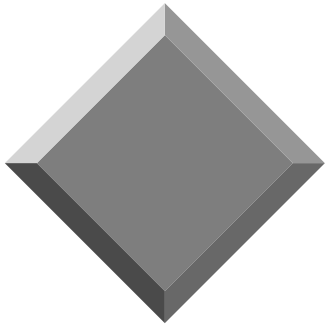
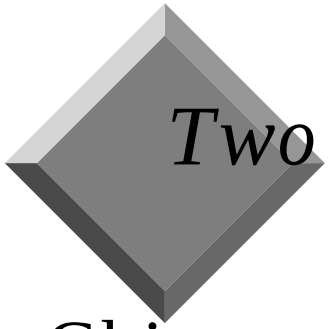


Voting on Prices: The Political Economy of Regulation

- When Markets Fail: Is Regulation the Answer?
  - Regulation Can "Fail", Too.
  - Comparative Institutions: Is the Market Failure Better or Worse Than the Regulatory Failure?
- We Examine an Idealized Case of "Perfect" Regulation vs. a "Perfect" Market Failure.
  - Regulators Fully Informed, Efficient, Responsive
  - Firm is a Classic Monopolist
- Answer: Regulation Can Do Worse!
- Empirical Support for the Model from Telecoms

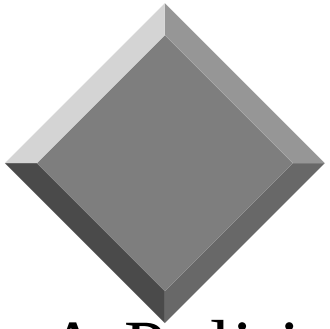
Two Paradigms: 1. Regulatory Models

- 1970-1982: Natural Monopoly Theory of Regulation: How to Price a Multi-Product Natural Monopoly.
  - Ramsey Pricing
  - Cross-Subsidy
  - Sustainability & Contestability
  - FULL INFORMATION
- 1982-present: Agency Theory of Regulation: How to Deal with Asymmetric Information
  - Baron & Besanko
  - Tirole & Laffont (include interest group theory)
  - Multiple P's and A's.



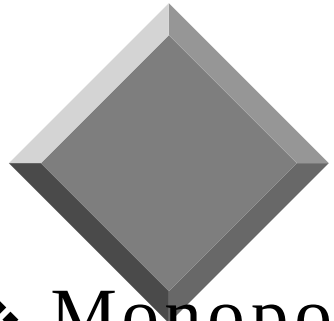
Two Paradigms: 2. Political Economy

- Chicago School: Stigler, Peltzman, Demsetz
  - A Political Market, in which the Coercive Power of the State Can Be Enlisted by Private Agents.
  - Supply and Demand for Regulation.
    - Demanders: those seeking protection / advantage. Producers, Consumers, Suppliers, other Constituents.
    - Suppliers: regulators, legislators, and politicians.
- Virginia School: Rent-seeking
- A Powerful Idea, But Little or No Modeling of the Interaction Between Economic and Political Markets.
  - Little attempt to link these paradigms.



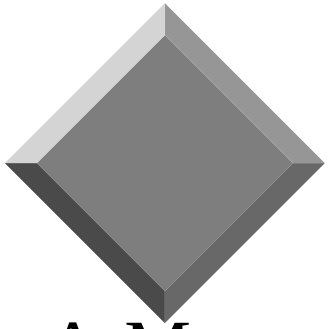
Problems with the Current Paradigms; Where Does This Research Fit?

- A Political Economy View Suggests That *Political Economy* Problems May Dominate Agency Problems:
  - Capture, Bribes, Interest Group Politics, Etc. Asymmetric Information May Be a Tiny Part of the Problem.
  - Nothing Inherently *Public*, *Political*, *or Governmental* About This; Regulators Treated Just Like a Private Sector Principal.
  - Maintains the Polite But Fantastic Fiction That Regulators (or Legislators) Care About Economic Efficiency.
- This Model Applies a Simple *Political Economy* Model to Regulatory Pricing.



