Is There '*Hope*' For Price Cap Regulation?[*]

By

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Abstract

This article examines the problem of *regulatory opportunism* or strategic behavior by the regulator that undermines the performance of price cap regulation (PCR) without technically breaching the price cap commitment. Drawing from the experience with PCR in the telecommunications industry, this article contends that the *Hope* standard, a litmus test for governing the bounds of regulatory discretion under earnings regulation, cannot be used to rationalize *regulatory opportunism* under PCR without blurring the distinction between the two regimes. These findings may have implications for recent claims by incumbent firms that regulatory policies designed to foster competition may constitute a governmental taking.

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1. Introduction

The pervasive adoption of price cap regulation (PCR) is arguably one of the crowning achievements of regulatory economics this past century.[1] Indeed, it would be difficult to identify a contribution to theoretical regulatory economics that has had a more profound and lasting impact in changing the regulatory landscape.

Unlike traditional rate-of-return regulation (RRR), the firm under pure PCR has ideal incentives to invest in cost-reducing innovation,[2] to operate with the least-cost technology, to operate with no waste and to diversify efficiently into new markets. In addition, PCR reduces the likelihood of cross-subsidization and abuse—expenditures on resources for which the costs exceed the benefits.

In the course of just over 15 years, at least 48 states in the United States have changed the method of regulating dominant local exchange telephone companies from RRR to PCR (Sappington, 2002 forthcoming, Table 2).[3] The trend in the U.S. has clearly been in the direction of pure PCR. In 1995, dominant local exchange carriers in the U.S. were subject to some form of earnings-based regulation (RRR or earnings sharing) in 35 states and PCR in 9 states. In 2000, the corresponding values were 8 and 39, respectively. Similar changes in regulatory regime have occurred in Australia, Europe and South America. The pace of regulatory reform in the energy sector, though somewhat less dramatic, reflects a similar trend (Costello, 1999; Sappington, Pfeifenberger, Hanser and Basheda, 2001).

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[1] For a discussion of the basic structure and historical origins of PCR, see Crew and Kleindorfer (1996), Acton and Vogelsang (1989), Beesley and Littlechild (1989), Brennan (1989), Hillman and Braeutigam (1989), Vogelsang (1989) and Littlechild (1983).

[2] The term pure PCR is sometimes used to refer to price cap regimes in which there is no *ex post* sharing of earnings with consumers. Except where otherwise noted, the terms PCR and pure PCR are used interchangeably.

[3] See Donald and Sappington (1995, 1997) for an empirical analysis of the determinants of alternative forms of regulation in the U.S. telecommunications industry.

Traditional RRR places a cap on the earnings of the regulated firm.[4] In contrast, PCR places a cap on the average prices that the regulated firm may charge for its services. The price cap is adjusted over time for inflation and an offset,[5] commonly referred to as the X-factor.[6, 7] In the case of pure PCR, this new regime represents more than an incremental adjustment in the form of regulation, but rather a fundamental change in the nature of the regulatory contract and a wholesale shift in risk bearing from consumers to the regulated firm.[8]

The substitution of PCR for RRR offers the opportunity for Pareto-Superior change for all primary interest groups: the regulated firm, consumers, the regulator and competitors. In theory, the regulated firm bears greater risk under PCR in exchange for the prospect of greater reward. It is also granted additional pricing flexibility that enables it to compete more effectively in increasingly competitive markets. Consumers typically enjoy price reductions over time that are more pronounced than those experienced historically under traditional RRR. In addition, it is common for regulators to extract "entry fees" for PCR that entail various combinations of bill credits, rate freezes, refunds and infrastructure modernization. The regulator benefits not only from more streamlined regulation, but from no longer being required to micromanage the regulated firm's operations. In addition, the regulator can structure the entry fees extracted from

[4] Under RRR, the regulator designs a set of rates that provide the firm with a "reasonable opportunity" to recover prudently incurred expenses plus a risk-adjusted market return on its rate base (invested capital less depreciation).

[5] Another common feature of price cap plans is that of a Z-factor, or adjustment to the price cap formula to reflect the financial impact of an exogenous event. The logic behind the Z-factor is that the regulated firm should not be unduly rewarded (respectively, unduly penalized) for events that are beyond its direct control.

[6] The X-factor in a price cap formula is the (minimum) rate at which prices for regulated services must fall on an annual basis after adjusting for inflation. The X-factor is designed in part to reflect the degree to which productivity growth and input price changes diverge from those realized in the general economy. See Bernstein and Sappington (1999) for a comprehensive analysis of the setting of X-factors in price cap regimes.

[7] This is why PCR is sometimes referred to as [RPI – X] regulation, or simply [I – X] regulation, where RPI and I indicate the "retail price index" and "inflation," respectively.

[8] This characterization is not universal as it depends on the particular structure of the PCR plan. Armstrong, Cowan and Vickers (1994, p. 172) offer the following interpretation of the difference between the two regimes as practiced in Britain. "As a rough characterization, under rate-of-return regulation reviews are infrequent, and the regulatory lag is endogenous because either side can request a review, whereas under price caps the lag is relatively long, and

the regulated firm to curry favor with his constituency. Finally, competitors benefit from PCR because the regulated firm has neither the incentive to misreport the nature of its costs nor the ability to true-up earnings should its rate of return fall below pre-specified levels. Hence, unlike RRR, PCR affords the regulated firm little or no protection from competitive losses.

In light of the above discussion, the title of this paper may strike the reader as somewhat curious. It would seem to suggest that the performance of PCR may have fallen short of expectations. It would be premature, however, to conclude that PCR has failed or even that it is failing.[9] The basic claim quite simply is that there are opportunities for strategic behavior by the regulator under PCR, heretofore largely unrecognized, that threaten to undermine its performance.

We employ the term *regulatory opportunism* to describe actions undertaken by the regulator that reduce the profitability of the regulated firm in the short run and undermine the performance of PCR in the long run without technically breaching the price cap commitment. For instance, regulators in price cap jurisdictions may adopt excessively liberal competitive entry policies to drive the market price below the price cap. The incentive for such behavior derives from the fact that regulators are "insured" against the adverse effects of competition under PCR because the regulated firm cannot normally petition for higher rates in the event of an earnings deficiency. This is an example of *regulatory opportunism*, but it does not constitute a breach of the price cap commitment because the price cap agreement typically does not govern the regulator's actions with respect to competitive entry.

