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# Telecommunications Regulation

## Current Approaches with the End in Sight

Jerry Hausman and J. Gregory Sidak

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### 6.1 Introduction

We consider the question in this chapter of the transition from regulated monopoly to competitive local markets in telecommunications. Technological change in terms of cellular and mobile competition has arisen over the past twenty years, where in most industrialized countries more than 80 percent of the population has cellular service. Even more important, the spread of competing fiber networks operated by cable companies that offer voice service and broadband service, in addition to pay TV, has transformed the competitive environment in the United States and has the potential to do so in many other countries. This transition will need to be managed within the framework of mandatory unbundling, first adopted in the United States in the mid-1990s, and now used by regulators in most advanced economies. We discuss the expected endpoint of competitive local markets, which should be facilities-based competition. We also discuss whether regulators will allow this process to occur or will hinder the process and end up with “regulation forever” by creating incentives for new entrants to choose a mandatory unbundling offer rather than investing in their own competing

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This chapter is based on the current state of knowledge in 2007, when it was written. It has not been revised to reflect developments since 2007. For a recent analysis of developments since then, see J. Hausman and W. Taylor, “Telecommunications in the US: From Regulation to Competition (Almost),” *Review of Industrial Organization* 42 (2013). For acknowledgments, sources of research support, and disclosure of the authors’ material financial relationships, if any, please see <http://www.nber.org/chapters/c12568.ack>.

facilities.<sup>1</sup> The United States is well positioned to greatly decrease regulation with the “end in sight” while the EU countries and other nations such as Australia may well be on the path to “regulation forever.” Indeed, a number of US states and Canada have recently deregulated fixed-line telephone services, as we discuss in this chapter.

Economic advice to regulators regarding the correct principles to set regulated prices has often been incorrect in that it ignored the technology of the industry. Economists recognized early on that, in the situation of privately owned utilities in the United States, the first-best prescription of price set equal to marginal cost could not be used because of the substantial fixed (and common) costs that most regulated utilities needed to pay for.<sup>2</sup> This realization typically accompanied the claim that the economies of scale of the regulated firm were so significant that competition could not take place because the regulated firm’s cost function was significantly below new entrants. Nevertheless, the most common advice from economists was that prices should be set similar to the outcome of a competitive process. Regulatory agencies largely adopted this technology worldwide. For example, the US Federal Communication Commission (FCC), when establishing the regulatory framework for setting prices under the Telecommunications Act of 1996, had the goal to adopt a pricing methodology that “best replicates, to the extent possible, the conditions in a competitive market.”<sup>3</sup> Similar statements about using a pricing framework to replicate competition have been made by numerous regulatory agencies. Indeed, the adoption of the TELRIC model by the FCC and similar TSLRIC models by regulators elsewhere were supposed to achieve prices similar to outcomes in a competitive market.<sup>4</sup>

What the competitive process would be was never specified with any detail, which was to be expected since economic theory had no well-accepted model of competition with a technology exhibiting strong economies of scale, especially in the multiproduct situation. In the United States, regulators following legal principles adopted the position that the regulated firm should cover its costs.<sup>5</sup> However, regulators also adopted prices for certain

1. We do not discuss the history of telecommunications regulation and the movement from state-owned monopoly companies (in most of the world) or regulated monopolies (in the United States and Canada) prior to the 1990s. Numerous (hundreds of!) survey papers have been written that discuss this history. Excellent groups of papers with many references are contained in Cave, Majumdar, and Vogelsang (2002) and Madden (2003).

2. See, for example, Kahn (1970).

3. Federal Communications Commission, *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket No. 96-98, First Report and Order, September 17, 1996, ¶ 679.

4. TELRIC is “Total Element Long-Run Incremental Cost” and is explained in FCC (see note 3). TSLRIC is “Total Service Long-Run Incremental Cost.” Both approaches use similar techniques but differ with respect to the level of aggregation used.

5. The Telecommunications Act of 1996 required that prices be set at cost, with the possible addition of a reasonable profit. See the Act § 252(d)(1).

services to attempt to meet social goals for these given services. For other services, regulators used arbitrary means to set prices while balancing competing claims from increasingly well-organized groups of consumers, all of whom claimed they should receive low prices with other groups paying for the fixed and common costs.

This regulatory approach arguably did not do undue damage when no actual competition existed. So long as the regulated firm was (nearly) productively efficient, the losses were essentially second-order social welfare losses. The regulated firm covered its total costs, at least approximately, although prices for individual services were often badly distorted from an economically efficient solution.

The regulatory process often failed to take sufficient notice of the importance of new product and service innovation in telecommunications. Academic research has found that much of the gains in consumer welfare occur when new services are introduced. The regulatory approach, by retarding the introduction of new telecommunications services, harmed consumers to a significant degree by retarding new product innovation, which is a first-order loss to economic efficiency. See Hausman (1997) for estimates of consumer welfare loss. Telecommunications differs in an important respect from many other regulated industries because of the rapidity of technological change. Telecommunications regulators have found it difficult to adapt to these changes and outdated regulatory policies may create perverse economic incentives for investments in new technology, as we discuss subsequently.<sup>6</sup>

However, when actual competition appeared and was allowed to exist by the regulators, the economists' advice of setting prices as if they were the outcome of a competitive process soon led to a regulatory morass. Regulators could no longer depend only on cost factors in setting regulated prices. The outcome of a competitive process would also need to take into account demand factors and competitive interaction (oligopoly) factors, with the first set of factors difficult to measure and the competitive interaction factors unlikely to be agreed upon. While regulators had some imperfect information about costs, they typically had little or no information about demand and no well-developed idea regarding the effects of competitive factors.

A particularly difficult problem arose when a regulated firm wanted to decrease its prices for services subject to entrant competition. Economists recognized that a price set above incremental (marginal) cost should be permitted. New entrants wanted the previously set regulator-set prices to be maintained. New entrants typically entered because regulated prices were

6. Cost-based regulation typically based consumer prices in part on depreciation lives of capital equipment. Regulators had an incentive to keep these lives at very long periods to reduce depreciation expense and hold down prices. Technological change led to much shorter economic lives of capital equipment so regulators often resisted the introduction of new equipment and new services. An example of this outcome was the delayed introduction of digital (computer driven) PBXs in the 1970s in the United States.

well above efficient levels, and the new entrants did not want these prices decreased. Furthermore, from a social welfare viewpoint the argument became first-order since inefficient new firms could be productively inefficient, causing a first-order loss of social welfare.

Regulators found it difficult to permit the regulated firm to decrease its prices, especially since under cost-of-service regulation other prices would need to increase. Even when cost-of-service regulation was replaced by incentive (price cap) regulation in the 1980s and 1990s, regulators still found it extremely difficult to allow price decreases since they believed in “regulated competition” (an oxymoron) where the regulators could better manage competition than the market.<sup>7</sup> Nevertheless, the regulated companies were not harmed too badly since competition did not proceed at such a rapid pace to cause extreme economic damage.

Cost-based regulation of telecommunications (e.g., rate-of-return regulation in the United States) had significant negative effects on innovation while it was claimed that it led to excessive capital investment. Most economists conclude that cost-based regulation led to significant consumer harm. In the mid-1980s when the UK government privatized British Telecom (BT), it decided not to use the historic approach of cost-of-service regulation to set regulated prices as the United States and Canada had done. The UK government instead chose price caps, a new regulatory method proposed by Littlechild.<sup>8</sup> Price caps regulated prices based on inflation and a productivity factor instead of regulated profits, as in the US cost-of-service based rate-of-return (ROR) regulation.

Price caps had a number of advantages over ROR regulation in terms of incentives for cost minimization (productive efficiency), innovation, and the ability of the regulated firm to rebalance its prices. In particular, the regulated firm could decrease its prices to compete. In 1989 and 1990 the Federal Communications Commission adopted price caps in the United States. Other countries such as Australia had also adopted price caps. During the 1980s and 1990s price cap regulation was implemented instead of cost-based regulation in most countries when telephone companies and other utilities were privatized. In the majority of the states of the United States, rate-of-return regulation has been replaced by price cap regulation. The battle to banish cost-based regulation appeared to be largely over.<sup>9</sup>

During the late 1990s and the early 2000s cost-based regulation has reappeared because of the necessity to set prices for unbundled network elements (UNEs) sold by incumbent firms to their competitors. A num-

7. See chapter 5 by P. Joskow in this volume that discusses the theory and application of using incentive-based regulation to replace traditional cost-of-service regulation.

8. See Beesley and Littlechild (1989) for a description of the economic incentives under price caps.

9. State regulatory agencies in the United States set local prices for telecommunications. California adopted the price cap in 1989 and by the mid-1990s the majority of states had adopted some form of incentive regulation.

ber of countries—including the United States, Australia, and Canada—adopted mandatory network unbundling for the incumbent local exchange carrier (ILEC). The most commonly used approach to set regulated network element prices based on costs is total service long-run incremental cost, or TSLRIC, although the United States adopted TELRIC instead of TSLRIC.<sup>10</sup> The adoption of TSLRIC as a cost basis to set the prices for unbundled elements has negative economic incentive effects for innovation and for new investment in telecommunications networks as we have discussed in previous academic research (Hausman 1997, 1998a, 2003; Hausman and Sidak 1999). Indeed, in the United States the two major landline telephone companies, Verizon and AT&T (previously Southwestern Bell), began construction of residential fiber optic networks soon after the FCC exempted new network investment from regulation in 2003 and began service in 2005. To the contrary, the incumbent residential telephone provider in Australia, Telstra, has so far refused to proceed with construction of a residential fiber optic network until it receives a guarantee from regulators regarding future regulatory policy toward new network construction.

How did network unbundling and a return to cost-based regulation become government policy? In 1996, the US Congress passed the Telecommunications Act of 1996. As a trade-off for being permitted to offer long-distance service, the incumbent Bell operating companies agreed to unbundle their networks.<sup>11</sup> The FCC adopted cost-of-service regulation to set the unbundled network element prices. Thus reappeared the well-known problems of cost-of-service regulation, with its inability to correctly treat economies of scale and economies of scope and its use of arbitrary allocations of fixed and common costs to prices. Even worse, the FCC adopted the approach of “total element long-run incremental cost” (TELRIC), which assumes that all investments in telecommunications networks are fixed, but not sunk. This assumption is, of course, directly contradicted by the actual technology of telecommunications networks. Other countries have adopted a similar approach based on total service long-run incremental costs (TSLRIC). Similar problems arise. While both TELRIC and TSLRIC regulation are supposed to be forward-looking so capital investments are not yet sunk, since networks are very long-lived investments, their sunk characteristic becomes very important in a world of uncertainty.<sup>12</sup> Regulators gave new entrants a “free option” to purchase either the unbundled element (TELRIC) or service (TSLRIC) on a monthly basis, which treated the investment as fixed but not sunk.

In this chapter we do not review these problems, which have been dis-

10. See fn. 4 for an explanation of the difference between TSLRIC and TELRIC.

11. The Bell Operating Companies had not been allowed to provide interLATA long distance service since the breakup of AT&T in 1984.

12. See Dixit and Pindyck (1994) for a discussion of sunk cost investment under uncertainty. Hausman (1997, 2003) and Pindyck (2004) discuss the problem in relation to telecommunications investment.

cussed in previous papers (e.g., Hausman 1997, 2003; Pindyck 2004), but instead we consider the outcomes thus far of the new regulatory approach to unbundling the incumbents' networks. We concentrate on the outcome in three countries: the United States, the United Kingdom, and New Zealand. The United States first adopted unbundling and has taken the most aggressive approach. However, in February 2005 the FCC, acting in response to a decision of the US Court of Appeals for the DC Circuit vacating the agency's unbundling rules, decided to "sunset" its most intrusive form of unbundling.<sup>13</sup> In response, the two most prominent local competitors, AT&T and MCI, announced they would exit the local market. Shortly thereafter, both companies announced that they would be acquired by incumbent local exchange operators, known as ILECs (SBC and Verizon). Thus, while much of the competition caused by the Telecommunications Act of 1996 was "artificial competition" (to borrow Justice Breyer's characterization), the local market in the United States will benefit from facilities-based competition as cable television networks are rapidly expanding their offering of telephone service over their networks through voice over Internet protocol (VoIP).

In the United Kingdom, the regulator initially favored facilities-based competition from the United Kingdom's cable operators, which already had a substantial share of the local telephone market. However, the regulator subsequently changed direction, in part because of directions from the European Union. We examine the effect of unbundling in the United Kingdom and its effect on the prospects for future facilities-based competition. Those prospects are all the more doubtful after the regulator (now, OFCOM) and BT announced in May 2005 that they had reached a compromise—in lieu of structural separation—that appears to "renationalize" BT insofar as governance of network unbundling is concerned.

Last, we consider New Zealand, where the regulator decided not to adopt network unbundling. New Zealand has an explicit consumer welfare test for regulation, the "long-term benefit of end-users," and bases regulatory decisions, in part, on an explicit cost-benefit analysis. Further, when the decision was made in New Zealand not to unbundle, the United States had over six years of experience of unbundling. We explore how this experience affected the regulator's decision in New Zealand.

Our general conclusion is that in both the United States and the United Kingdom unbundling may have caused an increase in competition, if one measures competition by market share of entrants. However, adverse effects occurred in terms of investments by both incumbents and new entrants. Further, the "goals" put forward by regulators in terms of unbundling have not been met.

13. Order on Remand, *In re Unbundled Access to Network Elements*, 2005 FCC LEXIS 912, WC Docket No. 04-313, CC Dkt. No. 01-338 (FCC February 4, 2005).

In the last section we consider whether, with increased facilities-based competition, especially in the United States, the “end of regulation” in telecommunications can occur. We explain that in an industry with high fixed costs and low variable costs, the incumbent will not be able to increase prices above competitive levels profitably if it loses a relatively small amount of business. Thus, the entry of cable television providers offering telephone service will serve to constrain incumbents from increasing prices above competitive levels at a quite early stage. Further, cellular telephone will also offer an additional constraining force. Thus, no economic reason exists for the incumbent’s share to fall to, say, 50 percent before price deregulation can follow. Emerging facilities-based competition can allow the end of price regulation and the regulatory burden that it creates for both consumers and the economy.

## 6.2 The Simple Model of Cost-Based Regulation

The typical approach to cost-based regulation is to use costs of production to set prices that would be the result of a “competitive” situation.<sup>14</sup> These costs of production are used to set prices independent of demand factors. A very simple one-good, one-period Marshallian partial equilibrium model leads to this result, where competitive prices are independent of demand. We first describe this simple model and its inherent limitations.

### 6.2.1 Conditions for Prices Independent of Demand

Assume that a given regulated telecommunications service is produced by one or more input factors. No multiperiod capital goods are present. The production technology exhibits constant returns to scale. In figure 6.1 the result follows that the competitive price equals marginal cost, which in turns equals average cost, because of the assumption of constant returns to scale. As can be seen, the position and shape of the demand curve does not matter in setting the competitive price. Under these conditions, cost determines price, independent of demand. This interesting result depends very much on the assumptions of the economic model: partial equilibrium, so that demand for the product does not affect input factor prices; constant returns to scale, so there are no economies of scale; a single product, so there is no joint production and no economies of scope; and a single period, so there are no durable capital goods. We discuss later what happens when these assumptions do not hold. If any of the assumptions fail, the competitive price cannot be based on cost, independent of demand. Thus, the price-independent-of-demand result will turn out to be a very special result not applicable to the real world of telecommunications.

14. This description of regulation only holds for telecommunications regulation, not price regulation of other industries.



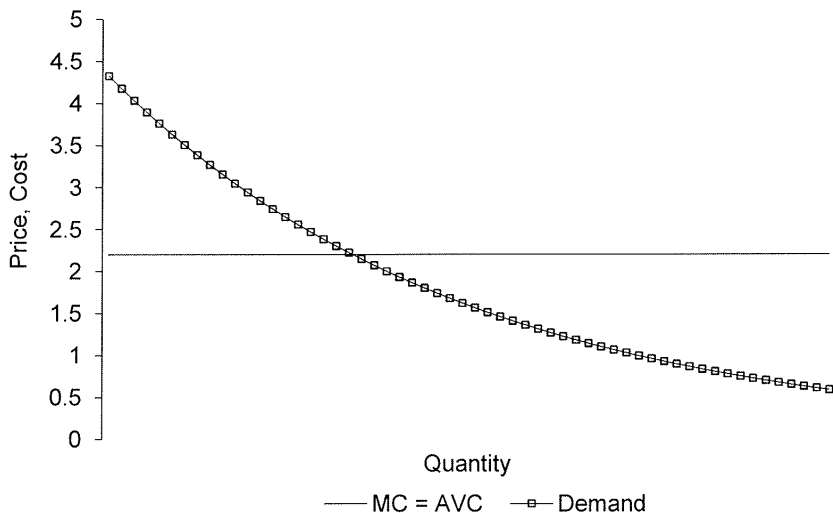


Fig. 6.1 Cost and price with constant returns to scale

### 6.2.2 The Role of Fixed Costs and Economies of Scale

We will now generalize this model slightly. Suppose that marginal cost remains constant but that we allow for a fixed cost of production. However, a single service is still being produced. The cost function can be written as:

$$(1) \quad C(q, w) = F + wq,$$

where  $F$  is the fixed cost,  $q$  is output quantity, and  $w$  is the constant marginal cost per unit of output. A regulator might conclude that in a competitive, free-entry situation price would equal average cost, so that  $p = (C/q) = (F/q) + w$ . Because quantity demanded is a function of price, price is no longer independent of demand. However, setting the price equal to average cost, ATC (or average total cost), seems to be the correct outcome if the regulated utility is to recover its costs.

### 6.2.3 The Role of Common Costs and Economies of Scope

Now we consider common costs. A common cost arises when two (or more) services arise from a joint production process, but some of the cost is incremental to neither product. The term “fixed and common costs” arises often in discussion of regulated costs and prices because of the common occurrence of this type of cost. In terms of the cost function we will again assume constant marginal costs for each output:

$$(2) \quad C(q_1, q_2; w_1, w_2) = G + w_1q_1 + w_2q_2.$$

Note that in equation (2) the fixed cost  $G$  cannot be uniquely assigned to either output. Indeed, no measure of average costs for either output exists.

Thus the statement, sometimes made, that regulators set prices equal to average cost is incorrect because no measure of “average cost” exists when a joint production process occurs.<sup>15</sup> Here regulators typically choose to use an allocation of the fixed cost  $G$  to each service. However, these allocations such as “fully allocated cost,” “equal allocation of cost,” and so on are inherently arbitrary.<sup>16</sup> Nevertheless, the results of the allocations have very important consequences on the regulated prices. These regulated prices in turn have important effects on competition, economic efficiency, and consumer welfare.