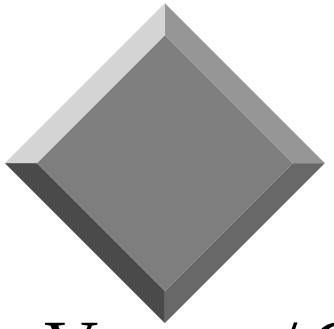
Regulatory Failure vs. Market Failure

- Monopoly a Classic Form of Market Failure
- But Is Unregulated Monopoly Worse Than Regulation Itself?
- We Model Regulation In The Most Favorable Light:
  - No Problems of Natural Monopoly (*not* a Ramsey problem)
  - No Information Asymmetries (*not* an agency problem)
  - All Players (voters, regulators, firm) Have Full Information
  - Regulators Run for Office; They Announce Their Plans, and Are Committed to Efficiently Carry Them Out.



The Industry

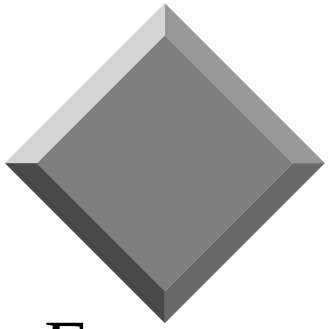
- A Monopolist Produces Two Services
  - Mass Service ***M***, which everyone consumes (e.g., local telephone service). Demand = Q_M, Price = p_M
  - Specialized Service ***S***, which some consume (e.g., long-distance toll telephone service). Demand = Q_S, Price = p_S
  - No Scale Economies (e.g., a franchise granted by govt)
  - Production Technology Known to All: Unit Costs Are c_M, c_S. Profit = $\pi = (p_M - c_M)Q_M + (p_S - c_S)Q_S$
  - Can Be Perfectly Monitored by Regulator, But Cannot Influence Him / Her.
  - Need Not Produce



Voters/Consumers

- Voters / Consumers Are Indexed by q , $0 \leq q \leq 1$.
- Voter q Consumes the Fraction $\lambda_X(q)$ of Demand for Service X (= M,S).
  - Assume $\lambda_M(q) > 0$, and $\lambda(q) = \lambda_S(q) / \lambda_M(q)$ is an increasing function (gives meaning to specialized vs. mass)
    - Think of Service M as Having a Uniform Distribution: $\lambda_M(q) = 1$, While Service S Has a Distribution Skewed Toward Higher q.
  - Surplus of Consumer q of Prices p_M, p_S =

$$U(p_M, p_S; q) = \int_{p_M}^{\infty} Q_M(z)dz + \int_{p_S}^{\infty} l(q) \cdot Q_S(z)dz$$

