

Regulatory Economics: Recent Trends in Theory and Practice*

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The purpose of this paper is to review some of the major developments in the applications of regulatory economics to network industries over the past twenty years or so. Section 1 reviews the background in which regulatory change has taken place and provides motivation for the paper. Section 2 provides a brief evaluation of theoretical developments over the period.¹ Section 3 examines a few of the major events that have occurred in practice in the wave of restructuring and “deregulation” undertaken in the network industries over the past two decades. We also briefly address the fallout from the California “deregulation” and the Enron fraud and bankruptcy in the energy sector, and the emerging challenges in regulating the transition to competition in telecommunications and the postal and delivery sector. While our approach is intended to be general, it is focused mainly on the U.S., though the theoretical developments reflect contributions from economists around the world. In Section 4, we provide some implications for the future of regulation and regulated industries.

1. Introduction

The regulatory scene in the early 80s differed significantly from what we see today. The change that has taken place in the last twenty years is ostensibly greater than that of the previous eighty years. Take telecommunications as a prime example. In 1982 the world’s largest company, American Telephone & Telegraph, controlled around 80 per cent of the access lines and over 90 per cent of the long-distance traffic. In addition, it

* This paper provides background on Kleindorfer’s presentation to the ACCC Conference “Evaluating the Effectiveness of Regulation”, Gold Coast, Australia, July 29-30, 2004. This is an updated version of the original paper Crew and Kleindorfer (2002). This paper adds to the original paper advances in regulatory theory and practice from the ensuing period of 2002-2004, mostly as reflected in papers in the *Journal of Regulatory Economics*. As with any survey, this short paper will necessarily be selective. A fuller appreciation of the on-going activity in the literature on regulation can be seen from the regulatory economics literature database available at the website: <http://www.rci.rutgers.edu/~crr>.

¹ In sections 2 and 3 we attempt to perform essentially the same task as Faulhaber and Baumol (1988), although in a more specialized manner. We are looking for “practical products of theoretical research” in the field of regulatory economics.

was, through its Western Electric subsidiary, a large manufacturer of telecommunications equipment ranging from handsets to cables to central office equipment. Its research arm, Bell Labs, was one of the premier research and development organizations in the world. However, as Phillips (2002) and Kovacic (2002) explain in more detail, trouble was afoot. The Justice Department had waged war on AT&T with a landmark antitrust suit that was settled with the Divestiture by AT&T of its local telephone companies. What was AT&T became seven local companies, the “Baby Bells” or Regional Bell Holding Companies (RBOCs) and AT&T. What remained of AT&T consisted of long distance, Bell Labs and Western Electric, subsequently renamed AT&T Technologies. The industry has undergone further dramatic changes since then with the RBOCs consolidating into four companies, and with GTE merging with Bell Atlantic to become Verizon, one of the four surviving RBOCs.

The changes in this industry have been dramatic because of the changes in the underlying technology. In 1982, technologies that existed only in rudimentary form are now ubiquitous – personal computers, optical fiber, the Internet and wireless technology. Fax was considered a big deal in 1982. It is now ubiquitous, but of much less significance than it was in the early 90s when it probably peaked. Wireless technology has become widespread and a major competitor of wireline technology across the world. The developments in telecommunications have, indeed, been startling and the resulting changes make the industry of twenty years ago seem but a distant glimmer.

Changes in the natural gas industry over the last twenty years have been no less dramatic. As Leitzinger and Collette (2002) note, the changes have been in institutions, market structure and regulation. The process began in the 70s with a concern over take-or-pay contracts and with the bundled nature of transportation and production companies that was seen as a barrier to open and non-discriminatory access to pipelines. In the ensuing regulatory changes of the 1980s and early 1990s, traditional long-term contracting was replaced by shorter-term contracts and risk hedging instruments benchmarked on new spot markets. Contracting and spot markets were driven by market intermediaries and brokers and the increasingly real-time information of the digital economy. Enron’s demise in December 2001, and the ensuing and on-going investigation that followed this, cast a dark shadow on the energy sector generally and on trading in particular. But trading in natural gas futures has again regained considerable vigor, now with new oversight on both markets and data underlying the derivative instruments traded. Thus, the basic institutions of the deregulated natural gas markets appear to have survived Enron’s fall, but as Weaver (2004) notes in her treatise on the subject, there will continue to be repercussions from “Enronitis” for some time to come.

Deregulating the electric utility industry has proved to be exceedingly challenging as Hogan (2002) and Joskow (2003) note in their summary of developments. Major change in the industry has taken place over the last twenty years. The first major change to affect the industry in the U.S. was the Public Utility Regulatory Policies Act of 1978 (PURPA). This set in motion a process whereby generators other than vertically integrated utilities would be allowed to sell power into the grid, *inter alia*, requiring utilities to purchase such power at prices that utilities deemed to be excessive. With PURPA, the independent

generation industry was effectively born. This led to dramatic changes in the industry but hardly to a resolution of its problems as the ensuing chaos in California in 2000-2002 dramatically illustrates. During this period, a series of radical changes (enabled by the Energy Policy Act of 1992) were introduced by the Federal Energy Regulatory Agency (FERC), directed at assuring open access to the transmission grid to a now unbundled and competitive generation sector. These regulatory decrees and the associated creation of wholesale power markets have met with mixed success. As we will discuss in more detail below, they are clearly a work in progress.

These trends in the U.S. have been motivated largely by the experience of the U.K., and indeed the entire process of deregulation is now an international affair, with countries and regions copying what they believe to be the good aspects of other systems and trying their best to avoid the larger mistakes of others. Currently, Continental Europe is poised to begin its own integrative journey following the opening of the electricity market in the European Union in 2002. Hopefully, the lessons of California will be of some value in the EU and elsewhere as these experiments begin to unfold. As Wolak (2004) notes in his review of electricity markets internationally, an ounce of precaution and humility before the fact is worth a pound of cleaning up after the fact.

Other network industries, including airlines, water and postal service, have gone through similar changes, as economists have touted the benefits of better pricing, ownership and governance structures. Many of the changes that have taken place have taken place under the umbrella of deregulation. Deregulation was touted in the economics community as the single best approach, promising increased production efficiency, lower prices and better service. The results achieved have been, however, much more modest.

A major problem of the deregulation movement is that its foundations were logically weak, especially the many claims that it would improve efficiency. These were typically grounded in self-interest, but this in itself, as Adam Smith noted long ago, is not going to lead to an efficient outcome in the absence of competition. In the case of a monopoly that exists because of government policy, abolishing it and going to competition would generally be welfare enhancing as long as no significant scale or scope economies are lost in the process. This is basically the old economic argument of the superiority of perfect competition to pure monopoly. Unfortunately, a choice as simple as this is almost never available in the world of regulated monopoly. The choices that are available are much more complex and it is much more difficult to make efficiency claims about them. The scenarios and choices available all derive from the basic strategy of “whittling down” rather than total elimination of the monopoly, along the lines of the following scenario.

Basic Deregulation Scenario: A regulated (possibly multi-product) monopoly is replaced by competition upstream and remains a regulated monopoly downstream, at least for some of its products. To the extent that there are X-efficiency gains upstream and these are passed on downstream, this is welfare enhancing. The expectation is that regulation will continue downstream, but that the more limited monopoly may be easier to regulate in that the information asymmetries between the firm and the regulator may be reduced.

There are many variations on this Basic Scenario in practice, and they typically involve a complex mixture of regulation and competition, involving problems of a regulated firm offering both competitive and monopoly products, access conditions and pricing, default service provision, and other now familiar themes from the past two decades of restructuring and regulated competition. Indeed, most of the recent history of network industry deregulation in the U.S. can be viewed as attempts to find solutions to these problems that balance the benefits of competition with the on-going existence of a residual monopoly arising from the this Basic Scenario. We review these developments for electricity, telecommunications and the postal service further on in the paper. But it will be useful first to develop a framework for understanding the origins of and background to deregulation itself.

Deregulation and Rent-Seeking

Deregulation is a vague term. It does not mean anything as clear and simple as abolishing regulation. Total abolition of regulation would qualify as deregulation, but the problem is that almost any regulatory change would also qualify. Moreover, few economists (and even fewer non-economists) seem willing to abandon regulation entirely, and the public seems to want to retain the benefits of regulation. One notable exception is Posner (1969, 1974) long before deregulation ever became fashionable. He argued that any efficiency losses from the abuse of monopoly power would be outweighed by the efficiency losses, transactions costs and other costs arising from regulation. His arguments for outright abolition received little support at the time or subsequently. To understand why abolition was not usually embraced as part of the deregulation movement and why the concept of deregulation is so fuzzy, it is necessary to understand something of the rationale for monopoly regulation in the first place and the role of the monopoly rents that drive the process.

Where there are overwhelming scale and scope economies as in the case of public utilities, traditionally, electric, gas, water and telephone, the cost to society is arguably minimized by having one supplier. The problem with one supplier is that it allows for monopoly exploitation with the resulting efficiency losses from monopoly. Consider Figure 1, depicting the usual monopoly solution at price E, where $MR = MC$. The Marshallian Triangle ABC is the efficiency loss and the rectangle EAB''F is the monopoly exploitation. The latter is also the monopoly profits and constitutes a transfer from consumers to the monopolist. As such it is not an efficiency loss. However, following Tullock's (1967) insight on rent seeking, this rectangle is much more important to the process of natural monopoly regulation. It consists of the rents from monopoly and, indeed, will normally be much larger than the lost efficiency triangle ABC. Indeed, it becomes the principal bone of contention in the regulatory process and the quest for these monopoly rents is the main driver of the process and is critical to understanding the process.

The first problem of regulation is an old one involving second-best issues. If regulation set price at C where the allocative efficiency losses ABC were totally eliminated, the firm would not cover its fixed costs and would either have to go out of business or recover

them by some form of lump-sum subsidy ($F''C''CF''$). Here lies the source of the rent-seeking dilemma. Regulation has to find a way of covering the firm's costs. It would traditionally do this by moving to the second best optimum of C' , which provides a total gain to the consumer of $EAC'F'$. This consists of an efficiency gain of the triangle $AB'C'$, the rectangle $FB''B'F'$ comprising the scale economies arising from the increased output and the monopoly rents $EAB'F'$. This second-best optimum effectively recognizes that the maximum gain of ABC is not attainable.

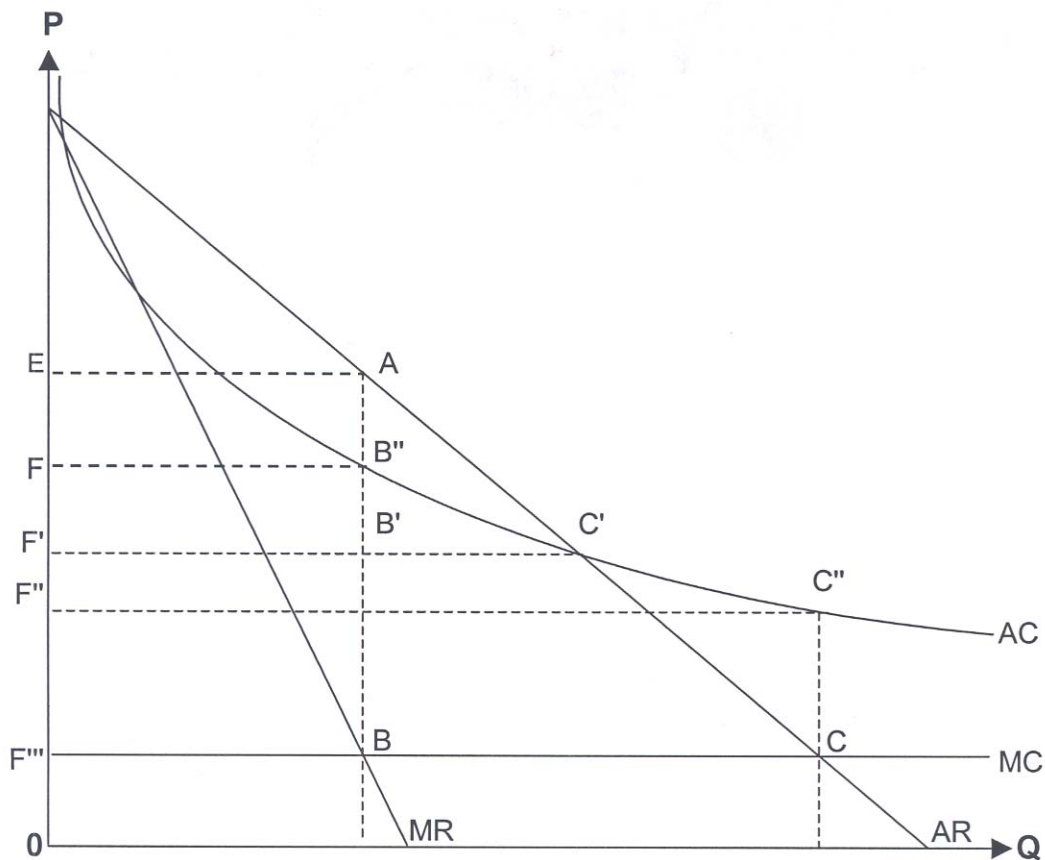


FIGURE 1

For many years this simple view of the regulation of natural monopoly was rather generally accepted with few exceptions. (Averch and Johnson, 1961 and Posner 1969, 1974). This is evidenced by the fact that prior to the 1980s there were two dominant forms of natural monopoly regulation, viz. public enterprise (PE), and cost-of-service or rate-of-return regulation (ROR). PE was the predominant form of regulation in most of Europe and ROR predominated in North America. During the 1970s and 80s a change took place in the views of policy makers and economists with the result that increasingly these regulatory institutions were the subject of greater criticism.