In competitive markets, firms set price based on cost conditions, demand conditions, and competitive conditions. Regulators attempt to base prices on only the first of these three factors. While the level of demand is used so that price times demand, across all service, is supposed to equal the cost of the regulated company, demand elasticities are almost never used. Yet in competitive markets demand elasticities are an important component of pricing decisions in a multiproduct situation. Thus, regulators do not meet their goal of setting regulated prices in a manner similar to that of a competitive market. Furthermore, they can cause billions of dollars per year of losses in economic efficiency and consumer welfare.<sup>17</sup> Instead of using inherently arbitrary allocation procedures, regulators could improve the outcome of the regulatory process either by taking account of demand and competitive conditions in setting regulated prices or adopting procedures such as global price caps, which will lead the regulated utility to take account of demand and competitive conditions.<sup>18</sup>

#### 6.2.4 The Role of Sunk Costs

We now generalize the model one step more by considering sunk costs in addition to fixed costs. Sunk costs are costs that cannot be recovered if the economic activity ceases. Sunk costs are prevalent in telecommunications networks. Consider an investment in a (copper) loop to a residential customer. The customer has a unique loop that connects the residence to

15. A classic example in local telecommunications was how the cost of the local loop between the customer premise and the central office should be recovered. Should local service pay for it or should it be paid for by some combination of local service, long-distance service, and other services such as voice mail?

16. Indeed, the results of the allocations can depend in important ways on the units in which the outputs,  $q_1$  and  $q_2$ , are measured. While regulators typically use arbitrary allocations (for example, the FCC used 20 percent for common costs for TELRIC), in some cases regulators used multipart tariffs, which can depend on demand conditions and are not arbitrary. However, in the large majority of situations, allocations have been used for common costs. Brown and Sibley (1986) analyze various forms of cost allocations and Laffont and Tirole (2000) consider the economic effects of allocation.

17. For an example of regulators causing losses of billions of dollars per year in economic efficiency and consumer welfare, see Hausman (1998a) and Hausman and Shelanski (1999).

18. See Laffont and Tirole (2000) for a discussion of global price caps. See P. Joskow's chapter in this volume for a further discussion.

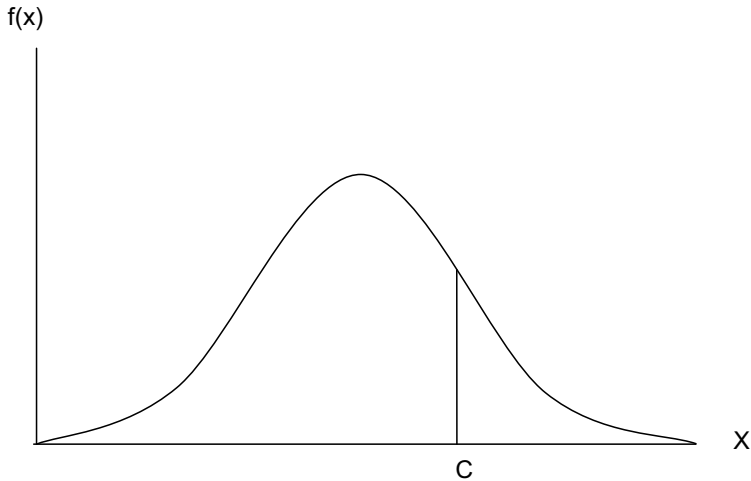
the central office switch. If the customer decides to use a competitive service, such as local access service offered by a competitive cable company or by a wireless company for its voice (and broadband) service, the copper loop cannot be redeployed in another service. The investment in the loop is sunk. Now if a regulated telephone company faced no uncertainty over the future use of the loop and the cost and prices for the associated services provided with the loop, the distinction between a fixed cost—which arises from an asset that can be economically redeployed—and a sunk cost is not that important.

Indeed, in the “old days” of cost-based regulation for a monopoly provider, if an investment were deemed to be “used and useful” by the regulator, then the asset entered the regulatory cost base. Once the asset entered the regulatory cost base, the regulator, in principle, allowed the utility to recover the cost of the investment.<sup>19</sup>

However, in the current situation of competition, where the utility’s competitors are allowed to use the incumbent’s network at regulated prices, the distinction between fixed costs and sunk costs can be important. The competitor typically pays for the facility it uses on a monthly basis. As we explain later, regulators universally use an approach that assumes that the investment costs are fixed but not sunk. In setting the regulated prices without taking into account the interaction of sunk costs and uncertainty, regulators give competitors a “free option” to use the incumbent’s network without requiring a price that takes account of the sunk cost nature of much of the investment. The regulators thus subsidize the competitors at the expense of the incumbent and create an economic disincentive for the competitors to invest in their own competing facilities.<sup>20</sup> Furthermore, the regulators decrease the incentive for new services offered by the incumbent. New services often fail. Yet if successful new services must be resold to competitors at cost, the incentive to undertake the required risky investment is

19. In practice, because of the interaction of incorrect depreciation schedules and inflation, utilities often did not recover the true cost of their investments. See, for example, Schmalensee (1989).

20. Regulation permits a new entrant to choose to use the new investment if it is successful, thus truncating the potential return of the incumbent who has made a risky investment in sunk costs. However, the new entrant needs to make no investment in the new project so it does not face the risk of the incumbent and thus it receives a “free option.” See figure 6.2, which demonstrates that the effect of the free option is to decrease the expected return of a new investment because of truncation of the returns distribution. Justice Stephen Breyer of the US Supreme Court case *AT&T Corp. v. Iowa Utilities Board*, 119 S. Ct. 721 (1999), recognized how this outcome distorts and decreases the actual amount of competition. It is sometimes claimed (incorrectly) that the firm’s cost of financial capital will increase to offset the increase in risk. This claim fails to recognize that a typical telecommunications firm produces many products and services (e.g., cellular, which is not price regulated). Indeed, the FCC has recognized that the cost of capital used in setting unbundled element rates may differ from the firm’s overall cost of capital. See *Order on Remand, In re Unbundled Access to Network Elements*, 2005 FCC LEXIS 912, WC Docket No. 04-313, CC Dkt. No. 01-338 (FCC February 4, 2005).



**Fig. 6.2** Distribution of returns

decreased.<sup>21</sup> Eliminating a portion of the distribution of returns, as shown in figure 6.2, decreases the mean of the expected return of a new project. Thus, regulators are likely to decrease new services for consumers based on their approach to setting regulated prices.

### 6.3 Cost-Based Regulation: Economic Analysis with Cost but Not Demand

The FCC and other regulators claimed to be using a competitive model for setting regulated prices, at least for TELRIC and TSLRIC, as we stated above.<sup>22</sup> The FCC stated that its goal is to establish a framework that “best replicates, to the extent possible, the conditions in a competitive market.” As we discussed earlier, in a simple one-period and one-good production model with constant returns to scale, a partial equilibrium Marshallian analysis demonstrates that the competitive price does not depend on demand. Marginal cost and average cost are independent of quantity produced, so the position of the demand curve does not affect the price as demonstrated in figure 6.1. However, the required description of technology does not describe accurately almost any industry in a modern industrial economy

21. For estimates of the extremely large gain to consumer welfare that can arise from new telecommunications services see Hausman (1997).

22. Federal Communications Commission, *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket No. 96-98, First Report and Order, August 8, 1996, ¶ 679.

and certainly not the telecommunications industry. For example, telephone and wireless networks have a very large proportion of fixed and sunk costs. We now consider whether the “price independent of demand” result holds in a broader context to see whether it is (approximately) applicable to telecommunications.

To do so we consider “nonsubstitution” theorems, which demonstrate that under certain conditions an economy will have a unique price structure determined by the costs of production, independent of the structure of final demand. We will refer to these results as Samuelson-Mirrlees nonsubstitution theorems (Mirrlees 1969).<sup>23</sup> We consider initially the simplest situation where labor is the only nonproduced factor in the economy. Here is a set of necessary conditions that would lead to a Samuelson-Mirrlees nonsubstitution theorem result:

#### Necessary Conditions for a Nonsubstitution Theorem

1. *Only one nonproduced good exists:* The good is usually assumed to be labor so that land or minerals do not exist.

2. *The technology is constant returns to scale:* A constant per unit requirement of inputs occurs regardless of the amount of output. This condition rules out economies of scale.

3. *No joint production:* A single production process cannot lead to two or more different outputs. This condition rules out economies of scope.

4. *The economy is productive:* The economy can produce a positive net vector of outputs where net output is gross output minus inputs.

With these (plus some additional technical) conditions, the product prices will be independent of final demand. The product prices will equal the cost of production, denominated in terms of the numeraire, which can be units of the nonproduced good. Thus, in a Samuelson-Mirrlees nonsubstitution model, prices of the many products in the economy are independent of demand, as in the simple partial equilibrium single-product Marshallian model.

### 6.3.1 Necessary Assumptions and Economic Reality: The “Regulatory Fallacy”

We now consider how realistic the necessary assumptions for the application of the nonsubstitution theorem are in the context of telecommunications. Could the regulatory goal of setting competitive prices independent of demand hold approximately true in a realistic economic situation? Because the assumptions for the Samuelson-Mirrlees nonsubstitution theorems are necessary assumptions, no weaker assumptions will do. Thus, to correctly set prices independent of demand, the four necessary assumptions must hold true. The first assumption of only a single unproduced factor cannot be cor-

23. See Bliss (1975, ch. 11) for a discussion of nonsubstitution theorems.

rect in a modern economy. If labor and land (minerals) are both unproduced factors, their relative prices will affect input costs and final product prices. But their relative prices will depend on the pattern of demand for products that use both labor and land (silicon, copper, and silver). Since products will use in direct and indirect form different proportions of the nonproduced products, the relative prices cannot be independent of demand. Then, neither the cost of production nor final product prices can be independent of demand. How important this departure from the necessary assumption is cannot be resolved easily. It may not be that important since, if we consider telecommunications as a separable sector of the economy (somewhat similar to partial equilibrium analysis), it might be claimed that the sector is small enough compared with a given regional economy for service and the world economy for capital goods, that it does not have a significant effect on the relative prices of the primary factors. The price of the Hicksian composite economy for the nontelecommunications sector might then be used as a numeraire without too much departure from reality. We will similarly dispose of the last assumption that the economy is productive with the remark that, as an approximation, likely departure (if any) would likely be unimportant.

We now turn to the two most important necessary assumptions for the current application: no economies of scale and no economies of scope. The presence of large economies of scale has traditionally been given as one of the primary reasons for regulation.<sup>24</sup> The old question of a “natural monopoly” is based on large economies of scale. Whether or not the claim of a natural monopoly is correct, modern telecommunications network regulation in the United States, United Kingdom, Australia, and Canada is based on the importance of economies of scale.<sup>25</sup> The idea is that a new entrant cannot duplicate the telecommunications network, so that the incumbent provider is required to sell the use of its network to the new entrant at a regulated cost. The common terminology of “fixed and common” costs in telecommunications denotes the importance of economies of scale that arise from the “fixed costs” in modern telecommunications networks. As we discuss later, the regulated price typically ignores demand factors, which is inconsistent with the whole notion of economies of scale. The higher the demand, the lower the per-unit cost, especially when fixed costs are taken into account.

The “no economies of scope” assumption of the Samuelson-Mirrlees nonsubstitution theorems is violated by all modern telecommunications networks. Economies of scope arise when it is less costly to produce two or more products jointly than by separate production processes. An example of joint production arises with modern telecommunications switches, which

24. See, for example, Kahn (1988, vol. II, 119 ff).

25. Economies of scale can often appear as economies of density in telecommunications, but the basic notion is the same.

are combinations of computers and switch blocks.<sup>26</sup> Switches route calls, but they also provide other services such as voice mail. The same computer is used to provide both services in a less costly manner than if switching and voice mail were provided separately. Again economies of scope are one of the stated reasons for required resale of network functions by incumbent telephone companies to their competitors. A further indication of the importance of economies of scope is the importance of “common costs” in debates over regulated prices. Common costs are typically defined to be costs that arise from two (or more) services, but the costs are not incrementally caused by either service alone. Regulatory bodies such as the Canadian Radio-television Telecommunications Commission (CRTC) and some state regulatory bodies have arbitrarily set a markup to the “direct” cost of 20 to 25 percent to account for common costs.

Yet economists know that most modern competitive companies have joint production and common costs for the production of their outputs. These competitive companies base their prices on competitive conditions for their products. Competitive conditions take account of demand conditions that arise from overall market demand for the product as well as firm demand conditions that arise as a result of competition. Although regulators often say they want to replicate the outcome of a competitive process, they miss the obvious point that a competitive process involves cost factors as well as demand factors. Regulators, to the contrary, often ignore the effect of demand factors on competitive outcomes. Instead, regulators use arbitrary markups over some measure of incremental (or variable) cost to account for economies of scale and economies of scope.

An additional necessary assumption for a nonsubstitution theorem to hold is that the economy is on a steady state growth path. This assumption allows for durable capital goods to enter the model. This assumption for an economy may be a reasonable approximation in certain circumstances, but for the telecommunications sector it departs from any approximation to economic reality. Economists agree that the telecommunications sectors are among the most dynamic in the economy. And since a substantial portion of the durable capital goods used in the telecommunications sector are closely connected to semiconductors and optical transmission, innovations in these sectors will directly affect investment in capital goods in telecommunications. Thus, the steady-state growth assumption is not a good assumption for telecommunications.

Thus, our evaluation is that modern telecommunications differ in many significant and quantitatively important ways from the necessary conditions for price to be independent of demand. Economies of scale and economies of scope are universally recognized to be important economic characteris-

26. For a further discussion of economies of scope with switches, see Hausman and Kohlberg (1989).

tics of modern telecommunications networks. The regulatory attempt to set prices as if they were the outcome of a competitive process but to ignore the importance of demand factors and competitive conditions leads to what we call the *regulatory fallacy*.

No serious student of economics would claim that the necessary conditions for the nonsubstitution theorem hold in a telecommunication network environment. Yet the regulatory assumption that price would be based on cost alone in a competitive market is wrong. Economic theory has developed precise conditions when price is independent of demand, and they do not hold, even as an approximation, in telecommunications. Thus regulators are acting on an erroneous belief that, with competition, price equals cost, independent of demand. This erroneous belief leads directly to the resulting regulatory fallacy. The consequent use of arbitrary allocations and mark-ups to regulated prices to take account of fixed and common costs—which are *exactly the costs that arise from economies of scale and scope*—leads to significant consumers' harm. If regulators instead took account of demand factors in setting regulated prices, economic efficiency and consumer welfare could be increased significantly. For example, Hausman (1998a) estimated that the FCC caused a deadweight loss to the economy exceeding \$10 billion per year when it levied a “tax” to fund broadband connections in schools, when an alternative method of raising the same amount of funds would have led to a deadweight loss of approximately zero.

### 6.3.2 Distortions to Competition

Why does incorrect regulation harm consumers more when competition exists? Let us consider an incumbent fixed line provider who decides to explore the economic potential of upgrading its network by increasing fiber penetration. This upgrade would likely cost in the billions of dollars and would be largely a sunk cost investment. The company would have an economic incentive to invest in the upgrade so it could provide higher speed DSL (broadband Internet) service to compete better with cable providers who until recently had a 67 percent market share of broadband Internet connections through cable modems, although DSL has now increased its share from about 33 percent to 40 percent. Cable modems typically provide both faster download speeds and faster upload speeds than current telephone DSL service.<sup>27</sup> Cable companies typically charge a significant premium for their service, so incumbent investment would likely lead to increased competition and lower prices for consumers.

A potential larger benefit to consumers would arise if the incumbent decided to provide pay television service in competition with cable.<sup>28</sup> Thus,

27. DSL speeds depend in part on the distance of the premise from the central office, but typically cable modems provide two to three times faster download speeds.

28. These developments are currently ongoing in both Canada and New Zealand.



economies of scope would exist in the provision of two services, DSL and pay TV over the same network. Cable companies have exercised market power for many years. The FCC has reported that monthly cable rates in January 2004 were 15.7 percent lower in areas where incumbent cable operators face competition from a wireline overbuilder.<sup>29</sup> Almost all of the cable competitors have suffered financial difficulties that have limited their ability to expand (for example, RCN in the United States), but an incumbent telecommunications company would have much greater financial resources. Thus, phone company entry into the pay TV market could lead to significant gains for consumers.

However, under the initial implementation of the 1996 act incumbents would be required to allow competitors to utilize these new investments at TELRIC-based prices, which did not recognize the sunk cost character of the investments.<sup>30</sup> Further, because of economies of scope that exist in the provision of DSL, some state regulators who set actual TELRIC rates (as did California), set the TELRIC rate for DSL elements at essentially zero. Unsurprisingly, incumbent companies made little investment in next-generation networks in the United States. Since 2003, the FCC has begun to recognize the errors in its approach, in part at the direction of the DC Circuit, which by then had ruled three times that the FCC regulations on unbundling were inconsistent with the Telecommunications Act of 1996. In August 2005, the FCC finally exempted DSL from all unbundling requirements because of competition from cable networks (subject to a one-year phaseout).<sup>31</sup> However, by refusing for nearly a decade to recognize the role of competition and instead using cost-based regulation that did not take account of the risks of sunk cost investment in new technologies, the FCC has severely distorted competition and harmed consumers. First-order losses to social welfare occur in these types of situations when new products are not introduced to consumers.<sup>32</sup>

#### 6.4 Has Unbundling the Network Achieved Its Goals?

In the 1990s, mandatory unbundling became the proposed remedy of choice in telecommunications regulatory proceedings. In the United States,

29. Statistical Report on Average Rates for Basic Service, Cable Programming Service, and Equipment, MM Dkt. No. 92-266, 4 ¶ 12 (2005).

30. In the United States, state regulatory commissions set TELRIC price based on the FCC framework. Quite different results occurred because of the state implementation of TELRIC prices. Indeed, regulators almost always set TELRIC prices using the overall company cost of capital, rather than taking account of the much higher risk that arises with sunk cost investments. See Hausman (1997, 1998b, 2003) and Pindyck (2004).