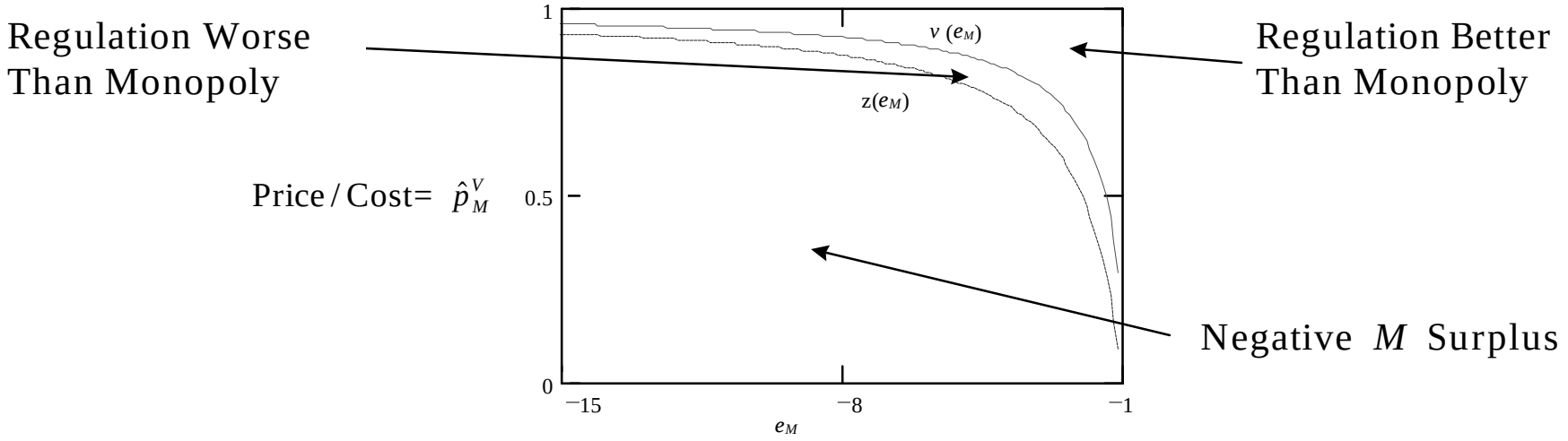


The Regulatory Game

- Everyone has perfect information.
- Firms have no influence (except to not produce).
- To determine prices for each service p_M, p_S :
  - Consumers have preferences to which institutions respond.
  - No "Pie-in-the-Sky:" voters know that if prices are set so that the firm loses money, then no production takes place.
  - Prices that result in strictly positive profits are dominated for all consumers. Hence, $\pi(p_M, p_S)=0$, so only one free price
- Median voter theorem applies; equilibrium price maximizes median voter's welfare.
  - Voter preferences are single-peaked in price.

Results

- Efficient Outcome $\Leftrightarrow$ median = mean $\Leftrightarrow \lambda(\theta^V) = 1$
  - If $\lambda(\theta^V) < 1$, Mass Service Consumers Extract Profits from Specialized Service to Subsidize $p_M < c_M$.
- Is This Less Efficient Than Monopoly?
  - Assume $\lambda_S(\theta^V) = 0$, constant elasticity demand functions:

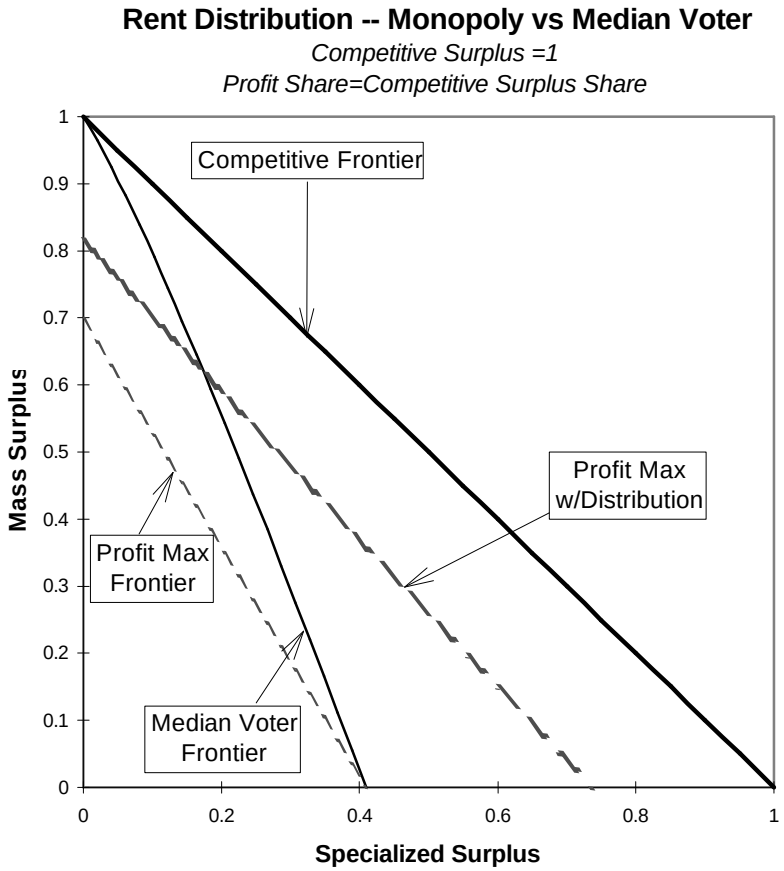


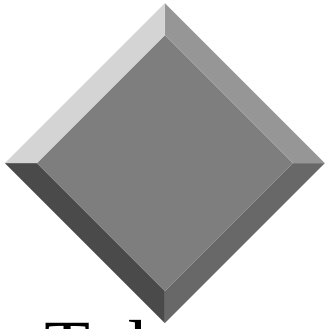
Results (cont'd)