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the date of the next review is fixed in advance. The difference is one of degree rather than kind." The price cap plans in the U.S., at least at the state level, tend to emulate more closely the principles of pure PCR.

[9] See Abel (2000) and Kridel, Sappington and Weisman (1996) for surveys of the effects of PCR and incentive regulation in telecommunications and Ai and Sappington (2002) for a comprehensive empirical analysis.

A second example concerns hybrid regulatory regimes that combine elements of both price and earnings regulation. In certain cases, prices for selected services are capped at levels below incremental cost. The regulated firm may be eligible to receive support payments or subsidies to make up for this shortfall. Under these conditions, the regulator can practice earnings regulation for a particular subset of services that are subject to price caps when the support payments (subsidies) for those services are cost-based. Once again, there is no breach of the price cap commitment, *per se*, even though the regulator's actions can be expected to weaken many of the desirable incentive properties of PCR.

Regulatory opportunism in price cap regimes is facilitated by the regulator's ability to invoke the *Hope* standard to rationalize such behavior. Under the *Hope* standard, a regulated firm is entitled to a "return … sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and attract capital" and to "enable the company to operate successfully … and to compensate its investors for the risks assumed …"[10] The regulator is granted broad discretion under *Hope* to adopt the lowest rates for the regulated firm consistent with the above standard even though it may produce only a meager return. This creates potentially fatal problems for PCR. On the one hand, the regulator can appeal to *Hope* as justification for the appropriation of "excess returns" that the firm under PCR may realize through its superior business acumen—thereby undermining incentives for efficiency. On the other hand, the firm under PCR that is sufficiently inept can invoke *Hope* as a means to protect itself against downside risk—thereby subverting the critical risk-return tradeoff.

These observations suggest that the substitution of PCR for RRR necessitates a corresponding change in the criteria necessary to determine whether a particular governmental

[10] See *Federal Power Commission* vs. *Hope Natural Gas Co.*, 320 U.S. 591, 603, 605, (1944). The Supreme court reaffirmed the fundamental tenets of *Hope* in *Duquesne Light Co.* vs. *Barasch*, 488 U.S. 299 (1989).

action constitutes a taking. In general, the *Hope* standard which establishes a lower-bound earnings benchmark for a governmental taking under RRR is not the relevant standard under PCR. The claim is that in order to preserve desirable incentive properties, the firm subject to PCR should not be able to prevail on a takings claim solely on the basis of earnings that are deemed deficient; nor should the regulator be able to insulate itself against a takings claim solely on the basis of earnings that are deemed sufficient.

The main findings of this analysis are four. First, *regulatory opportunism* undermines the performance of PCR in the long run. Second, there is evidence to substantiate the incidence of *regulatory opportunism*. Third, the *Hope* standard, a litmus test for governing the bounds of regulatory discretion under earnings regulation, cannot be used to rationalize *regulatory opportunism* under PCR without blurring the distinction between the two regimes. Fourth, whether a firm subject to PCR should have the ability to appeal to the *Hope* standard for relief from financial distress is not independent of the origins of the firm's financial distress.

The format for the remainder of this article is as follows. In section 2, we briefly review the efficiency properties of PCR and the problem of regulatory commitment. Section 3 examines whether firms subject to PCR should be able to appeal to the *Hope* standard for protection against downside risk. Section 4 presents evidence of *regulatory opportunism* with examples drawn from the U.S. telecommunications industry. Section 5 examines the relevance of the *Hope* standard under price-based regulatory regimes and its implications for the competitive transition now underway in telecommunications and energy markets. Section 6 presents the conclusions.

2. Performance Incentives and the Commitment Problem

PCR provides stronger incentives for economic efficiency relative to earnings regulation provided that the firm believes that the regulator's commitment to the basic tenets of PCR is credible. In other words, the firm must believe that the regulatory authority will honor its commitment to practice price regulation rather than earnings regulation under the guise of price regulation. The theoretical economics literature has recognized that PCR is a superior regulatory regime in that it puts in place economic incentives that more closely emulate those of a competitive market (Braeutigam and Panzar, 1989; Sappington and Weisman, 1996).[11]

2.1. Performance Incentives

The regulated firm under pure PCR has ideal incentives to (1) undertake cost-reducing innovation;[12] (2) operate with the least-cost technology; (3) operate with no waste; (4) diversify efficiently into new markets; (5) report its costs truthfully; and (6) eliminate abuse.[13, 14] These superior incentives for efficiency derive from the fact that pure PCR operates much like a *fixed-price contract*.[15] This property benefits consumers because the prices they pay do not vary directly with the reported costs of the firm. In other words, consumers bear little or no risk for the duration of the specified price cap period.[16] Conversely, traditional earnings regulation

[11] Clemenz (1991) shows that in general PCR yields higher social welfare in comparison with RRR.
[12] Cabral and Riordan (1989) prove that this result holds provided that the price cap is not set too low.
[13] In this context, abuse refers to resources consumed by the regulated firm for which the realized costs exceed the benefits. In other words, abuse represents expenditures on resources that the regulated firm would not undertake if it had to bear their full cost. For example, a regulated firm operating under RRR may decide that it requires a corporate fleet of 12 jets at the disposal of its senior management. That same firm may decide that under a 50/50 earnings sharing regime, it can get by with only 9 jets, and with pure PCR, 6 will do just fine. In this example, 6 of the jets in the case of RRR and 3 of the jets in the case of earnings-sharing regulation constitute abuse. See Blackmon (1994).
[14] Weisman (1993) demonstrates that these superior incentive properties are dampened under earnings regulation. Lyon (1995) and Schmalensee (1989) demonstrate that economic welfare may be higher under earnings sharing regulation in comparison with pure PCR, in part, because prices are maintained in closer proximity to marginal cost.
[15] See Laffont and Tirole (1993, pp. 39-40) for a discussion of *fixed-price* and *cost-plus* contracts.
[16] Consumers may ultimately experience rate shock at the end of the price cap review if rates are re-calibrated to achieve a target rate of return. See, for example, Isaac (1991).

operates much like a *cost-plus contract*. As a result, the prices consumers pay tend to vary directly with the reported costs of the firm.