31. Report and Order and Notice of Proposed Rule Making, CC Dkt. No. 05-150, 5 August 2005.

32. For a further explanation of the first-order effects, see Hausman (1997, 2003).

the Telecommunications Act of 1996 rests on the hypothesis that requiring a firm to share the use of its facilities with its competitors will enable the competitors eventually to build their own facilities, presumably to the eventual benefit of consumers. The mandatory sharing of facilities is thus the prelude to eventual competition between rival infrastructures or platforms. The corollary of this assumption is that, but for this exact form of regulatory intervention, natural market forces cannot be counted on to produce facilities-based competition.

Any firm may choose to unbundle or lease components of its network with a third party *at a voluntarily negotiated rate*. The firm is also able to decide the scope of unbundling it wants to undertake—that is, how much of its network to resell. The term mandatory unbundling describes an involuntary exchange between an incumbent network operator and a rival *at a regulated rate* where the scope of unbundling is determined by regulators. Determination of the access rate thus becomes the major bone of contention between incumbent and entrant, as a regulatory access rate that is equal to the voluntarily agreed-upon access rate cannot really be said to constitute “mandatory” unbundling. When formulating that access rate, regulators have generally opted in favor of a measure of total element long-run incremental cost (TELRIC) or total service long-run incremental cost (TSLRIC) and against a measure of opportunity cost or option value.<sup>33</sup>

Mandatory unbundling at a regulated rate may apply to various network elements, which are defined by the US Telecommunications Act of 1996 as “a facility or equipment used in the provision of a telecommunications service.”<sup>34</sup> The act instructs the FCC to consider whether “the failure to provide access to such network elements would impair the ability of the telecommunications carrier seeking access to provide the services that it seeks to offer.”<sup>35</sup> Under the act, prices for unbundled network elements (UNEs) are based on the cost of providing the interconnection or network element.<sup>36</sup> The FCC interpreted that pricing rule as “forward-looking, long-run, incremental cost.”<sup>37</sup> In practice, prices are “based on the TSLRIC [total service long-run incremental cost] of the network element . . . and will include a reasonable allocation of forward-looking joint and common costs.”

As part of its *Triennial Review Order* of its unbundling regulations, the FCC explained that ILECs were required to provide access to network ele-

33. For a detailed analysis of the scope of the unbundling decision and the access pricing decision by a telecommunications regulator, see Hausman and Sidak (1999).

34. 47 U.S.C. § 153(29).

35. 47 U.S.C. § 251(d)(2)(B).

36. 47 U.S.C. § 252(d)(1).

37. *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996; Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers*, CC Docket Nos. 96-98, 95-185, First Report and Order, 11 F.C.C. Rcd. 15499, ¶ 620 (1996).

ments “to the extent that those elements are capable of being used by the requesting carrier in the provision of a telecommunications service.”<sup>38</sup> The FCC ordered all ILECs to make available at regulated rates the following UNEs:

- (1) stand-alone copper loops and subloops for the provision of narrow-band and broadband services;
- (2) fiber loops for narrowband service in fiber loop overbuild situations where the incumbent LEC elects to retire existing copper loops;
- (3) subloops necessary to access wiring at or near a multiunit customer premises;
- (4) network interface devices (NID), which are defined as any means of interconnecting the ILEC’s loop distribution plant to wiring at a customer premises location;
- (5) dark fiber, DS3, and DS1 transport, subject to a route-specific review by the states to identify available wholesale facilities;
- (6) local circuit switching serving the mass market;
- (7) shared transport only to the extent that carriers are impaired without access to unbundled switching;
- (8) signaling network when a carrier is purchasing unbundled switching;
- (9) call-related databases when a requesting carrier purchases unbundled access to the incumbent LEC’s switching;
- (10) operations support systems (OSS) for qualifying services, which consists of preordering, ordering, provisioning, maintenance and repair, and billing functions supported by an ILEC’s databases and information; and
- (11) combinations of UNEs, including the loop-transport combination (enhanced extended link, or EEL).

Based on this exhaustive list, it is reasonable to conclude that, at least in the United States, virtually no component of an incumbent’s network was immune from unbundling obligations eight years after the passage of the Telecommunications Act.

#### 6.4.1 Line Sharing versus Bitstream Access of Data Services

Bitstream access provides service-level (resale) entry to digital subscriber line (DSL) data provision. Under the bitstream approach, the entrant buys the complete service for a high-speed link to the consumer, and the service includes delivery to the first data switch in the incumbent’s network. Unbundled network line sharing, by contrast, allows the entrant to acquire the high-frequency portion of the copper connection but requires it to make some investments in infrastructure.

38. Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, CC Dkt. No. 01-338, 20 August 2003, p. 42 ¶ 59 [*Triennial Review*], rev’d, U.S. Telecom Ass’n v. FCC, 290 F.3d 415, 428-29 (D.C. Cir. 2002).

Mandatory line sharing was attempted and then abandoned in the United States. In the FCC's *Line Sharing Order* released in 1999, the FCC directed ILECs to provide the high-frequency portion of the local loop (HFPL) to requesting carriers as a UNE.<sup>39</sup> The commission found in the *Line Sharing Order* that "[t]he record shows that lack of access would materially raise the cost for competitive LECs to provide advanced services [such as DSL] to residential and small business users, delay broad facilities-based market entry and materially limit the scope and quality of competitor service offerings." In May 2002, however, the US Court of Appeals for the DC Circuit vacated the *Line Sharing Order*, finding that the commission had failed to give adequate consideration to existing facilities-based competition in the provision of broadband services, especially by cable systems.<sup>40</sup> In its August 2003 *Triennial Review Order*, the FCC decided not to reinstate the vacated line-sharing rules because it determined that "continued unbundled access to stand-alone copper loops and subloops enables a requesting carrier to offer and recover its costs from all of the services that the loop supports, including broadband service."<sup>41</sup>

The FCC rejected its prior finding that lack of separate access to the high-frequency portion would cause impairment for four reasons. The two most important reasons from our viewpoint is that the FCC noted that the difficulties of cost allocation for different portions of a single loop had led most states to price the high frequency portion of the loop at approximately zero, which distorted competitive incentives. Also, the FCC recognized the substantial intermodal competition from cable companies, which lessened any competitive benefits associated with line sharing. In its March 2004 opinion, the DC Circuit upheld the FCC's decision to eliminate line sharing, concluding that the FCC "reasonably found that other considerations outweighed any impairment."<sup>42</sup> The court added that "intermodal competition from cable ensures the persistence of substantial competition in broadband."

Regulators in other nations have chosen bitstream access over line sharing. For example, in December 2003, the New Zealand Commerce Commission recommended the designation of an "asymmetric DSL bitstream access service."<sup>43</sup> The agency defined ADSL bitstream access service as "a

39. Deployment of Wireline Services Offering Advanced Telecommunications Capability and Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, CC Dkt. Nos. 98-147, 96-98, Third Report and Order in CC Dkt. No. 98-147, and Fourth Report and Order in CC Dkt. No. 96-98, 15 F.C.C. Rcd. 3,696 (1999).

40. U.S. Telecom Ass'n v. FCC, 290 F.3d 415, 428-29 (D.C. Cir. 2003).

41. See *Triennial Review*, p. 125 ¶ 199.

42. *United States Telecom Association v. FCC*, 359 F.3d 554, 585 (D.C. Cir. 2004).

43. New Zealand Commerce Commission, Section 64 Review and Schedule 3 Investigation into Unbundling the Local Loop Network and the Fixed Public Data Network, Final Report, December 2003 (available at <http://www.comcom.govt.nz/telecommunications/llu/finalreport.PDF>).

high speed IP access service which provides good performance, but could not typically support extensive use of mission critical applications which require excellent real-time network performance or availability.” The commission defined bitstream access as a situation in which the incumbent’s access link “is made available to other operators, which are then able to provide high-speed services to end-consumers.” The agency concluded the net social benefits from bitstream access exceeded the net social benefits of line sharing due to the lower total cost of providing the unbundled service (collocation costs are avoided in bitstream access). The commission reasoned that, under bitstream access, entrants face a lower risk of investing in network components such as DSLAMs (digital subscriber line access multipliers) that might not be fully utilized. We discuss the New Zealand experience in greater detail in a later section.

In February 2005, the FCC released a new unbundling order that, most significantly, eliminated UNE-P as a separate network element entitled to mandatory unbundling.<sup>44</sup> The commission found that the ability of CLECs (competitive local exchange carriers) to compete would not be impaired if they did not have access to unbundled switching at TELRIC prices. The FCC also established new unbundling rules for mass market local circuit switching, high-capacity loops, and dedicated interoffice transport. With switching removed from the list of UNEs, it followed that UNE-P could no longer be mandated at regulated TELRIC prices—although ILECs obviously could still offer UNE-P to CLECs at commercially negotiated rates. The FCC also found that the Telecommunications Act of 1996 did not require that the agency mandate ILECs to offer UNE-P.

Despite the reasonable prospect that it could eventually be thrown out by the DC Circuit, mandatory UNE-P at TELRIC rates had become the cornerstone of the business plan for AT&T and MCI in the local market. In the case of AT&T, the company had abandoned its facilities-based strategy for local markets by selling off its cable television assets at an enormous loss of approximately \$40 to 50 billion, and it spun off AT&T Wireless, which soon merged with Cingular, the joint venture of SBC and BellSouth. With the commercial and regulatory demise of mandatory UNE-P, and with its long-distance revenues under increasing pressure from Bell company entry following the completion of the section 271 approval process for the RBOCs (Regional Bell Operating Companies) in all states and the District of Columbia, AT&T was rapidly becoming a brand name in search of a product. Although AT&T embarked on yet another nonfacilities-based strategy by negotiating with Sprint PCS to rebrand wholesale wireless minutes as an AT&T cell phone product, the highest priority for AT&T’s management (and, similarly, the prize for the managers who took MCI through chapter

44. Order on Remand, *In re Unbundled Access to Network Elements*, 2005 FCC LEXIS 912, WC Docket No. 04-313, CC Dkt. No. 01-338 (FCC February 4, 2005).

11 reorganization) was to concentrate on readying the company for sale to one of the three financially stable RBOCs. Thus, AT&T, with its symbol “T” (telephone) on the NYSE and its long history as the primary company in US telecommunications, lacked an economic rationale for its continued existence.

#### 6.4.2 Rationales for Network Unbundling

We examine the theoretical underpinnings of mandatory unbundling. We also survey the rationales offered by regulatory agencies in support of mandatory unbundling. In general, mandatory unbundling was believed to, among other items, (a) generate competition in retail markets through greater innovation and investment and lower prices, (b) generate greater competition in wholesale markets, and (c) encourage entrants to migrate from unbundling to a facilities-based approach. Because our focus is on the benefits of mandatory unbundling, we do not consider its regulatory costs, such as the difficulties in implementation or compliance costs for operators. When considering unbundling, a regulator also should take account of a full range of efficiency considerations, including allocative (consumer welfare gains associated with greater penetration at lower prices), productive efficiency (producer surplus associated with reductions in marginal costs), and dynamic efficiency (how welfare is generated and distributed over time).

##### *Rationale 1: Competition in Retail Markets Is Desirable*

In a static model that does not consider investment in future periods, consumers benefit from mandatory unbundling to the extent that such regulation lowers retail prices. In a dynamic model, mandatory unbundling at regulated rates runs the risk of decreasing investment by both incumbent ILECs (by truncating returns by granting a free option to new entrant CLECs)<sup>45</sup> and CLECs (by increasing the relative return of UNE-based entry). Despite these factors, proponents argued that the net effect of mandatory unbundling was to increase investment by both ILECs and CLECs.

*Innovation and Investment.* According to its proponents, mandatory unbundling at regulated rates encourages innovation and investment on behalf of both incumbents and entrants. In its *Third Order* implementing the Telecommunications Act, the FCC explained that a positive by-product of mandatory unbundling at TELRIC was greater innovation on behalf of entrants and incumbents:

Unbundling rules that encourage competitors to deploy their own facilities in the long run will provide incentives for both incumbents and competitors to invest and innovate, and will allow the Commission and the

45. See Hausman (1997).

states to reduce regulation once effective facilities-based competition develops.<sup>46</sup>

The more competitors in the market, the FCC reasoned, the greater the incentive to introduce a new technology to gain a technological edge. With the correct incentives in place, the need for wholesale regulation would disappear:

The unbundling standards we adopt in this Order . . . seeks [*sic*] to create incentives for both incumbents and requesting carriers to invest and innovate in new technologies by establishing a mechanism by which regulatory obligations to provide access to network elements will be reduced as alternatives to the incumbent LECs' network elements become available in the future.

With greater facilities-based investment, the FCC reasoned, the market could one day be relied upon to discipline ILEC prices for local services.

Although it was aware of arguments that mandatory unbundling at regulated rates might discourage ILEC investment, the FCC believed that other factors in the marketplace would mitigate these negative effects:

We acknowledge that the incumbent LEC argument that unbundling may adversely affect innovation is consistent with economic theory, but events in the marketplace suggest that other factors may be driving incumbent LECs to invest in xDSL technologies, notwithstanding the economic theory.

For example, investment by cable companies in cable modem service was believed to be sufficient motivation for ILECs to invest in DSL facilities. Although the negative investment effects might not overcome these other factors, it is not clear how mandatory unbundling at regulated rates actually *increases* investment by ILECs. One theory is that an ILEC would have to respond to greater competition from CLECs by investing in new facilities. But to the extent that those new investments would be subject to unbundling rules, those investments might not be undertaken.<sup>47</sup> Another theory is that the ILEC will invest in new access technologies that potentially will not be subject to unbundling rules.

*Prices and Retail Margins.* When a CLEC obtains an access line at incremental cost, it is free to charge the end user an amount anywhere between the incremental cost and the retail price. A CLEC can charge below incremental cost if it can bundle the access line with other services such as vertical ser-

46. See Third Order, ¶ 7.

47. See *AT&T Corp. v. Iowa Utilities Bd.*, 525 U.S. 366 (1999). Justice Breyer, concurring in part and dissenting in part, stated "a sharing requirement may diminish the original owner's incentive to keep up or to improve the property by depriving the owner of the fruits of value-creating investment, research, or labor."

vices or long distance. Competition among CLECs is predicted in theory to discipline CLECs in their pricing behavior. If competition among CLECs is intense, then the retail price offered by CLECs should equal the access price for the unbundled loop plus the incremental cost of other inputs. Finally, ILECs must respond to price cuts by CLECs with their own price cuts. The equilibrium outcome of that game is lower prices.

The FCC believed that the Telecommunications Act encouraged the agency to promote retail price competition through mandatory unbundling:

[T]he 1996 Act set the stage for a new competitive paradigm in which carriers in previously segregated markets are able to compete in a dynamic and integrated telecommunications market that promises lower prices and more innovative services to consumers.<sup>48</sup>

Even if the mandatory unbundling at TELRIC never led to facilities-based competition, the FCC reasoned, consumers would be better off to the extent that prices for local services declined:

National requirements for unbundling allow [*sic*] requesting carriers, including small entities, to take advantage of economies of scale in network. Requesting carriers, which may include small entities, should have access to the same technologies and economies of scale and scope available to incumbent LECs. Having such access will facilitate competition and help lower prices for all consumers, including individuals and small entities.

Because ILECs enjoyed a cost advantage vis-à-vis CLECs, the FCC argued, it was preferable from a social welfare perspective for retail prices to be based on the ILECs' costs and not on the CLECs' costs. Because ILECs are subject to state-sponsored price regulation, it was not clear that prices would decrease absent subsidized UNE rates. Although the FCC was concerned about stimulating retail competition for local telephone and broadband access services, most European regulators focused exclusively on stimulating retail competition in broadband markets.

*Rationale 2: Competition in Retail Markets  
Cannot Be Achieved without Mandatory Unbundling*

Even if competition in retail markets is desirable, it is still necessary to show that competition would not occur in the absence of mandatory unbundling. In this part, we explain the reasoning articulated by unbundling proponents as to why natural market forces cannot deliver the benefits of competition in local services.

*A Vertically Integrated Firm Generally Prefers Its Own Downstream Affiliate.* In general, a vertically integrated firm prefers retail sales by its af-

48. See Third Order, ¶ 2.



filiated retail division to sales by an unaffiliated retailer. This preference can be reversed, however, if the access price exceeds the retail margin. Much academic work has been dedicated to analyzing the incentives of vertically integrated firms to deny access to key inputs to unaffiliated downstream rivals.<sup>49</sup> If a vertically integrated firm can solidify its market power in future periods by refusing to deal with rivals in a downstream market, then that firm has an anticompetitive reason for such a refusal to deal.<sup>50</sup> A vertically integrated firm might also refuse to deal with other unaffiliated firms in the downstream market as a means to acquire market power in that market.

Although no ILEC prefers unbundling its network elements *at a regulated rate* to selling its services through its own retail division, some ILECs have voluntarily unbundled their network elements to rivals at a commercially negotiated rate. For example, in January 1995, Rochester Telephone implemented its own Open Market Plan for unbundling network services in New York.<sup>51</sup> Under the Open Market Plan, Rochester restructured itself into a network services company, which retained the Rochester name, and a competitive company, Frontier Communications of Rochester, which the New York Public Service Commission regulated as a nondominant carrier. Rochester provided on an unbundled, nondiscriminatory basis the local loop, switching, and transport functions as a wholesaler, at discounted (yet voluntary) prices lower than its standard retail rates.

*Entry Barriers Prevent Natural Competition.* In the United States, a CLEC is considered impaired when lack of access to an incumbent LEC network element poses a barrier to entry that is likely to make entry into a market uneconomic.<sup>52</sup> In its *Triennial Review Order*, the FCC offered the following factors that contribute to entry barriers in the provision of local telephone service: (a) scale economies, (b) sunk costs, (c) first-mover advantages, (d) absolute cost advantages, and (e) barriers within the control of ILECs. The FCC's explanation of sunk costs provides some insight as to the regulator's decision making:

Sunk costs increase a new entrant's cost of failure. Potential new entrants may also fear that an incumbent LEC that has incurred substantial sunk costs will drop prices to protect its investment in the face of new entry. In addition, sunk costs can give significant first-mover advantages to the incumbent LEC, which has incurred these costs over many years and has already had the opportunity to recoup many of these costs through its rates.

49. See, for example, Riordan and Salop (1995) and Sidak and Crandall (2002).

50. Carlton (2001).

51. FCC News Release, *Rochester Telephone Corporation Granted Rule Waivers to Implement Its Open Market Plan*, March 7, 1995, available at [http://www.fcc.gov/Bureaus/Common\\_Carrier/News\\_Releases/1995/nrcc5030.txt](http://www.fcc.gov/Bureaus/Common_Carrier/News_Releases/1995/nrcc5030.txt).