This questioning of regulation was known generally as deregulation. Anyone who objected to regulation could argue his point preaching the gospel of deregulation. It did not seem to matter much that the arguments were based on self-interest. Indeed,

deregulation seemed to open up new avenues for rent seeking not previously available when the old system was accepted. The monopoly rents, as shown in the rectangle, had always been large for utilities. Regulation had managed to transfer many of these to customers, especially small customers. For most small customers regulation was and still remains a rather good deal. As long as the traditional consensus held, consumers retained their share of the rents and the companies, although limited in the profits, were not subject to major pressures to minimize costs. By raising the average cost curve, the system may have dissipated some of the rents in X-inefficiency, a total deadweight loss, in addition to the allocative efficiency loss of the resulting price increase. These X-inefficiency losses were the subject of significant criticism on the part of economists whose arguments provided a foundation in hearings for rent seekers preaching change in the name of deregulation. Deregulation opened the door of the chicken coup and many foxes entered wearing the clothes of deregulation.

The important inference to draw from the rent seeking insight is that it is the rectangle (the monopoly rents), not the triangle (efficiency) that drives the process. If it were a simple matter of just going over from regulated monopoly to a competitive situation, then all that was at stake would be the incumbent's rents from an artificial barrier. There is some precedent in the airline case for this. Here the incumbents' rents were sacrificed for at least a quasi-competitive outcome. This is not the case, however, with most utilities. Some residual monopoly power will remain, at least with the current technologies. Such considerations make the choices far from clear and the deregulation debate has been murky not just because of some of the complexities involved but also because of underlying rent seeking, which encourages obfuscation.

Indeed, mainly because of rent seeking, the debate on deregulation has not been well informed. Rent seekers have sought regulatory change, deregulation, as a means of increasing their share of the rents. In so doing obfuscation has played an important role. It would have appeared too self-serving just to argue for a greater share of the pie. Efficiency arguments provided good cover for self-interest arguments. The problem was that the choices were rarely clearly articulated. There was always some vague underlying claim that deregulation would improve X-efficiency because of the increased pressure of competition. The details of how this would happen were always a bit of a mystery, and compounded in cases like electric power by the inherent physical complexities of the network itself.

Partly because of the lack of transparency of regulation, and its inherent multi-party nature in splitting the rents generated by protected monopolies, the deregulation process has also typically been piecemeal, serving one set of interests after the next in selective implementation of changes and reforms. Large bodies of professional expertise in the legal and economic communities have become dependent on the continuing process of justifying these changes and reforms of reforms. Essentially the approach has been to adopt changes that seem to be the most easily implemented without addressing some of the fundamental underlying problems. This piecemeal approach and the failure to recognize the role of rent seeking have jointly led to a failure to think through the consequences of regulatory changes. At this stage, it is still too early to guess what the

outcome of all this will be for the next two decades in the U.S. Taking an optimistic perspective, some of the worst decisions of the past on regulatory reform may yet provide instructive guidelines for the future.

2. Developments in the Theory of Regulation

Two decades ago regulatory economics had just completed some major strides. In part, this had been as a result of a major investment made in economics by the Bell System. Notable in this was the founding in the spring of 1970 of *The Bell Journal of Economics and Management Science*, which became the *Bell Journal of Economics* in the spring of 1975 which begat the *Rand Journal* in the spring of 1984, immediately following the Divestiture. AT&T apparently saw no significant benefit in continuing its major effort in regulatory economics, which had ostensibly been a costly failure memorialized in the Divestiture. The divestiture of the *Bell Journal* to Rand and the gutting of its premier economics group at Bell Labs might be seen as two casualties in the failure of some outstanding economic brainpower and innovative research to carry the day for Bell.

In many ways the research of the 70s and 80s was inspired in a significant way by the resources ploughed into microeconomics by AT&T. Take the *Bell Journal*.² Money appeared to be no object. As two young faculty in the 70s, when young faculty in business schools were paid significantly less in real terms, we were impressed to receive what appeared to be princely sums for refereeing, not to mention the additional fees paid to us for our 1976 article on peak-load pricing. The *Bell Journal* had no difficulty attracting extremely talented editors and contributors including already distinguished scholars like William Baumol, Walter Oi, Richard Posner, George Stigler, William Vickrey, Oliver Williamson, and others. Perhaps even more important was that the *Bell Journal* attracted many young economists, such as Elizabeth Bailey, John Panzar, Robert Willig, and David Sibley, whose work in the 70s and 80s played a major role in the evolution of regulatory economics. Together the visibility of regulated industries and the quality of the researchers involved made regulatory economics the most important subspecialty of industrial organization.

Before the founding of the *Bell Journal* regulatory economics was extremely undeveloped. There was the seminal work of Averch and Johnson (1962),³ the marginal cost pricing debate for monopolies of the 40s and 50s, which itself became specialized into the peak-load pricing debate through the work of Boiteux (1949), Steiner (1957) and Williamson (1968). Ramsey pricing was given a new lease on life by Baumol and Bradford (1970) and the Bell Labs economists, including Rohlfs (1979). These contributions all provided the context for the research that the *Bell Journal* fostered in the

² Henceforth we will not distinguish between the two appellations but will use this term to refer to either *The Bell Journal of Economics and Management Science* or the *Bell Journal of Economics*.

³ We intentionally use the word seminal to describe A-J. Although many authors have sought to discredit this paper, it is one of the most highly cited and influential papers in regulatory economics and includes both insights on single-product regulated firms as well as the distortions that regulation can cause in multi-product firms that may face competition in some of their product lines.

70s. They also provided important benchmarks for policies in energy and telecommunications that were intended to emulate the benefits promised by theory in practice.

All of these developments were outgrowths of already established theory. However, the theory of contestable markets, due primarily to Baumol, Panzar and Willig (1982) did not have such roots. They were thus original and unconstrained in a way that other developments were not. Perhaps for this reason the authors of contestability had very high hopes for the impact of their work.⁴ Indeed, now more than two decades on, it is clear that this work has become one of the landmarks in regulatory economics. Among other contributions, this work clarified considerably the nature of economies of scale and scope. They also provided clear definitions and tests for cross subsidy in a multi-product firm in the form of the burden test.⁵ The work of Baumol and his colleagues has been important for both the development of theory as well as for guiding practice.

Principal-Agent Models and Mechanism Design Theory

Around the mid 80s a change took place in the theory of regulatory economics, and this was the incorporation of principal-agent theory, mechanism design theory and information economics into regulatory economics. This began with the work of Baron and Myerson (1982). The work was an outgrowth of the work on principal-agent theory in the 1970s (e.g., Ross (1973) and Groves (1973)), which, indeed, offered major insights into issues of managerial effort and corporate governance. However, as we noted in Crew and Kleindorfer (1986), the insights of this rather large (and still growing) stream of literature have had very little to do with designing institutions or mechanisms that can be applied to regulatory problems as they exist in practice.

Theorists employing this “new” approach were highly critical of the earlier work, which they perceived as having little value as it missed the critical problem of incentives. For example, Laffont and Tirole (1993) note: “In the policy arena discontent was expressed with the price, quality, and cost performance of regulated firms and government contractors... More powerful incentive schemes were proposed and implemented, deregulation was encouraged... [but] regulation theory largely ignored incentive issues.” (Laffont and Tirole 1993, xvi) Previous regulatory theory, they argued, “...did not meet the standards of newly developed principal-agent theory, whose aim is to highlight the information limitations that impair agency relationships. Furthermore the considerably simplified formal models that assumed away imperfect information were less realistic in that they implied policy recommendations that require information not available to regulators in practice.”

⁴ This not to say that there has not been controversy about the applicability of contestability theory, e.g. Shepherd (1984, p572), but the ideas of Baumol and his colleagues on the key role of entry in promoting competition have nonetheless been exceedingly important elements of the on-going debate on deregulation.

⁵ According to the burden test, a cross subsidy is not present if the revenue from a product is between its incremental cost and its stand-alone cost. This test, and associated procedures for measuring incremental and stand-alone costs, are key benchmarks in network industries for monitoring the behavior of regulated, multi-product companies that compete with entrants in some of their lines of business.

While we accept that these criticisms have some validity, we argue that the contributions that replaced them were at least as limited in their applicability and fell far short of the expectations created by their authors. Ironically, a principal reason for this is precisely the reason raised above by Laffont and Tirole in ushering in the new theory, namely, a heavy reliance by such schemes on information that is not available to regulators. Indeed, the entire mechanism design literature, beginning with Baron and Myerson (1981) and ably summarized by Laffont and Tirole (1993), is based in one way or another on assumptions like common knowledge that endow the regulator with information that he cannot have without a contested discovery process that always leaves him in a state far short of the level of information assumed in these theories. Common knowledge is the Achilles heel of mechanism design theory.⁶

Why is it that extending the traditional principal-agent theory to regulatory economics is so problematical? When a principal and agent are involved in a private transaction, there is not a fundamental problem with the principal designing incentive systems for the agent based on assumed “common knowledge” by the principal about the agent’s costs or preferences. In private transactions, the principal bears the costs of any error in his assumptions.⁷ Contrast this with a regulator with responsibility for the price and quality of an essential good. If the regulator is wrong in his common knowledge assumptions about the agent (the regulated firm), it is consumers or the regulated firm that bear the consequences. The anticipation of these consequences will clearly give rise to strategic interactions, both in theory and practice, which may have fundamental effects on what common knowledge assumptions are legitimate, and on the ultimate consequences of these for the outcomes of regulation. Theories that fail to address these strategic interactions leave a gaping hole in interpreting the results of any such theory. In particular, lifting the common knowledge assumption from a private principal-agent framework to the regulatory context leads to major problems because it leaves open how this common knowledge distribution will be determined. Note that in the traditional principal-agent theory, the contracting agent is free to take or leave the principal’s offer (which must therefore satisfy an individual rationality constraint), but under regulation

⁶ By “common knowledge”, we are referring to the standard assumption of much of the mechanism design literature that the regulated firm actively reveals its type (e.g., its cost or other key parameters), knowing that the regulator will set regulatory parameters (e.g., the allowed rate of return in cost-of-service regulation or the X factor in price-cap regulation) based on the revealed type of the firm. The common knowledge assumption presumes that the regulator and the firm take as incontestable knowledge the probability distribution of possible revealed types, with regulatory design contingent on this common knowledge distribution. We include in our broad criticism of this assumption also weaker forms of this that allow the regulator to simply declare *ex ante* the distribution of revealed types, whether or not the regulated firm agrees to it. Any such declaration, unless agreed to by the regulated firm, can and would be contested, since different assumptions about this distribution naturally lead to different regulatory incentive systems under the standard Bayesian Incentive Bargaining approaches used in this literature. To put it plainly, the regulated firm definitely cares about what the regulator claims to be the actual distribution of potential types and would attempt to influence the accepted definition of this distribution if it were a central aspect of regulatory design. If such a distribution is a central feature of a design problem, a theory that simply takes it as a given, without modeling the process that would accompany its adversarial determination, is fundamentally flawed.

⁷ In particular, the models and applications in Laffont and Tirole (1993) that treat private procurement contracts remain significant contributions to the literature of contracting.

this does not apply in the case of the firm which may have considerable sunk costs at risk and cannot simply pull up stakes if the firm does not find the regulator's assumptions acceptable.

