

**Incentive Regulation and Telco Performance: A Primer\***

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## **Abstract**

*The links between incentive regulation and telco performance are complex. This survey of recent research briefly reviews empirical studies of the causes and effects of new regulatory initiatives to promote modernization, price reductions, and cost containment. Given the importance of this topic, the strengths and limitations of the first generation quantitative studies need to be understood by policy-makers worldwide. After describing how new initiatives are attempting to improve telecommunications performance, we present some observations about the art of policy development.*

# **Incentive Regulation and Telco Performance: A Primer**

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## **1. Introduction**

National policies affecting the telecommunications industry have changed in response to technological developments, new commercial opportunities, and problems with cost-based regulation. At the state and national level, U.S. regulators are adopting new regulatory regimes designed to promote network modernization, price reductions, and cost containment. Other countries have also turned to price-caps, performance-based regulation, and other alternatives to cost of service regulation. Also, some initiatives have been grounded in the theory of incentive regulation; others are ad hoc--attempting to address specific issues in particular states. The different state policies offer a unique opportunity to test hypotheses regarding the impact of alternative regulations in the U.S.

This study serves as a short primer on the status of empirical research in the area. It is no substitute for comprehensive surveys of the literature or studies of the conceptual foundations for measuring the impacts of incentive regulation. Readers are referred to a study by Kridel, Sappington, and Weisman (1996)<sup>1</sup> for the former, and Lawton, Marvel, Rosenberg, and Zearfoss (1994)<sup>2</sup> for the latter. Both studies contribute to our understanding of incentive regulation, as they identify the strengths and limitations of previous empirical work. Of course, neither of those studies nor this primer are substitutes for careful examination of the growing number of

econometric analyses--with their associated data issues, model specification problems, and conflicting interpretations.

This primer presents a map of the terrain. As such, it provides a starting point for evaluating the causes and effects of regulatory initiatives being undertaken in the telecommunications industry. Its purpose is to alert readers to potential problems with some pioneering studies. The next generation of empirical work needs to avoid pitfalls found in the initial set of studies described here. A study may include a regulatory policy as a variable explaining price, productivity, profitability, or some other variable. However, the chains of causation are seldom unidirectional. Section 2 shows that interpreting estimated coefficients for evaluating policy impacts is fraught with difficulty. Section 3 surveys recent empirical studies of the causes and effects of new regulatory initiatives to promote modernization, price reductions, and cost containment. Some observations about the art of policy development are presented in the concluding section.<sup>3</sup>

## **2. Basic Economic Conditions and Regulation**

Statistical studies purporting to show how one set of variables causes values of another variable to change have typically involved single-equation models. After controlling for relevant factors, analysts reach conclusions about the influence of a particular policy and the significance of the finding. Caution is necessary when deriving policy conclusions from these studies of incentive regulation. The outcomes in each state result from interactions within complex systems, where influences arise from a number of directions.

Regulation (in the U.S.) and public ownership/privatization (elsewhere) have emerged in response to fundamental economic features of telecommunications, so an understanding of these features is essential to understanding the regulatory rules that affect industry structure, corporate conduct, and market performance. Figure 1 outlines a simplistic chain of causation, from basic conditions to performance. A more comprehensive characterization of the economic and political factors will be presented shortly. For now, the key economic factors can be divided into elements associated with either supply or demand. In addition, information is another important characteristic of underlying economic conditions. For example, information asymmetries have significant implications for the nature and extent of efficient regulatory intervention. The supply conditions basically relate to available production technologies (eg., scale economies) and the availability of inputs. Efficiencies associated with management overseeing several stages of production have often resulted in vertical integration (economies of sequence). Similarly, economies of scope (reflecting multiproduct economies) have characterized telecommunications -- as with the joint provision of local and long distance service. On the demand side, the size of the relevant markets and their rates of growth have a significant impact on the number of firms that can deliver the services in a least cost manner. That is, supply and demand conditions may be such that competition is not efficient or feasible.<sup>4</sup>

In addition to concerns over the exercise of market power, policy-makers have identified network externalities and universal service as issues to be addressed in

telecommunications. Thus, policy-makers' perceptions regarding market imperfections and market failures can justify intervention. Whether the outcomes are actually an improvement over unregulated markets is open to debate. Suppliers regularly seek protection from (efficient) potential entrants, and policy-makers often utilize cost allocation procedures to create price structures which benefit favored customer classes. Higher costs and allocative inefficiencies can result from such policies. Special interest beneficiaries of entry protection, exit prevention (carrier of last resort obligations), and existing price structures are threatened when there are changes in technologies or in public policy priorities.