52. See *Triennial Review*, p. 9.

According to its proponents, mandatory unbundling is necessary to overcome such barriers. The corollary of this proposition is that, without mandatory unbundling, facilities-based investment cannot occur. In its May 2002 decision vacating certain portions of the *UNE Remand Order*, the DC Circuit concluded that the commission had failed to adequately explain how a uniform national rule for assessing impairment would help to achieve the goals of the act, including the promotion of facilities-based competition.<sup>53</sup>

Opponents of mandatory unbundling also cite the large sunk cost of the ILEC's network, but for different reasons. They argue that sunk costs imply that regulators should abstain from appropriating the quasi rents of ILECs, which undermines the incentive of ILECs to invest in new technologies.<sup>54</sup> They also argue that, to the extent that network investment cannot be directed toward other uses in the event of low market demand, large sunk costs require that access prices are set higher than what would otherwise be necessary to induce investment under a standard present discounted value calculation.

### *Rationale 3: Mandatory Unbundling Enables Future Facilities-Based Investment*

Access-based competition is supposedly the stepping stone to facilities-based competition. This proposition, or hypothesis, lies at the heart of regulatory decisions on unbundling and access pricing that the FCC and its counterparts in other nations have made since the mid-1990s. In the telecommunications industry, the examples of the *stepping-stone hypothesis* are numerous. For example, MCI successfully made the transition from reseller of long-distance services to facilities-based carrier. The leasing of selected unbundled elements at regulated prices is vigorously defended by CLECs and regulators as a complement to subsequent facilities-based entry, not a substitute for it. Within the strata of regulated access-based entry options, regulators may consider UNE-P to be a stepping stone to a CLEC's subsequent investment in its own switches and its more limited reliance on unbundled local loops.<sup>55</sup>

In implementing the unbundling rules, the FCC sought to follow the intent of Congress by creating an intermediate phase of competition, during which some new companies would deploy their own facilities to compete directly with the incumbents:

53. See USTA, p. 427 (emphasis in original).

54. For a description of the role of sunk costs in access pricing and unbundling, see generally Hausman and Sidak (1999).

55. Similarly, regulators may consider mandatory roaming at regulated prices to be a stepping stone to a wireless carrier's eventual investment in base stations and spectrum in another geographic region. However, a component of the relevant infrastructure is radio spectrum, the allocation of which is controlled by the government (at least in the primary market). Consequently, it is not clear where the stepping stone of mandated access leads in wireless.

Although Congress did not express explicitly a preference for one particular competitive arrangement, it recognized implicitly that the purchase of unbundled network elements would, at least in some situations, serve as a *transitional arrangement* until fledgling competitors could develop a customer base and complete the construction of their own networks.<sup>56</sup>

The FCC thus sought to force the incumbents to allow others to access their systems, in the hope that mandatory unbundling would create competitors who would later invest in their own facilities.

In the long run, the FCC expected that entrants would build their own facilities because doing so would enhance the entrants' ability to compete more effectively with incumbents:

We fully expect that over time competitors will prefer to deploy their own facilities in markets where it is economically feasible to do so, because it is only through owning and operating their own facilities that competitors have control over the competitive and operational characteristics of their service, and have the incentive to invest and innovate in new technologies that will distinguish their services from those of the incumbent.

Thus, mandatory unbundling would allow entrants to derive revenue from offering services over the unbundled network elements, and then use that revenue to construct their own networks once the technology shifted. Of course, if the access rate were set too low, the transition to a facilities-based competitor would not occur, as CLECs would never find it in their interests to invest in their own facilities. If access rates were set just right, this transition to facilities-based competition would generate additional social benefits, which are described in the next section.

#### *Rationale 4: Competition in Wholesale Access Markets Is Desirable*

Competition in the input markets was, by itself, desirable. In this part, we review how input-level competition can, in theory, generate technological innovation and incentives for gains in productive efficiency and can eventually lead to regulatory withdrawal.

*A Network of Networks.* Facilities-based entry by CLECs in the current period meant that future entrants would not have to depend exclusively on ILECs to obtain network elements. The FCC believed that mandatory unbundling would expedite this process:

Moreover, in some areas, we believe that the greatest benefits may be achieved through facilities-based competition, and that the ability of requesting carriers to use unbundled network elements, including various

56. See Third Order, note 39, ¶ 6 (emphasis added).

combinations of unbundled network elements, is a necessary precondition to the subsequent deployment of self-provisioned network facilities.<sup>57</sup>

In theory, facilities-based entry generates greater benefits than UNE-based entry because the former signals a credible commitment to stay in the market. If an entrant has not made sunk investments in infrastructure, it cannot use sunk costs to make that signal. Nor will the incumbent face the prospect of durable capacity that survives the demise of the company that invested to create it. Moreover, facilities-based competition leads to technological diversity, which increases choice and may provide newer and better services because the CLEC does not depend on a legacy network.

The FCC envisioned that facilities-based entrants would spawn a new generation of UNE-based entrants, who in subsequent periods would become facilities-based entrants:

In order for competitive networks to develop, the incumbent LECs' bottleneck control over interconnection must dissipate. As the market matures and the carriers providing services in competition with the incumbent LECs' local exchange offerings grow, we believe these carriers may establish direct routing arrangements with one another, forming a network of networks around the current system.

Thus, the FCC believed that mandatory unbundling at TELRIC would evolve into voluntary access arrangements. Under this scenario, some facilities-based entrants might choose to become a pure wholesaler of network elements, leaving the retail component to other CLECs.

*Regulatory Withdrawal.* Competition among facilities-based providers to supply network elements to future generations of CLECs would decrease the price of those network elements. The next generation of CLECs would, in turn, pass those savings along to end users in the form of lower retail prices. At some point in the process, the regulator could, in theory, withdraw and allow a competitive market for inputs to discipline the price of retail service.

In practice, however, regulators are reluctant to relinquish their power to control entry and allocate rents in a given market. This vision of mandatory unbundling also ignores the strategic use of regulation by competitors. Given the large rents at stake, it is not realistic to believe that the regulatory machinery could be dismantled very easily. Indeed, in the United States, the degree of regulation has increased since the passage of the Telecommunications Act of 1996.

In summary, mandatory unbundling was based on the following rationales: (a) competition in retail markets is desirable; (b) competition in retail markets cannot be achieved without mandatory unbundling; (c) mandatory

57. See [http://transition.fcc.gov/Bureaus/Common\\_Carrier/Orders/1999/fcc99238.txt](http://transition.fcc.gov/Bureaus/Common_Carrier/Orders/1999/fcc99238.txt).

unbundling promotes future facilities-based investment, the *stepping-stone hypothesis*; and (d) competition in wholesale access markets is desirable. Fortunately, there is testable hypothesis associated with each rationale.

### **6.5 The Unbundling Experience in the United States, United Kingdom, and New Zealand**

The previous section considered how mandatory unbundling should work *in theory*. With the benefit of several years of experience, we turn now to an evaluation of the extent to which the rationales for mandatory unbundling were substantiated *in practice*. We note that many of the studies we refer to are necessarily confounded by the effects of the telecom boom and bust of the late 1990s and early 2000s. Further, many of the studies cannot be claimed to be necessarily causal in nature; nevertheless, the data presented in them are often suggestive of the economic effects. In addition, due to the small sample nature of the outcomes differing interpretations can exist (and do exist) regarding the economic reasons for a particular outcome. We discuss what we consider the primary interpretation with differing interpretations also noted.

We focus on the unbundling experience in the United States, the United Kingdom, and New Zealand. For each country, we examine whether any of the four primary rationales for mandatory unbundling at TELRIC was substantiated in practice. We rely on data from the relevant regulatory agency that implemented the unbundling regime. For example, we discuss why regulators in New Zealand did not adopt mandatory unbundling.

In compiling the country surveys, we observed a large variation in the degree to which economic analysis informed the regulator's decision-making process. In the United States, for example, the process was informed by legal interpretation of specific language (such as the meaning of "impaired") or by engineering measures of hypothetical operating costs. In New Zealand, by contrast, the process was informed largely by economic analysis and by international experience with mandatory unbundling. Using economic methods, the New Zealand regulator literally assigned net welfare gains to each regulatory option and selected the path with the greatest net welfare gain. New Zealand had the benefit of studying the experience of other nations before it decided on the optimal regulatory approach. The FCC still has not used economic analysis when modifying its rules, despite the fact that the United States now has more than six years of unbundling experience.

#### **6.5.1 United States**

The Telecommunications Act of 1996 ordered the FCC to introduce competition into the local services market by forcing ILECs to provide entrants access to the ILECs' existing facilities at regulated rates. In 1999, the FCC

explained that Congress did not provide the agency much flexibility in the exact form of managed competition: “Congress directed the Commission to implement the provisions of section 251, and to specifically determine which network elements should be unbundled pursuant to section 251(c) (3).7.” Hence, the FCC did not have the discretion to reject or embrace any of the rationales for mandatory unbundling. The only decisions left to the FCC concerned the *extent* of mandatory unbundling—namely, which elements would be included in the list of UNEs and the appropriate pricing of those elements.

### *Retail Competition*

In this part, we review the unbundling experience in the United States with respect to retail pricing and investment.

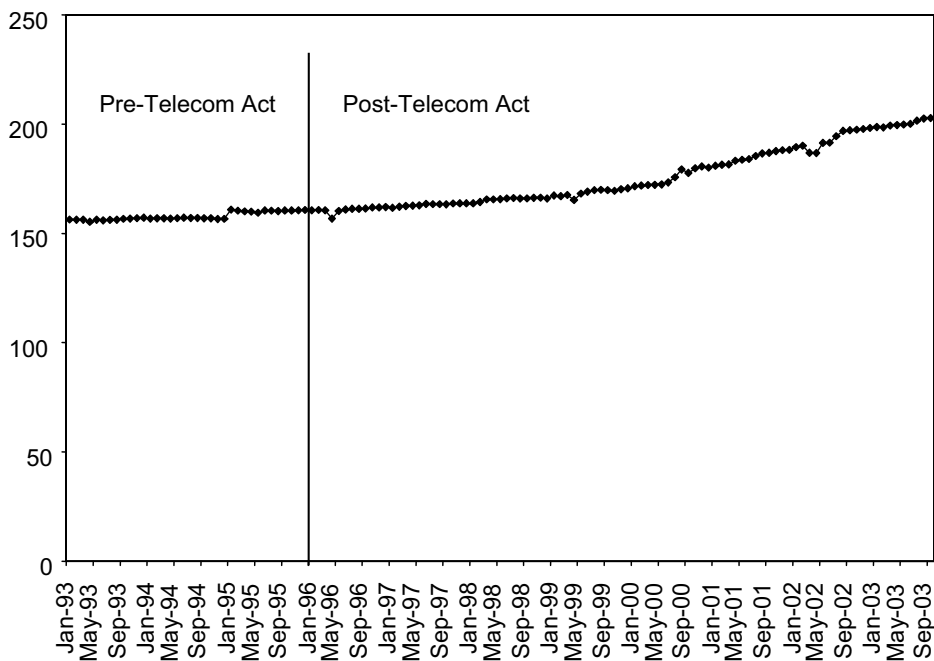
*Pricing.* Retail competition triggered by mandatory unbundling should manifest itself in terms of lower retail prices. Even if price regulation of local services by state PUCs were binding, the introduction of UNE-based competition could still reduce price. In the United States, however, mandatory unbundling does not appear to have decreased local service prices measurably—despite the fact that CLECs had more than 13 percent of the nation’s access lines by 2003. Figure 6.3 shows the Bureau of Labor Statistics’ (BLS) Consumer Price Index for local telephone services from 1993 through 2003.

As figure 6.3 shows, prices of local telephone services offered by *all carriers* in urban areas grew at a slower annual rate on average before passage of the act (1.21 percent versus 2.96 percent).

It bears emphasis that such price comparisons do not control for other changes in the price of local service. For example, since the passage of the Telecommunications Act, the subscriber line charge (SLC) was increased and long-distance access prices were decreased. Hence, a small part of the BLS CPI price increase might be attributable to regulatory tax shifting. According to the FCC, the average residential rate for local service provided by ILECs in urban areas *before taxes, fees, and miscellaneous charges* increased from \$13.71 in 1996 to \$14.55 in 2002.<sup>58</sup> Hence, mandatory unbundling does not appear to have decreased retail prices in the way the FCC intended. This experience is in marked contrast to the prices of other telecommunications services, which uniformly decreased over the same period.<sup>59</sup> An alternative interpretation of figure 6.3 is that the increased prices are the result of rebalancing of the relative price differences between residential and business rates; however, the basic fact we emphasize is that price increases

58. Trends in Telephone Service, FCC Industry Analysis Division, 2003 Report, p. 13-1 (rel. August 2003), available at [http://www.fcc.gov/Bureaus/Common\\_Carrier/Reports/FCC-State\\_Link/IAD/trend803.pdf](http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/trend803.pdf).

59. The prices of telecommunication equipment were decreasing over this period at the rate of approximately 8 to 10 percent per year.



**Fig. 6.3 Consumer Price Index of local telephone services, 1993–2003**

*Source:* Bureau of Labor Statistics, Consumer Price Index, All Urban Consumers, Telephone Services, Local Charges (available at <http://data.bls.gov/labjava/outside.jsp?survey=cu>).

*Note:* Prices normalized to 1984 dollars.

were greater after the Telecom Act was implemented, when most other telecommunications prices were falling rapidly in real terms.

*Investment.* Many scholars have examined the effect of mandatory unbundling on ILEC investment. For example, in work performed for AT&T (the largest CLEC) and submitted to the FCC, Robert D. Willig, William H. Lehr, John P. Bigelow, and Stephen B. Levinson examined the relationship between UNE-P wholesale rates and Bell companies' capital expenditures.<sup>60</sup> They attempted to distinguish between the "competitive stimulus hypothesis" that UNE-P creates competition that induces increased ILEC network investment, and the "investment deterrence hypothesis" that UNE-P diminishes the return on network investment by ILECs and causes them to invest less. Willig et al. hypothesized that TELRIC-based UNE-P rates encourage entry by CLECs, which forces Bell companies to invest more in their net-

60. Willig et al. (2002).

works to protect market share. They therefore expected to find that ILEC capital expenditures are inversely related to UNE-P prices. They calculated that the elasticity of ILEC investment to UNE-P prices was between  $-2.1$  and  $-2.9$ , meaning that a 1 percent decrease in the UNE-P rate generated between a 2.1 and 2.9 percent increase in ILEC investment.

In a book published by the Brookings Institution, Robert W. Crandall explained that the loss of end-user subscribers to CLECs reduces ILECs' revenues by more than their costs.<sup>61</sup> Crandall found that, whereas ILECs lose roughly 60 percent of the revenues associated with a given line when provisioned on an unbundled, rather than retail, basis, the avoided costs of customer service and marketing are only about 10 percent of the Bell companies' total costs.

Crandall also examined the relationship between the FCC's state-by-state capital expenditure data and the various measures of state UNE-P rates found in various studies. Crandall hypothesized that the UNE-P rate should not have a significant negative effect on capital expenditures because it is not logical to invest more if the ILEC receives less revenue under mandatory unbundling. Crandall concluded that none of the previous studies provided support for the theory that UNE-P rates have influenced capital spending by Bell companies. Crandall further demonstrated that Bell companies scaled back their capital expenditures in 2002 and 2003, and that the decline in capital expenditures was greatest in those states that reduced their UNE-P rates. However, as discussed earlier, these results may well be confounded with the effects of the telecom boom and bust period. The fact that RBOC revenue and investment has been reduced relative to historic averages implies that mandatory unbundling in the United States did not achieve its intended effect if these effects arose from the effects of mandatory unbundling.

We turn to the question of CLEC investment in the next sections on entry barriers and the stepping stone hypothesis. Investment activities during the late 1990s were undoubtedly affected by exceptional capital market conditions during the telecom boom period when access to capital markets by technology companies (and especially telecommunications companies) was extremely cheap. But capital expenditure by CLECs was modest even when considered in terms of the way in which the CLECs have applied their resources. For example, an analysis of financial statements of EarthLink and Covad, two data CLECs, suggests that the ratio of capital expenditure to sales was 5 to 6 percent in 2001 and 2002, compared with a ratio of 20 to 25 percent for ILECs such as Verizon, SBC, and BellSouth.<sup>62</sup> Similar results are found for other ILECs.

61. Crandall (2004).

62. Sales and capital expenditure data were taken from company annual reports. See also Hausman (2002a) who discusses Covad and other CLECs' competitive strategies.



*Entry Barriers*

The second rationale for mandatory unbundling is that, without that particular form of regulatory intervention, market forces cannot deliver facilities-based competition. In the United States, cable telephony appears to disprove that proposition. According to the National Cable Television Association (NCTA), the number of cable telephony subscribers in the United States increased from 180,000 in the first quarter of 2000 to 2.5 million by September 2003.<sup>63</sup> In addition to the deployment of circuit-switched telephony, many companies have begun trials or are launching voice over Internet protocol (VoIP) service. For example, in 2003 Cablevision launched Optimum Voice VoIP throughout its New York City service area of four million homes. As of December 2006 all of the major cable companies are now offering cable-based voice services in competition with the ILECs. The service typically combines local and unlimited long-distance services. Further, the service is often also offered as a bundled service with broadband Internet cable modem service and cable TV service in the so-called triple play. The discounts of the bundled package are typically quite substantial (for example, Comcast offers a discount of approximately 33 percent).

In its *Third Report* in 1999, however, the FCC dismissed the emergence of cable telephony as a substitute for the ILECs' fixed-line networks:

We also disagree with the incumbent LECs' argument that cable television service offers a viable alternative to the incumbent's unbundled loop. Cable service is largely restricted to residential subscribers, and generally supports only one-way service, not the two-way communications telephony requires. Moreover, we conclude that declining to unbundle loops in areas where cable telephony is available would be inconsistent with the Act's goal of encouraging entry by multiple providers. Given that neither mobile nor fixed wireless can yet replace wireline service, if we were to take the incumbents' approach, consumers might be left to a choose [*sic*] between only the cable company and the incumbent LEC.<sup>64</sup>

The FCC's reasoning is unpersuasive. If two facilities-based carriers offer a similar service, and if the first carrier is not compelled to share its network with rivals, then consumers would no longer be subject to monopoly prices for local services. Moreover, the FCC's suggestion that cable infrastructure supports only one-way service is outdated given that, as of June 2003, cable modems accounted for nearly two-thirds of all residential broadband subscriptions,<sup>65</sup> which is a two-way service. Cable networks are now rapidly upgrading their service offerings to provide telephone service using VoIP technology.