The promise of these mechanism-design-style theories was ostensibly considerable. They promised none other than the holy grail of X-efficiency, something previous regulation had manifestly failed to deliver. X-efficiency, however, was only achieved if two conditions - aside from the basic assumptions criticized above - were met. The first condition was that achievement of the promised X-efficiency required that the regulator concede some information rents to the firm.⁸ The second condition was what is referred to in mechanism design theory as "commitment". This is the notion that the presence of information rents would not present a problem to the regulator and that, as a result, he was committed to his original agreement with the firm. In other words, the *ex post* appearance of excess profits (or financial distress) would not cause the regulator to renege on his commitment to the original incentive scheme. Why this would not be a fatal flaw in the whole scheme was never considered. The new theory promised efficiency as long as the regulator is prepared to allow information rents.⁹ Theorists, however, never understood the impossibility of this in practice. No regulator can even admit that it allows the firm to retain information rents let alone commit to such a practice. For the regulator, this is a congenital problem of far greater magnitude than has been recognized in economic theory.¹⁰ How do these rents differ so much from the old style monopoly rents that would make them acceptable to the regulator when it was monopoly rents that were the principal motivation of regulation in the first place? Thus, the promise of X-efficiency was hedged with conditions, which, we argue, make the theory of little significance for real world regulation, as subsequent events have shown. In particular, neither commitment nor its associated information rents are reasonable assumptions. As a result, other than being a rich source of classroom exercises, and perhaps in providing some solace to under-informed regulators on the constraints on regulatory policy arising from asymmetric information, mechanism design theory has had little impact on practice.

Lest we paint too pessimistic a picture about mechanism design theory, we hasten to point out that one of its offshoots, auction theory, has been an important contribution to both regulatory theory and practice. This literature points to both important empirical work as well as an increasing number of experimental and behavioral contributions, with extensive regulatory applications as illustrated in the two special issues of JRE in May and July 2000 (see Salant 2000). Although economists now have a much better understanding of auctions and bidding, the applications have not been without their problems as the California electricity generation market illustrates. However, unlike the

⁸ These rents arose from the information advantages of the firm relative to the regulator.

⁹ It should be noted that theorists have now discovered several cases of the standard regulatory problem under asymmetric information in which information rents are not required to achieve socially efficient outcomes. For a recent synthesis of the issue of information rents and efficiency, see Armstrong and Sappington (2004).

¹⁰ Loeb and Magat (1979), and Vogelsang and Finsinger (1979) implicitly rely on this same notion of commitment.

mechanism design literature, the bidding, auctions and experimental economics literature offers considerable potential in regulatory economics. These innovations do not mean that franchise bidding along the lines of Demsetz (1968) is going to replace traditional regulation or that bidding will result in radical changes in regulation. They do, however, provide regulatory economists with some powerful tools, which have already resulted in a number of promising applications. Besides providing the backbone for spot market and futures exchanges, well-designed auctions are also now providing workable solutions for dealing with the thorny problem of providing default service obligations (e.g., Salant, 2002).

Price-Cap and Incentive Regulation

Allowing more rent seekers to compete for the rents according to the original Tullock (1967) analysis is likely to dissipate more of the rents as the rent seekers compete more and more of them away. This is likely to be true unless the gain from any reduction in X-inefficiency somehow outweighs the dissipation of the rents. In the 80s economists offered a new form of regulation, incentive regulation or price-cap regulation (PCR), that seemed to offer just this – improvements in X-efficiency. In addition, it seemed to fit in well with the macroscopic political changes that were taking place. In U.K. the election of Margaret Thatcher in 1979 gave her the opportunity to carry out her election platform, which promised the dismantling of most of the economic institutions of democratic socialism. Her program of privatization of public enterprise was a centerpiece of her vision of a non-socialist, free market economy. Along with privatization, changes in regulation were required. Stephen Littlechild (1983), a long time critic of ROR, proposed PCR for British Telecom, the former Post Office Telephones and PCR spread to other public utilities in the U.K. PCR and other forms of “incentive regulation” gave rise to a whole new generation of theory and institutional development in the U.S. and elsewhere.¹¹

All of this led in the 80s to great expectations from incentive regulation. However, by the mid 90s the façade of incentive regulation started to crack and hybrid systems known as performance-based regulation (PBR) appeared on the scene. What was it that Littlechild and most economists found so problematical about ROR, making such an easy target and why did regulatory practice partially turn against PCR? The feature of ROR that most offended economists was that it coupled revenue and cost closely together. The firm earned revenue by demonstrating that its costs were at a particular level and its regulators then allowed revenues based on the proof of these costs. Thus, revenue directly depended on costs. The greater its costs the greater the revenue allowed. Given the asymmetry of information about the firm’s costs it was very difficult for a regulator to determine whether the firm’s costs were minimized. The firm was able to take some of the monopoly rents in the form of higher costs entirely consistent with the much earlier notion of J.R. Hicks (1935) that the “quiet life” was the “best of all monopoly profits.” It was this internal inefficiency or X-inefficiency that was at the root of most economists’ distaste for ROR, and PCR was an attempt to overcome these inefficiencies.

¹¹ See Schmalensee (1989) and Lyon (1996) for insightful reviews of the literature on incentive regulation.

PCR, by setting price, broke the link with costs and provided incentives for internal efficiency absent under ROR. In terms of the Figure 1, it created a discontinuity in the firm's marginal revenue curve. Unfortunately, PCR offered no free lunch as readily became apparent in theory and practice. The theoretical problem is already apparent in the mechanism design literature reviewed above. Under the framework developed by Laffont and Tirole (1993), the firm can be shown to operate in a least-cost manner provided it is able to appropriate the rents attributable to its information advantage and *provided the regulator allowed it to continue to retain these rents*. If a regulator cannot be counted on to stick to the regulatory bargain, the firm loses its incentives to operate at least cost. This is dubbed a failure of commitment. But, as history has demonstrated, regulators simply cannot promise to leave rents on the table, whether or not this might be theoretically justified. Thus, in practice, under PCR, regulatory commitment and renegeing are significant aspects of the problem. When a regulated firm makes significant profits, regulators adjust PCR parameters to appropriate them. When a regulated firm shows signs of approaching financial distress, regulators have relaxed the PCR regime. The required theoretical commitment of the regulator to a stable regime is not evident in practice, with the end result that "pure PCR" has been difficult to implement in practice.

In the United States, PCR was rarely embraced so enthusiastically as it was in Europe. Could it be that years of regulatory practice had bred a concern about the regulator's congenital inability to commit? Put more gently, there was a long established practice in regulation of pragmatism or "working things" out as you go along. Goldberg (1976) argued that regulation should be seen as a complicated form of contract for which all eventualities could not be specified, where the regulator acted as the intermediary between consumers and the firm to address problems as unforeseen eventualities arose. The alternative argument developed from Tullock (1967) would see the regulator as a broker distributing the rents dependent on changes in the political equilibrium, as developed in Crew and Rowley (1988). Either interpretation is consistent with the way practice developed in the U.S. PBR is a hybrid of PCR and ROR. The firm's ability to make profits is attenuated by a sharing rule, whereby above or below an upper and lower limit respectively the firm shares profits or losses according to a pre-specified sharing rule. Either the regulator or the regulated firm has the option of reopening the regulatory process to renegotiate the "agreement" should significant adverse or positive consequence materialize. These protocols and procedures provide a process for attenuating the regulator's ability to take away what are perceived as excess profits by agreeing up front on a process for limiting the scope for excess profits on the upside and limiting the exposure faced by the firm for losses on the downside. Clearly, incentives for X-efficiency are weakened in the process and the distribution of rents is affected less. However, this may be the best that is achievable now given the state of technology in regulatory economics today.

Access Pricing and Regulated Competition

Even twenty years ago, concerns over access pricing were a practical issue in telecommunications. With the Divestiture these concerns increased significantly. However, theoretical contributions to address the problem of access pricing came later.

Access to an essential or bottleneck facility is the issue. The problem is compounded when the owner of an essential facility is also selling to final consumers in competition with the other firms. An example would be long distance telephone companies purchasing access from local phone companies to complete their calls. The local companies themselves might be also providing long distance service. This is the case, for example, with British Telecom, and a few jurisdictions for RBOCs. The efficient component pricing rule (ECPR), which originated with Willig (1979), was one of the first attempts by economists to address the issue of efficient access pricing. Among the leading exponents of ECPR are Baumol and Sidak (1994). The idea of ECPR can be summarized as in Baumol and Sidak (1994, p178):

Optimal input price = the input's direct per-unit incremental cost
+
the opportunity cost to the input supplied of the
sale of a unit of input.

The problem with ECPR arises from the second term on the right-hand side. If this could be determined on the basis of a readily observable price in a competitive market, then ECPR would be an efficient rule, at least for a homogeneous product. However, it is precisely because of the bottleneck facility that such a competitive price cannot be determined. ECPR then comes down to allowing the bottleneck supplier the monopoly rents that he was earning when he was the only vertical integrated monopolist. As most monopolists are regulated, this presumably comes down to allowing him the regulated return that he would have obtained.

Most access pricing problems encountered in the real world are much more complicated than this. For example, products may be differentiated and entrants may use the incumbent's access product to gain a foothold in the market, and eventually to undercut the incumbent in the monopoly market thereby undermining the incumbent's financial viability. This is very much the core of the debate on access pricing in the postal arena, where entrants could use the incumbent postal operator's (PO) network to deliver in areas that the entrants did not want to serve (e.g., because they are high-cost delivery areas). The result of liberalized access policies could well be that entrants deliver end-to-end service in the low-cost urban areas, while tendering to the incumbent PO all other mail for delivery at some published access price. As a number of authors have shown (e.g., Crew and Kleindorfer (2004)), great care must be exercised in this instance to define access prices that promote efficient entry without undermining the financial viability of the PO, which retains a default service obligation. In particular, the ECPR approach is not efficient, because this is a multi-product environment and taking the same avoided cost discount off the end-to-end single-piece price of a letter leads to subsidized access in the high-cost areas. Such subsidies not only promote inefficient entry, but they may also lead to the financial demise of the incumbent PO.

Because almost every restructuring proposal for network industries foresees some form of competition and entry, access pricing has become a key focus of the debate on deregulation. It effectively allows the gradual entry in network industries, leveraging

such entry off the incumbent's existing network and allowing entrants to develop their business based on partial entry rather than the much more demanding facility-based full entry scenario would require. Because of the importance of access pricing, a great deal of energy has been devoted in the theory of regulatory economics to understanding some of the complexities involved and in developing solutions to them. A particularly promising approach seems to be what Laffont and Tirole (1996) have referred to as "global price caps."¹² The idea is intriguingly simple. Access is treated as a final good rather than as an intermediate good and is included in the computation of the price cap. In addition, "Weights used in the computation of the price cap are exogenously determined and are proportional to the forecast quantities of the associated goods." (Laffont and Tirole, 1996, p243). Laffont and Tirole explore the possibilities of forming a hybrid of ECPR and global price caps, which may offer benefits in terms of weight setting and protection against anti-competitive practices. Such a hybrid approach may provide a means of achieving a transition to the global price cap, which has considerable advantages summarized by Laffont and Tirole (1996, p254) as follows: "A global price cap penalizes increases in both access prices and final prices and induces the [regulated firm] to price discriminate very much the way an unregulated firm would do, except that the entire price structure is brought down by the cap."

While significant progress in the theory of access pricing has been made, a considerable amount of further development is required particularly if it is going to contribute to the practical policy debate, which is the subject of the next section. Interest continues in access pricing as illustrated by Armstrong's (2002) excellent survey on access pricing and interconnection. Many problems remain, some of which are addressed by Armstrong, including two way interconnection – an important problem for Internet service providers. Other issues include structural separation of access from the rest of the business and divestiture of access monopolies. Finally, access pricing is part of a much larger problem of the role and obligations of incumbent network service providers in industries under deregulation to which we will now turn briefly.

Default Service Provision

Microeconomic theory over the last twenty years has supported deregulation. However, it has done so in a piecemeal fashion. Consideration of the impact of entry on the obligations of incumbents has left much to be desired. Incumbents have as regulated monopolists faced default service provider obligations and these have been the vehicle for the propagation of many subsidies. While the understanding of the nature of such obligations has been the subject of some study, for example, the USO in the postal sector as illustrated in Crew and Kleindorfer (2002, 2005), the bigger picture of the impact and nature of default service obligations (DSO) on deregulation is still undeveloped.

¹² The term is an excellent one. Crew and Kleindorfer (1994) proposed the same basic idea, but unfortunately not the term. Laffont and Tirole (1994) first floated the idea. An interesting recent application in the postal sector is provided in Billette de Villemeur et al. (2003).