Thus, in this simple framework, basic conditions influence public policy which in turn constrains the evolution of telecommunications markets. Rate of return regulation represented one way to obtain lower prices and reduce excessive profits. However, as changes in production technologies, demand conditions, and other factors occurred, some regulatory jurisdictions have jettisoned old rules and procedures. These different policies across the states provide natural experiments for policy analysts. Even where change has not been profound, an improved understanding of the long term consequences of ignoring key aspects of cost, demand, and information asymmetries on traditional rate-of-return incentive structures has lead to a re-thinking of regulation.<sup>5</sup>

Figure 1 is an extremely simple schematic of how traditional regulation influenced the structure of the telecommunications industry and limited the range of behaviors observed. Regulatory rules defined markets, constrained entry, and

facilitated vertical integration by firms. Complex cost allocation procedures resulted in the sharing of capacity costs across customer groups, over markets for different services, and between geographic areas. Postage stamp (uniform) pricing was sometimes utilized, despite cost differences in serving various locations or customer groups. Thus, regulation influenced the number of suppliers in various markets and the prices facing customer groups. However, the optimal configuration of firms in an industry depends on the underlying basic conditions -- which change over time.

The regulatory initiatives undertaken since divestiture have targeted structure (via a reduction of entry barriers), or conduct (via price caps), or performance (through profit-sharing plans). These state policies have, in turn, been influenced by the political and economic factors in each state. Thus, unidirectional models are brought into question when one adopts a more comprehensive view of regulation. The policies identified in Figure 2 illustrate how complicated the new regulatory regimes have become, both in terms of incentive regulation (via price caps or shared earnings) and entry policies.<sup>6</sup> Most empirical studies take a state's regulatory policy as exogenous, yet changes are the result of features within each state.<sup>7</sup>

### **3. Links Between Regulation and Performance**

Many analysts have examined the impacts of rate of return regulation, entry restrictions, and inter (and intra-) state cost allocation procedures. Suffice it to note that evidence accumulated which has led to numerous state experiments in incentive regulation. Determining the impacts of specific policies can be quite complicated since policies have been adopted at different times (and in different combinations)

in response to political and economic pressures. Furthermore, it is not easy to develop proxies for state-by-state expectations regarding regulatory commitment and the likelihood (and direction) of rule modifications. Thus, the geographic and intertemporal patterns of regulations have stimulated much research -- but few definitive results.

A further complication is that the positions of incumbents, recent entrants, and potential suppliers differ on many regulatory issues. The differential political power of these groups influences the adoption of new regulatory initiatives. The irony is that depending on the market (local telephony, information services, inter-LATA toll, or cable television) a firm can find itself as an incumbent in one, entrant in another, and potential supplier in a third! Each stakeholder would like to protect its established position while gaining access to new markets.<sup>8</sup>

Characterizing the regulatory regimes and channels of causation is extremely difficult. For example, entry policies affect industry structure directly, but limits on incumbent price flexibility also encourage entry. Price caps have many components: productivity offsets, bundles of services, inflation adjustments, duration of the plan, quality of service constraints, and procedures (and the timing) for future modifications.<sup>9</sup> Similarly, incentive plans may establish a cap in exchange for network modernization investments (which, in turn, affect basic economic conditions and incentives for competitive entry). Sharing rules provide more incentives for cost containment and new service introductions than traditional rate of return regulation. Higher earnings provide a flow of funds which can be applied to modernization. A

dummy variable for "incentive regulation" cannot capture the different policies across states. Another potential feedback arises from productivity advances which affect political perceptions regarding the industry. Universal service represents another policy objective that complicates the adoption of new regulatory policies.<sup>10</sup> Single equation models purporting to capture the causal factors behind regulatory innovations and the impacts of implementing particular rules need to be interpreted with care.

To illustrate the key relationships, let us posit three functions:

$$(1) \quad \text{Performance} = f(\text{Regulation, Economic Conditions, Structure, Behavior})$$

$$(2) \quad \text{Behavior} = g(\text{Regulation, Economic Conditions, Structure})$$

$$(3) \quad \text{Regulation} = h(\text{Performance, Economic Conditions, Political Conditions})$$

Some studies examine the determinants of dimensions of industry performance (equation (1)). For example, the deployment of digital infrastructure or introduction of new technologies is explained in terms of regulation and other factors. Other studies show pricing decisions as a function of regulation (equation (2)). Some explain the use of new state regulations in terms of economic and political conditions (equation (3)). Table 1 provides a brief overview of the growing empirical literature on intrastate telecommunications.<sup>11</sup> The main categories into which the literature falls are on (1) technology and incentive regulation, (2) local, intraLATA toll, and access prices combined, (3) intrastate interLATA, and (4) intrastate, intraLATA. The literature is diverse in terms of the questions asked and the explanatory variables

and methodologies employed. Some common observations in the literature on intrastate telecommunications are:

- Incentive regulation appears to be linked with significant increases in technology deployment, but much work remains to be done to establish long term impacts.
- There appears to be linkage among the prices for basic local service, intraLATA toll, and access, but present cross-subsidy mechanisms have not been found to reduce basic service subscription rates.
- Intrastate, interLATA competition is most effective when entrants have pricing flexibility.
- Present forms of intraLATA toll competition have not had a substantial impact on prices compared with reductions in access charges.
- State demographic conditions and political environments appear to have significant impacts on regulatory regimes, policy selection, and service prices, (see fn. 7).

The work on incentive regulation and technology deployment is in an early stage of development. The most detailed study of the linkage between incentive regulation and technology spans just four years. The studies do not examine the linkage to existing price levels, so the literature has little to offer on whether states have benefitted from these policies.