An important property of PCR is that the regulator no longer has to second guess the firm's operations and evaluate the prudence of its investment decisions and operating practices. This is a difficult task for the regulator because it is generally recognized that the firm has superior information regarding its business operations including opportunities for reducing costs.[17] Pure PCR makes the firm the residual claimant for improvements in operating efficiency.[18] Under pure PCR, the link between the firm's [actual] costs and its prices is severed. The superior incentive properties of PCR derive in large measure from breaking this link between costs and prices. In other words, because the regulated firm retains one-hundred percent of its efficiency improvements, it has ideal incentives to strive for maximum efficiency. The regulator can thus be assured that the regulated firm will enlist its informational advantage to improve efficiency.

Pure PCR is the exception rather than the rule, however. It is standard practice for the price cap plan to be reviewed after some stipulated period of time.[19] This review may be limited to a reexamination of the parameters of the price cap formula (e.g., the X-factor),[20] or entail a re-calibration of the regulated firm's rates to achieve a target rate of return.[21]

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[17] This, of course, is the dominant theme in the New Economics of Regulation Literature. See, for example, Laffont (1994).

[18] In this context, the term *residual claimant* means that the regulated firm has claim to the entirety of the difference (residual) between its revenues and its costs just like any other firm operating in a competitive market. Moreover, just as price is exogenous to the competitive firm, the price cap is exogenous to the regulated firm.

[19] Armstrong, Rees and Vickers (1995), Gasmi, Ivaldi and Laffont (1994) and Strategic Policy Research (1994) examine the optimal regulatory lag under PCR. The operative trade-off is one between static and dynamic efficiency. Longer review periods provide the firm with stronger incentives for cost-reducing innovation, but simultaneously increase the length of time over which prices diverge from marginal costs.

[20] The average X-factor in state price cap plans in the U.S. telecommunications industry is approximately 2.7% (National Economic Research Associates, 2001). This contrasts with an X-factor of 6.5% for the FCC's price cap plan for local exchange carriers in the U.S. (FCC, 1997). Notably, the FCC's price cap plan covers primarily (interstate) carrier access charges (the charges that local exchange carriers assess long distance carriers for the origination and termination of long distance messages).

[21] In some cases the regulator is explicitly prohibited by law from conducting an earnings audit for the purposes of revisiting the terms of the price cap plan. See, for example, KTA (1996), New Section 6(f).

2.2 The Commitment Problem

Under pure PCR, the regulatory authority commits not to adjust the prices of the regulated firm's services on the basis of its actual earnings or costs. To do so, of course, would represent a form of earnings regulation and re-establish the very link between allowed earnings and prices that PCR attempts to break. The commitment problem is the Achilles' heel of PCR.[22] The regulated firm has limited incentives to seek out opportunities to improve efficiency if it believes the regulator will simply usurp any realized cost savings and pass them on to consumers in the form of lower rates. Similarly, the firm will have limited incentives to bear the risk associated with large-scale investment in infrastructure modernization if it believes the regulator will appropriate the returns from this investment. Consequently, if the firm is uncertain as to whether regulatory commitments will be honored, there may be little difference between PCR and earnings regulation in practice. In fact, the political pressures for regulators to renege on their commitments under PCR have long been recognized. The following passages are instructive:

> …Can the regulator credibly pre-commit to a system of price cap regulation? Stated differently, can today's regulatory commission bind its successor? A regulatory agency is likely to be subjected to considerable political pressure to change the price cap or price cap formula over time. If a firm regulated by price caps begins to earn large profits, consumers will no doubt petition the regulator to lower the price in the core market (Braeutigam and Panzar, 1989, p. 320).

> This issue of recontracting and the efficiency distortions resulting therefrom is arguably one of the more serious problems with PC [Price Cap] regulation in practice. A key premise underlying PC regulation is that increased profits for the firm will be viewed by regulators and their constituency as something other than a failure of regulation itself. If this premise is false, then regulators will be under constant political pressure to recontract when the firm reports higher profits. In equilibrium, the firm learns that this is how the game is played and the efficiency gains from PC regulation in theory may fail to materialize in practice (Weisman, 1993, pp. 364-365).

[22] Baron (1991) provides a formal treatment of the commitment problem. Kovacic (1991) examines the problem in the context of defense contracting and draws parallels with PCR. Levy and Spiller (1994) provide an international perspective on the commitment problem in the telecommunications industry.

The commitment problem has proven to be more than just a theoretical concern. Regulators in both the United States and Britain have repeatedly increased the X-factor in the price cap plans for telecommunications carriers, in part, on the basis of earnings levels that were deemed to be excessive (Armstrong, Cowan and Vickers, 1994, pp. 224-227; Sappington and Weisman, 1996, pp. 84-85, 162-164).

Ratcheting upward the X-factor need not constitute a breach of the price cap commitment, however, if it is understood by all parties that such adjustments are a standard part of the periodic review of the price cap plan. This observation notwithstanding, the fact remains that changing the X-factor on the basis of the actual earnings of the regulated firm will tend to dampen incentives for cost-reducing innovation, *ceteris paribus*. In contrast, limiting adjustments to the X-factor to changes in industry-wide productivity growth and input price differentials need not harbor the same adverse incentive effects.[23]

To understand the precise nature of this problem, suppose that the regulated firm improves operating efficiency under the belief that it is the residual claimant for its cost-reducing innovations. If the regulator now ratchets upward the X-factor based on the actual earnings of the regulated firm, it will have appropriated improvements in operating efficiency that may exist only because the regulated firm believed it was subject to price regulation rather than earnings regulation. In other words, these cost savings may exist only because the regulated firm relied upon a commitment by the regulator that it subsequently chose not to honor.[24]

[23] In order to preserve ideal incentives for cost-reducing innovation, the regulated firm must perceive that the X-factor is invariant to its own performance. This condition is satisfied if the measure of productivity growth on which the X-factor is based excludes data on the firm's own performance. Alternatively, this condition is satisfied if the regulated firm's share of total industry output is so small that it perceives no direct linkage between its own performance and industry-wide productivity growth. See Schleifer (1985) for a discussion of yardstick competition.