- Regulation Can Indeed Do Worse -- Much Worse-- Than Monopoly
  - If Service M Is Inelastic and S Not Very Profitable, More Room for Regulation to Do Well.
  - If Service M Is Elastic, and S Very Profitable, Regulation Almost Surely Worse Than Monopoly
  - In Telephone, Local Service Relatively Inelastic, But Toll Service Profitable!
- Comparative Statics
  - As $\lambda(\theta^V) \to 1$, $p_M \to c_M$, $p_S \to c_S$, Surplus $\to$ Efficiency
  - If Total S Demand Increases, $p_M \to c_M$, $p_S \to c_S$, Surplus $\to$ Efficiency

Distribution of Rents

- Weighting Mass Service More Moves Curves Down and the Right, but Result Still Holds.
- …But Who Gets What?





Empirical Issues

- Telecoms Traditionally Involved Huge Subsidies from Toll Service T to Local Service L
  - Other Subsidies As Well, Such as Urban $\rightarrow$ Rural, But Toll $\rightarrow$ Local the Big One.
- Political Pressure to Open Markets: 1959 - present
  - Divestiture in 1984
  - Further FCC Actions to Re-balance Rates Toward Cost
  - Net Result: Substantial Reduction in Toll $\rightarrow$ Local Subsidy
- Why Did This Happen?
- Can This Simple Model Provide Part of the Answer?

Empirical Model

- Two-equation Structural Model :

Relative Toll Usage of Median Voter

$$l(0.5) = \frac{1 + m_T e_T}{1 + m_L e_L}$$

Elasticity

Price / Cost Margin = Lerner Index

$$0 = m_T R_T + m_L R_L$$

Revenues

- Estimated for Toll and Local Telephone, 1960-1993
- Required Data:
  - Distribution Across Customers of Toll and Local
  - Quantities and Elasticities
  - Prices and Unit Costs

Distribution Data

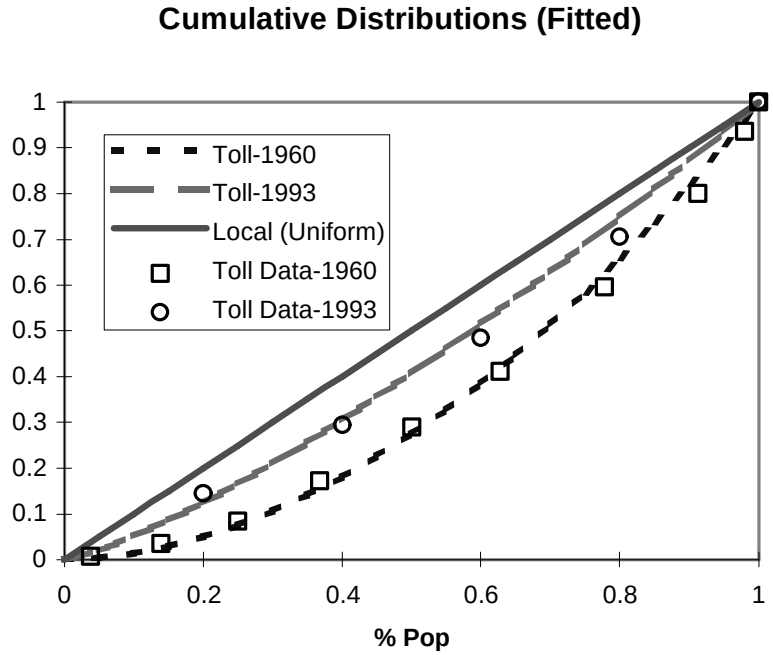
- Distribution Across Income Percentiles
  - 1984-1993 by Income Quintile (FCC)
  - 1960-61 and 1972-73 (*Consumer Expenditure Survey*)
  - Fit Each Year to CDF q^{a+1}; Lower $a \Rightarrow$ Flatter Distribution

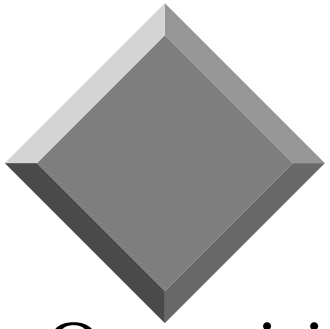
Year	a	Year	a
1960	0.882	1988	0.408
1972	0.694	1989	0.371
1984	0.356	1990	0.342
1985	0.387	1991	0.338
1986	0.382	1992	0.338
1987	0.387	1993	0.370