Studies of intrastate telecommunications prices suggest that competition is most effective when it is on an equal basis among carriers, which is the case for most

interLATA markets but not for intraLATA markets. The most important observation is the significance of state demographics and political environments in all of the analyses that include such measures. These findings strongly suggest that the diversity of approaches in the literature holds lessons about what may be “appropriate” explanatory variables for explaining the causes and effects of intrastate telecommunications regulation, almost regardless of what “theory” of regulatory behavior is posited.<sup>12</sup> We have some general concerns with the literature on intrastate telecommunications:

- Lack of underlying motivation for inclusion of some and omission of other variables,
- Endogeneity of explanatory variables with the dependent variable, and
- Need for analyses to incorporate intertemporal adjustments.

Not all of the empirical analyses clearly define a working theory of how the regulatory process works. In fact, recent contributions on how to test competing theories of regulatory behavior suggest that distinguishing among different theories is often difficult in practice.<sup>13</sup> Whether the regulator is postulated to maximize political voting support, a utility function, or social welfare, it seems safe to say that demand, cost structures, and some measures of the political or regulatory environment are germane. Many of the studies summarized in Table 1 omit variables which might capture these basic features. Among those studies where no specific theory is presented, variables are often combined in an ad hoc manner that

not only omits potentially important factors but often includes variables that are endogenous with the dependent variable.

Omission of variables and endogeneity are major concerns throughout the literature on intrastate telecommunications. General categories of variables include (1) prices, (2) politics, (3) demographics, (3) regulation, and (4) industry/company features. For meaningful inferences about relationships among regulatory policy choices, technology deployment, and regulatory regimes price impacts, one must control for underlying demographic features of states. Endogenous variables ought to be avoided unless a simultaneous equations approach is employed.

Kridel, Sappington, and Weisman (1996) underscored these concerns as well as others in their comprehensive survey of empirical studies. They identify seven pitfalls in interpreting quantitative results:

1. **Uni-dimensional Yardstick Pitfall:** Concluding that a policy is a failure overall when it is weak on a particular dimension of performance. Policy-makers have multiple objectives. Depending on the weights given particular performance objectives, a policy could be judged as highly successful or unsuccessful. Some studies take a very narrow view of regulatory objectives. In fact, regulators seldom explicitly prioritize their policy objectives, so cavalier treatment by analysts should not be surprising.

2. **Causality Pitfall:** "Confusing causation with correlation." (p. 275) The endogeneity of regulatory regimes has only been addressed in a few studies. Simultaneous equation systems represent a model that captures the multidirectional

nature of some variables. Figure 2 showed feedbacks over the short and longer terms. More sophisticated modeling efforts will take such facts into account.

**3. Competition Effect Pitfall:** Not disentangling the impacts of industry competition from those of incentive regulation. This is one of the most important criticisms of earlier studies. Conditions in some states are more conducive to competitive by-pass. Disentangling the role of incentive plans and competition is not a simple task.

**4. Mandated vs. Motivated Pitfall:** Attributing outcomes as the result of incentives rather than mandates. Studies of network modernization often relate incentive plans to fiber deployment, implementation of ISDN, adoption of signalling system 7, and other technological developments. Even absent measurement and timing problems, the link is often the other way around. In exchange for pricing flexibility or higher returns, incumbent local exchange carriers often agree to mandates for technology modernization. Thus, analysts must be careful about interpreting behavior as the result of incentive plans.

**5. Demonstration Effect Pitfall:** Imputing outcomes to incentive programs, despite the experimental nature of those policies and telco interest in influencing future regulatory regimes. The gaming aspects of regulation warrant greater attention. Ascribing short term outcomes to particular incentive plans is problematic when firms are in the process of negotiating plans in other jurisdictions. Furthermore, the firm could be acting in a particular manner to influence the next regulatory regime in that state.

**6. Measurement Timing Pitfall:** Evaluating impacts over insufficient time periods, so the long-term consequences are not captured. Since the time-frames for most studies are very short, it is difficult to disentangle the long term consequences of different regulatory regimes. Long term cost savings may involve higher outlays in early periods, associated with contract termination for downsizing or other programs.

**7. Sequencing Pitfall:** Failing to account for shifting expenses and investments in response to expected changes in regulations. Anticipatory actions ought to be modeled explicitly; otherwise, differential performance or behavior in particular time periods will be compared incorrectly.

Kridel, Sappington, and Weisman did not develop this parade of horrors to discredit early studies, but to encourage humility on the part of policy advocates. Modeling problems, omitted variables, timing issues, and other complications limit the robustness of the conclusions emerging from quantitative work. Nevertheless, the studies to date are suggestive, and generally support incentive regulation as a substitute for cost-of-service regulation.

