \alpha_0 + \alpha_1 Q_{ims} + \alpha_2 L_s + \alpha_3 X_{ms}^C$

Price Caps: $\frac{\partial \bar{P}(\cdot)}{\partial L_s} = \delta_0 + \delta_1 X_s^P$

Estimation

Simultaneous estimation by FIML allows to accommodate a varying number of equations.

- a) Inverse demand
- b) Quantity relation
- c) Lobbying FOC

$$\theta^Q, \theta^L, \phi \text{ fixed parameters}$$
$$\theta^Q, \theta^L = 1 \text{ for monopolies}$$

Results

- Market conduct and lobbying coordination in the early U.S. mobile telecommunication industry are consistent with a one-shot Nash equilibrium.
- In regulated states price caps inflicted restrictions on firms' market conduct.
- Campaign contributions as a means of influencing political and regulatory decisions were effective in reducing the production costs as well as in lowering the burden of the price cap.
- The cost advantage achieved through campaign contributions varies significantly across firms, with Bell companies achieving the greatest cost reductions.
- The simultaneous model of quantity setting and lobbying is rejected.

Robustness Checks

- Specification test for monopoly-CVP
- Year-specific CVP
- Market equations with exogenous lobbying
(with and without firm-specific cost advantages)
- Potential measurement bias: reestimate with those 54 state-level observations where at least 80 % of the population with access to cellular services are in the sample.