  - All Coefficients Highly Significant, All $R^2 \geq 0.99$

Distributions (cont'd)

- Distribution Shows Toll Service Becoming More Widely Used: $\hat{a}_t = 1.897 - 0.172 \cdot t,\ t = 60, 72, ..., 93,$
  - Note: Shape of Distribution Does Not Depend on Price (result of *assumption* about individual demand functions)

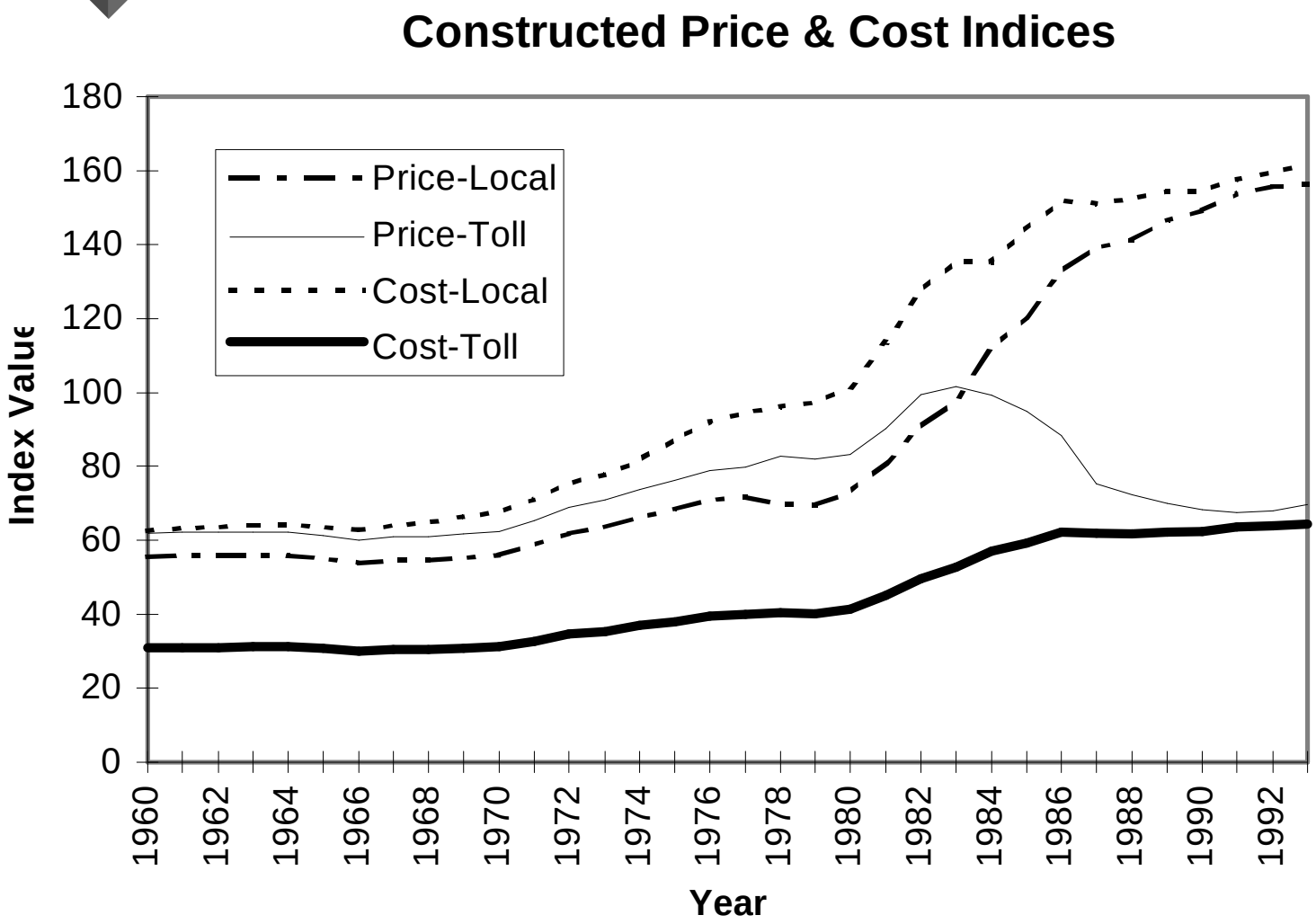




Quantities, Elasticities, Prices, & Costs

- Quantities from FCC *Statistics of the Common Carriers*
- Elasticities: Toll = -1.0, Local = -0.2 (*Taylor*, 1980, 1993)
- Prices: FCC Toll and Local Price Indices 1978-1993
  - Use Backcast Method for 1960-1977, Based on Aggregate Telephone Price Index.
- Unit Costs: Projects Based on 1960-1978 Subsidy Estimates (*Rohlfs*, 1978)

Prices and Costs



Estimation Strategy

- Estimation Strategy: Use the Data and the Model to *Predict* Margins $\tilde{m}_L^t, \tilde{m}_T$
- Then Regress Actual Margins On Predicted Margins, Lagged (to reflect lags in political process):

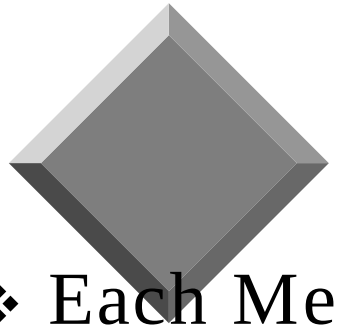
$$m_L = b_L + \sum_{t=0}^{10} b_t \tilde{m}_L(-t) + e_L$$

$$m_T = b_T + \sum_{t=0}^{10} b_t \tilde{m}_T(-t) + e_T$$

  - Series Is Non-Stationary, So Equation Was Also Estimated in First Differences and Second Differences (for which non-stationarity is rejected).

…And The Answer Is...

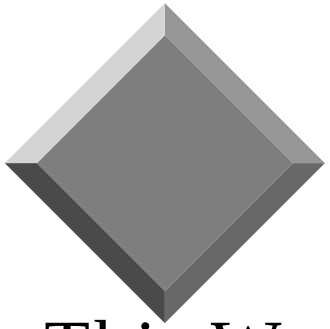
	Level Coefficient	(St Dev)	First Diff Coefficient	(St Dev)	Second Diff Coefficient	(St Dev
Toll Const	-0.414	(0.184)	0.235	(0.100)	0.0075	(0.017)