Given the complexities noted above, and the mixed results of previous empirical studies, what can be concluded? First, command and control regulation has been found wanting in this rapidly changing industry. Production efficiency was not promoted by protective regulations. Similarly, although allocative efficiency is valued, relatively high prices on inelastic demands (Ramsey pricing) runs counter to political pressures. The slow re-balancing of local and long-distance rates is evidence

that regulators try to limit dramatic price changes. Finally, while profits ought to be commensurate with risks, there is much debate about risks associated with LECs. As incumbent firms, they have advantages in the local exchange market. However, they also have supplier of last resort obligations and (thanks to historical adherence to cost allocation procedures for services and geographic averaging within basic service) their prices do not reflect incremental costs.<sup>14</sup>

We would like economic policies to improve industry performance and promote the achievement of objectives with the highest priority. A database covering fifty states, over twenty years, including all policy components and performance dimensions might allow us to test a multi-equation model of the causes and effects of regulations. While the empirical studies described earlier provide us with a good foundation, much more work remains to be done. Thus, policy debates continue due to (a) disagreements regarding how the objectives ought to be weighted, or (b) differences in understanding regarding the links described in equations (1) - (3) above, or (c) alternative visions regarding how basic conditions are changing. Whatever the reasons, we find ourselves with different sets of prescriptions regarding what should be done.

#### **4. Concluding Observations**

The art of policy development involves placing the burden of proof on the appropriate party. If it is placed on those who challenge the status quo, change is less likely to occur. If the benefits of traditional rate of return regulation and its attendant entry restrictions are less than in the past, then the presumption ought to

be that competition and incentive regulation are the preferred processes.<sup>15</sup> Thus, the burden would be on the incumbent LEC to establish why entry into the local exchange ought to be limited. Similarly, the burden of proof would be on the cable industry to show that limitations on LEC retail pricing flexibility is in the best interests of consumers and industry performance. If the burdens are different (and residual regulation is asymmetrical), protectionist policies are more likely to be adopted--to the detriment of consumers.

In telecommunications markets, voice, data, information, and video seem to be coming together--as firms discover new economies of scope and sequence. Not only are there resource savings from producing multiple products together, but vertical integration can lead to efficiencies and improved information regarding consumer preferences. Similarly, network planning may be improved if marketing plans are well integrated into engineering requirements. Erecting regulatory barriers between markets dampens incentives to innovate and to discover new ways to meet consumer demands.<sup>16</sup>

Artificial barriers are likely to fall as technological change brings telecommunications markets together. The delivery technologies are diverse: traditional wireline via twisted copper pair, coaxial cable, fiber optics, and new uses of the radio spectrum (especially Personal Communications Systems). The formats can be analog or digital. No single firm is likely to be the least-cost supplier for all these services, using all these technologies, in all possible formats. The fundamental issues facing the FCC and state regulators revolve around the transition from what

were once viewed as natural monopolies to clusters of interconnected delivery systems which are becoming competitive with one another. The transition is clearly affected by where the burden of proof is placed when considering policy initiatives.

Those who advocate "level playing fields" tend to want public policy-makers to dig up the opponents' side of the field, and use the material to fill in holes, benefitting their side. Competition lets firms establish competitive advantage based on inherent technological capabilities and successful recognition of commercial opportunities. Decisions should be made by those willing to make risky investments in research and development, marketing, and new capacity. Plans and mandates by regulators are surely a recipe for inefficiencies and lost opportunities. Looking to the future, mistakes will be made--both by private decision-makers and public policy-makers. However, a world of no (visible) mistakes is a world of stagnation (and lost opportunities). A strong case can be made that our citizens cannot afford to miss out on the new services made possible by the convergence of computers and communication technologies.

While regulatory micromanagement of this rapidly changing sector is inappropriate, regulators cannot avoid taking on two tasks: (1) serving as umpires who ensure that the game of competition is played according to well-defined rules, and (2) protecting those customers who continue to face residual market power. Completing these tasks will require great discipline on the part of legislators and regulators. It will require substantial analysis and the beginning of an educational process informing stakeholders (large and small) of the rationale behind the new

initiatives. In addition, the approach requires all suppliers to exercise self-restraint--trying negotiation and economic compromise rather than seeking political victory in the hearing room. The "league office" (the legislature) can ease the burden on "umpires" (regulators) by clearly articulating the desired objectives and establishing mechanisms for maintaining universal service. The impacts of transitional incentive regulation can then be evaluated and policies re-calibrated. Well-crafted legislation today means that less bickering is likely to arise in the future. Whether states will actually adopt this path is an open question.

Nevertheless, we need a better understanding of the impacts of specific regulatory constraints and general oversight procedures so we can take advantage of the innovative capabilities of market processes. Empirical studies provide some clues regarding impacts to date. However, we must also learn how to simultaneously constrain the exercise of market power and limit regulatory discretion--so that potential benefits from innovation and economies of scope are not dissipated through corporate gaming or political opportunism. Enhancing policy commitment capabilities reduces the likelihood that rules will be changed in ways that run counter to original regulatory agreements. Keeping commitments is important because it promotes efficiency and fairness during the period of transitional regulation.

Economic laws describe how fundamental conditions determine efficient industry structures. The political process (hardly immune from economic forces) mediates the evolution of industries.<sup>17</sup> The purpose of this primer has been to

underscore the need for gaining an improved understanding of the strengths and limitations of different types of government intervention.