63. National Cable Television Association, Statistics & Resources, available at <http://www.ncta.com/Docs/PageContent.cfm?pageID=86>.

64. See Third Order, ¶ 189.

65. See FCC High-Speed Services, p. 10 (tbl. 3).

When the availability of cable telephony was on the verge of ubiquity in late 2003, the FCC was forced to offer a different explanation for why the threat of cable telephony should be discounted:

As a general matter, while these [cable] systems are increasingly being used for the delivery of retail narrowband and broadband services (e.g., telephony and high-speed Internet access services), the record indicates that such systems are not being used currently to provide wholesale local loop offerings that might substitute for access to incumbent LECs' loop facilities. Some cable companies also have augmented their networks to enable the provision of two-way voice telephony services. For such services, the cable infrastructure serves as a replacement for loops. At this time, however, deployment of voice telephony by cable companies has been substantially exceeded by the deployment of cable modem service.<sup>66</sup>

Hence, the FCC argued that unbundling of the ILECs' network is necessary because cable operators were not inclined to share their own network with rivals at marginal cost. It bears emphasis that the DC Circuit rejected this very rationale for mandatory sharing of broadband in its May 2002 decision, explaining that competition removes the reason for mandatory sharing.<sup>67</sup> To date, the FCC has refused to recognize the effect of interplatform competition to fixed line telephony despite the DC Circuit's repeated admonitions that such competition cannot be ignored.

In May 2004, Comcast, the nation's largest cable company, announced that it planned to offer phone service to half of the households reached by the company's cable systems by the end of 2005 and to all 40 million of them by the end of 2006.<sup>68</sup> Verizon perceived the threat posed by cable telephony to be significant. Verizon began selling video over fiber optic lines to homes and businesses in 2005, which was "part of a long-term strategy to fight cable companies on their own turf before they erode too much of Verizon's traditional telephone business."<sup>69</sup> Verizon has already applied for licenses for cable franchises in several states. AT&T (formerly SBC) has also begun to construct fiber networks that will provide pay-TV services. Both Verizon and AT&T have decided that they need to offer a "triple play" bundle in competition with the cable companies. Both ILECs are investing in the tens of billions of dollars in these upgraded networks.

Wireless phone service also constrains the ability of ILECs to raise the

66. Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Deployment of Wireline Services Offering Advanced Telecommunications Capability, CC Dkt. Nos. 01-338, 96-98, 98-147, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, 18 F.C.C. Rcd. 16,978, 16,979 ¶ 229 (2003).

67. See USTA, p. 428.

68. Peter Grant, *Wall St. J.*, 26 May 2004, p. A3.

69. Justin Hyde, *Reuters News*, 19 May 2004, \*1.

price of voice services. There is a growing evidence of “wireless substitution” in the United States, which documents the degree to which consumers perceive wireless phones to be substitutes for fixed-line connections. The California Public Utilities Commission in August 2006 found that wireless substitution accounts for approximately half of ILEC primary residential wireline losses.<sup>70</sup> The combined number of wireless and cable telephony subscribers as of 2004 exceeded the number of end-user switched access lines and has continued to increase rapidly since that time. Wireless substitution is not unique to the United States. A J. D. Power and Associates survey in May 2004 revealed that 53 percent of UK contract customers “use mobile as main method of communication.”<sup>71</sup> The emergence of facilities-based competition for voice customers implies that the rationale for mandatory unbundling based on insurmountable barriers to entry is not substantiated in the United States.

### *Stepping-Stone Hypothesis*

The stepping-stone hypothesis implies that CLECs will migrate toward facilities-based entry over time as they gain market share. One way to measure the effect of mandatory unbundling on the method of CLEC entry is through time-series analysis. Figure 6.4 demonstrates that, contrary to the stepping-stone hypothesis, CLECs are, in the aggregate, increasingly relying on UNE-P as their preferred mode of entry.

The vertical axis is the share of total CLEC switched access lines: the sum of the shares across all types is 100 percent.<sup>72</sup> Whereas CLECs relied on UNEs for 23.9 percent of their lines in December 1999, by June 2003, UNE lines accounted for 58.5 percent of all CLEC lines.<sup>73</sup> Of all UNE lines in December 2002, 70.5 percent were acquired in combination with the ILEC’s switch.<sup>74</sup> The availability of wholesale access appears to have discouraged CLECs from investing in their own facilities (including switches) over time.

The increasing share of UNEs might be attributable to entry by new CLECs, which rely on UNEs extensively in their early stages. Stated differently, it is possible that mature CLECs have, in fact, made the transition to

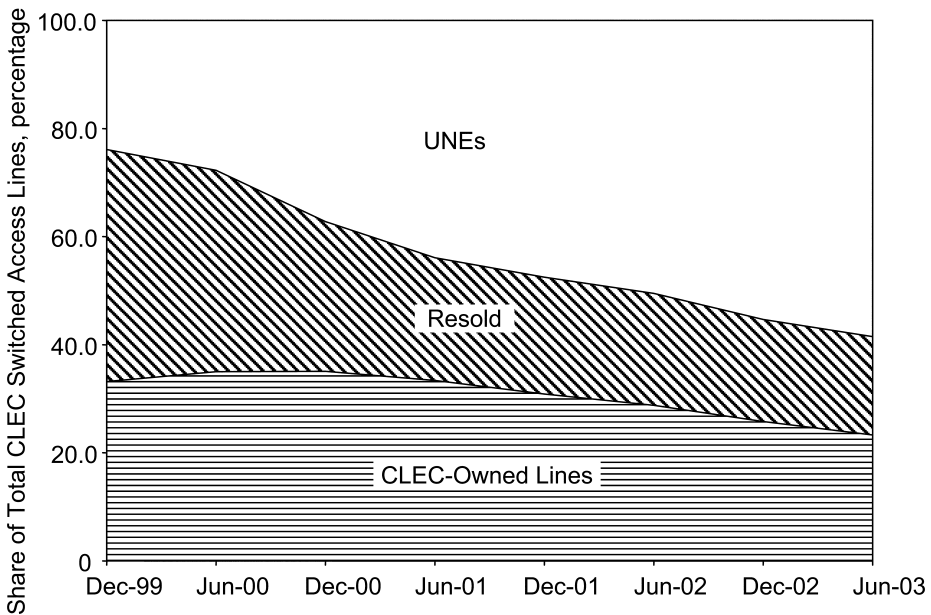
70. Most of the other half of residential wireline losses went to cable telephone providers. See Public Utilities Commission of the State of California, “Order Instituting Rulemaking on the Commission’s Own Motion to Assess and Revise the Regulation of Telecommunications Utilities,” Proposed Decision, August 25, 2006. The CPUC found “Finding of Fact No. 39. Wireless service is a substitute for wireline service.”

71. J. D. Power and Associates, Consumer Survey, May 2004.

72. Since the total number of switched access lines was approximately constant over this period (although it has decreased more recently), we believe that discussing the share of CLEC Switch Access lines is easier than considering the total number of CLEC access lines. In addition, most regulatory analysis of CLECs has been in terms of their share of access lines.

73. See FCC, Local Telephone Competition: Status as of June 30, 2003, tbl. 3 (rel. 22 December 2003), available at [http://www.fcc.gov/Bureaus/Common\\_Carrier/Reports/FCC-State\\_Link/IAD/lcom1203.pdf](http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/lcom1203.pdf).

74. *Ibid.*, tbl. 4.



**Fig. 6.4 CLEC lines by type, 1999–2003**

Source: FCC, Local Telephone Competition: Status as of June 30, 2003, p. 6 (tbl. 3) (rel. December 22, 2003).

Note: UNEs include UNE-loops and UNE-platform.

facilities-based lines, but entry by new UNE-based CLECs is artificially inflating the share of CLEC lines that are UNEs. To examine this hypothesis, we analyzed the progress of seventeen specific CLECs from the first quarter 2000 through the fourth quarter 2004. If the stepping-stone hypothesis were valid, then one would expect to observe the share of facilities-based lines *for a given CLEC* to increase over time. We found that a very small share of CLECs increased their share of facilities-based lines before the telecommunications meltdown of 2001. Roughly one-quarter of the firms in the sample increased their share of facilities-based lines in 2000. The majority of the CLECs continued to rely on UNEs to the same extent during that time period. Thus, we do not find evidence in support of the stepping-stone hypothesis. Other empirical analyses support the position that mandatory unbundling does not provide a stepping-stone to facilities-based investment. For example, Crandall, Ingraham, and Singer find that the share of CLEC lines that are facilities-based is lower in states where the UNE rental rates are lower, which suggests that unbundling decreases facilities-based competition in the short term.<sup>75</sup>

75. Crandall, Ingraham, and Singer (2004).

### *Wholesale Competition*

The FCC's vision of a network of networks does not appear to have materialized in the US residential market. For certain sectors of the US enterprise market, however, several CLECs have established themselves as pure wholesale providers of local access. In its *Triennial Review Order*, the FCC reported that “[t]o a smaller degree, some competitive LECs began to provide selected transport services to other competitive LECs on a wholesale basis.”<sup>76</sup> Since 1998, CLEC-owned fiber has increased from 100,000 to 184,000 route miles. In addition, wholesale suppliers of fiber continue to invest in facilities that are being used by all carriers.<sup>77</sup> The FCC noted that much of this interoffice transport is long-haul intercity, rather than local. In summary, an operating wholesale market appears to have emerged in enterprise switching, transport, and high-speed (DS3) loops only according to the FCC analysis.

### *Other Observations about the Process*

The Telecommunications Act retained the BOCs' (Bell Operating Company) interLATA (interstate long-distance) prohibition while establishing, in section 271,<sup>78</sup> a process—involving each state public utilities commission, the FCC, and the Department of Justice (DOJ), acting on a state-by-state basis—by which the BOCs could earn regulatory approval to enter the interLATA market within the regions in which they provide local exchange service. By 2004, the BOCs had received section 271 authorizations to provide in-region interLATA service in forty-eight states (long-distance customers in Alaska and Hawaii are not yet served by BOCs) and the District of Columbia.<sup>79</sup> For the FCC, BOC entry into the in-region interLATA market has been “an incentive or reward for opening the local exchange market.”<sup>80</sup> That view implicitly subordinates the possible harm to consumers (in the form of delayed price reductions) from the restrictions on the BOCs while they seek that carrot.<sup>81</sup>

In an article with Gregory Leonard published in the *Antitrust Law Journal*, we found that the average US consumer received a savings of 8 to 11 percent on the monthly interLATA bill in the states where BOC entry occurred as compared with “control” states where BOC entry had not occurred. We also found that CLECs gained a substantial increase in cumulative share of the local exchange market in states where BOC entry occurred as compared

76. See *Triennial Review*, p. 31 ¶ 37.

77. BOC UNE Fact Report 2002, pp. III-8 to III-14.

78. 47 U.S.C. § 271.

79. See FCC, *RBOC Applications to Provide In-region, InterLATA Services Under § 271*, available at [http://www.fcc.gov/Bureaus/Common\\_Carrier/in-region\\_applications/](http://www.fcc.gov/Bureaus/Common_Carrier/in-region_applications/).

80. 1997 Michigan Section 271 Order, 12 F.C.C. Rcd. Pp. 20,746 ¶ 388.

81. Hausman, Leonard, and Sidak (2002).

with control states without BOC entry. Finally, we found that that there was no significant change in the local bill of the average consumer in states where BOC entry into interLATA service occurred as compared with those bills in the control states. Thus, the failure of the FCC and the DOJ to consider the trade-off between consumer harm from entry restriction of the BOCs into long distance and the marginal gains from further delaying BOC entry by requiring greater regulatory adherence led to significant consumer harm in the billions of dollars per year. We return to the question of how consumer interests should enter regulatory deliberation when we examine the regulatory experience in New Zealand.

### 6.5.2 United Kingdom

Mandatory unbundling in the United Kingdom was first considered by the former telecommunications regulator, the Office of Telecommunications (OfTel), in 1996. OfTel stated that three facilities-based service providers would be *sufficient* to provide effective competition in the telecommunications market of the United Kingdom.<sup>82</sup> OfTel acknowledged that at least three facilities-based service providers (including British Telecom [BT], a cable operator, and a radio access operator) already competed in many UK geographic markets. Because of the strong level of existing and expected future facilities-based competition in the United Kingdom in July 1996, OfTel decided that:

Any move to allow operators to take over BT exchange lines would undermine past investments and jeopardize future plans. Our conclusion, therefore, is that direct connection to the BT Access Network would adversely affect the development of competition and would not be in the interests of the UK consumer.<sup>83</sup>

In short, OfTel recognized that mandatory unbundling would undermine the goals of dynamic efficiency.

From 1994 through 1997, regulation shifted in favor of infrastructure competition over service competition.<sup>84</sup> In 1996, OfTel became convinced that “the key to achieving a vibrant market for services provided over telecommunication networks is the promotion of fair, efficient and sustainable network competition.”<sup>85</sup> This emphasis of infrastructure competition

82. OfTel, OfTel’s Policy on Indirect Access, Equal Access and Direct Connection to the Access Network, ¶ 46, July 1996, available at [http://www.ofcom.org.uk/static/archive/oftel/publications/1995\\_98/competition/access96.htm](http://www.ofcom.org.uk/static/archive/oftel/publications/1995_98/competition/access96.htm).

83. *Ibid.*, ¶¶ 46–47. Facilities-based investment by BT’s competitors existed even in the early 1990s. In particular, ILECs in the United States and Canada invested in UK cable companies. Those cable companies then began to offer telephone services to their customers. Consequently, by January 2004, over 400,000 homes in the United Kingdom were offered telephone service by a cable operator.

84. See, for example, Geradin and Kerf (2003, 163).

85. OfTel (1996).

affected OfTel's treatment of issues such as number portability and equal access. The regulatory emphasis shifted back to service competition in 1998 with the issuance of several EU directives, which encouraged national regulators not to discriminate between firms that were building networks and those that were not.

In December 1998, OfTel released a consultation document that called for mandatory unbundling as a *necessary* condition for bringing higher bandwidth services to consumers.<sup>86</sup> OfTel cited four reasons why mandatory unbundling was needed in the United Kingdom. First, BT, which supplied service to 85 percent of UK consumers, was not equipped in 1998 to provide DSL service. Second, the forthcoming 1999 European Union review on telecommunications markets was anticipated to place local loop unbundling high on its agenda. Third, the UK government had stressed the importance of the deployment of new technologies to all consumers. Fourth, other countries, such as the United States, had already implemented mandatory unbundling. Although UK consumers already benefited from platform competition, OfTel felt that mandatory unbundling was important for the United Kingdom to maintain its "competitive advantage" vis-à-vis the rest of the world.

In November 1999, OfTel announced that unbundled loops and collocation would become available to competitive providers.<sup>87</sup> BT was required by July 2001 to allow unbundling and collocation within its network.<sup>88</sup> In its *Access to Bandwidth Report*, OfTel provided the following rationale for pursuing mandatory unbundling:

The best way to achieve the variety of services that consumers want at reasonable prices is to promote effective competition in the provision of access to and delivery of these services. In examining the case for action, OfTel has considered the level of demand in various segments of the market, the supply of products available and whether there are barriers to the competitive delivery of higher bandwidth access and services. The conclusion is that regulatory action is needed to introduce competition into the upgrade of the local loop.<sup>89</sup>

86. OfTel, *Access to Bandwidth: Bringing Higher Bandwidth Services to the Consumer*, December 1998 (available at [http://www.ofcom.org.uk/static/archive/oftel/publications/1995\\_98/competition/llu1298.htm](http://www.ofcom.org.uk/static/archive/oftel/publications/1995_98/competition/llu1298.htm)) [*OfTel Access to Bandwidth December 1998*].

87. OfTel, *Access to Bandwidth: Delivering Competition for the Information Age*, November 1999 (available at <http://www.ofcom.org.uk/static/archive/oftel/publications/1999/consumer/a2b1199.htm>) [*OfTel Access to Bandwidth 1999*].

88. For a thorough discussion of the regulatory requirements under mandatory unbundling in the United Kingdom, see Geradin and Kerf (2003, 172–74). Along with the requirement of mandatory unbundling, the Director General of Telecommunications (DGT) permitted that rates for mandatory unbundling should (1) permit the recovery of an appropriate share of common cost, (2) permit the recovery of reasonably incurred long-run incremental cost, (3) may differ across BT's service area according to varying economic circumstances, and (4) should include a reasonable return on capital employed (Geradin and Kerf 2003, 173).

89. See OfTel (1999, ¶ 2.4).

Oftel intended that mandatory unbundling would lead to enhanced competition in broadband services. Thus, the primary intent of mandatory local loop unbundling in the United Kingdom was to expedite the delivery of advanced services to consumers, even though regulators conceded that natural market forces might provide competitive offerings within a reasonable period of time.

### *Retail Competition*

*Pricing.* One rationale for mandatory unbundling is increased competition in retail services, which is characterized by lower retail prices.<sup>90</sup> Pricing data from Oftel indicate that mandatory unbundling, which was implemented in the United Kingdom in the middle of 2001, has not measurably decreased prices of telecommunications service. According to Oftel, from 1996 through the middle of 2001, the time at which BT was required to begin unbundling, prices for residential service decreased by approximately 20 percent.<sup>91</sup> In contrast, prices for residential service slightly increased after BT was required to unbundle.<sup>92</sup> Similarly, the price of telecommunications service for businesses decreased by 40 percent between 1996 and mid-2001, but it has not declined measurably since mandatory unbundling was implemented. Only a few carriers have actually provided or were attempting to provide local telephone service via unbundled access.

Although UNE-based competition for residential voice customers has not flourished in the United Kingdom, CLECs have provided broadband Internet service extensively through unbundled access. As of July 2003, entrants providing broadband service through unbundled access increased their DSL lines to over 536,000, which nearly equaled the total DSL customers of BT.<sup>93</sup> Almost all of these new entrants provided high-speed Internet service, as only 3,500 of the new entrants' 536,000 unbundled lines were used to provide *both* voice and data service.