[24] This, of course, begs the question as to why regulated firms prefer PCR if regulators renege on their commitments. Two observations are noteworthy. First, despite its shortcomings, regulated firms may still believe that PCR dominates RRR, either in terms of expected profitability or in terms of the ability to transition to complete

3. Protections Against Downside Risk

The discussion heretofore has focused primarily on the prospect that the regulated firm could be the victim of *regulatory opportunism* should it realize supra-competitive earnings under PCR. The recent electricity crisis in California reminds us that the opposite is also possible—the regulated firm may incur steep losses without recourse under PCR to the regulatory authority for rate relief. The specific details of the price cap plan for the electric utilities in California are beyond the scope of this discussion.[25] Nonetheless, the more general question of what recourse the regulated firm has under such conditions is pertinent to the analysis.

A key tenet of PCR is that the firm agrees to bear greater risk in return for the prospect of greater reward. This observation suggests that deficient earnings alone would not be sufficient to qualify the price-regulated firm for an appeal to *Hope* for relief from financial distress. Moreover, it is significant that neither *Hope* nor *Duquesne* differentiate between financial distress due to confiscatory rate-setting and financial distress due to poor performance by the regulated firm. And yet, this distinction is of paramount importance in a price-cap setting.

A stylized example should prove instructive. Suppose that there are 4 firms in the industry subject to PCR and that they differ only with respect to their investments in cost-reducing effort. In addition, assume that the market conditions and regulatory policies are identical for each of these firms and there is no *regulatory opportunism*. Suppose that the regulator sets the initial rates and the industry-wide X-factor to achieve a competitive rate of return of 10 percent on average for the firms in the industry. Over the course of the price cap regime, the firms report

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deregulation. Moreover, there is some evidence to suggest that regulated firms may have been surprised at the regulator's propensity to renege on the price cap commitment. A number of early studies, including Schmalensee and Rohlfs (1992), Tardiff and Taylor (1993) and Majumdar (1997) indicate that PCR resulted in efficiency gains. In contrast, there is little or no evidence from more recent studies that suggest PCR has led to efficiency gains. See, for example, Ai and Sappington (2002) and Resende (1999, 2000). One plausible interpretation of these findings is that it is possible for regulated firms to be fooled once—but not twice.

[25] See, for example, Borenstein (2001) and Makovich and Yergin (2001).

returns equal to 4 percent, 8 percent, 12 percent and 16 percent, respectively. The key question concerns whether the firm with a return of 4 percent should be able to appeal to *Hope* on the grounds that its return is grossly deficient and therefore impedes its ability to attract capital and operate its business successfully?

The answer to the aforementioned question is "no." The reasoning is as follows. First, as part of the price cap agreement, the firm agrees to bear the risk that its returns may well be less than that which it could reasonably have expected to earn under traditional RRR. Second, at its core, *Hope* turns on the issue of government confiscation. There is no evidence here that either the initial rates or the industry-wide X-factor is confiscatory. To the contrary, 2 of the 4 firms have out-performed the industry-wide X-factor and realized supra-competitive returns. In this respect, the industry-wide X-factor provides a benchmark that enables an inference to be drawn as to whether the rate-setting process is confiscatory.[26] For example, a scenario in which all 4 firms in the industry were consistently earning returns markedly less than 10 percent may suggest that the rate-setting process is confiscatory and thus an appeal to *Hope* may be in order.

The discussion above presumes, of course, that the firm subject to PCR did not have the option of returning to RRR once the initial rates and the X-factor for the price cap regime are set by the regulator. There are no valid grounds for an appeal to *Hope* in the case where the firm subject to PCR retains the option of returning to RRR once the initial rates and the X-factor for the price cap regime are set by the regulator.

Regardless of whether the regulated firm has a valid claim under *Hope*, there is the practical matter of "keeping the lights on" and this may ultimately force the state's hand in

[26] In principle, relaxing the assumption of identical firms does not pose insurmountable difficulties for the analysis. The basic tenets of PCR recognize that the firm should not unduly benefit (respectively, not be unduly penalized) for events that are largely beyond its control. This implies that the X-factor should be adjusted for exogenous characteristics unique to the regulated firm and/or the environment in which it operates.

ensuring that the financial distress of the regulated firm does not threaten the continuation of service. A key question then concerns whether it is possible for the state to intervene without dulling the superior incentive properties of PCR?

Should it prove to be the case that the regulated firm's financial distress is due to poor managerial performance, we might expect that it will be taken over by managerial talent with superior business acumen. Conversely, the failure of any suitor to step forward may suggest that the state does not offer a regulatory climate conducive to profitable business opportunities in this particular sector.[27] This increases the likelihood that there is a valid claim under *Hope*, *ceteris paribus*. In the event that the regulated firm is ultimately granted some form of rate relief in order to avoid service disruptions; and assuming that the financial distress of the regulated firm is due to poor performance rather than the structure of the price cap plan itself, an upper bound on earnings may be warranted to ensure that the price cap plan is symmetric around the target level of earnings. These upper and lower bounds on earnings need not materially distort performance incentives if the probability of their occurrence is sufficiently small.

To summarize, whether a firm subject to PCR should have recourse to *Hope* is not independent of the origins of the firm's financial distress. Unconditional recourse to *Hope* by the firm subject to PCR can be expected to give rise to the same type of moral hazard problems that plague cost-based regulatory regimes. It follows that, as a general principle, the firm subject to PCR should not have recourse to *Hope* as a mechanism to protect itself against downside risk due to poor performance. In other words, ineptitude on the part of the regulated firm should not be mistaken for government confiscation.

[27] For example, the electric utilities in California are precluded from using long term contracts to secure stable supplies of electric power and are limited in their ability to adjust prices for exogenous effects—a feature that is common in most price cap plans in the U.S. telecommunications industry.