# Figure 1

## Traditional Features of Telecommunications

### BASIC CONDITIONS

Economies of	Demand Patterns
Scale	Price
Scope	Income
Sequence	Demographics

### TRADITIONAL STRUCTURE

Regulatory	No Entry
Defined	Public Utility
	Vertical Integration
Markets	Homogeneous Output

### TRADITIONAL BEHAVIOR

Cost-of-Service Regulation	Price-Regulated
	Production Process R&D

### TRADITIONAL PERFORMANCE

	Technological Advances
Rate of Return on Rate Base	Fair Return on Investment
Cost Allocation Manuals	Prices Based on Cost Allocations
Geographical Averaging	Universal Service

ETR=ECONOMIC THEORY OF REGULATION  
 NT=NO THEORY SPECIFIED EXPLICITLY  
 UF=UTILITY FUNCTION FOR REGULATOR  
 PI=PUBLIC INTEREST

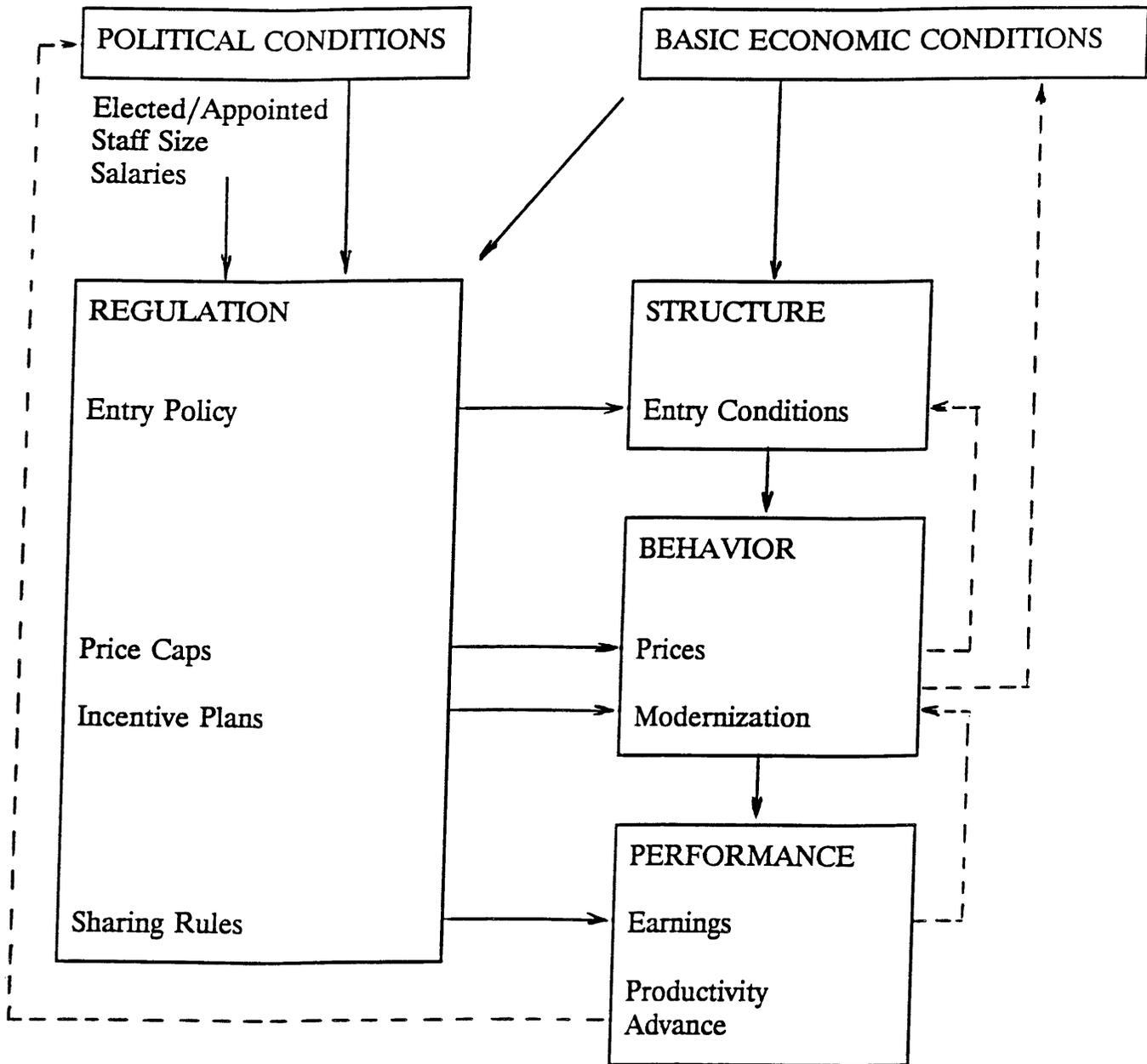
**Table 1: Summary of Recent Empirical Literature on Telecommunications  
 Regulation and Prices**