Consider the case of distribution services for local network services for gas or electricity. A price cap for a distribution utility with a DSO creates a certain dissonance. Is the energy purchased treated as a simple pass through, with this component of the bill varying with the purchases in the spot market? Or is the distribution utility required to line up long-term contracts to provide guaranteed prices? In either case the default service provider is on to a losing proposition. If it insists on only making purchases in the spot or short-term market and is allowed a straight pass through, the value to consumers of the default service obligation is minimal since they are absorbing all the risks. If the distribution company sets up long term contracts to guarantee prices and if prices fall, it loses customers and is stuck with high priced long-term contracts, which will prove costly to it under a price cap. Competition in such markets is very difficult to achieve when distortions like the default service obligation are included. The optimal risk sharing problem, under a default service obligation, is further complicated when the regulated firm is a for-profit, investor-owned firm since then these contract-based risk sharing decisions must also be integrated with the decision (perhaps co-determined with the regulator) on the capital structure of the regulated firm (see de Fraja and Stones, 2004). The problem is not well understood and awaits a workable solution.

The DSO problem illustrates a deeper underlying problem with deregulation, in that the residual monopoly after deregulation affects classes of consumers very differently. Large industrial and commercial customers are usually not going to face much risk of monopoly exploitation because they have significant alternatives. They can generate their own electricity. They can connect directly to the gas pipeline; they do not need the local gas distribution company. Similarly, they have alternatives to the local phone company and would have no difficulty obtaining mail service in the absence of a postal monopoly. The situation for small customers is, however, very different. They have few alternatives. Indeed, for most of them the reality of natural monopoly is obvious. The only way that they can be economically supplied is by a single producer with the ability to spread large fixed costs across many small customers and the ability to incur and pay for customer specific sunk costs. Regulation provided rough and ready consumer protection for these small customers. Even if the potential for cross subsidy that regulation provided could be abandoned, the problem of monopoly exploitation of small customers would remain as a serious issue to be addressed.

The DSO might be considered an extension of the protection from monopoly exploitation that regulation offered to small customers. However, it turns out to be a major obstacle to deregulation. Generally, the default service obligation may be considered the right of any customer, in practice normally only a constraint in the case of small customers, to receive service of some defined quality at a “reasonable” price. This notion was rather easily achievable under monopoly. The regulator, in effect, guaranteed that the profitable large customers could not be picked off by entrants, in return for which the monopolist faced the obligation to provide service to customers large and small at the rate set by the regulator. The regulator, in determining “reasonable” prices, had considerable potential to cross subsidize and even this did not overly concern the monopolist as long as the regulator barricaded the market against entry. This all changed under deregulation. The

regulator started to allow entry into the profitable parts of the incumbent's business while at the same time continuing to require the incumbent to provide default service. In short, the regulator retained the obligation to serve while simultaneously removing the wherewithal to finance it.

Deregulation must address these twin issues of residual monopoly and default service. One approach is the Posnerian one. This would essentially say, "Let 'er rip". If these residual problems remain as a result of deregulation, so be it. The difficulties of fixing them are just too great. At the other extreme there is tight regulation of the cost of service variety that addressed these twin issues in a rigorous manner. Many economists would find the Posnerian view attractive and, indeed, would find tight regulation reprehensible and against their religion. However, most of them would recognize that the Posnerian approach is not feasible politically. The question that remains then is whether there exists a middle ground, which takes into account the twin problems of residual monopoly and default service and, at the same time, mitigates some of the inefficiencies of traditional tight regulation. Where one locates on this spectrum may, of course, depend on the industry, its technology, its growth potential and its starting condition.

However one proceeds, addressing the twin challenges of curbing monopoly exploitation for the residual monopoly and maintaining default service are critical if deregulation is to succeed. One consequence of all of this might be that the gains from deregulation are likely to be much less than originally anticipated and there may be significant transactions costs of regulation in the face of increased complexity resulting from the interaction of competition, regulation and the characteristics of the DSO itself. In particular, the requirement to provide default service without a regulated monopoly to finance it inevitably leads to major problems that are not easily fixed and are at the root of many of the on-going problems of deregulation in specific sectors, as we review in more detail below.

Determining the Proper Scope of the Monopoly

Consistent with the history of deregulation, suppose that abolition of regulation is not an option and that a fully competitive or completely unregulated outcome is not feasible. It is then natural to consider regulatory designs consistent with opening up of part of a regulated monopoly's market to competition along the lines of Scenario B in Section 1 above. Further, in line with the discussion of the DSO, assume that the incumbent's obligation to serve continues and his residual monopoly is regulated. A basic question is what structural restrictions applied to this scenario will be welfare enhancing. One approach, which we pursue in Crew and Kleindorfer (2003), is to consider restrictions on the scope of monopoly. We compare three different regimes, each of which envisions a price-cap regulated Incumbent facing a Default Service Obligation to provide downstream service to all entrants. We evaluated the consequences of the following three scenarios representing different levels of entry and ownership structures for the Incumbent.

(S1) The Incumbent acts as a vertically integrated monopolist providing end-to-end service for all customers. We might think of this as the initial condition of the industry.

(S2) The Incumbent remains vertically integrated, but entry is allowed upstream. All entrants are identical and operate as a competitive fringe. Entrants must use the Incumbent's downstream facilities to complete end-to-end service for their customers. Entrants' end-to-end products are imperfect (and perhaps superior) substitutes for the Incumbent's end-to-end product.

(S3) The Incumbent is required to divest its upstream operations, which are then supplied by a separate profit maximizing and unregulated entity, competing with other entrants. The (former) Incumbent is assumed to retain some product differentiation compared to other entrants after divestiture.

We show that when the Incumbent faces only a competitive fringe in these upstream operations, and when entrants and Incumbent product offerings are (at least weak) substitutes, welfare does not decrease and profits do not increase when comparing S2 to S3, i.e., divestiture of its upstream operations is welfare-enhancing under these conditions. Whether S2 or S3 dominate S1 is centered on the question of whether significant economies of scale are eroded in the upstream operations or whether economies of scope are eroded across upstream and downstream operations.¹³

A related question concerning the scope of monopoly is that of sabotage or driving up rivals' costs under S2 or S3 above. For some time there has been a concern in practice and in the regulatory economics literature as to whether vertically integrated providers (VIPs) like the RBOCs have an incentive to discriminate. For example, Economides (1988), Mandy (2000) and Weisman and Kang (2002) have studied this situation at some length. Mandy provides a summary and analysis of the state of the debate including a critical review of the assumptions employed by the participants of the debate. Weisman and Kang (2002, p125) summarize the results of their analysis as follows:

Discrimination always arises in equilibrium when the vertically integrated provider (VIP) is no less efficient than its rivals in the downstream market, but it does not always arise when the VIP is less efficient than its rivals. Numerical simulations that parameterise the regulator's ability to monitor discrimination in the case of long-distance telephone service in the U.S. reveal that pronounced efficiency differentials are required for the incentive to discriminate not to arise in equilibrium.

In Crew, Kleindorfer and Sumpter (2004), we extend the Weisman and Kang analysis to consider the welfare impacts of sabotage. We show that when economies of scope are not too large between upstream and downstream operations, then the divested solution S3

¹³ See Crew and Kleindorfer (2003) and Crew, Kleindorfer and Spiegel (2004) for a discussion and analysis of these issues, the latter paper in the context of reliability and system operator roles in electric power.

is welfare superior to both S2 and S1. This result is primarily driven by the absence of any incentive to discriminate against entrants by the divested downstream monopoly access provider, whereas there would be such incentives to raise rival's costs under S2, where the downstream access provider also provides service to his own upstream operations. We return to this issue in our discussion of practice below. From a theoretical perspective, at least, limiting the scope of the monopoly to those services for which there are overwhelming scale or scope economies, and requiring divestment of these from remaining services offered by an incumbent, appears to offer fairly robust efficiency advantages. It also clearly enhances transparency in terms of the regulatory process for the residual, smaller monopoly that results.

3. Developments in Practice

One of the lessons of the last twenty years for regulatory economics is the importance of practice. Regulatory economics is an area of economics that is enhanced by practice and most of the important theoretical developments are likely to arise out of practice. Thus, in this section we intend not only to evaluate some the developments in practice that have occurred but also some ways in which practical problems may lead to advances in theory. We begin with a general assessment of the interaction of regulatory theory and practice and then we turn to a brief review of developments in three specific network industries: telecommunications, electricity and the postal sector.

Theory and Practice: Economists and Deregulation

The growth in regulatory economics over the last twenty years illustrated by the increasing literature has led to a change in the role of economists, at least in the U.S. Companies probably employ fewer regulatory economists since the depletion of AT&T's regulatory economics staff in the mid 80s, but consultants and the demand for regulatory economists has continued to grow as economists partake of the feeding frenzy in litigation associated with restructuring.¹⁴ Some of the important elements brought by economists to the restructuring debate have been arguably a conceptual framework to analyze efficiency and notions of cost, and these have been nowhere more in evidence than in the area of pricing. To take two examples, access pricing and peak-load (or its descendent real-time) pricing, economists have generally led the debate on these innovations in practice.

Access pricing for network industries was in its infancy twenty years ago. In the area of telecommunications, there has been a decidedly mixed success in practice in implementing the principles for efficient access pricing (e.g., Armstrong, 2001), and the debate over access pricing and structure continues unabated. Some mixed success has been achieved in access pricing in the gas industry as indicated by recent developments

¹⁴ In some ways consultant economists are at risk of becoming perceived in the same way as lawyers, namely as hired guns. Kovovic (2002) addresses such issues in more detail with the law's treatment of economists as expert witnesses.

analyzed in Collette and Leitzinger (2002).¹⁵ The postal sector is an unlikely success story. The United States Postal Service (USPS) is often criticized as a moribund public enterprise. Its role and that of its regulator, the United States Postal Rate Commission (PRC), in opening up parts of the postal value chain to access is a major success story. However, postal worksharing – a postal term of art referring to upstream activities like presorting, bar-coding and drop shipments – has been a major success in the postal sector as illustrated in numerous papers, for example, Mitchell (1999). This seems to be one aspect of the postal sector pricing practices, which USPS, large mailers and the PRC all seem to agree is working well, although there are still wide disagreements on how postal worksharing and access pricing should be integrated with the incumbent Postal Operator's Universal Service Obligation (Crew and Kleindorfer, 2004).

Peak-load and real-time pricing is another mixed success story in terms of practice. Twenty years ago the theory of peak-load pricing was well developed. Since then, it has been successfully applied in many areas not just in network industries. In some ways, given the head start that peak-load pricing had in network industries the progress has been disappointing in these industries relative to elsewhere. Peak-load pricing in other industries, notably airlines and hotels, has become successful largely because of advances in computing, telecommunications and the Internet. The airlines, by employing techniques like artificial intelligence and datamining, have successfully combined peak load pricing with price discrimination. The main device used for price discrimination is flexibility in travel schedules. The business traveler requires flexibility in this travel plans. He may need to travel at a moment's notice. His plans may change or the business gets concluded more quickly and he wishes to return early. He normally travels during the business week. Thus, airlines find means of identifying business travelers. The lower price tickets must be purchased in advance – usually at least 7 days – and cannot be changed without penalty. In addition, a Saturday night stay is required. The airlines have found relatively straightforward ways of identifying the travelers with lower demand elasticity, while preventing transfer and arbitrage thus making price discrimination highly successful.

The Airlines successful techniques of price discrimination are combined with peak load pricing not in the way peak load pricing is normally employed, namely in real time. Peak load pricing was traditionally time of day or combined time of day and seasonal pricing. (For example, electricity might be charged at a lower price at night and weekends.) For airlines this would appear to translate into last minute fares with people who were prepared to wait at the airport getting empty seats at low prices. The argument would be that given that an additional passenger could be put on the aircraft at essentially zero marginal cost that a low (off peak) price could be offered. With the greater understanding of price discrimination, such last minute cheap fares would not be attractive to the airlines. Because of the tendency of business travelers to change plans and to be last minute the airlines may not wish to sell remaining seats to standby passengers. They might prefer to leave them unfilled in case a full fare business traveler shows up. In addition, because of their rather sophisticated yield management techniques

¹⁵ See also Doane and Spulber (1994).

and their frequent flyer programs, standby passengers are of much less importance. In many ways frequent flyer programs are the ultimate peak load-pricing device. More of them can be made available on flights that have low load factor. The airlines can estimate weeks and even months ahead how full a given flight is likely to be. If the flight is running light the airline changes the mix of seats. For example, it can add more frequent flyer seats. The airlines have benefited from deregulation in that they have been able to take into account two of the basic ideas of microeconomic theory, namely, price discrimination and peak load pricing and combine them in a reasonably sophisticated way. The application of these two techniques has resulted in off-peak consumers benefiting, with the result that many small customers have received low priced fares. Load factors have increased – fewer empty seats – arguably with some reduction in service quality. By contrast business customers have probably been made worse off. Given the airlines’ ability to identify their low demand elasticity, they have paid the higher prices. This has been particularly true for small business, as many large customers and the federal government have made special deals with the airlines.