4. Regulatory Opportunism

Recall that *regulatory opportunism* refers to actions undertaken by the regulator that reduce the profitability of the regulated firm in the short run and undermine the performance of PCR in the long run without technically breaching the price cap commitment. We present two examples drawn from the U.S. telecommunications industry. The first example focuses on the implementation of the 1996 Telecommunications Act; and the second example concerns hybrid regulatory regimes that combine elements of both price and earnings regulation.

4.1 Implementation of the 1996 Telecommunications Act

There are two forms of "regulator-assisted" competitive entry into local telephone service markets under the 1996 Telecommunications Act: unbundled network elements (UNEs) and Resale.[28] Through a series of arbitration proceedings, state regulators set the prices of UNEs sold to the incumbent firm's rivals as well as the wholesale discounts that apply to the incumbent firm's retail services for purposes of resale by competitors.[29] Hence, the Act empowers regulators to essentially control the rate at which competitive entry materializes. This is significant because competition is no longer purely exogenous, but in part endogenous to the regulator's actions.

Lehman and Weisman (2000a, 2000b) investigate whether UNE prices are endogenously influenced by the form of regulation under which the regulated firm operates. On the basis of 48 observations on state arbitrations involving the Regional Bell Operating Companies from 1997-

[28] Network unbundling refers generally to the practice of partitioning retail services into individual network elements and leasing these elements to would-be entrants at prices determined by the regulatory authority. In theory, this practice encourages competition by substantially reducing the sunk costs of entry. See Hausman and Sidak (1999), Sidak and Spulber (1997a) and Vogelsang and Mitchell (1997).

[29] See Kahn, Tardiff and Weisman (1999) for a comprehensive analysis of the economic principles underlying the Act's implementation.

1999, they find that regulators in states that practice PCR set systematically lower UNE prices in comparison with regulators in states that practice RRR or earnings sharing.[30] Specifically, the ratio of UNE prices to embedded costs for unbundled local loops (considered to be among the most essential of network inputs) is approximately 15 percent lower in price caps states than in RRR and earnings sharing states, *ceteris paribus*.[31, 32] These results are consistent with the theory that the regulator is "insured" against the adverse effects of pro-competitive entry policies under PCR because the regulated firm's prices do not vary with its earnings (Weisman, 1994).

In an environment in which the regulator controls the terms of competitive entry, the regulator can adopt entry policies sufficiently liberal to render the price cap non-binding. That is, the regulator can ensure that the competitive equilibrium price lies below the price cap.[33] The impact on the regulated firm's earnings, however, will be the same as if the regulator had unilaterally lowered the price cap.[34] Hence, the effective price cap may less than the actual price cap. This type of behavior does not constitute a technical breach of the price cap commitment,

[30] In contrast, there is no systematic evidence that regulators in PCR states set resale discounts significantly higher than their counterparts in states practicing RRR. This may occur because regulators perceive that UNEs and facilities-based competition are complements, whereas resale and facilities-based competition are substitutes. A regulator interested in encouraging the development of facilities-based competition would therefore not want to create artificial incentives for resale competition. See Weisman (2000, pp. 16-17).

[31] The incentive for competitive entry is a function of both retail prices and input prices. Weisman (2000, p. 16) examines the mark-up of the average retail business rate over the average unbundled loop rate under price regulation and earnings regulation and finds that this mark-up is systematically higher in price cap jurisdictions. The difference in means is statistically significant at the 5 percent level.

[32] Lehman (1998) conducts a simulation analysis of the relationship between embedded costs and forward-looking costs to determine whether UNEs are priced below cost. His findings indicate that, unless one appeals to a speculative costing standard, there is a high probability that the average price of unbundled loops is below forward-looking (incremental) cost. See also Chapter 6 in Lehman and Weisman (2000b) and Mandy (2002). A noteworthy conclusion of this latter study is that the UNE prices generated from the FCC's TELRIC (total element long run incremental cost) methodology fall below the corresponding competitive equilibrium prices.

[33] Weisman (1994) contends that earnings sharing may be more profitable for the regulated firm than pure PCR in an environment in which the regulator controls the terms of entry. The prospective loss of shared earnings imposes a cost on the regulator should it adopt liberal competitive entry policies. In other words, earnings sharing may discipline the regulator to maintain relatively high entry barriers in order to sustain the profit stream of the regulated firm.

[34] The regulator's commitment to a particular price cap without a corresponding commitment to the level of UNE prices is akin to a basketball game in which there is a commitment not to raise the height of the basket but no corresponding commitment not to lower the floor.

however, because the terms of these plans do not impose any restrictions on the regulator's policies governing competitive entry.

The fact that regulators are empowered under the 1996 Telecommunications Act to set UNE prices that endogenously and asymmetrically affect the nature of the risk that the incumbent firm bears has the potential to undermine the very essence of the price cap commitment.

4.2 Hybrid Regulatory Regimes

In the second example, we illustrate how hybrid regulatory regimes can lead to *regulatory opportunism*. Southwestern Bell Telephone (SWBT) operates under pure PCR in the state of Kansas for the vast majority of its retail, local service offerings, including basic residential local telephone service. Historically, regulators in telecommunications have maintained rates for residential telephone service at artificially low levels, in some cases below cost, purportedly to further the goal of universally-available telephone service.[35] The Kansas Universal Service Fund (KUSF) provides the subsidies that enable these rates to be maintained below cost in the state of Kansas. SWBT is able to draw from the fund an amount equal to the shortfall between its cost of providing basic local telephone service and its corresponding revenues.

Under state statute, the level of KUSF support is cost-based, but the prices for basic residential telephone service are subject to PCR. In addition, the KTA (Kansas Telecommunications Act) calls for rate re-balancing over time that will eventually eliminate the need to subsidize basic residential telephone rates.[36, 37]

[35] See Mueller (1997) and Crandall and Waverman (2000) for a discussion of the evolution and assessment of the merits of this public policy in the telecommunications industry.

[36] Rate re-balancing refers generally to moving prices closer to their respective marginal costs. In the telecommunications industry, re-balancing has taken the form of increasing local service prices and reducing long-distance prices and carrier access charges. [Carrier access charges refer to the payments that long distance providers make to the local telephone service providers for the origination and termination of long distance messages.]