Retail competition in broadband services is intense and prices have been decreasing. Mandatory unbundling may not be the cause of the price decline. Facilities-based cable operator NTL launched the first UK broadband offering in April 1999, followed by Telewest in March 2000. Although BT did not launch its first DSL offering until mid-2000, owing to technical prob-

90. Oftel has stated that "competitive markets are most likely to promote innovation and increased productivity with resulting benefits in terms of lower prices and better quality and choice for consumers." See Oftel (1998, ¶ 4.2). Oftel has also maintained that regulatory intervention "should be limited to situations where competition is either not possible or is not working effectively or where costs and benefits accruing to third parties are not taken into account by market participants." By pursuing a policy of mandatory unbundling, Oftel believed that it could correct a market failure which, once eliminated or reduced, would result in lower retail prices.

91. Oftel (2003, 7).

92. Residential access lines in the United Kingdom were not subsidized to the extent found in the United States. Thus, this change in prices is not due to rebalancing.

93. Commission of the European Communities (2003, 59).



lems, lines were not widely available until May 2001. The launch of retail DSL products by BT and various third parties (via BT's wholesale offer) began a period of intense price competition among broadband providers. By the middle of 2003, price reductions had transformed the UK broadband market from one of the most expensive in the OECD (Organisation for Economic Co-operation and Development) to the cheapest, as observed in OfTel's survey of the broadband market.<sup>94</sup> Hence, price decreases in the UK market can be directly linked to competition between DSL and cable providers.<sup>95</sup> In the months after the launch of BT's DSL service, NTL and Telewest responded with significant price reductions such that by mid-2001, prices were around 50 percent of their launch levels. BT responded in March 2003 with a 25 percent price reduction, which provided the trigger for a series of price cuts by other ISPs using BT's resale service.

*Investment.* Another rationale for mandatory unbundling is the expectation that it will increase the ILEC's incentive to upgrade its network. Table 6.1 lists BT's investment in fixed capital assets for its fiscal years ending in March between 1996 and 2003.

The data in table 6.1 indicate that in its fiscal year 1999, BT spent £1.8 billion on fixed-capital investment. During 2000, BT spent £5.8 billion on fixed capital investment,<sup>96</sup> and in 2001 BT spent £5.2 billion on fixed capital investment. In fiscal year 2002, BT reduced its investment to £1.2 billion, and in fiscal year 2003, BT spent only £555 million on fixed capital investment. Hence, BT's investment in fixed capital assets reached its apex at the end of fiscal year 2001, which ended in March 2001, before mandatory unbundling was introduced in the United Kingdom. Of course, the end of BT's fiscal year 2001 coincided almost perfectly with the bursting of the telecommunications bubble, which likely contributed, at least in part, to the decrease in BT's investment.

BT's pattern of investment corresponds closely with the pattern of investment by the entire UK telecommunications industry. From 1994 through 2000, telecommunications investment in the United Kingdom increased substantially. Approximately £4 billion was invested by the telecommunications industry in 1994, accounting for 4 percent of total investment in the United Kingdom that year.<sup>97</sup> By 2000, nearly £12 billion was invested by the telecommunications industry. Between 2000 and 2001, telecommunications investment in the United Kingdom fell by approximately £4 billion.

94. OfTel's Internet and Broadband Brief, 12 October 2003, available at [http://www.ofcom.org.uk/legacy\\_regulators/oftel/oftel\\_internet\\_broadband\\_brief?a=87101#10](http://www.ofcom.org.uk/legacy_regulators/oftel/oftel_internet_broadband_brief?a=87101#10).

95. *OECD 2001 Broadband Study*, p. 42.

96. BT, Annual Report & Form 20-F 2003, p. 27, available at <http://www.btplc.com/report/report03/index.htm>.

97. OFCOM, Strategic Review of Telecommunications: Phase I Annex F-J 35 (Spring 2004), available at [http://www.ofcom.org.uk/codes\\_guidelines/telecoms/strategic\\_review\\_telecoms/?a=87101#remit](http://www.ofcom.org.uk/codes_guidelines/telecoms/strategic_review_telecoms/?a=87101#remit).

**Table 6.1** BT investment in fixed capital assets: Fiscal years 1996–2003

Fiscal year	Fixed capital investment (£ billion)
1993	0.74
1994	1.31
1995	1.08
1996	1.06
1997	1.27
1998	1.71
1999	1.83
2000	5.88
2001	5.20
2002	1.22
2003	0.56

*Sources:* BT, Annual Report and Form 20-F 2003, p. 27 (released 2003), available at <http://www.btplc.com/report/report03/index.htm>; BT, Annual Report and Form 20-F 2000, p. 26 (released March 2000), available at <http://www.btplc.com/Sharesandperformance/Howwehavedone/Financialreports/Annualreports/Annualreportsarchive.htm>.

### *Entry Barriers*

Mandatory unbundling is considered necessary whenever market forces cannot be relied upon to produce facilities-based competition. An analysis of platform competition for broadband services in the United Kingdom, however, reveals that entry unrelated to unbundling currently exists. As of July 2003, BT operated over 563,000 DSL lines in the United Kingdom,<sup>98</sup> while cable operators served nearly 1.1 million customers. Given the nearly two-to-one advantage of cable modem service to BT's DSL service in the United Kingdom, it is not reasonable to presume that BT has market power in the broadband Internet services market, especially in those geographic markets passed by cable networks.

Cable operators NTL and Telewest also compete vigorously with BT for residential and business voice customers.<sup>99</sup> UK cable companies have offered residential telephone service for nearly a decade. When the cable companies first deployed coaxial cable for television services, they simultaneously laid regular copper phone lines in the same trenches.

Cable telephony's share of fixed voice connections has steadily increased over time. In March 1998, cable operators NTL and Telewest provided telephone service to 9.1 percent of residential customers.<sup>100</sup> By December

98. See Commission of the European Communities (2003).

99. NTL and Telewest had geographically separate networks that have now merged into a single company, Virgin Media. Also, in the United Kingdom, cable companies compete again with an extremely competitive satellite provider (BSkyB), which controls football (soccer) telecasts in the United Kingdom, which provides a significant competitive advantage.

100. OfTel, The UK Telecommunications Industry Market Information: 2001/02, March 2003, p. 27 (tbl. 8a) (available at [http://www.ofcom.org.uk/static/archive/oftel/publications/market\\_info/2003/ami0303.pdf](http://www.ofcom.org.uk/static/archive/oftel/publications/market_info/2003/ami0303.pdf)) [2003 UK Telecommunications Information Report].

2003, their combined share of the residential voice market had increased to 16.6 percent.<sup>101</sup> Hence, in households passed by cable networks, cable operators have roughly 33 percent of fixed-line voice connections.<sup>102</sup> The increase in the cable companies' share of residential voice services in the United Kingdom came largely at the expense of BT, whose share fell from 86.2 percent to 82.7 percent between March 1998 and December 2003.<sup>103</sup>

Cable companies' share of business voice service revenues in the United Kingdom has also increased. Between 1996 and 1997, NTL and Telewest controlled only 2.6 percent of business voice revenues, but by December 2003 those companies had acquired a 4.8 percent share.<sup>104</sup> Cable's share of business voice revenues is smaller than its share of residential voice revenues because cable operators must compete with several other facilities-based CLECs, including Colt Telecom Group (COLT), in the business sector.

COLT, which has operations in thirty-two cities in thirteen European countries, competes directly with BT and cable operators for business customers. COLT established its metropolitan area network in London in 1993.<sup>105</sup> It expanded its network to include Birmingham in December 2000 and Manchester in February 2002. The COLT network is largely deployed on COLT's fully owned fiber, which when supplemented with current hardware, can reach multigigabit speeds on a single circuit. COLT targets its services to business users (COLT interAccess) and resellers of Internet access (COLT InterTransit). COLT also offers its business customers a full range of voice services. Fidelity Investments owns 56 percent of COLT. COLT expected to spend between £150 million and £200 million in capital expenditure in 2004, depending on customer demand.<sup>106</sup> As of March 2004, COLT reported having over 17,000 business customers across Europe.<sup>107</sup>

BT's share of both residential and business voice revenues has decreased significantly since 1993. BT's share of residential voice revenues, which was nearly 100 percent in 1993, declined steadily to just below 70 percent in 2001.<sup>108</sup> Since 2001, when BT was required to unbundle the local loop, BT's share of residential revenues has remained constant at 70 percent. In 1993, BT controlled approximately 85 percent of the voice revenues in the busi-

101. Ofcom, Ofcom Fixed Telecoms Market Information Update, May 2004, at tbl. 7, available at [http://www.ofcom.org.uk/research/industry\\_market\\_research/m\\_i\\_index/telecoms\\_providers/fix\\_t\\_mkt\\_info/](http://www.ofcom.org.uk/research/industry_market_research/m_i_index/telecoms_providers/fix_t_mkt_info/).

102. Ibid.; Ofcom, ITC Multichannel Quarterly, July 2003, available at [http://www.ofcom.org.uk/research/industry\\_market\\_research/m\\_i\\_index/tv\\_radio\\_region/itc\\_market\\_info/cable\\_sat\\_stats/multichannel\\_q2\\_2003.doc](http://www.ofcom.org.uk/research/industry_market_research/m_i_index/tv_radio_region/itc_market_info/cable_sat_stats/multichannel_q2_2003.doc). Cable companies pass approximately 50 percent of UK residences.

103. Ibid.; Ofcom, ITC Telecommunications Information Report, p. 27 (tbl. 8a).

104. See 2003 UK Telecommunications Information Report, p. 32 (tbl. 13); *Ofcom FTMI Update*, tbl. 11.

105. COLT, About Us (available at [www.colt.net](http://www.colt.net)).

106. Nic Fildes, Dow Jones Newswire, 22 April 2004, \*1

107. *COLT Telecom expands metro optical services offering*, M2 Presswire, 9 March 2004, \*1.

108. OFCOM, Strategic Review of Telecommunications: Phase I Annex F-J 35 (Spring 2004), available at [http://www.ofcom.org.uk/codes\\_guidelines/telecoms/strategic\\_review\\_telecoms/](http://www.ofcom.org.uk/codes_guidelines/telecoms/strategic_review_telecoms/).

ness sector. That share, however, had steadily declined to below 60 percent by 2001. By 2003, BT's share of business voice revenues had decreased to approximately 52 percent.

### *Stepping-Stone Hypothesis*

As of 2005, it was not apparent that new entrants in the United Kingdom had used unbundled loops to evolve into facilities-based competitors. A lack of conversion from unbundled access to facilities-based service is likely due to the high level of facilities-based investment that already occurred *before* unbundling was mandated. In particular, entrants controlled 24.0 percent of the revenues for residential voice services by March 2001, and 39.5 percent of the business revenues from voice services by March 2001.<sup>109</sup> The high level of facilities-based competition that predated the decision-making process for local loop unbundling raises serious issues as to whether mandatory unbundling was even needed for voice or broadband services in the United Kingdom by the time that Oftel mandated it in November 1999.

### *Wholesale Competition*

A final rationale for mandatory unbundling is increased competition in the wholesale market, which is typically characterized by supply of alternative networks by CLECs for new entrants. The size of the wholesale market in the United Kingdom has grown considerably since the mid-1990s. Between 1996 and 2002, the wholesale market for voice services in the United Kingdom increased from £1.9 billion to £4.5 billion—a 130 percent increase. By March 2002, the largest share of the wholesale voice market, approximately 49.1 percent, was controlled by BT. Cable operators NTL, Telewest, and Cable & Wireless controlled approximately 19.9 percent of the wholesale voice revenues in the United Kingdom. The remaining 31 percent of the market was controlled by other operators. Business districts in most major cities and towns in the United Kingdom are served by facilities-based CLECs. These CLECs typically offer service to both business customers and CLECs for resale.

### *Other Observations about the Process*

The industry structure facing UK regulators was unique in the sense that competition from cable telephony emerged *before* mandatory local loop unbundling was ordered, let alone implemented. Cable operators have opposed mandatory unbundling on the grounds that it would not encourage facilities-based competitors to expand into rural areas. For example, Telewest stated in February 2000:

[W]e do not believe that local loop unbundling will deliver the necessary universal broadband upgrades that Government policies require. It may

109. 2003 UK Telecommunications Information Report.

purely delay the dominant player from full broadband upgrade of its local infrastructure (assuming that ADSL over twisted copper pair is only an interim solution) and deter alternative local loop investors from further substantial build, particularly to the lower density areas.<sup>110</sup>

Telewest argued, correctly, that CLECs that rely on unbundled access were likely to focus their activities in densely populated markets.

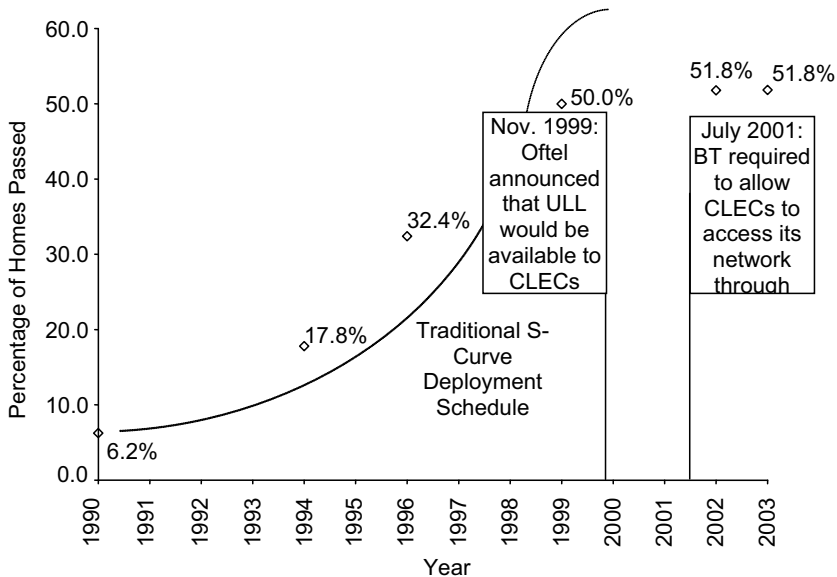
Although the cable companies in the United Kingdom have begun to offer broadband Internet and voice service to their existing base of customers, only 50 percent of the homes in the United Kingdom were passed by the cable network as of July 2003.<sup>111</sup> This lack of coverage explains in part why cable television accounted for only 26.4 percent of the multichannel television market in the United Kingdom as of 2003. Satellite television is much stronger in the United Kingdom than in the United States, as British Sky Broadcasting (BSkyB) controls much of the sports content that cable operators cannot provide. It might be tempting for regulators to consider the cable industry's investment in broadband and telephony *in cables' existing footprint* as a sunk investment that cannot be reversed through mandatory unbundling of BT's local loops. But mandatory unbundling of BT's network in rural areas might indirectly decrease the incentive of the cable operators to expand into rural areas, as UNE-based CLECs could enter those rural areas through unbundling *at a lower cost*. Cable operator Telewest succinctly explained the fallacy of the regulator's decision making when it declared: "[I]f demand [for unbundled access] really exists, the market will deliver access products for new broadband services without regulatory intervention."<sup>112</sup> Figure 6.5 shows the percent of homes passed by a cable operator in the United Kingdom between 1990 and 2003.

The deployment of any new technology typically follows an S-curve. Initially, technology penetration increases at an increasing rate. After some critical point, the technology is deployed at a diminishing rate until the entire market is saturated. Until 1999, cable penetration in the United Kingdom followed a deployment schedule similar to that suggested by the S-curve. In particular, cable penetration rapidly increased from only 6.2 percent in 1990 to 50 percent by 1999. Since 1999, however, cable penetration has increased by only 1.8 percent. The slow deployment of cable services to new markets in the United Kingdom could be explained, in part, by the introduction of mandatory unbundling of BT's network. If this effect is present, consumers have been injured by the decrease in competition to BSkyB. Hence, Ofcom's

110. Response of Telewest Communications, Toward a New Framework for Electronic Communications Infrastructure and Associated Services—The 1999 Communications Review, February 2000, § E ¶ 2.3, available at <http://europa.eu.int/ISPO/infosoc/telecompolicy/review99/comments/telewest28b.htm>.

111. See ITC Multichannel Quarterly.

112. See Response of Telewest Communications, § E ¶ 2.5.



**Fig. 6.5** Percent of UK homes passed by cable, 1990–2003

*Sources:* Peter Humphreys, Radio and Television Systems in Great Britain, Spring 1999 (available at [http://www.obs.coe.int/oea\\_publ/hbi/HBI2K\\_GB.html](http://www.obs.coe.int/oea_publ/hbi/HBI2K_GB.html)); Teldok, Teldok Yearbook 1997, July 24, 1997, p. 245; Martyn Williams, TS News-UK Market Roundup, December 4, 1996; OFCOM, ITC Multi-Channel Quarterly-Q3 2002, December 17, 2002, p. 7; OFCOM, ITC Multi-Channel Quarterly-Q2 2003, June 2003, p. 7.

policy has led to greater market power for a company that Ofcom recognizes is exercising market power.<sup>113</sup> Again, the regulator in the United Kingdom, as in the United States, did not do an analysis of the effect of its regulatory policy on consumer welfare.

As late as mid-2005, Ofcom believed that it was necessary to resort to greater levels of regulatory intervention to make unbundling work. In June 2005, Ofcom stated that “years of intrusive regulation have not created the conditions for the sustainable competition necessary for long-term consumer benefit and which, in other countries, has spurred investment in next generation core and access networks.”<sup>114</sup> Ofcom’s fundamental concern was that some assets were supposedly economically impossible to replicate, which created an “enduring bottleneck,” especially in the access part of

113. See, for example, OFCOM, The Regulation of Electronic Programme Guides, March 2003, ¶ 16, available at [http://www.ofcom.org.uk/consultations/past/epg/stat\\_provisions/?a=87101](http://www.ofcom.org.uk/consultations/past/epg/stat_provisions/?a=87101); OfTel, Beyond the Telephone, the Television and the PC, August 1995, ¶ 4.4.12, available at [http://www.ofcom.org.uk/static/archive/oftel/publications/1995\\_98/info\\_super/multi.htm](http://www.ofcom.org.uk/static/archive/oftel/publications/1995_98/info_super/multi.htm).

114. OFCOM Telecommunications Statement, June 23, 2005, p. 1, available at [http://www.ofcom.org.uk/consult/condocs/telecoms\\_p2/statement/main.pdf](http://www.ofcom.org.uk/consult/condocs/telecoms_p2/statement/main.pdf).

the network. Ofcom rejected the option of recommending a Competition Commission investigation, which could have led to the breakup of BT, and it instead opened a public consultation on the proposal to accept a series of solutions offered by BT.<sup>115</sup>

In November 2004, Ofcom opened the Phase 2 consultation of its Strategic Review of Telecommunications.<sup>116</sup> The review noted that the fixed line market in the United Kingdom has remained fragmented and that BT was larger than most of its competitors combined, in terms of revenues, market capitalization, and investment. The review argued that the economies of scale and sunk costs for fixed networks are especially difficult for entrants to overcome, which made them reliant on BT to provide wholesale access to the network. Ofcom stated that the result of this reliance on BT was slow product development, inferior wholesale products, poor transactional processes, and a general lack of transparency, which combined to create an unattractive market for competition.