Study	Period/Method	Questions	Conclusions	Concerns
<i>Technology and Incentive Regulation.</i>				
Greenstein, McMaster, Spiller (1994)	1987-1991 2SLS  Causes of deployment  NT	Seek influence of regulatory structures on deployment of digital infrastructure	Incentive regulation—especially price regulation— influences deployment; more deployment with liberal regulatory environments; price regulation has stronger effect than sharing mechanisms; price regulation associated with earnings sharing is less effective than price regulation itself; price regulation would have increased deployment by 100% in states that by 1991 did not adopt incentive regulation	Includes no variable to capture whether network investment was part of a "deal" with the state.
Montgomery consulting (1994) study for MCI	1986-1992 (panel of only seven states. Estimation method not described).  Effect of incentive regulation on deployment.  NT	Seek relationship between regulatory form and network investment.	Earnings sharing and price-caps do not lead to greater infrastructure deployment.	Small sample size. Estimation procedure not described. Possible sample selection bias.
Donald and Sappington (1994)	1991 Cross-section  Causes of incentive regulation.  UF/PI	Seek determinants that induce states to switch to incentive regulation.	Extreme historic earnings; less competitive pressure (bypass); elected commissioners; Democratic governor; high commissioners' salaries.	Cross-sectional; bypass data may overestimate impact.
Taylor, Zarkasas, Zona NERA (1991)	1991 Cross-section Logit  Effect of incentive regulation.  NT	Seek relationship between incentive regulation and diffusion of new technology	Find significant positive relationship between incentive regulation and technology deployment.	Deployment occurs over time, so cross-section of one year is questionable. Also omits demographic factors.

Study	Period/Method	Questions	Conclusions	Concerns
<i>Local, IntraLATA Toll, and Access Prices</i>				
Kaserman, Mayo, Flynn <i>JRE</i> (1990)	1986 Cross-section (some data from 1981, 1985, 1988, 1989)  Simultaneous Equations  Effects  UF/ETR	Seek relationship between long-distance cross-subsidization of local rates and universal service.	No evidence that cross-subsidization is linked to universal service--both subsidy levels and subscription rates appear to be determined by other economic variables, such as those suggested by the economic theory of regulation.	Result may reflect lack of time dimension.
Kaestner and Kahn (1992)	1986-1992 Panel  Simultaneous Equations  Effects  UF/ETR	Seek relationship between prices of intraLATA toll, local, and access--add access and time dimension to Kaserman et. al. (1990).	Little evidence that intraLATA toll competition drives prices lower; positive relationship between long-distance access prices and elimination of regulatory barriers.	Specification. Data problems--no panel treatment.
<i>Intrastate, InterLATA</i>				
Kaserman, Mayo, Pacey <i>JRE</i> (1993)	1988 Cross-section  Logit  Causes  ETR	Seek determinants of state deregulation of AT&T in intrastate, interLATA toll markets. Compare economic theory of regulation with public interest view.	Claim results support economic theory of regulation. Significant determinants are WATS lines as % of total, elected/appointed commissioners, total PUC staff size, number of PUC staff involved in telecommunications, measure of whether state has bill on telecom. deregulation.	Even though these factors are found to affect deregulation of AT&T, the impact on prices is not examined. Limited by cross-section..
Mathios and Rogers <i>RAND</i> (1989)	Cross-section, based on data in 1987, 1985.  Effects  NT	Compares AT&T's intrastate, interLATA prices across states that either do or do not allow AT&T some pricing flexibility.	Rates lower in states that allow AT&T pricing flexibility.	Potential problem with endogeneity of regulation and base period prices.

Study	Period/Method	Questions	Conclusions	Concerns
<i>Intrastate, IntraLATA</i>				
Foreman (1994)	1983-1992 Panel  Causes and effects.  ETR	Seek basic determinants of intraLATA toll rate differences among states.	State statutory allowance of facilities-based intraLATA toll competition is not a major force that drives toll price lower. Toll rates are significantly lower in states where threats of entry from competitive access providers and cable television are greater. Furthermore, intraLATA toll rates are lower in states where consumers are more sensitive to higher rates.	Proxy for rent-seeking activity is not telecommunications-specific. Do elected regulators improve overall performance?
Mathios and Rogers <i>JRE</i> (1990)	1986, Pooled Cross-section  Effects  NT	Seek relationship between status of intraLATA toll competition and intraLATA toll rates.	Find toll rates 7.5% higher in states that prohibit all intraLATA toll competition.	Other characteristics of states that prohibit intraLATA toll competition may account for rate differences.
Teske (1991a) <i>PC</i>	Cross-Section, data from 1984-1986  Logit  Causes  ETR	Seek factors that induce states to allow BOCs to change their intraLATA toll rates.	US West, government-funded consumer advocates, Fortune 450 Service firms, political party control of state legislature, higher (Saloman Bros.) rated regulatory climates, and appointed commissioners influence regulators to approve competition	Theoretical basis for inclusion of these variables? Cites Peltzman but omits all economic variables. Not clear what constitutes a "change in rates." Does not address rate levels.
Teske (1991b) <i>PC</i>	Cross-Section, data from 1984-1986  Logit Causes  ETR	Seek factors that induce states to allow BOCs to change their intraLATA toll rates--slightly different independent variables than (1991a). Seeks to demonstrate that US West states have more rate structure changes.	US West , government-funded consumer advocates, political party control of state legislature, rated regulatory climates, regulatory budget.	Criticisms of Teske (1991a) apply. This article focuses on US West and finds significance. No other BOC variables are included; companies other than US West might also have distinctive impacts.