In the fall of 1998, the Kansas Corporation Commission (KCC) notified SWBT of its intention to initiate an inquiry into the level of support that SWBT received from the KUSF (KCC, 1998a). Should the KCC's audit reveal that SWBT's draw from the KUSF exceeds that required to make up the cost-price shortfall, the level of support will be reduced concomitantly. Despite the fact that SWBT operates under pure PCR, the KCC believes that it was justified in pursuing this inquiry. The KCC advanced two main arguments in support of its action. First, the KTA explicitly calls for a cost-based KUSF.[38] Second, a reduction in SWBT's draw from the KUSF will not necessarily result in a governmental taking under the *Hope* standard. The KCC concluded that "A takings claim can only be evaluated by analyzing SWBT's costs and corresponding revenues"(KCC, 1998b, ¶ 19).

It is instructive to examine the incentive properties associated with the KCC's actions in this particular case. To this end, we construct a simple example to demonstrate how reducing SWBT's KUSF support to reflect the lower cost of providing basic local telephone service undermines the superior incentive properties of PCR.

Suppose that the average incremental cost of providing basic local telephone service is $20 per month and that the KCC has effected a complete re-balancing of rates so that SWBT's KUSF support is identically zero. Now suppose that SWBT implements cost-reducing innovations that reduce the incremental cost of providing basic local telephone service by 10 percent ($2) to $18 per month. SWBT is the residual claimant for its cost-reducing innovations

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Crandall and Waverman (1995, Chapter 3) estimate that the prospective efficiency gains from rate re-balancing in the U.S. telecommunications industry range upwards of $8 billion annually.

[37] The KCC established the KUSF to ensure revenue neutrality for the incumbent local exchange companies as they phased down their intrastate access charges toward parity with interstate access charges. The KTA authorized the KCC to provide for revenue neutrality either by rebalancing rates or through the KUSF or some combination of the two. The KCC opted to assure revenue neutrality through the KUSF. See KCC (1998a, ¶ 2).

[38] There is additional language in the KTA, including New Sections 6(c), 6(e), 6(f), and 6(u), that could be construed to suggest that the legislature never intended an earnings-sufficiency criterion be invoked, but these issues are somewhat ancillary to the matters at hand.

under pure PCR which implies that this $2 per month reduction in the cost of providing basic local telephone service is retained in full by SWBT and its shareholders.

For purposes of comparison, now suppose that the KCC had only affected a partial re-balancing of rates. Without loss of generality, assume this partial re-balancing of rates results in a price of basic telephone service equal to $14 per month and a draw from the KUSF (on a per line basis) for SWBT of $6 per month. As before, suppose that SWBT implements cost-reducing innovations that reduce the cost of basic local telephone service by $2 per month. Consistent with its position in this proceeding, the KCC would presumably propose to reduce SWBT's draw from the KUSF by $2 per month (on a per line basis) to reflect the reduced cost of providing basic local telephone service.

A number of observations concerning this example are in order. First, the example makes it clear that the Commission's ability to appropriate SWBT's cost savings derives from an incomplete re-balancing of rates. Second, the KTA allows SWBT to elect PCR subject to KCC approval (New Section 6(b)). It is therefore problematic that an incomplete re-balancing of rates enables the KCC to practice earnings regulation regardless of SWBT's choice of regulatory regime. Third, SWBT is penalized by an incomplete re-balancing of rates in that its cost savings are appropriated. Finally, the KCC's opportunistic behavior in appropriating SWBT's cost savings under partial re-balancing but not under complete re-balancing could conceivably give the KCC an incentive to drag its feet in re-balancing rates, an outcome seemingly inconsistent with the pro-competitive and efficiency-enhancing provisions of the KTA (See, for example, New Section 1(a)-(d)).

The argument could be made, of course, that because the KUSF is cost-based, a finding that SWBT's draw from the KUSF was insufficient to cover the shortfall could symmetrically

result in an increase in support for SWBT. Two additional observations are noteworthy. First, if the KCC commits to increasing/decreasing KUSF support on the basis of SWBT's actual costs then it is practicing earnings regulation rather than price regulation. Furthermore, adjusting SWBT's KUSF support in this manner invites the same sort of second-guessing of operating practices that are common under RRR and that PCR is specifically designed to eliminate. Second, even if the KCC makes a good-faith commitment to symmetric treatment of KUSF support in theory, it is unlikely this can be achieved in practice. The experience with earnings regulation does not bode well for the likelihood of symmetric treatment. In fact, this experience suggests that there will be an incentive to appropriate the surplus during good times and question the regulated firm's diligence in cost control during bad times. This amounts to an exercise of heads you win and tails I lose.[39] In other words, the process is inherently asymmetric.[40]

In early 2000, the KCC approved a settlement between the parties that terminated all litigation on the specific issues in question (KCC, 2000). Unfortunately, the settlement also precluded the opportunity for the KCC (and the courts) to rule on the more general question of the relevance of the *Hope* standard in price cap regimes.

5. PCR and the Hope Standard

The *Hope* standard provides a litmus test for governing the bounds on discretionary behavior by the regulator under earnings regulation. Specifically, the *Hope* standard states that:

> Rates which enable the company to operate successfully, to maintain its financial integrity, to attract capital, and to compensate its investors for the

[39] Notably, it was the prospect of opportunistic switching between "rate methodologies" that the Court indicated in *Duquesne* "would raise serious constitutional questions." See *Duquesne Light Co.* vs. *Barasch*, 488 U.S. 299, 315 (1989). The Court was concerned in this case with different methods of valuing the firm's assets under RRR. It is uncertain whether these constitutional concerns would extend to the specific types of *regulatory opportunism* discussed herein for a firm subject to PCR.

[40] For a discussion of the asymmetry of financial returns under RRR, see Kolbe and Tye (1991). See also Lyon (1991).