Local Const	0.687	(0.094)	-0.025	(0.071)	0.0081	(0.015)
Lag = 0	-184.965	(19.506)	-177.473	(30.934)	-177.013	(28.398
Lag = 4	125.893	(32.513)	-25.271	(93.480)	-272.188	(84.125
Lag = 6	316.168	(36.830)	106.186	(33.723)	99.677	(33.060
Lag = 7	-308.409	(35.634)	82.671	(118.822)	201.469	(96.929
Lag = 8	109.744	(40.961)	-65.949	(99.882)	-9.432	(78.480
Lag = 10	-72.617	(33.680)	109.558	(46.709)	169.940	(82.948
Toll Adj R^2	0.863		0.956976		0.972406	
Local Adj R^2	0.881		0.948847		0.941263	



Empirical Conclusions

- Each Method Leads to Very High (Adjusted) R^2 and Significant Coefficients
  - Which are significant varies, but strong commonality
  - Surprising Result that Differencing *Increases* R^2 Suggests the Results Are Robust
  - However, there are significant scale differences, and the lag structure has no plausible explanation.

- The Hypothesis that the Model Explains the Strong Price Movements in Telecoms Is Confirmed.
  - Even Though the Model Is Highly Stylized, It Appears To Have Great Explanatory Power



Overall Conclusions

- This Work Attempts to Bring*Political Economy* into Regulatory Economics
  - In Sharp Contrast with Previous Paradigms of Natural Monopoly and Agency Theory
- Even When Regulation Works "Perfectly" (in the High School Civics-Class sense) It Can Be More Inefficient Than Market Failure
- The Model Does a Good Job at Explaining Why Telecoms Prices Have Undergone the Substantial Changes We've Seen in the Past Decade.