**Figure 2**  
**Chains of Causation:**  
**Regulation, Behavior, and Performance**



(1) Performance = f (Regulation, Economic Conditions, Structure, Behavior)

(2) Behavior = g (Regulation, Economic Conditions, Structure)

(3) Regulation = h (Performance, Economic Conditions, Political Conditions)

<sup>1</sup>Donald J. Kridel, David E. M. Sappington, and Dennis L. Weisman, 'The Effects of Incentive Regulation in the Telecommunications Industry: A Survey', *Journal of Regulatory Economics*, May 1996, 269-306.

<sup>2</sup>Raymond W. Lawton, Mary Marvel, Edwin A. Rosenberg, and Nancy Zearfoss, 'Measuring the Impact of Alternative Pricing Reforms in Telecommunications', National Regulatory Research Institute, NRRI 94-30, December 1994.

<sup>3</sup>To avoid both inefficient competition and discourage inefficient monopoly, Haring proposes eliminating barriers created by both incumbents and regulators. His observations regarding the limitations of status quo regulation are quite consistent with the themes developed in this paper. John Haring, 'Can Local Telecommunications Be Self-Policing? A Proposed Discovery Procedure', *Telecommunications Policy*, Vol 19, No 2, 1995, pp 91-104.

<sup>4</sup>Factors influencing supply and demand determine the efficient configuration of the industry (which also must take into account any external effects and social objectives, such as universal service). The features noted earlier were associated historically with a single supplier as being the least cost arrangement for producing the quantity demanded.

<sup>5</sup>In the absence of regulation, basic conditions facing an industry determine the number and size distribution of suppliers which are feasible in an industry. Causation runs from the basic conditions to industry structure (entry conditions, number of firms, degree of vertical integration, and product differentiation). Industry structure influences, in turn, the behaviors likely to be observed (prices, promotion, research and development, production process changes, and new service introductions). The market outcomes can then be described in terms of performance criteria (profitability, efficiency, innovation, and meeting other social objectives). Clearly there are feedbacks in this process--for example, high levels of R&D can lead to innovations which affect the production technologies and entry conditions. Given the role of regulation in restricting entry historically, the resulting R&D feedbacks were probably substantial. It was not in the interest of incumbent firms to develop technologies which would disrupt existing patterns of production.

<sup>6</sup>The irony is that the transition to greater competition often involves new types of regulation rather than less regulation during the evolution to new industry structures. Numerous contentious issues remain: funding universal service, maintaining network interoperability, ensuring service quality, developing number portability, continuing supplier of last resort

obligations, determining the appropriate extent of unbundling, and designing efficient prices for network components. The politics of regulation are such that regulators dare not withdraw from the field before they are confident that politically powerful consumer groups are, indeed, protected from the exercise of residual market power. Similarly, to the extent that policy-makers can operate as honest brokers in the development of complex contracts in vertical markets, they may be able to make the transition to competitive markets less disruptive. However, involvement in these negotiations (or dictating new supply arrangements) requires different types of regulation than in the past. To some extent, hearing rooms will continue to serve as the arbiters of outcomes -- limiting the role of the marketplace in rewarding good performance.

<sup>7</sup>Stephen G. Donald and David E. M. Sappington "Explaining the Choice Among Regulatory Plans in the U.S. Telecommunications Industry" (*Journal of Economics and Management Strategy*, 4, 2, 1995, pp 237-265) have shown the likelihood that a state *will* replace rate of return regulation with incentive regulation is positively related to a number of factors: relatively high residential basic local service rates, particularly high or low allowed earnings under ROR regulation, state's leaders do not tend to come from a single party, relatively

rapid urban population growth, and relatively less bypass activity by competitors in the state.

Their study supports the endogeneity of regulatory policy, which brings into question a number of existing studies purporting to explain the differential impacts of particular regulations.

<sup>8</sup>George Stigler, 'The Theory of Economic Regulation', *Bell Journal of Economics and Management Science*, Vol 2, No 1, Spring 1971, pp 1-21. Sam Peltzman, 'Toward a More General Theory of Regulation', *The Journal of Law and Economics*, Vol 19, No 2, August 1976, pp 211-240.

<sup>9</sup>David E. M. Sappington, 'Designing Incentive Regulation', *Review of Industrial Organization*, Vol 9, 1994, pp 245-272.

<sup>10</sup>The policy options to achieve universal service could include (a) low prices to all, or (b) targeted subsidies to "deserving" groups. Each policy alternative has a different price tag, and each has different consequences for the industry organization. If a very low basic service price cap is applied to all residential customers, funds will be required from other customers and from residential customers who purchase other telecommunications services. Such indirect "taxes" will keep intrastate interLATA rates up and will slow the introduction

of new services. In addition, entry (which takes the form of by-pass) will be artificially encouraged unless some form of comprehensive surtax can be put into place. Targeted subsidies and a higher basic service price cap allow the achievement of the universal service objective without introducing incentives for inefficient behavior.