A similar story could be told about the hotel industry, which employs many of the same techniques, including frequent guest programs, corporate, government, weekend and a host of special rates. The industry has not been as successful as the airlines in gaining acceptance of non-refundable rooms in the ubiquitous way that airlines have done so with non-refundable tickets. One approach has been to require guarantees by credit card with cancellation penalties 24-72 hours prior. This is a means of identifying the lower elasticity of the business customer. However, there may exist more competition among hotels making this approach more difficult to achieve. Similarly, the frequent guest programs may not promote as much loyalty as frequent flyer programs as the potential rewards to consumers are normally less.

The success of peak load pricing in these two industries, neither of which is rate regulated, stands out in some ways in contrast to the regulated network industries. The latter had a distinct head start in peak load pricing and almost all of the economic theory had been written with them in mind. Moreover, the potential benefits from peak load pricing were significant in electricity and telecommunications. It is interesting why the network industries, especially electricity, failed to capitalize on its head start with peak load pricing. Several things were in place for success including innovations in metering that meant that more sophisticated and lower cost time of day meters were now available. These could be employed with smaller customers. One problem is that the metering or transactions costs are still high relative to the successful applications in the airline and the hotel industries. In addition, electricity still remained regulated limiting its potential profits from innovative pricing and reducing its flexibility in pricing.

Developments in Specific Network Industries

As noted in Section 1, the essential driver of deregulation in network industries in the U.S. has been rent seeking. The result has been an unwillingness to give up the benefits of regulation while simultaneously seeking regulatory change. The central question has been a structural one: how far should the initial regulated monopoly be reduced? Once

this question is answered in one way or another, issues of access pricing, market governance and regulation, and the treatment of entrants and incumbents can be addressed clearly. We have argued that the most appropriate solution to this question is to pare down the monopoly “to the bone”. What this means is, of course, different in different sectors. Indeed, taking the approach of asking what is the “core monopoly” in each sector will help to organize our discussion of developments in practice, which we now consider for telecommunications, electricity and the postal service.

Telecommunications

Telecommunications is the most rapidly changing of all the network industries not only in the form of technologic change but also major legal rulings, which are in part the product of technological change. Technological change in microelectronics, optical fiber, wireless, cable and the Internet are all having a major impact on telecommunications. In the last few years the changes in the industry have been major, inspired to a considerable extent by the technological changes taking place. Competition has increased significantly over the period. Wireless is now a major competitor primarily for long-distance, although it does offer some competition for local service, as some subscribers may have only wireless phone and do without local wireline service.¹⁶ Cable and the Internet also offer some competition. Indeed, Danner and Wilk (2002) argue significant competition for the local wireline market is even developing. However, in our view the competition is primarily in the long-distance market and this is coming from the Internet and especially from wireless.

The major long-distance companies are facing serious threats to their viability to which they have yet to adjust. The problem is that long-distance is an artificial product, primarily a regulatory construct. A large part of its *raison d'être* turned out to be a very convenient means of enabling subsidies to flow from it to local service. When telephone service was a monopoly this was viable. It became less viable as cost differences shrank dramatically between local and long-distance service. Distance as a cost driver became less and less important with new technologies. Wireless and the Internet became much fiercer competitors than had been envisaged. The Telecommunications Act recognized the problem facing long-distance but failed to address it. It offered the long-distance industry the opportunity to be vertically integrated providing local access as well and long-distance. It offered the same to local companies. In neither case has very much happened. Part of the problem was the inability of politicians with regulators acting in unison to give up the pool of cross subsidies provided by long-distance. This happened despite leakages from the cross subsidy pool caused by technological change and competition. The result was a dramatic weakening of the long-distance companies, and a failure of local competition to take off. Against this background the industry attempted to consolidate. In the case of the hardest hit sector, long-distance, consolidation was frustrated by antitrust enforcement. Notably, the MCIWorldCom-Sprint merger was stalled by the antitrust authorities. However, the local companies were much more successful in their efforts to consolidate. After Divestiture there were eight major local

¹⁶ According to Yang, Crockett and Gow (2004) 95% of wireless customers hold on to their traditional wireline service. This percentage is expected to decline as wireless becomes more reliable.

companies, the seven Regional Bell Holding Companies, plus GTE. All of these were roughly the same size and between them covered over ninety per cent of the telephones in the U.S. Now there are only four companies. SBC consists of the old Southwestern Bell, Pacific Telesis, Ameritech and Southern New England Telephone. Verizon is Bell Atlantic, NYNEX and GTE. Only BellSouth and Quest, the former U.S. West, remain. All of these companies have major holdings in wireless, especially Verizon. They have made some entry into long-distance notably in New York in the case of Verizon and in Texas in the case of SBC. However, their primary strengths are in local wireline and wireless.

The current structure of the industry is thus far from competitive. Two extremely large companies are monopolists or near monopolists in over half the local wirelines in the U.S. Three large companies provide most of the long-distance service. In both cases there is a competitive fringe, which for the long-distance companies is particularly bothersome. For the local companies the competitive fringe is much less of a problem and certainly one that they can manage more easily than the long-distance companies can. One reason is that they own a significant part of the competitive fringe, their large holdings in wireless. Now this, in itself, might not matter if wireless were competitive. Currently, there are moves toward consolidation in wireless. For example, further mergers in wireless seem highly likely. Indeed, AT&T Wireless have reached agreement to be acquired by Cingular, which is a wireless company jointly owned by BellSouth and SBC further strengthening the RBOCs' position in wireless. A second reason is that the CLECs (Competitive Local Exchange Carriers) are facing tough times and providing much less competition.

The Telecommunications Act and the rapid technological change in the industry have not resulted in widespread competition. We are in agreement with Danner and Wilk (2002) that competition in the telecommunications market is being attenuated by the current regulatory structure. How to bring greater competition about through regulatory change is where we differ. Their solution to the problem is based on ending regulation of local service. They argue that local rates will go up but competitive entry will become more attractive leading to improved service, greater variety and other benefits including perhaps lower prices. We will not pursue this here as they make their case admirably in their own paper. Instead, we ask the reader to consider an alternative approach and one toward which we lean and which follows from our discussion. We argue that the problem of monopoly rents and residual monopoly cannot be ignored. Indeed, we argued that deregulation was largely inspired by an attempt to change the share of monopoly rents. As some residual monopoly is likely to remain rents are likely to remain. Whatever its merits the Danner-Wilk proposal is going to be criticized as an attempt to channel more of the residual monopoly rents to the local carriers.

Our alternative approach, if we follow the logic of our argument must therefore address the problem of monopoly rents and redistribution. It recognizes that competition cannot be present ubiquitously. We argue that where competition can thrive it should be encouraged to thrive. We argue that there is a residual monopoly around which competition can thrive. However, at least for the present getting rid of this residual may

be impossible. Although our solution retains some residual monopoly it is at least as radical as Danner and Wilk, and involves a structural remedy. The idea would be for local carriers would divest themselves entirely of their local wires business. This proposal would correspond to S3 in section. These local wires businesses or Wirecos would be regulated. They would be carriers' carriers. Their rates would be regulated by state commissions and they would not have retail customers. Carriers would compete to provide service and the Wirecos would provide only dial tone. All other services would be obtained through the individual carriers. This may involve the Individual carriers would be able to bundle together wireless, wireline and Internet services. Ideally, a move would be made to end the cross subsidies for universal service. However, this is unlikely and previous attempts at this kind of rent redistribution have had limited success. Absent an ending of the subsidies they would be levied directly as a flat per line charge on the carriers and distributed as currently. It would then be for the competing carriers themselves to decide how to collect them whether on minutes of use or as part of the fixed charge.

This proposal is not very different from an option we discussed in Crew and Kleindorfer (1999). Changes since then make it worth reconsideration. One major change is that the Telecommunications Act has resulted in entry by long-distance carriers into to local markets while at the same time allowing entry on the part of RBOCs into long-distance. The RBOCs have argued that the implementation of the Telecommunications Act had resulted in their providing local service to competitors for resale at prices below cost. Significantly, the Circuit Court for the District of Columbia agreed and found for the RBOCs against the FCC on its rules for unbundling of network elements.¹⁷ The court ruling strengthen the position of the RBOCs considerably giving them much greater freedom in setting rates for resale of local facilities. This together with the further strengthening of the RBOCs' position in wireless is likely to increase their market power. As Yang (2004) noted the remaining competition is likely to be from cable for broadband and Voice Over Internet Protocol (VOIP) leaving little room for competition from long distance carriers and CLECs. This all gives added impetus to the latest version of our proposal in Crew, Kleindorfer and Sumpter (2004) that the RBOCs divest their wireline operations. Under this all carriers would compete on equal terms. They would all be required to buy Wireco services at the same regulated price. They would all be in a position to present evidence to the regulator in arguing for rate structures and rate levels. They would be highly informed customers and able to make convincing presentations to regulators. The other major change has been the consolidation of the wireline industry which now makes it possible to the local carriers to divest their wires-only businesses into companies large enough in their own right to take advantage of any scale economies. Some scope economies may be lost in the process but these may not be very large compared to the benefits the proposal has for competition.

This proposal would have the advantage of bringing about competition for telephone service. It would end the artificial distinction between a local call and a long-distance call. Like the Danner-Wilk proposal it might be difficult to gain acceptance because it

¹⁷ United State Telecom Association v. Federal Communications Commission and the United States of America, No 00-1012, U.S. Circuit Court of Appeals for the District of Columbia, March 2, 2004.

does disturb the distribution of the monopoly rents. It does, however, have the advantage of paring down the monopoly and allowing the preservation at least for the time being of the universal service subsidies. It has the further advantage of rough and ready fairness. The residual monopoly is identified and regulated. Under Danner-Wilk the concern that there would be monopoly exploitation remains. It could be criticized on dynamic efficiency grounds in that such a regulated business subject to competition from different modes may be starved of invested and fail to innovate, whereas Danner-Wilk, through the profit motive is aimed at fostering innovation. We are a long way from being able to say that our divestiture proposal is one whose time has come. It does seem to offer a workable solution to the problem of monopoly exploitation. It does seem to reduce the potential rents going to local carriers while encouraging competition upstream. It seems unlikely to succeed as long as local carriers oppose it and it is likely that they will. Their situation is one where if they wait it out the long distance carriers will be drastically weakened. On the other hand, under a Wireco regime, they become one of many carriers competing on more or less equal terms. They would have one advantage, however. Minus their Wirecos they would still be very powerful players, perhaps the most powerful. It may be that for some managers in the RBOCs the prospect of being maybe the strongest competitor is attractive relative to the current alternative. They may see that there is little advantage to owning pipes and wires when the price for doing so is restriction on the ability to compete and innovate. While this is not very likely, as most RBOCs are likely to prefer the security of remaining in the residual local monopoly even at the price of current restrictions in their ability to compete.

Telecommunications today has numerous problems. The FCC's massive bureaucracy does little about telephone scams and creates major regulatory burdens whose benefits are hard to identify. While the prospects of success for either of the radical proposals by Danner and Wilk or by us seem slim, either is likely to be preferable to the current situation. There are costs in delay and the continuing malaise, which seems destined to continue for the foreseeable future. The DC Circuit decision and the further entry of RBOCs into wireless enhance their potential market power. It may be that a divestiture remedy could be forthcoming as a result of antitrust action. However, such action is unlikely to originate from the Department of Justice under the Bush Administration, which has made its position clear by declining to appeal the DC Circuit decision to the U.S. Supreme Court.¹⁸

Electricity

The debate about electricity restructuring in the U.S. has resulted in some colossal failures, including the Enron debacle and the California experience, which is itself not unconnected to Enron (see Weaver (2004) for a discussion of the Byzantine interdependencies of these two histories). Restructuring itself was triggered by early

¹⁸ In *Verizon Communications, Inc. v. the Law Offices of Curtis V. Trinko, LLP*, U.S. Supreme Court, January 13, 2004 decided that the incumbent has no obligation under the Sherman Act to share its network with competitors. Thus, it seems unlikely that antitrust would offer a remedy as the Court holding also seems to imply increased immunity from antitrust action in the case where regulatory commissions have jurisdiction.

contributions of economists on peak-load pricing (going back to Boiteux (1949)) and detailed assessments of industry structure (in particular, the work of Joskow and Schmalensee (1984) showing that economies of scale in generation were exhausted at relatively low output levels and not a barrier to unbundling of generation). The basic approach undertaken was in line with that pursued in our question of “paring down the monopoly”, with the understanding that generation would be divested from transmission and distribution, the latter two functions continuing to be treated in a transition phase as regulated monopolies of traditional vintage. Independent power producers were to be on an equal footing with traditional utilities in competing for load. Just as in natural gas, brokers and intermediaries were expected to flourish in linking generation assets to final demand. The transmission system was to operate as an open-access common carrier, providing service to all comers on transparent non-discriminatory terms. With the passage of the Energy Policy Act of 1992, these “visions” were enshrined in law, and the Federal Energy Regulatory Commission (FERC) began the hard work of drafting regulations that would implement this vision.