> risks assumed certainly cannot be condemned as invalid, even though they might produce only a meager return on the so-called "fair value" rate base.[41]

This would seem to imply that the regulator may act unilaterally to reduce the profitability of the regulated firm provided that the resultant level of profitability continues to satisfy the *Hope* standard. In this section, we inquire as to whether the *Hope* standard can be reconciled with PCR.[42]

A fundamental dictum of *Hope* is a balance between consumer and investor interests. In practice, this has taken on the meaning of ensuring that the firm maintains the ability to attract capital and sustain its financial integrity while providing for "just and reasonable" rates. Under earnings regulation, profits that are "higher than normal" imply rates that are not just and reasonable. The contra-positive of this last statement, which is its logical equivalent, states that "rates that are just and reasonable imply profits that are not higher than normal." The *Hope* standard was designed to ensure an equitable division of the pie. This is the balance of consumer and investor interests alluded to above.

Under PCR, the firm's earnings may be "higher than normal" because (i) the initial prices are set too high; (ii) the X-factor in the price cap plan is set too low; or (iii) the regulated firm exercised its superior business acumen and managerial prowess to outperform the industry-wide X-factor.[43] The key point, however, is that higher than normal earnings no longer (necessarily) imply rates that are not "just and reasonable." These higher than normal earnings may simply

[41] *Federal Power Commission* vs. *Hope Natural Gas Co.*, 320 U.S. 591, 605 (1944).

[42] Hillman and Braeutigam (1991, p. 78) observe that "As a departure from traditional cost-based profit level regulation, a price level regime would require the adaptation of established 5th and 14th amendment 'confiscation' doctrines to a new setting."

[43] Another possibility is that the regulated firm cut back on the level of service quality. In fact, the regulated firm may have an incentive to reduce service quality under PCR because the firm bears a larger proportion of the costs associated with quality provisioning (Laffont and Tirole, 2000, p. 88). Despite the fact that quality of service has been an issue in local exchange telephone service markets, there is no systematic evidence to suggest that quality degradation is related to PCR or incentive regulation broadly defined (Ai and Sappington, 1998, Banerjee and Dasgupta, 2001). While this degradation in quality has been a concern to regulators, it is also possible that quality

reflect the stronger incentives for efficient performance under price cap *vis a vis* earnings regulation. Should this be the case, these additional earnings would not exist but for the regulator's commitment to allow the regulated firm to be the residual claimant for its realized efficiency gains. In other words, the ability on the part of the regulator to appropriate these earnings may exist only because the firm believed the regulator would not take unfair advantage of this opportunity. It follows that because PCR breaks the link between prices and costs, it must also break the link between higher than normal profits and excessive rates, which is essentially the *Hope* standard.[44] The following citation is instructive:

> It is possible to conclude that under a properly articulated economic rationale, consumer protection against "excessive profits", as traditionally applied under profit regulation, could not be invoked to reestablish a necessary link between prices and profits. … In effect, therefore, the standard of constitutional protection for consumers under a price level regime would be modified. The focus would shift from protection against "excessive profits" *per se*, as defined under profit level regulation, to protection against prices viewed as "unconscionable" and "demonstrably irrelevant" to the purposes of the price level regime (Hillman and Braeutigam, 1989, pp. 80-81).

This discussion has important implications for the transition to competition now underway in both telecommunications and energy markets. An important public policy issue concerns the degree to which regulatory actions designed to encourage competitive entry deprive the regulated firm of a reasonable opportunity to recover prudently-incurred costs.[45] In this context, the debate has centered on whether such actions represent a governmental taking in violation of constitutional protections that prohibit unjust confiscation of property without just compensation

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of service exceeded optimal levels under traditional RRR regulation. Hence, reductions in quality may [actually] be welfare enhancing (Abel, 2000).

[44] In this context, it important to recall that X-factors in price cap plans are generally set at levels that require real prices to decline over time at rates that exceed those realized historically under traditional RRR.

[45] For example, a critical issue in *Iowa Utilities Bd. v. Federal Communications Commission* concerns whether the TELRIC standard adopted by the FCC for the purpose of setting prices for UNEs allows for "fair and just compensation." The U.S. Supreme Court granted *certiorari* in this case, but limited the proceeding to three questions—one of which is the takings issue. The Court heard this case in the fall of 2001. See Huber, Kellogg and Thorne (2001, Chapter 3) for a summary of the legal issues surrounding the TELRIC standard.

(Baumol and Merrill, 1997; Spulber and Sidak, 1997b, 1997c). The government could argue that while its policies governing competitive entry, including mandatory sharing of network assets, reduce the profitability of the regulated firm, they do not reduce them sufficiently to run afoul of *Hope*.[46, 47]

These practices give rise to the same type of regulatory asymmetries that troubled the Court in *Duquesne*. In general, the regulated firm under price caps has no recourse to petition the regulator for an increase in prices should earnings fall below a stipulated level (at least between regulatory reviews),[48] but the regulator is purportedly able under the *Hope* standard to appropriate dollars that may not even exist but for the superior incentives of PCR. In other words, the degree to which the regulator can behave opportunistically, either to foster competition or to reduce the regulated firm's support payments, without violating the *Hope* standard depends upon the level of cost-reducing effort put forth by the regulated firm.[49] Because the regulated firm has no incentive to invest in cost-reducing effort if it expects the

[46] According to Hope, "Under the statutory standard of 'just and reasonable' it is the result reached not the method employed that is controlling." *Federal Power Commission* vs. *Hope Natural Gas Co.*, 320 U.S. 591, 602 603, 605 (1944). The Court reaffirmed this principle in *Duquesne* when it found that a regulatory commission operates within the bounds of its discretion provided that its actions do not "jeopardize the financial integrity of the companies, either by leaving them with insufficient operating capital or by impeding their ability to raise future capital." *Duquesne Light Co.* vs. *Barasch*, 488 U.S. 299, 312 (1989).

[47] For example, Gabel and Rosenbaum (2000, p. 264) contend that the large telephone companies have no legitimate takings claim because the majority of these companies are earning returns on regulated investments above the FCC's composite rate-of-return benchmark.

[48] Some price cap plans have explicit provisions that allow for revisiting the terms of the price cap plan should the regulated firm's rate of return fall to inordinately low levels. To date, there has not be sufficient experience with these fail-safe provisions to determine the degree of financial protection actually afforded the regulated firm.