<sup>11</sup>Shane Greenstein, Susan McMaster and Pablo Spiller, 'The Effect of Incentive Regulation on Local Exchange Companies' Deployment of Digital Infrastructure', University of Illinois mimeo, June 1994 (subsequently published in *Journal of Economics and Management Strategy*, Vol 4, 1995, pp 187-236); William Page Montgomery, 'Promises Versus Reality: Telecommunications Infrastructure, LEC Investment and Regulatory Reforms', Working Paper, August 1994; Stephen Donald and David E.M. Sappington, 'Explaining the Choice Among Regulatory Plans in the U.S. Telecommunications Industry', University of Florida mimeo, September 1994; William E. Taylor, Charles J. Zarkadas and J. Douglas Zona. 'Incentive Regulation and the Diffusion of New Technology in Telecommunications', NERA Study, 1994; D.L. Kaserman, J.W. Mayo and J.E. Flynn, 'Cross-Subsidization in Telecommunications: Beyond the Universal Service Fairy Tale', *Journal of Regulatory Economics*, Vol 2, No 3, September 1990, pp 231-249; Robert Kaestner and Brenda Kahn,

'The Impact of IntraLATA Competition on Local Exchange Company Prices', *Economic Innovations in Public Utility Regulation*, ed. Michael A. Crew. Boston: Kluwer, 1992, pp 37-55; D.L. Kaserman, J.W. Mayo and P.L. Pacey, 'The Political Economy of Deregulation: The Case of Intrastate Long Distance', *Journal of Regulatory Economics*, Vol 5, No 1, March 1993, pp 49-63; Alan D. Mathios and Robert P. Rogers, 'The Impact of Alternative Forms of State Regulation of AT&T on Direct-Dial, Long-Distance Telephone Rates', *Rand Journal of Economics*, Vol 20, No 3, Autumn 1989, pp 437-453; R. Dean Foreman, 'IntraLATA Toll Rates: Tests of a Positive Model of Regulation', Public Utility Research Center, Working Paper, 1994; Alan D. Mathios and Robert P. Rogers, 'The Impact and Politics of Entry Regulation on Intrastate Telephone Rates', *Journal of Regulatory Economics*, Vol 2, No 2, March 1990, pp 53-68; Paul Teske, 'Interests and Institutions in State Regulation', *American Journal of Political Science*, Vol 35, No 1, February 1991, pp 139-54; and Paul Teske, 'Rent-Seeking in the Deregulatory Environment: State Telecommunications', *Public Choice*, Vol 68, No 1, January 1991, pp 235-243.

<sup>12</sup>Caudill et al. formally test specifications of seven alternative models and conclude that the economic theory of regulation consistently outperforms alternative theories and "rules of

thumb" for explaining regulatory behavior. S.B. Caudill, B.G. Im and D.L. Kaserman.

'Modeling Regulatory Behavior: The Economics Theory of Regulation Versus Alternative Theories and Simple Rules of Thumb', *Journal of Regulatory Economics*, Vol 5, No 3, September 1993, pp 251-262. See also Bae-Guen Im, D.L. Kaserman and F. Melese, 'Endogenous Regulation and The Firms' Regulatory Expenditures', *Applied Economics*, Vol 21, No 3, March 1989, pp 375-385.

<sup>13</sup>Nowell and Tschirhart present conditions necessary to distinguish between competing theories of regulatory behavior. Clifford Nowell and John Tschirhart, 'Testing Competing Theories of Regulatory Behavior', *Review of Industrial Organization*, 1993.

<sup>14</sup>Multiple policy objectives have complicated the implementation of incentive regulation. Productivity advance has resulted from innovations in computers, fiber optics, and spectrum-compression have created new commercial opportunities as well. New service introductions represent a significant source of benefits to consumers. Other objectives have often been viewed as being negatively affected by competition in telecommunications. There is concern that the universal service objective will suffer as current funding mechanisms dry up. Income distributional concerns are also raised by rate averaging--where low income rural customers

are hurt by price increases (even if they continue to subscribe to telephone service). Similarly, network reliability (and other dimensions of quality) are viewed as threatened by competitive pressures. Another performance objective, job security, has certainly suffered, as LECs have downsized. However, entrants have expanded their employment. In addition, the debate over implications for international balance has raised issues about imports of foreign equipment and U.S. foreign direct investment abroad.

<sup>15</sup>See, for example, Berg and Foreman, "Price Cap Policies in The Transition from Monopoly to Competitive Markets," *Industrial and Corporate Change*, 4, 4, 1995, 671-681.

<sup>16</sup>Sanford V. Berg and John Tschirhart, 'A Market Test for Natural Monopoly in Local Exchange', *Journal of Regulatory Economics*, Vol 8, 1995, pp 103-124.

<sup>17</sup>An anonymous reviewer put the point quite forcefully:

"We know that by having a [regulatory] process in place, those who have axes to grind, or who may not be selected by the market evolutionary process, will have a forum that can be used to prevent the evolution from happening. *"Every law and every regulation will be colonized by a constituency and [its affiliated] bureaucracy dedicated to continuing it."* We propose that the burden of proof be placed on those

who propose to interfere with market outcomes. This approach will not solve the problem of rent-seeking, but it increases the likelihood that the marketplace will be allowed to operate in a relatively unfettered way.