What has happened in the interim has been a chastening experience in the complexities of inducing economic change when the laws of physics will not cooperate. Whereas in countries the United Kingdom and Spain, a central authority continued to be in control of transmission, in the U.S. the Energy Policy Act of 1992 is based on the prevailing status in the U.S. in which transmission assets are in the hands of many owners. However, in the emerging competitive markets, instead of vertically integrated monopolies that had previously existed, the externalities and free rider issues that are part of a transmission system surfaced. The result has been confusion, under investment in transmission, and general dissatisfaction with the state of electric power markets and their expected evolution going forward.

A central question is why the North American power grid has not kept pace with the growth in generation investments and the demand for electric power. Just to cite one of many statistics reinforcing this same conclusion, electricity demand in the U.S. is expected to grow by 25% over the next ten years, while President Bush’s national energy plan predicts an increase in grid capacity of about 4% during the same period.¹⁹ From an economic perspective, the growing gap between existing and required transmission capacity can have huge consequences. Disruptions, such as that on August 14, 2003 obviously have large economic costs in lost production and transactions costs. Beyond disruptions, as the instructive recent report by Huber and Mills (2003) points out, electric power is at the very foundation of the country’s critical infrastructure, and growth in electric power has tracked growth in GDP at roughly the same pace. Absent reliable electric power, the country stops communicating, stops working, and stops producing.

Given the consensus on the pressing need for additional investment in the grid, why are investors not rushing into fill this need? The reason: there are large differences in the historical and projected returns for investments in transmission relative to other opportunities, even in the electric power sector. Added to this “returns disadvantage” is

¹⁹ See McNamara (2001). Detailed assessments are available through the Edison Electric Institute and other industry think tanks.

the regulatory uncertainty associated with predicting longer-term revenues that will accrue to existing and new transmission investment. These problems are, in our view, tied up with current models of regulation of transmission and with an inadequate state of knowledge about how to run power markets under distributed ownership of the grid.

From an economic perspective, transmission provides two critical enabling functions within the electric power system: first, as an enabler of competition for alternative sources of generation to provide an efficient mix of technologies to meet demands; and, second, as a means of assuring high reliability to geographically dispersed loads. Absent sufficient transmission, local pockets of market dominance develop, inefficient solutions to backup power flourish, energy prices become more volatile, and average cost and reliability of energy supplies suffer. Assuring adequate transmission capacity, including the necessary control technologies, requires the resonant interplay between the financial consequences of decisions related to electric power and the physical system within which these decisions play out. Figure 2 below is a summary of the interactions between the financial and physical systems, and shows this as occurring in four time frames: long-term, medium-term, short-term and real-time.²⁰ We note that decisions on transmission infrastructure (and other assets in the electric power system) belong to the long-run time frame of Figure 2.

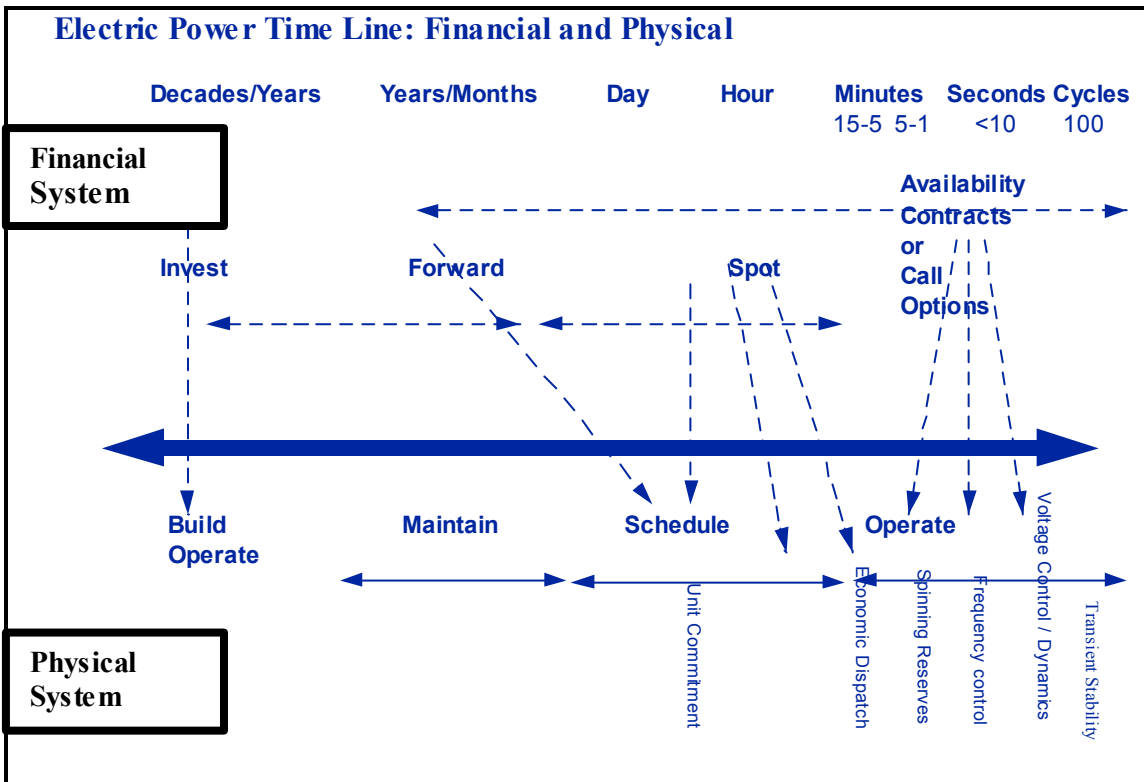


Figure 2: Market and Physical Time Lines of the Electric Power System

²⁰ See Fernando and Kleindorfer (1997) for a more detailed discussion of the interactions between physical and financial systems depicted in this Figure.

The difference between the long-run perspective of potential investors and the short-run dictates of controlling the physical system has given rise to a fundamental tension in regulation of the electric power system. On the one hand, there is a need to set up strong, centralized organizations, the Regional Transmission Organizations (RTOs) of FERC Order 2000, to ensure that operational authority and responsibility for short-term reliability is in the hands of competent technical professionals. On the other hand, the requirement that investors see opportunities to recover invested capital, plus a competitive return, requires attention to the level and certainty of cash flows that will accrue to specific assets should these be put in place. The key problem is that most of the debate on restructuring and market design has been focused on solving the real-time problems of transmission and system operation, but reliability is a function not just of these decisions, but also of medium-run and long run choices, including investment. This is coupled with the fact that most transmission assets are in the hands of former integrated utilities and must be surrendered to RTOs for operational control. In the post FERC-2000 unbundled world, these owners must cede operational control of their assets to a new, independent transmission service provider, the RTOs of FERC Order 2000.

A key question resulting from this is the governance of choice for new investments (and possibly for other decisions, such as maintenance). According to the FERC Order 2000, the RTO is to have primary responsibility for managing the planning and evaluation of required investments. If the RTO is a for-profit, regulated Transco, which owns or leases all transmission assets under its control and which makes independent choices for new investments, then the traditional models of regulation can be readily adapted to put pressure on the Transco to operate efficiently, to meet performance standards, and to do so while achieving fair and sustainable rates of return on invested capital in its operations. The clarity of this situation, both on the physical side as well as the organizationally co-extensive financial side, has led several commentators to strongly recommend this type of RTO.²¹ But in some jurisdictions, it may not be possible “to get there from here.” What can then be done in the non-profit RTO with distributed ownership? Here the route is much less clear, and knowledgeable parties have offered many competing proposals (e.g., Hogan (2003), Joskow (2003), Crew, Kleindorfer and Spiegel (2004)). It will not surprise the reader here to know that our own proposal calls for divestment of transmission assets to a for-profit, regulated entity with full responsibility for transmission service provision in a specific (electrically integrated) region. This is the so-called “Transco” version of the RTO. Such a proposal would finalize the unbundling proposal originally developed by Joskow and Schmalensee (1984) into an end-state in which transmission would be run as a business by a for-profit firm, subject to regulatory oversight on its pricing and access policies. If this is infeasible, which it may be, various intermediate proposals, which still allow independent management and investment actions to be undertaken by the RTO, are possible (Crew et al. (2004)), but these will involve considerably more complex regulation to enact because

²¹ See, e.g., the argument in Awerbuch, Crew and Kleindorfer (2000). This is, of course, also the existing form of transmission organization in the United Kingdom and Spain, where it has worked well in achieving both reasonable returns for shareholders in the respective companies while providing strong improvements in the management of the grid and of congestion costs.

of the distributed ownership of transmission that continues to characterize the current situation in the U.S.

On the decision rights issue for the RTO with distributed ownership, one possibility is that foreseen in FERC Order 2000: that the RTO itself will declare the requirements for new lines or enhancements to the transmission grid under its control. Requirements that are thus blessed by the RTO would then, if constructed, be given the assurance of reasonable rates of return on the basis of traditional cost-of-service (or Rate-of-Return) form of regulation. One might find sufficient agreement among current and potential asset owners in the RTO, if the allowed rates of return are high enough, and if the determination of new investment requirements is based on objective efficiency and reliability criteria by an independent RTO (where independence is the bedrock requirement of FERC Order 2000). In the face of these policy choices associated with the RTO structure, we model in Crew et al. (2004) several regimes that are could be implemented. All of them foresee the short-term control of the ISO functions in the hands of the RTO, but the long-term decision rights and governance of investment, as well as the pricing scheme implemented to recover investment costs, ranges from distributed ownership to a centralized, regulated single-owner model. Our results show that the nature of the decision rights embedded in the transmission provider will have fundamental effects on the overall reliability and efficiency achieved by the systems that arise from these different governance schemes.

The arguments for clear regulatory boundaries and for paring down the monopoly that underlie our proposal for divestiture in telecommunications apply as well for electricity. Here the industry could be structured as generation and wires. The wires part of the industry consists of transmission, the wholesale high-voltage transport of power, and distribution. It is possible to configure the wires industry as Transcos and as Discos or as a combination of the two, T&D's. There is a major difference between the divestiture proposal in electricity and the Wireco proposal in telecommunications, namely, that the approach has been put into practice in electricity. In electricity Discos, and T&D's currently operate. In California, where the major utilities divested a large part of their generation, it resulted in a near disaster. By contrast, in the Eastern United States, Discos have operated successfully over roughly the same period. Despite the success to date of Discos in the East it is still too early to claim success for the experiment. It certainly looks promising. Major differences between the East and California occurred in the way Discos procure power. While the California utilities retained more generating assets than some of the Eastern Discos, the latter purchased a much larger proportion of their power under long or medium term contracts whereas almost all of the purchases by the California utilities were in the spot market.²² These differences in the approach to power supply have a significant effect on the ability of the Eastern Discos to address the default service obligation (DSO), a topic to which we will now turn.

The DSO in electricity is a major issue in electricity regulation. Deregulation, by allowing entry into the profitable parts of a regulated monopoly and by leaving the

²² By contrast, over 80% of the power in the PJM, the Independent system operator in the Mid-Atlantic States was through long term or medium term contracts.

company with a residual monopoly, which is typically a much smaller base over which to spread such costs, threatens the ability of the company to finance the DSO. In electricity, the Disco is left with the least profitable customers, the residential and commercial customers, which we call “small” customers. The industrial and large commercial customers, which we refer to as “large” customers, have opportunities to bypass under a system with entry. The problem with the small customers is that because they are small there is little at stake to make competition for them worthwhile. The original idea was that the small customers would face regulated distribution rates from the Disco and that energy suppliers would compete to supply them energy. However, with residential electric bills on average even in the Eastern States and in California running less than a hundred dollars, there is very little incentive to attract competitors. The other aspect of the problem that makes competing for such customers unattractive is the DSO. How this was interpreted in California was especially troubling, but there is no guarantee that regulators elsewhere would view very the issue much differently. The California utilities were forced to maintain a price cap not just on distribution but also on energy when the prices they were paying for power were, for a significant period of time, in excess of their retail rates. In a situation like this the independent energy suppliers quickly dropped out leaving the utilities with the entire burden of the DSO.

Undoubtedly, the failure to run with the ball of peak load pricing has cost the electric utility industry. Nowhere is this more apparent than in California. If the companies and the California Public Utilities Commission had begun instituting a major upgrading program for metering, it is likely that the crisis could have been lessened if not averted. As Borenstein (2004) notes, peak load pricing would have sent some of the right signals to consumers. Real time pricing would have sent the precise signals. Moreover, a long-term program with the sanction of the CPUC would have made renegeing much more difficult.