Ofcom offered three potential courses of action in its November 2004 review. The first option involved across-the-board deregulation and complete reliance on competition law to constrain BT's purported market power. The second option was to make a reference to the Competition Commission under the Enterprise Act of 2002, which would actively consider the structural separation of BT. The third option was to seek from BT "real equality of access," which consisted of two parts.<sup>117</sup> The first part would require "BT's own downstream operations use the same products, processes, and prices as those used by their retail rivals." The second part would require "operational separation within BT that would ensure that those responsible for overseeing BT's bottleneck assets had real incentives to wish to serve other operators in practice and on the ground with the same zeal, efficiency and enthusiasm as they served the remainder of BT's downstream activities." BT chose Ofcom's third option.

BT responded to Ofcom's November 2004 review in February 2005 by announcing a "comprehensive set of proposals to stimulate the UK telecoms industry."<sup>118</sup> The proposals announced in February 2005 formed the basis for the proposed regulatory settlement with Ofcom, which was formally pro-

115. Notice under Section 155(1) of the Enterprise Act 2002: Consultation on undertakings offered by British Telecommunications plc in lieu of a reference under Part 4 of the Enterprise Act, OFCOM, June 30, 2005, ¶ 1.1, available at <http://www.ofcom.org.uk/consult/condocs/sec155/sec155.pdf>.

116. Strategic Review of Telecommunications: Phase 2 consultation document, OFCOM, November 18, 2004, available at [http://www.ofcom.org.uk/consult/condocs/telecoms\\_p2/tsrphase2/maincondoc.pdf](http://www.ofcom.org.uk/consult/condocs/telecoms_p2/tsrphase2/maincondoc.pdf).

117. OFCOM Telecommunications Statement, p. 2.

118. *BT Unveils Proposals to Stimulate the UK Telecoms Industry*, BT Press Release DC05-057, February 3, 2005, available at <http://www.btplc.com/News/Articles/Showarticle.cfm?ArticleID=a13fbce7-157c-4220-bc38-c4c482026d50>.

posed by BT in June 2005.<sup>119</sup> In response to BT's proposal, Ofcom opened a public consultation to elicit comments on BT's solutions.<sup>120</sup>

The most significant of BT's proposed undertakings was the creation of a new business unit within BT, provisionally named the Access Services Division (ASD), which would provide equal access to its nationwide network. The ASD would provide, on behalf of BT, wholesale line rental, local loop unbundling, wholesale extension service, partial private circuits, backhaul extension service, and various other products. The ASD would not provide any service to BT unless it also offered that product to BT's competitors on an "equivalence of input" basis, which would include the same time frames, terms, conditions, and prices. The ASD would have its own staff of approximately 30,000 employees, and it would have a distinct brand name.<sup>121</sup>

A significant part of the agreement between BT and Ofcom was the creation of an internal, five-member Equality of Access Board, supported by an Equality of Access Office, to monitor the company's compliance with its "Undertakings" agreement and to recommend remedial action to BT's management. Three members of the board would be independent, meaning that BT would select them with Ofcom's advice and consent. Ofcom would receive minutes of the proceedings of the Equality of Access Board, as well as regular reports. The Equality of Access Board "may suggest to BT remedial action to ensure compliance with these Undertakings," and "BT shall take due account of any suggestions or comments the [Equality of Access Board] may have." The Equality of Access Board "shall inform Ofcom, within ten working days, when it comes to its attention that there has been a non-trivial breach of these Undertakings." BT is required to fund and staff this internal oversight activity satisfactorily: "BT shall ensure that the [Equality of Access Office] is resourced commensurate with the demands placed upon it and is able to operate with the level of independence required." The Equality of Access Board would have access to information held anywhere in or by BT that the board deemed that "it needs to fulfil its role," and, in a curiously worded provision, the board "shall determine how best to engage with representatives of industry in order to understand their issues and concerns."<sup>122</sup>

This arrangement underscores that decisions concerning network access implicate both ownership and control of the incumbent firm. One way to view BT's undertaking with Ofcom is that the regulator's indirect majority participation in the governance of the ASD eliminates detailed *ex ante* regu-

119. *BT Commits to Support New Era of Regulation*, BT Press Release DC05-405, June 23, 2005, available at <http://www.btplc.com/News/Articles/Showarticle.cfm?ArticleID=e89ed523-12a0-45a1-bc2b-321f127e83be>.

120. OFCOM Consultation, p. 4.

121. BT Press Release DC05-405.

122. Annex E: The Undertakings offered by BT, § 10.



lation of wholesale services. Nonetheless, the risks of ownership (including the financial risk inherent in making sunk investments in network infrastructure) would remain with BT's shareholders. Perhaps this hybrid renationalization of BT's access network will purchase regulatory relief for its retail business. But there is reason for skepticism, given the familiar tendency of regulators to perpetuate (and even initiate) intervention in markets that have become demonstrably competitive. Further, the UK government's previous record with a somewhat similar plan for the railroads ended in financial disaster in 2001 because the regulator would not permit the network provider to set rates high enough for continued investment and modernization of the rail network.<sup>123</sup>

As of 2006 it appears that the United Kingdom's insistence on "equality of access" may lead BT to invest neither in a "fiber to the home network," as Verizon is currently doing in the United States, nor in a "fiber to the node" network, as AT&T (SBC) is currently doing. Given the current technology both of these forms of fiber networks do not permit "equality of access" to competitors. While the US ILEC investments are risky and may not succeed economically, the UK regulatory policy may well lead to a significant distortion in technology choice and future competition among pay-TV providers compared with likely outcomes in the United States, Australia, Canada, and a number of other advanced economies.

### 6.5.3 New Zealand

Deregulation of the telecommunications industry in New Zealand began in April 1989 with the separation of Telecom Corporation (Telecom) from New Zealand Post Office.<sup>124</sup> Telecom became fully privatized in 1990. In accordance with New Zealand's Commerce Act of 1986 and the Fair Trading Act of 1986, Telecom was declared dominant in the telecommunications market. As a result, the regulator placed certain constraints on Telecom, but "reaffirmed its reliance on general competition law to achieve its objective in telecommunications."

Unlike many other countries, New Zealand did not adopt any sector-specific regulation.<sup>125</sup> Section 64 of the Telecommunications Act of 2001 required the Commerce Commission (CC) to determine the necessity of regulating access to the unbundled elements of Telecom's local loop network and fixed public data network.<sup>126</sup> The CC initially set resale discounts as specified in the Telecom Act of 2001. In December 2003, the CC recom-

123. Hausman and Myers (2002) discuss the railroad network financial disaster in the United Kingdom.

124. New Zealand Telecommunications 1987–2001, Publication No. 8, ¶¶ 8–9 (August 2001).

125. See, for example, Geradin and Kerf (2003, 119), explaining how New Zealand adopted the opposite approach of the United States, where sector-specific regulation was pervasive.

126. Telecommunications Act 2001, Section 64 Review and Schedule 3 Investigation into Unbundling the Local Loop Network and the Fixed Public Data Network, Final Report, 9 December 2003, p. i.

mended in its *Final Report* against unbundling local loops, line sharing, and unbundling “elements of Telecom’s fixed Public Data Network beyond those supporting the Asymmetric Digital Subscriber Line (ADSL) bitstream services.”

To measure the efficacy of full local loop unbundling, the CC used a cost-benefit analysis that measured the changes in total surplus (consumer and producer surplus) relative to the status quo of no regulation. The New Zealand CC uses the Long-Term Benefits to End-Users (LTBE) criteria in determining its regulatory policies. This determination usually involves an explicit cost-benefit analysis.<sup>127</sup> To the extent that mandatory unbundling reduces prices in the short term, consumer welfare increases. The increase in consumer welfare due to an expansion in output is referred to as an “allocative efficiency” gain. The CC also considered the “wealth transfer” from producers to consumers when prices decline, which occurs independent of output expansion. Although the CC found short-run gains in welfare, the calculations were subject to considerable uncertainty and criticism, and did not take account of effects on investment by the incumbent. Although it recognized the potential importance of dynamic efficiency, the CC believed that there was no robust method of quantifying dynamic efficiency gains that were applicable to its decision.

The CC ultimately elected not to adopt local loop unbundling and listed several reasons in support of its decision. First, the CC noted that platform competition, especially in the form of fixed wireless networks, was likely to “evolve and reduce the extent of [Telecom’s] bottleneck over time.” Second, the CC explained that the potential for dynamic efficiency gains from local loop unbundling was tempered by international experience, noting that “in a significant number of countries, the gains from local loop unbundling have been disappointing.” Third, the CC revealed that responses to its draft report indicated “fairly limited demand for local loops” as the preferred means of competitive entry. Fourth, the CC explained that mandatory unbundling was “a resource intensive activity,” which generated “a significant level of controversy in determining terms of access to unbundled loops in overseas jurisdictions.” Most importantly, the CC determined the economic incentives for the incumbent to invest in new services would be significantly decreased and that these new services could lead to very large welfare gains to consumers.

Instead of mandatory unbundling, the CC recommended access to Telecom’s ADSL service for residential and small and medium size enterprises (SMEs), along with the associated backhaul transmission services and operational support systems (OSSs). With the exception of updating the

127. Australia uses a similar approach. The ACCC calls its test the “Long-Term Interest of End-Users” (LTIE) approach. Australia and New Zealand are the two regulatory bodies that use an explicit economic approach to determination of regulation.

Kiwi Share, which imposes universal service obligations on Telecom and establishes a price ceiling for its residential calls,<sup>128</sup> the result of the CC's recommendations was a largely unregulated telecommunications market relative to most European countries and the United States.

### *Retail Competition*

In this section, we examine the recent trends in investment and pricing in New Zealand. The New Zealand survey provides a potential counterfactual to the unbundling experience in other countries.

*Pricing.* Despite the fact that the CC has abstained from mandatory unbundling, prices for telecommunications services in New Zealand have not increased substantially. Figure 6.6 shows the prices for telephone rental and connection and telephone call charges in New Zealand since June 1999. However, to a large extent this outcome is influenced by the Kiwi Share Obligation, which permits New Zealand Telecom only to increase residential monthly access charges at the rate of inflation, although no regulatory restriction is placed on business access charges.

As figure 6.6 shows, telephone rental and connection charges offered by all carriers in New Zealand consistently decreased from June 1999 to December 2001. From March 2003 through March 2004, telephone rental and connection charges have increased by a modest 2.5 percent. Similarly, the price for telephone call charges has remained flat over the past few years. According to Statistics New Zealand, prices for residential telephone service decreased by an average of 3.5 percent per year between 1991 and 2001.<sup>129</sup> One possible explanation for the decline in prices in the absence of mandatory unbundling is that TelstraClear and other facilities-based rivals compete with Telecom in urban areas.<sup>130</sup>

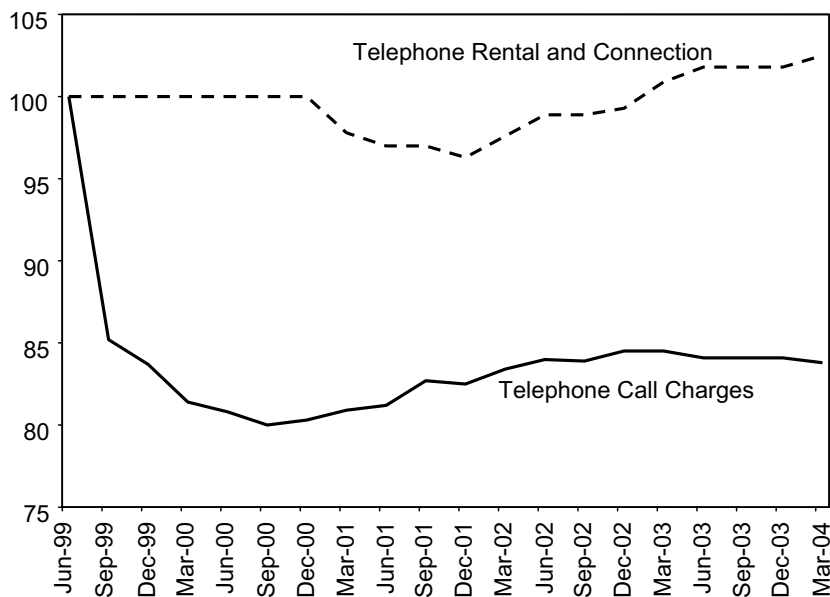
*Investment.* As of June 2003, Telecom had decreased its capital expenditure by over 60 percent since 2001.<sup>131</sup> The decline in Telecom's investment may be attributable to the rapid decline in telecommunications prices and the general decline of the global telecommunications market. The decline

128. Government Announces Updated Kiwi Share Obligation, available at <http://www.med.govt.nz/pbt/telecom/minister20011218b.html>; Determination for TSO Instrument for Local Residential Service for Period between 20 December 2001 and 30 June 2002, p. 11, available at <http://www.comcom.govt.nz/telecommunications/obligations/FinalDetermination17Dec2002.PDF>. Among other requirements, Telecom is required to provide (1) a monthly line rental no higher than the CPI-adjusted price of the residential line rental charged on 1 November 1989, and (2) free local calling.

129. See New Zealand Pub. No. 8, pp. 22–23.

130. TelstraClear's network was established before TelstraSaturn bought Clear Communications in 2001. TelstraSaturn and Clear separately invested in fiber optic networks in New Zealand.

131. Telecom New Zealand Annual Report for the Year Ended 30 June 2003, p. 4, available at [http://www.telecom.co.nz/binaries/annual\\_report\\_2003.pdf](http://www.telecom.co.nz/binaries/annual_report_2003.pdf).



**Fig. 6.6 Statistics New Zealand's real residential telephone service price index: Percent change from June 1999 index**

Source: Statistics New Zealand (available by request at <http://www.stats.govt.nz/>).

in Telecom's *rate* of investment is potentially misleading, however, because Telecom increased its investment in the late 1990s. In particular, Telecom introduced high-speed Internet access in 1999 with the rollout of Jetstream, which is based on ADSL technology.<sup>132</sup> In 2000, following the development of Jetstream, Telecom connected New Zealand's North and South Islands using a submarine cable, with an estimated investment of NZ\$38 million. The submarine cable allows 98 percent of New Zealand's population to access Telecom's wireless network. Telecom also introduced VoIP in 2000.<sup>133</sup> Telecom offers VoIP to business customers, which is a fully managed service that includes extensive IP services and is the base for their next generation network (NGN), which is currently being developed and will gradually be rolled out over the next ten years.<sup>134</sup> Telecom's NGN is composed of "a single network that delivers multiple applications (voice, data, video) to multiple

132. TelstraClear Company Information, available at <http://www.telecom.co.nz/content/0,3900,200633-1548,00.html>.

133. NetIQ Case Study, *Telecom New Zealand Prepares for IP Telephony with NetIQ's Vivinet Manager*, 2003, available at <http://www.netiq.com/products/vm/whitepapers.asp>.

134. See Telecom New Zealand's website, <http://www.telecom.co.nz/content/0,3900,202900-201383,00.html>; TelstraClear, *Telecom NZ Next Generation Network Regulatory Issues Raised by NGN Deployment*, Conference on Commerce Commission Draft Report, 10-14 November 2003, p. 5, available at <http://www.comcom.govt.nz/telecommunications/llu/Conf/tclngn.PDF>.

devices, whether fixed or mobile.”<sup>135</sup> In addition to the development of the NGN, Telecom has begun to roll out its 3G wireless services.

Perhaps more importantly, Telecom is rolling out video services over ADSL, which will lead to large benefits to New Zealand consumers.<sup>136</sup> Fearing Telecom would slow its investment in video capabilities, the CC gave TelstraClear low grade (128K) bitstream in lieu of full loop unbundling. The main competition for Telecom’s video service is satellite television, as cable television penetration in New Zealand is lacking (except in Wellington). Soon, Telecom will have the “triple play” of voice, broadband, and television over a single network. It is noteworthy that New Zealand is in the forefront of video over the fixed-access network.

### *Entry Barriers*

As of early 2004, facilities-based competition was well underway in New Zealand. TelstraClear represents the most significant facilities-based competitor to Telecom. TelstraClear invested over \$1 billion in New Zealand through 2002, with an additional investment of approximately \$200 million in 2003.<sup>137</sup> By June 2002, TelstraClear had acquired a 7 percent share of all fixed-access voice connections.<sup>138</sup> TelstraClear, which owns Clear Net and Paradise.net, and other entrants had acquired 28 percent of the residential broadband market by June 2003.

Before the purchase of Clear Communications by TelstraSaturn and Austar in December 2001 (which formed TelstraClear), both Clear and TelstraSaturn independently invested millions of dollars to establish their own fiber-optic networks.<sup>139</sup> Since the acquisition, TelstraClear has been developing a nationwide network in New Zealand to provide telephone, data, Internet, mobile, and cable television services.<sup>140</sup> TelstraClear plans to spend NZ\$14 million to roll out its network in nine cities.<sup>141</sup> In January 2002, TelstraClear proposed the construction of an overhead network with underground connections in Auckland, which will provide direct competition to Telecom’s network.<sup>142</sup> During the Section 64 Review proceeding in 2003, TelstraClear claimed that it had determined not to continue rolling out its network because it was too expensive.<sup>143</sup> Such claims seem implausible in

135. Milner and Pizzica (2003).

136. See Hausman (2003a, 5).

137. New Zealand Commerce Commission, *4th Annual New Zealand Telecommunications & ICT Summit*, 25 June 2003, pp. 2–3.

138. See New Zealand Profile, p. 27.

139. See 4th Summit, p. 14.

140. See TelstraClear Information.

141. See New Zealand Profile, p. 19.

142. *TelstraClear Application: Area 3 Rollout Assessment of Environmental Effects*, January 2002, p. 3, available at [http://www.telstraclear.co.nz/network\\_proposal.pdf](http://www.telstraclear.co.nz/network_proposal.pdf).