[49] To see this formally, let $U(p, a)$ denote the regulator's utility function with $U_p < 0$ and $U_a > 0$, where p is price, a is the degree to which the regulator accommodates competitors in the market for the regulated firm's services and the subscripts denote partial derivatives. Let $R(p, a)$ denote the revenues of the regulated firm, with $R_a < 0$. Also, let $C(Q(p), e)$ denote the observable costs for the regulated firm, where Q is quantity, e is cost-reducing effort which is privately costly and $C_e < 0$. Fix the price, p, and let a^* define the maximum level of competitor accommodation the regulator can engage in without violating the *Hope Standard.* a^* implicitly solves $R(p, a^*) - C(Q(p), e) = k$, where $k \geq 0$ is a constant. It is straightforward to show that $da^*/de > 0$. In other words, the regulator's optimal level of entry accommodation is increasing in the regulated firm's investment in cost-reducing effort. See also Weisman (2000).

gains from such effort to be fully appropriated, it would seem that the ability to engage in *regulatory opportunism* rests principally on the successful deception of the regulated firm.

If the *Hope* standard is not the applicable standard for determining what governmental actions are confiscatory in a price-cap setting, what is the relevant standard? We contend that the foregone opportunity to earn on the merits is the relevant standard. In a price cap setting, a governmental action may be confiscatory even though the regulated firm's actual rate of return exceeds some benchmark rate of return. The regulated firm is the residual claimant under pure PCR. This has a precise and unambiguous meaning. Specifically, it means that the firm is price regulated rather than earnings regulated. Hence, provided that the price cap constraint is satisfied, any opportunity to earn on the merits that is denied the regulated firm admits the possibility of a confiscatory act and hence a taking.[50, 51]

The regulator could respond to the claim of a taking by an incumbent firm subject to encroaching competition with an appeal to *Market Street Railway*.[52] This case reaffirmed that while the due process clause of the Fourteenth Amendment cannot be applied to "insure values or restore values that have been lost by the operation of economic forces," it does protect utilities

[50] In other words, an action by the regulator that constitutes a taking under PCR may not constitute a taking under RRR and vice versa. In *Federal Power Commission* vs. Texaco Inc., 417 U.S. 380, 391-392 (1944), the Court ruled that "All that is protected against, in a constitutional sense, is that the rates fixed by the Commission be higher than the confiscatory level."

[51] The amount of the taking would be equal to the greater of zero and the difference between what the regulated firm could reasonably have expected to earn but for the regulator's action (I^E) and the regulated firm's actual earnings (I^A), or max $\{0, I^E - I^A\}$, *ceteris paribus*. For example, suppose that $I^E = 100$ and $I^A = 75$. The amount of the taking would be max $\{0, 100 - 75\} = 25$. This implies that the regulated firm could not prevail on a takings claim solely on the basis of *earnings-deficiency*, nor could the regulator insulate itself against a takings claim solely on the basis of *earnings-sufficiency*. Moreover, one regulated firm may have a takings claim against the government even though its earnings are strong, whereas another regulated firm may have no takings claim against the government even though its earnings are weak.

[52] *Market Street Railway Co. vs. Railroad Commission of California*. 324 U.S. 548 (1945). See also Central Power and Light Company (1997). In this case, the Texas Public Utilities Commission invoked *Market Street Railway* to argue, in part, that it was not required to compensate the utility for earnings lost due to increasing competition and technological change in the electric power industry.

against "governmental destruction of existing economic values."[53] The critical issue would seem to focus on the degree to which the regulator artificially propagates the economic forces that deprive the regulated firm of an opportunity to earn on the merits by constraining it to pricing rules and service obligations that prove advantageous to competitors.[54] The key phrase in *Market Street Railway* is the "operation of economic forces." The interaction between retail price caps, a failure to re-balance rates and pro-competitive (respectively, pro-competitor) entry policies may give rise to unnatural economic forces.[55] It is the creation of these unnatural economic forces at the hand of the regulator that has the potential to breathe life into the takings claims of the regulated firms.

It is generally held that the objective of economic regulation is to emulate a competitive market outcome (Kahn, 1970, p. 17; Bonbright, 1961, Chapter VI). Hence, it is important to recognize that the issue here is not the introduction of competition *per se*, but rather the accommodation of that competition through "regulator-assisted" forms of entry that undermine the prevailing retail price structure and/or deny the incumbent firms an equal opportunity to compete on the merits. In other words, the validity of a takings claim is not independent of the origins of the "competition" that erodes the regulated firm's revenue streams.

6. Conclusion

The basic premise underlying the discussion in this article is that PCR represents a fundamental change in the nature of the regulatory contract and a wholesale shift in risk bearing from consumers to the regulated firm. In theory, the prospect of higher-than-normal financial

[53] *Market Street Railway Co. vs. Railroad Commission of California*. 324 U.S. 548, 567 (1945).
[54] Weisman (1989) examines this question in the context of regulators introducing competition into traditionally-regulated markets while continuing to require that incumbent firms generate cross-subsidies internally and serve as carriers-of-last-resort.
[55] Recent federal initiatives designed to promote competition in telecommunications and electric power markets include, respectively, the Telecommunications Act of 1996 and The Energy Policy Act of 1992.

returns is symmetrically balanced against the risk of lower-than-normal financial returns. In other words, the regulated firm bears greater risk in exchange for the prospect of greater reward. What is not well-defined is the precise nature of the risk that the firm is expected to bear under PCR.

The transition to competition in traditionally-regulated markets raises complex public policy issues that are not amenable to easy solutions. Paramount among these issues is the delicate balance between investor and consumers interests amidst what are seemingly unavoidable market disruptions. And yet, if PCR truly represents a meaningful departure from RRR, then regulators should not have discretion to invoke the *Hope* standard as a means to rationalize competitive entry policies (respectively, unilateral reductions in subsidy support) that endogenously and asymmetrically exacerbate the risk borne by the regulated firm. By similar reasoning, regulated firms should not have recourse to *Hope* as a means to protect themselves against downside risk due to poor performance. It follows that while price caps affords the regulated firm much greater discretion *vis a vis* RRR; it must of necessity afford the regulator considerably less.

As a final observation, we return to the question that motivated this analysis: Is there "*Hope*" for price cap regulation? The answer presents its own paradox: if there is—there isn't.

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