The California electricity crisis and the failure to implement peak load pricing is part of a more general failure of deregulation, namely piecemeal implementation. Policies have been adopted because they are relatively easy to adopt, while other policies that were necessary for success were not followed. It is this piecemeal approach and failure to understand the larger picture that explains many of the problems with deregulation generally and in particular the problems in California. In principal, the California restructuring appeared to be a promising development. It seemed to apply some of the recent theoretical developments and to offer the potential for greater competition and incentives for the California utilities to become more X-efficient. The implementation failed because it was piecemeal, ignored evidence from elsewhere and showed little concern for the nuts and bolts. We argue that if you fail to take these three considerations into account, deregulation or restructuring is going to fail or at best provide essentially zero net benefits.

Let us see how the California approach made these three serious errors. Starting with the nuts and bolts, California failed to introduce significant amounts of peak load pricing or smart metering particularly to the smaller customers. This meant that the price signals received in the wholesale market were not transmitted to final consumers. Another area

of nuts and bolts was forecasting. California has built little capacity yet at the time of restructuring in 1998 any forecasts of capacity shortages were ignored. This is surprising since the low elasticities in electricity markets has been common knowledge for many years. In the event of shortage, elementary economics says that price must rise to very high levels. Moreover the experience of the U.K. with a similar bidding system was that local market power was easily exploited. All of these lessons were ignored and the industry went headlong into purchasing all of its electricity on the spot or short-term market.

Very little attempt was made to hedge against risk. Indeed, elementary lessons about managing risk were ignored.²³ You can hedge against risk by choosing among different fuels. You can hedge further hedge against risk by entering into contracts of varying duration. A distribution company that is at all concerned about risk would have a portfolio of generation contracted for at various maturities. It might at the one extreme own some generation of its own. In like vein it might enter contracts for physical bilaterals with generators providing for power at a guaranteed price over a number of years. The portfolio would also include forward contracts and options to purchase power months or weeks ahead. Finally, some power would be purchased a few days ahead, or a day ahead or in the spot market. Unfortunately, the utilities concentrated in the very long market, the generation they still owned and the short term and spot markets, ignoring the options in the middle particularly physical bilaterals. When demand started to outstrip supply the spot and short-term markets hit the roof and claims were made about generators exploiting the market power that the bidding system gave them. This should have surprised nobody since the experience of a similar type of power pool in the U.K. with generators making bids had revealed how easy it was to exploit market power. Since the utilities had agreed to a price cap this led to huge deficits and the ultimate declaration of bankruptcy on April 7, 2001 by Pacific Gas and Electric.

The California disaster shows not only a lack of understanding of some basic lessons of economics but also the dangers of piecemeal and ill-conceived deregulation. Although the utilities were no longer provided with a monopoly in the sale of power almost all of the obligations that they faced when they had a monopoly still continued. Their monopoly now consisted only of the wires, which effectively meant small and medium sized companies. Any customer who was willing and able to connect at transmission voltage could bypass their systems. Similarly, any customers worth supplying by others would be taken, leaving the distribution utilities with the least profitable customers since they had default service or carrier of last resort obligations.

The California problem will be with us for a long time. It has already cost the State of California, the utilities and consumers many billions of dollars and the outflow will continue. It will correct itself eventually when the State runs out of money – the utilities

²³ Fernando and Kleindorfer (1997) provide an overview of risk management for electric power. For a distribution company, the emphasis is on determining an optimal portfolio of contracts, including forwards, capacity and demand-side options, to balance the costs of such instruments against the volatility of spot market purchases and non-performance due to shortages.

are already broke – and finally consumers are forced to pay the full freight. This may not prove to be as bad by then as the current policy will have hastened a recession in the State making it more severe and thus reducing the demand for electricity. Altogether, California is a black eye for deregulation and for economists. As regulatory economists we have to take our lumps over California and learn our lessons. The California deregulation can be interpreted as an attempt to redistribute rents from small to large customers and big business. The California utilities lobbied extensively for change in an attempt to address their “stranded cost” problem. Unfortunately for the utilities, when push came to shove, the politicians lost their nerve because the redistribution turned out to be much greater and very different from what had been intended. It was not large customers and the California utilities that gained from the process, but the generating companies who became the nouveaux riches overnight. The California utilities began the process with some arguably manageable problems of stranded costs. The end result was financial distress for the utilities and for California consumers, now facing debts for high priced power far in excess of the original stranded cost problem and acrimonious attempts to determine what are just and reasonable contract rates going forward.

The problem is that in California “deregulation” dramatically reduced the potential to tax large customers, who had access to the wholesale market, to fund the cross subsidies to small customers. It also set up a market that provided no discipline on prices in the event of shortage. The resulting hodgepodge of deregulation required the utilities as default service providers to perform this role of subsidizing smaller customers, a role that the State of California took over at a large cost. The California situation is a gross example of the problems that can go wrong with ill-conceived deregulation. The size, impact and nature of the rent redistribution was badly misunderstood by all, creating a massive windfall for generators and traders but leaving consumers extremely vulnerable, the default providers (the utilities) facing potential bankruptcy and the State taking on a huge burden for even the greatest State of the Union. The problem was created primarily by the massive redistribution of rents involved and the failure to understand the ramifications of a situation where a supplier faces an obligation without the wherewithal to perform it.

In principle, the argument for Discos is strong. However, industry, regulatory and public opinion differ. Supporters would point east and opponents would point west. In reality the jury is still out. The Disco meets our criterion of whittling away the monopoly very effectively. However, based upon the experience of California, the DSO will not just go away. How to provide the DSO is likely to involve significant regulation. Discos, to reduce the risks they face under the DSO, are going to have to acquire generating assets again or to enter long-term contracts or some combination of both. This gets potentially the regulator back big time into their business. Insuring against the risk is going to be costly raising the old regulatory issue of whether it is prudent. Regulators may be forced back into micromanagement, determining whether the Discos paid too much to avoid or safeguard against the risks. Instead of determining whether investment in a nuclear plant was prudent they will be in the business of determining whether the Disco’s long term contracts and hedging strategies were prudent unless they can adopt a procedure, which enough of the parties can agree is prudent. One such procedure is to auction off the energy supply, the risky part of the DSO. In New Jersey such an experiment is underway

and explained by Salant (2002). It offers guaranteed prices of energy for a year. Whether it will survive major turmoil in the energy markets remains to be seen. In addition, it has transactions costs associated with it that may be significant. Moreover, it may further dull the incentives for Discos to pass on appropriate signals to their customers of the real time costs that customers' consumption decisions occasion.

Putting all of this together, it is fair to say that the U.S. electric power industry remains in a state of shock. Enron, California, catastrophic grid failures, and large regulatory uncertainty are the rule of the day. Like a feudal lord in the tumultuous 14th century in Europe, it is not surprising that the basic strategy being pursued by participants in this market is to fortify their current castle and protect it from further damages. This means retaining current customers, fighting off new entrants and stalling on any further changes in regulatory structure. In this castle metaphor, economists are still helping to man the battlements. However, they now show a few of the scars of previous encounters, and grand plans for foreign wars have given rise to more modest pursuits in defending the home territory.

Postal Service

The United States Postal Service joins many other national postal operators around the world in facing a number of problems that are not easily resolved. These include declining demand in its traditional letter mail products, increasing competition in parcels and logistics services, and often (as is certainly the case in the U.S.) flawed regulatory and business models. With these problems in mind, Postmaster General Jack Potter and Under Secretary of the Treasury Peter Fisher announced on December 11, 2002 the formation of the Presidential Commission on the United States Postal Service. This has been followed in 2004 by proposed legislation to reform the postal service and introduce new forms of regulation. We briefly review the status of the debate here.²⁴

The most important problem going forward for USPS is the pressure it faces in the form of competition from various electronic communication service providers. This has led to the erosion worldwide of demand for the basic letter-mail products of postal services, and this is anticipated to continue and possibly strengthen. USPS needs to change significantly the nature of its product mix that still relies heavily on its monopoly in letter mail, which is under pressure, while failing to take advantage of the opportunities for growth in many competitive products, including parcels, small packets and hybrid electronic mail products. In competing in these areas, it faces problems that arise not only from its own cost structure and regulatory cost allocation mechanisms, but also from the response such entry elicits from its competitors.

A major aspect of the institutional and governance structure of USPS arises from constraints on its flexibility in pricing and in the introduction of new products, as well as on the use of its primary input factor, labor. The nature of these institutional constraints significantly impairs its ability to respond efficiently to changing market conditions, including any such conditions requiring a smaller and more flexible labor force.

²⁴ For an extended discussion of the problems of the USPS, see Crew and Kleindorfer (2004b).

Understandably, USPS has argued strongly for changes in regulation that will allow it to respond more flexibly to real or perceived competition. On the other side, there is concern about the market dominant position occupied by USPS and the potential it has for impeding competition by abusing this position, e.g., engaging in cross-subsidies or predatory pricing to impede entry. Under the present circumstances of eroding letter mail volumes and significant financial problems, it is especially difficult to determine what elements of USPS behavior are essential for the viability of the USO and what elements are unnecessary infringements on the market.

In the absence of institutional change, it is unlikely that USPS will achieve the significant cost reductions and service improvements required to remain competitive. As a government enterprise, the USPS lacks two key incentives for cost containment and service improvement: it has no profit incentive and is unable to go bankrupt. As a regulated enterprise, the USPS has little flexibility to alter its prices, introduce new services, or control its labor costs, which account for 80 percent of total costs. If the underlying causes of these problems are not addressed, competition could easily exacerbate USPS' financial difficulties, creating political pressure for massive taxpayer subsidies.

The fundamental flaws in the USPS business model are reflected in some of the very serious problems it currently faces. These problems include powerful competition from the Internet, severe financial problems and rigid institutional constraints that prevent it from controlling its most important factor of production, labor. As the recent use of the mail to deploy anthrax has highlighted, mail service is also extremely vulnerable to terrorism, especially bio-terrorism.

All of these elements combine to yield a grim picture. The financial problems facing USPS are particularly severe. When Robinson and Rawnsley (2002) analyzed the finances of USPS they examined the 2001 Balance Sheet, which indicated an extremely serious situation. Since then the situation has improved with the discovery of that USPS had made contributions in excess of those considered actuarially appropriate resulting in the removal of a large liability from the balance sheet. However, significant off-balance-sheet liabilities remain. Off-balance-sheet liabilities and other accounting problems have recently received worldwide interest with the Enron bankruptcy and the web of off-balance-sheet transactions that in the case of Enron allegedly served to hide billions of dollars of losses and liabilities. Examination of USPS accounts also reveals similar serious problems (primarily deferred employee pension and health care obligations), although in the case of USPS there is no reason to believe that any improprieties have taken place.

Can USPS use its letter monopoly to provide the funding for its deferred liabilities and off-balance sheet obligations? This seems unlikely, since increased competition for its basic letter-mail product will undoubtedly continue. For example, the ever-increasing penetration of the Internet alone is having significant impacts in eroding bill presentment and payment procedures via postal services. Partly reflecting such increased choice in the market place, estimates of letter-mail demand elasticities in recent studies have been

near unity or greater, and estimates of letter-mail volumes and revenues suggest the strong likelihood that these are already in decline.²⁵ For example, Robinson (2002) notes that First Class Single Piece Mail, the primary product in USPS Retail Sector, has seen annual volumes between 1991 and 2002 decrease from 15.1 to 13.3 billion pieces. Most of this is the result of electronic diversion of business mail. In the Commercial Sector (which includes all mail that is tendered to USPS in bulk), USPS revenue has shown steady increases throughout the period 1972-2000, but sharp declines in the past two years, perhaps as a result of recession and terrorism. Even if commercial revenues recover somewhat, however, demand estimates in the industry make it very difficult to imagine a scenario that will enable USPS to use its letter monopoly to provide funding for these deferred liabilities. Indeed, given its operating losses in the past two years and the demand issues noted above, if USPS does not become considerably more adaptive in its approach to managing its labor costs and fixed facilities, it might not even be able to meet its operating costs going forward.

The basic problem faced by USPS in controlling cost arises because of the fixed nature of costs arising out of its USO, as illustrated in Table 1 (from Cohen et al. (2002)). This Table provides a breakdown of the cost structure of USPS between fixed and variable costs. From this we note that delivery and window services are overwhelmingly fixed, running over 50% of their total cost. This reflects the basic problem of the USO, in that Post offices and ubiquitous delivery are the major elements of the USO. As long as the USO continues in anything like its present form, there will be a significant fixed cost element to it with all the attendant pricing and entry regulation problems.