143. See New Zealand Profile, p. 14: “Over a year ago [TelstraClear] basically abandoned the roll out of any new fixed infrastructure themselves and their future now depends on utilising TNZ’s national network wherever it can.”

light of the fact that Telstra is the largest Australian company and paid its shareholders an interim dividend of A\$1.6 billion in April 2004.<sup>144</sup> Thus, our hypothesis that mandatory unbundling undermines the incentive of CLECs to invest in their own facilities seems to hold. While the CC did not mandate unbundling it did mandate bitstream sharing for DSL and TelstraClear has not increased its network coverage (except marginally) in the last three years. Another significant facilities-based rival in New Zealand is Counties Power, which rolled out a fiber optic and radio network on May 8, 2003.<sup>145</sup> The project, called Wired Country, provides high-speed Internet and telephone services to business and residential customers in the Franklin and Papakura regions of New Zealand.<sup>146</sup>

Fixed wireless access (FWA) providers represent yet another source of facilities-based competition. In its decision not to require unbundling, the CC noted the potential for fixed wireless to constrain Telecom's local telephone prices:

The Commission notes the potential for Fixed Wireless Access (FWA) to evolve and reduce the extent of this bottleneck over time, although the Commission has reservations over the technical capacity of FWA to be a substitute for services that can run over the local loop network. FWA is likely to evolve over time in terms of its capacity and its ability to substitute for services that run over the local loop network, although the timing and nature of this evolution is uncertain.<sup>147</sup>

The CC's inclusion of fixed wireless in the relevant product market is notably at odds with the position of the US FCC, which has argued that FWA is not a suitable substitute for the fixed copper network.<sup>148</sup>

Beginning in 1999, Woosh Wireless (formerly Walker Wireless) began rolling out a national FWA network to compete with Telecom's fixed-access network.<sup>149</sup> Woosh competes with Telecom in voice and data services by targeting residential and business customers. As of May 2004, deployment of Woosh's network was underway in Auckland and Southland, and was expected to continue in Wairarapa, Northland, Canterbury, and other major markets in late 2004.<sup>150</sup> In addition to Woosh, other FWA providers, such as Broadcast Communications Limited (BCL), are investing in FWA tech-

144. Telstra Press Release, *Telstra Pays Shareholders Interim Dividend of \$1.6 Billion*, 29 April 2004, available at [http://www.telstra.com.au/communications/shareholder/docs/tls225\\_interimdividend.pdf](http://www.telstra.com.au/communications/shareholder/docs/tls225_interimdividend.pdf). Telstra has announced a total expected payout of over A\$4 billion over the next few years.

145. See 4th Summit, pp. 2–3.

146. *Counties Power Gets Totally Wired*, Axon, October 2003, available at <http://www.axon.co.nz/info/Counties%20Power%20gets%20totally%20wired.htm>.

147. See CC Final Report, p. 196 ¶ 788.

148. See Triennial Review, p. 141 ¶ 231.

149. See CC Final Report, p. 91 ¶¶ 368–370.

150. Whoosh Wireless, *About Us*, available at <http://www.woosh.com/UserInterface/Woosh/Static/WhoisWoosh/WhoisWoosh.aspx>.

nology intended to compete with Telecom. For example, BCL is rolling out an FWA network that covers rural and provincial areas in New Zealand.<sup>151</sup>

Telecom regards Woosh and other FWA providers as competitors in the local telephone services market. According to a Telecom study, if Woosh were able to capture 10 percent of the local market covered by its rollout, then Woosh would be able to undercut Telecom's prices by 22 percent.<sup>152</sup> As Woosh and other CLECs increase their geographic scope, they will be able to exert further pricing pressure on Telecom.<sup>153</sup>

Facilities-based entrants argue that mandatory unbundling would hinder the introduction and development of new technologies that compete with Telecom's local loops. In particular, those CLECs explain that mandatory unbundling will make raising investment capital increasingly difficult. They also point out that mandatory unbundling would reduce the price at which competitive fixed-line services could be offered, thereby undermining the return on their investment.

### *Stepping-Stone Hypothesis*

The stepping-stone hypothesis implies that after initial entry into the market through the use of a competitor's lines, CLECs will eventually invest in construction of their own network. The New Zealand government accepted the CC's recommendation on mandatory unbundling.<sup>154</sup> Hence, the stepping-stone hypothesis was never put to the test in New Zealand.

### *Wholesale Competition*

We are not aware of any evidence that facilities-based entrants are providing wholesale access to new entrants in New Zealand. As of December 2003, the CC characterized the wholesale markets for local loops, bitstream access, fixed public data network (PDN) services, and backhaul services as "limited," with the exception of wholesale competition in certain central business districts. Given the nature of the supply of and demand for switching, transport, and high-capacity loops serving business customers, however, we expect that the development of a wholesale market in New Zealand should be no different from the US experience.

### *Other Observations about the Process*

New Zealand is unique among the countries we discuss in that the CC used the appropriate *social welfare* framework—namely, the sum of consumer

151. See CC Final Report, p. 95, ¶ 392.

152. Telecom's Response to the Commission's Draft Report, 29 October 2003, p. 55.

153. See CC Final Report, p. 96, ¶ 399.

154. Honorable Paul Swain, Decision on Telecom Network Recommendations, 19 May 2004, available at <http://www.beehive.govt.nz/ViewDocument.cfm?DocumentID=19750>. He explains that his "decision that has the potential to quickly promote more competition in the long term interests of consumers."

and producer surplus—to assess various regulatory policies. Most regulators, including the US FCC, have embraced a *competitor welfare* framework when formulating telecommunications policy. Perhaps more remarkable, the CC considered dynamic efficiency in addition to static efficiency when evaluating alternatives, and defined the former as “how well the competitive process works: how well the market ultimately responds to the demands of end users over time, by changes to what is produced and how it is produced.” The CC concluded that (negative) dynamic efficiency effects of unbundling could potentially exceed (positive) static effects:

The general point, though, is that regulation imposes risks on investors and can potentially hamper investment and, as a consequence, innovation. Regulation may mean that firms with access to Telecom’s local loop network or fixed PDN may have access to the benefits of an upgraded network without taking associated risks, which are borne by the owner of the network. Regulated firms may be reluctant to invest when competing firms have access to some of the rents provided by their assets. A risk for the regulated firm is that entrants may “cherry pick” markets, without committing to the market in the same way as the incumbent has. The importance of these possibilities would depend on the extent of unbundling and the behaviour of access-seekers.

As other countries are considering whether to mandate unbundling, the CC’s framework for analysis provides a different point of view in that it was more explicitly economic in focus.

However, in 2006 the majority party in New Zealand decided to overrule the CC and require mandatory local loop unbundling of Telecom’s copper network using TSLRIC pricing principles in New Zealand.<sup>155</sup> While the final outcome of the process is not definite, it currently appears that the government will not require telecom to be structurally separated into wholesale and retail segments. However, it does appear likely that the regulatory basis for the wholesale price of bitstream access will change from retail minus to a cost-based approach, as with mandatory unbundling.<sup>156</sup>

155. Since New Zealand has a parliamentary form of government, this new policy direction will be adopted. The major reason for the change in policy is the relatively low level of broadband penetration in New Zealand compared to other countries with comparable income levels. However, New Zealand is the only country outside of North America and Hong Kong with free residential calling, which makes narrowband Internet access “free” on a per call basis and that makes broadband Internet access relatively more expensive than in other countries that have telephone charge on either a per call (e.g., Australia) or per minute (e.g., most EU countries) basis. Thus, the effect on broadband access of this relative price difference would need to be analyzed to determine what amount of the New Zealand broadband “shortfall” arises from this feature of telecom regulation that requires free residential calls in New Zealand.

156. The relevant government websites as of November 2006 are: [http://www.med.govt.nz/templates/ContentTopicSummary\\_\\_\\_20266.aspx](http://www.med.govt.nz/templates/ContentTopicSummary___20266.aspx) and <http://www.parliament.nz/en-NZ/PB/Legislation/Bills/7/2/1/72144abd2b5c4524b0792c1f7295640c.htm>.



## 6.6 The End of Regulation?

The public pronouncements of most regulators suggest that the end point of the current regulatory process should be facilities-based competition. As we discussed in the beginning of this chapter, regulation sets prices based only on costs, which cannot be the correct approach when competition exists together with technologies that exhibit important fixed costs (economies of scale) and economies of scope, and that require large sunk cost investments. Further, we believe that the former “natural monopoly” justification for a single network has been demonstrated to no longer hold given the success of cable networks in providing both broadband Internet and residential voice service in both the United States and the United Kingdom. Also, the increasing use of cellular telephony and other wireless technology such as fixed wireless, WiFi, and in the future WiMax, provides additional competition to the landline network.<sup>157</sup> While regulators such as the FCC have been very slow to take account of competition, scrutiny by the US Court of Appeals for the DC Circuit has forced the FCC to moderate its approach. Indeed, in August 2005 the FCC voted to deregulate ILEC provision of broadband Internet service, DSL, so that it need no longer be unbundled after a one-year transition period. Thus, the FCC has retreated from its mandatory sharing approach and recognized the competitive reality that cable networks have approximately a 60 percent share of broadband Internet demand.

We first consider the question: Will landline service in the United States continue to be regulated, or will we see “the End of Regulation”? Telecommunications regulators, along with many antitrust authorities, are sometimes fixated by market share calculations. Given past experience, we might expect them to require the incumbent landline providers’ share to fall below a particular threshold (say, 50 percent) before substantial deregulation would occur.<sup>158</sup> However, this approach would be incorrect because in a high fixed cost business such as telecommunications, only a small loss in market share is sufficient to constrain a large firm from increasing price above competitive levels.

Suppose prices under regulation are set at approximately “competitive levels.” Consider the decision of an incumbent to increase prices 5 percent above the competitive level in a given market.<sup>159</sup> Because competition takes place at the margin, only a small proportion of the ILEC’s customers need to defect to defeat its attempted price increase. In a simple example, it is possible

157. For a discussion of wireless technology as a competitive factor for landline networks, see Hausman (2002b).

158. This approach was used by the FCC in its decision to deregulate prices for AT&T in the long-distance markets in the 1990s.

159. A 5 percent price increase above the competitive level is often used in antitrust analysis. Regulation sometimes leads to prices below the competitive level, so this analysis would need to be modified in those situations.

to calculate that necessary proportion. Suppose that an ILEC attempted to increase prices on end-user access by 5 percent. How much traffic would that ILEC need to lose before the increase would be unprofitable? The formula to calculate that “critical share” is:

$$(3) \quad \left(1 - \frac{MC}{P}\right)Q_1 < \left(1.05 - \frac{MC}{P}\right)Q_2.$$

An important empirical fact for network elements is that fixed costs are a very large component of the overall cost, so marginal cost is a relatively small component. Assume, for example, that the ratio of marginal cost to price,  $MC/P$ , is 0.2. Then  $Q_2$  would be  $0.94Q_1$ , so that the critical share is 6 percent. Thus, if the ILEC were to attempt to raise its price by 5 percent, and if, as a result, it were to lose more than 6 percent of its traffic, the attempted price increase would be unprofitable and thus unilaterally rescinded.<sup>160</sup> This calculation demonstrates that only quite small competitors’ shares are needed to defeat supracompetitive pricing by an incumbent.<sup>161</sup> This calculation would imply a minimum (in magnitude) own price elasticity of  $-1.2$ , which seems quite likely to exist where ILEC voice telephony competes with cable-based telephony. Econometric investigation of this elasticity will require a few years of data since the competition is quite recent in most geographic areas.

Two further considerations operate in opposite directions. First, we have assumed no price discrimination. If price discrimination occurs, the calculation of equation (3) operates in only narrower markets. However, although historically price discrimination was often required by regulators for monopoly providers, with competition it is more difficult to undertake price discrimination profitably, especially in a business with large fixed costs and low marginal costs.<sup>162</sup> Further, in the United States section 202 of the Communications Act of 1934 forbids price discrimination.<sup>163</sup> So long as price discrimination does not occur, our calculation of a share below 10 percent continues to hold.

This relatively low share will decrease when we further consider the fact that many customers buy bundles of services. If they stop their landline subscription, they are very likely to stop subscription for voice mail, broadband Internet, call forwarding, and other services provided as bundles. In this situation the required percentage loss to constrain prices can be signifi-

160. For a more extensive discussion of critical share, see Hausman, Leonard, and Velturo (1996).

161. We do not consider coordinated interaction among the incumbent and its competitors. Given the technologies involved and services offered, such coordination would be extremely unlikely to occur or be successful.

162. See Hausman, Leonard, and Velturo (1996). The calculations in the paper demonstrate that the firm would have to be able to successfully target customers in approximately 95 percent of the cases to be profitable. Firms are unlikely to have the requisite information to be correct 95 percent of the time.

163. 47 U.S.C. § 202.

cantly below 5 percent.<sup>164</sup> Thus, we conclude in the quite near future, or even at present, where the incumbents have lost greater than 5 percent of their landline subscription to cable and wireless competition, regulators could safely decree the end of regulation. Incumbents could then provide new services and compete better against the cable networks, which currently exercise market power, without the possibility that they will be required to share their successful new services with competitors at regulatory decreed prices.

Indeed, in August 2006 (eleven months after the conference at which this chapter was presented), the California Public Utility Commission (CPUC) decided to deregulate fixed-line telecommunications services in California.<sup>165</sup> The CPUC found significant competition from cable telephone providers and from VoIP offered over broadband, which is available in 100 percent of the zip codes within California. The CPUC noted that Cox Communications had a 40 percent penetration of cable telephony in Orange County, a very populous county in between Los Angeles and San Diego. The CPUC determined: “VoIP provided by cable telephone companies is a direct substitute for circuit-switched wireline service.” They also recognized the competition that mobile (cellular) networks provide to fixed-line networks: “Verizon’s survey data regarding customers who have ‘cut the cord’ indicate that many customers consider mobile telephones and landline telephones to be close substitutes. . . . Verizon demonstrated that wireless substitution accounts for approximately half of ILEC primary residential wireline losses.” Lastly, the CPUC found, “[w]ireless service is a substitute for wireline service.” In terms of competition, the CPUC recognized that competition occurs at the margin (as in our previous calculation) and that market shares could not be used to infer market power: “The calculation of HHI [Herfindahl-Hirschman Index] values provides no information relevant to our assessment of ILEC market power, because rapidly changing technological and market conditions undercut our ability to use HHI as a measure of market power.” California has thus decided the correct policy is the “End of Regulation” for fixed line telecommunications. A number of other large states are currently holding regulatory proceedings to determine whether they should also end regulation of fixed-lined telephone service. Both Illinois and New York state have also decided to deregulate fixed-line telephone services. The Canadian government also voted recently to deregulate fixed-line telephone services in geographic areas where cable TV competition and cellular competition exist.<sup>166</sup>

A potentially important economic question is whether two competing platforms, operated by the ILECs and the cable TV companies, are sufficient

164. See Weisman (2006).

165. Public Utilities Commission of the State of California, “Order Instituting Rulemaking on the Commission’s Own Motion to Assess and Revise the Regulation of Telecommunications Utilities,” Proposed Decision, August 25, 2006.

166. Canada adopted deregulation in April 2007.

to insure a competitive outcome.<sup>167</sup> Alternatively, would the two platform operators coordinate their actions to maintain high prices? Our view is that coordination is very unlikely. The two sets of firms begin at opposite ends of the “Hotelling product space” since cable beings with a near zero amount of telephone customers and the ILECs begin with a near zero amount of pay-TV customers. Further, given the high fixed costs and relatively low marginal costs of new customers (especially for telephone service) the economic incentives to coordinate pricing is low and the economic incentives to cheat are high. More importantly, evidence to date demonstrates that the cable companies and ILECs have been highly competitive with each other. Cable companies are now establishing cellular service to expand from a “triple play” to the “quadruple play” to allow them to compete better with Verizon and AT&T, both of whom are adding pay-TV and will have a “quadruple play” since they both own cellular companies. Thus, we conclude that deregulation and competition will likely work well with facilities-based competition, but other economists might not agree with this conclusion. In addition, the growing importance of cellular networks almost makes coordination between telephone platform operators and cable platform operators even less likely to occur.

The alternative to wireline facilities-based competition and deregulation is “regulation forever.” Our reading of the regulatory experience in the United Kingdom and New Zealand is that the onset of regulation coincided with the end of competitor-based expansion of wireline networks. As we discussed, the cable television networks stopped their expansion in the United Kingdom and Telstra-Clear stopped its network expansion in New Zealand. Similar experiences occurred in other countries such as Australia. Although we can advance other reasons for this observed end to geographic expansion, a leading cause would seem to be that competitors need not make significant sunk investments in regulatory access to incumbents’ networks. Instead, they acquire access at below competitive prices without the risk of sunk network investments. We find it interesting that the United States and Canada will now have deregulation while the United Kingdom, Australia, and New Zealand are heading toward “regulation forever.”<sup>168</sup>

Without facilities-based competition, the regulator will be in charge of the future direction of telecommunications in these countries. Indeed, this future role for regulators seems to have been made explicit in the proposed restructuring of BT, since Ofcom would assume corporate governance of BT’s access network, even though ownership (and, hence, financial risk) would remain with private shareholders. Similarly, in Australia where the government sold off its controlling (51 percent) interest in the incumbent

167. To the extent that other technologies such as cellular and WiMax increase in competitive importance, this potential concern would not be important.

168. We apologize for our English language bias in country selection. However, the EU is also headed toward “regulation forever.”

ILEC Telstra in November 2006, it could have divested the fiber optic cable network that Telstra operates in the large cities in Australia. Facilities-based competition might then have replaced the mandatory local unbundling regulatory framework used by the ACCC (Australian Competition and Consumer Commission), which has been the topic of intense controversy between Telstra and the ACCC. However, Telstra was divested with its control of both the copper loop network and the largest fiber-based cable network intact so that the prospect for facilities-based competition in Australia has decreased.<sup>169</sup>

Experience has demonstrated that markets do considerably better than regulators in creating consumers' welfare gains. Although international benchmark comparisons will provide some useful information, the natural regulatory tendency is toward a competitor welfare standard rather than a consumer welfare standard. Thus, our two closing comments are that regulation might be improved if regulators adopt an explicit consumer welfare goal, as in New Zealand and Australia, and that a viable regulatory plan is adopted where the endpoint is facilities-based competition and deregulation. The technology and economics exist for such an endpoint, as recent action in the United States has demonstrated. The regulatory framework in a given country will determine the speed at which this endpoint of the "End of Regulation" is approached.

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169. A group of CLECs in Australia has proposed to build its own fiber-based network, which could lead to facilities-based competition. However, the economic feasibility of such a network investment has not yet been demonstrated and no current plans exist to begin construction of the network.

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