Table 1: USPS Fixed/Variable Cost by Major Function (FY 1999)

Source: Postal Rate Commission Docket No. R2000-1

Function	Fixed (%)	Variable (%)	Total Cost (\$ Billions)
Delivery*	52	48	22.1
Mail Processing	4	96	21.4
Transportation	8	92	4.3
Window Service	54	46	3.1
Other	77	23	11.5
Total	37	63	62.4

*Delivery includes in-office and out-of-office costs.

The most salient feature of USPS cost structure, as with other postal administrations, is the fundamental role that labor plays in determining total costs. In recent years, the cost

²⁵ Wolak (1997) provides elasticity estimates for the household sector in the U.S. that show a clear pattern of increase, beginning in the early 1990s, achieving levels well above unity by the mid 1990s. Similar patterns to those in the U.S. are reflected in studies on other postal administrations as well. All of these show the significant impact of electronic communications in eroding letter mail volumes and in putting pressure on postal administration revenues.

of labor has held steady at approximately 80% of total USPS costs. As discussed in detail by Wachter et al. (2001), labor inflexibility and wage levels have a major effect on the ability of USPS to restructure its operations to remain viable. This is very important for any discussion of the future of USPS. USPS labor agreements with postal unions leave very little room for postal management to control labor costs, as these are determined by an external arbitration process. Over the years, this process has led to a wage premium in excess of 20% relative to comparable wage standards in the private sector.²⁶ Thus, given current wage premium levels, full-time USPS employees, currently around 800,000, have little reason to seek employment elsewhere. This, and job security provisions included in postal labor agreements, make it exceedingly difficult under present arrangements for postal management to respond flexibly to competitive or market pressures that dictate changes in the structure or size of the postal labor force. These are serious financial problems that will be extremely difficult to overcome whether USPS continues as a public enterprise or, as recommended by some, is privatized. The remedies available to the private sector of downsizing and restructuring face insuperable barriers given the governance and ownership structure of USPS. The discipline of competition and resulting incentives for innovation can only have muffled effects under these circumstances.

The serious problems currently facing USPS arise primarily from its business model, which is seriously flawed, as it lacks a number of basic attributes of a viable business model. First, there should be a governance structure that attracts highly qualified top management, mainly by providing an appropriate incentive and reward structure. Second, there should be freedom to introduce new products or services without undue delay for regulatory clearance. Third, management should be able to control its principal input costs, which, in the case of postal service, is labor. Fourth, the regulatory framework should allow for growth or change while preserving the Universal Service Obligation (USO) and offering some protection for small customers. These features are not controversial. For regulated industries generally, any viable business model would be expected to have these features. However, USPS is deficient in varying degrees in all four of these attributes as discussed in detail in Crew and Kleindorfer (2004b).

Consider just the issue of regulatory governance. While it operates within a framework of law, the Postal Rate Commission (PRC), the regulator of the USPS, has a significant role in interpreting and administering the regulatory process. Its mandate cannot be specified in every detail. PRC has considerable discretion in interpreting testimony from interveners. Depending on the views of the membership of the PRC, the treatment that competitors or particular customer groups receive can vary significantly as the PRC has extremely detailed rate setting authority. While its decisions are technically “recommended” they are not easily overturned by USPS management operating through its Board of Governors. The regulatory process inhibits significantly USPS ability to set prices. Similarly, on the issue of closure of post offices the hearing process administered by the PRC places non-trivial restrictions and delays in closing local post offices.

²⁶ In addition, Wachter et al. (2001) provides the results of further assessments and comparisons, taking into account working conditions between postal workers and various private sector counterparts, showing that the wage premium may be as high as 36.2%.

Current reform legislation before both the House and the Senate proposes some changes in regulation, including the installation of price-cap regulation. However, the problem is that the benefits obtained from such reforms can only go so far if there are no significant changes in the public enterprise status or the governance structure. The reforms likely to promote a viable business model would need to address the regulatory framework, the labor relations framework and the governance of USPS. Governance might be considered the prime driver, as without changes in it the impact of changes in the other two is likely to be limited. USPS must become more commercial in its orientation. This could be achieved in varying degrees from increased corporatization and commercialization to full-scale privatization. Commercialization implies that USPS would function similar to a private company although the stock would be held by the Federal Government. A commercialized USPS would expect to be subject to the control of its board of directors as in the case of a privately owned company and not directly subject to Congressional intervention as presently. To bring about successful commercialization would require a significant reduction in the role of Congress. This would be difficult to achieve short of privatization, but, whatever the ultimate institutional form USPS takes, every effort must be made to achieve commercialized operations if USPS is to have the necessary flexibility and structure to accomplish the business and policy objectives noted earlier.

A number of steps could be taken to increase the commercial orientation of USPS. These would include replacing the existing Board of Governors with a Board of Directors. As such it would resemble the Board of many large corporations, including leading figures from the business world. This would give the new USPS a profit orientation. Having a private sector style Board of Directors would have little impact unless USPS were allowed in certain basic ways to behave like a commercial entity. This would not be feasible unless the prohibition on retained earnings were repealed. This change along with a Board of Directors would make motivation and compensation of top management less difficult. Profit orientation and ability to retain earnings would give the additional benefit, if successful, of putting USPS finances on a sounder footing. This would make USPS less vulnerable to Congressional intervention in its business. It would have the most basic independence of all, financial independence. Since Congress would not be paying the piper, it would find it more difficult to call the tune. The Federal Reserve has been successful in maintaining independence from both the legislative and executive branches of government because it has no difficulty funding its activities and even in effect paying a dividend to the Treasury. Ending the prohibition on retained earnings would go some way to giving USPS the desired commercial orientation and independence from government.

USPS also needs to attract talented top management and commercialization would go a long way to achieving this in that it would involve a change of duties, different incentives and higher compensation, and the ability to make a difference in the future of USPS. One consequence of commercialization is that USPS would become more involved in the "selling business". It would have to compete and become more innovation oriented. Of at least as much importance there are many other aspects of commercialization and

“turnaround” operations that are well known in the private sector and could be brought by knowledgeable executives to USPS, if it were restructured to promote a culture of commercialization.

While a detailed discussion of labor reforms is beyond the scope of this paper, they are obviously central to long-run viability of the any postal operator, including USPS. A commercialized entity would presumably have to make major changes in the existing system including allowing the right to strike and negotiating more productivity oriented labor agreements. Other possibilities might include an employee stock ownership plan (ESOP). Commercialization would involve a radical examination of all of USPS real estate holdings and product facilities and would presumably result in a major rationalization. This could result in the reduction in many mail processing positions and closure of facilities. Of course, such restructuring would have to be accomplished according to agreed principles and prior discussion with the public or its representatives, but a commercial orientation would leave the actual execution of rationalization strategies in the hands of USPS management.

Finally, a commercial orientation would require a change in the regulation of USPS. Traditionally, postal regulation has provided a forum for special interests to battle over the division of the spoils. First Class Mail has traditionally been the captive mail product that has provided most of the contribution to fixed costs while other classes of mailers have fought to minimize the amounts they pay for advertising, newspaper, magazines and other products. USPS attempts to make headway in parcels and small packets have been “policed” carefully by competitors who have intervened actively in the regulatory process. Regulation would change significantly not only in allowing USPS greater freedom but also the regulatory commission would no longer be subject to being overruled by the Board of Governors with its replacement by a Board of Directors.

Currently, most of the Postal Rate Commission’s and USPS’s efforts are taken up with Rate Cases, which occur approximately every three years and formally take ten months to complete but in practice involve more time given the requirement that USPS and others prepare testimony. Formal rate hearings would be less frequent and much simpler under the new regulatory regime. Indeed, not all of USPS products would be regulated. Probably some form of price cap regulation would be the most appropriate form of regulation. One major issue would be what to include in the price cap. Clearly single piece First Class Mail would be subject to regulation. One possibility might be to make single piece subject to a price cap with automatic adjustments according to an inflation index with all other products not subject to price regulation. While this seems to be minimal regulation, it turns out that regulating single piece would impact many other rates. For example, as argued in Crew and Kleindorfer (1994), this would set a ceiling on the access prices USPS could charge and would provide the base for presort and other quantity discounts. USPS might be required to file an access tariff for letters and parcels. Another possibility might require USPS to face a price cap on single piece parcels and small packets.

As with telecommunications and electricity, the key issue going forward for the postal services of the world will be designing effective institutions for “regulated competition”, including access conditions and pricing, joint use of the postal network for both regulated and competitive products, and other the scope of the monopoly itself. The success of commercialization, for example, in the case of Germany, the Netherlands, Sweden, New Zealand, Canada and Australia provide a strong case for the commercialization of USPS. The progress toward privatization in Germany and the Netherlands strengthen the case for going further, namely, adopting privatization. The issue is not only whether to privatize or to commercialize without privatization but also how to get from here to there.

Despite recent problems with private governance with instances of outrageous corporate greed and fraud, we continue to have faith in the corporate private ownership model. It has stood the test of time. Failure to consider privatization to replace USPS failed business model because of concerns with private governance is akin to throwing the baby out with the bath water. As indicated in Crew and Kleindorfer (2004b), privatization of the USPS is likely to offer the prospect of the most efficient solution, with the privatized entity subject to restructured regulation to promote innovation and productivity growth. However, given the weak economy and experience elsewhere, getting from here to there is a challenge. Germany and the Netherlands both began with commercialization and have still not attained full privatization. Other successful experiments in commercialization, for example, Sweden, New Zealand, Canada and Australia, show no apparent interest in privatization. Even when privatization is the ultimate objective, experience may show that a more gradual commercialization approach may be superior to a big bang. From a U.S. perspective, at least, the challenges in the postal and delivery sector for regulatory economics will be very significant going forward, as this sector continues to be a focal point of expected public infrastructure, but it also operates at the nexus of many private companies offering substitutes or complements to postal products. The ensuing challenges for regulators to maintain the traditional USO while trying to allow competition to promote innovation across communication and logistics networks is a very large one, indeed.

4. The Road Ahead

Because our critique was intended to be provocative, it oversimplified some issues and may come across as overly pessimistic. Undoubtedly, considerable progress has been made in the last twenty years. It is important to build on this for the future. Failure to learn the right lessons can set regulation and regulatory economics back. One lesson not to learn as a result of the California experience is that a return to old-style regulation is required, for example, a return to command, control or cost of service and extensive expansion of public ownership. Returning to the old ways will be difficult. New property rights have been created, which will be defended vigorously by the new owners. Regulating the California generators will be fought tooth and nail by the generators. What we have learned is to respect the complexity of change in network industries, and the huge problems of regulation under the transition to competition. Some old ideas still have great currency, including pricing and incentive alignment. Making use of the new

financial instruments and competitive bidding processes should still be a part of a reformed system. Such devices have much to offer in terms of efficiency and risk sharing, but their precise structure and design will need to be more carefully thought out than in the past “rush to markets”. Carefully thinking things through means running experiments *ex ante*, constructing reasonable simulations of new designs before they are implemented, encouraging diverse and differentiated solutions rather than a one-size-fits-all approach that may be wrong, watching and learning from others internationally, and most importantly promoting a flexible and evolutionary approach to institutional development and change.

Another lesson is that more must be understood about the deregulatory process. This should start from the public choice insight on rent seeking. The deregulation game is an attempt to secure or redistribute the monopoly rents that exist in regulated industries. The California experience shows how badly things can go wrong if the rent distribution is disturbed too severely. In part, this stemmed from a failure to understand the incompatibility of restructuring with the continuation of an onerous default service obligation. The problem of the default service obligation and the USO is that deregulation calls for allowing entry but the complexity of doing so while assuring that the incumbent responsible for default service is not towed under in the process is significant. This is a major problem, which is currently unsolved. For now it implies caution. For the postal sector where major restructuring of the kind in telecommunications and electricity has not taken place, this means deciding what changes to make in the USO before changes in the conditions of entry and other restructuring are allowed to take place.

The final lesson that we draw is that the expectations for deregulation should be revised downward drastically and that further deregulation should be undertaken with caution. Indeed, there may be a return to old style regulation in some areas, for example in transmission ownership in electric power, to achieve sufficient clarity and incentive alignment for long-run sustainability. In other industries, for example, telecommunications it may be necessary to adopt very different policies, for example, requiring divestiture of the local wires. Local service is dominated by very large companies. If they divested their wires-only operations all of the remaining pieces would still be large enough to take advantage of scale economies.

Thus, although a lot of interesting research and many interesting developments have taken place over the last twenty years, much remains to be done. Regulators, managers in regulated companies, policy makers, pundits and academic researchers have many problems to address in regulatory economics, at least for the foreseeable future.

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