

A WORKING PAPER IN REGULATORY STUDIES

Costs and Consequences of  
Federal Telecommunications and  
Broadband Regulations

by

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# Costs and Consequences of Federal Telecommunications and Broadband Regulations

## Executive Summary

**Federal telecommunications and broadband regulations have significant costs.** These regulations cost consumers \$105 billion annually in higher prices and forgone services. Excluding the large costs of FCC spectrum management, federal telecommunications and broadband regulation cost consumers \$27 billion annually and telecommunications firms \$9 billion annually, for a total social cost of \$36 billion each year.

**The cost of regulation dwarfs the cost of FCC regulatory spending.** The FCC spent \$1.2 billion at most on these regulations in fiscal 2004. The taxes necessary to raise this money reduced social welfare by up to \$480 million, for a maximum total cost of \$1.7 billion. The cost of regulation to consumers is more than 60 times this amount, and the cost excluding spectrum management is more than 15 times the cost of FCC regulatory spending.

**Spectrum management is by far the most costly regulation.** Federal spectrum management policy costs consumers at least \$77 billion in higher prices and forgone wireless services—75 percent of the total consumer cost of regulation in this study.

**Regulation harms economic welfare more than taxation.** The principal effect of economic regulation is to transfer wealth from some consumers and firms to others. Almost all regulations examined in this study entail a higher “excess burden” than the taxation necessary to transfer the same amount of wealth.

**One regulation—Enhanced 911—has clear evidence of positive outcomes.** Enhanced 911 significantly reduces both cardiac risk and hospital costs.

**Some regulations achieve positive outcomes, but not very effectively.** Some studies find that universal service programs increase telephone subscriptions, but at a cost of thousands of dollars annually per additional subscriber. Regulations requiring incumbent local telephone companies to lease the local network to competitors transfer \$9.7 billion to consumers and businesses, but much less effectively than alternative policies. Such regulations also reduce competitors’ investments in building their own networks.

**Many regulations have negligible effects on the outcomes they are intended to influence.** These include interstate long-distance access charges, low-income universal service programs, high-cost universal service programs, spectrum allocation, and resale of incumbent local exchange carrier services.

**For some regulations, outcomes are effectively unknown.** No studies or data establish that the regulations have accomplished desired outcomes for the schools and libraries universal service program, local number portability, number pooling, satellites, or Communications Assistance to Law Enforcement for wireless communications.

**Cost and outcome information are especially poor for satellite regulation.** Neither costs nor outcomes could be reliably ascertained.

The accompanying table classifies regulatory costs into several categories:

- **Wealth transfers:** Economic regulation redistributes wealth from some consumers and producers to other consumers and producers. Traditionally, economic researchers have not regarded such transfers as a cost of regulation, because one party's loss is another party's gain. However, if the transfer process itself is wasteful, or if firms expend resources to capture or defend themselves from wealth transfers, then some or all of the transfer is a cost.
- **Forgone consumer surplus:** When regulation raises costs or prices, consumers use less of the regulated service, and they are worse off as a result. The value that consumers forego, minus the price they would have paid, is the forgone consumer surplus.
- **Total cost to consumers:** This is the sum of the wealth transfer extracted from consumers plus the forgone consumer surplus. If some of the wealth is redistributed to consumers, it is counted as a beneficial outcome, and estimating the net effect on consumers requires a comparison of the total cost to consumers with the value of any wealth transfers or other benefits that consumers receive.
- **Forgone producer surplus:** When producers receive revenues that exceed all of their costs (including the cost of capital), the profit they earn is called "producer surplus." If regulation artificially elevates the price of a service and consumers use less of it as a result, the profit forgone due to the reduction in sales is forgone producer surplus.
- **Value of forgone output:** This is the sum of forgone consumer surplus and forgone producer surplus that occur when regulation reduces consumption by raising prices. Empirical studies frequently calculate this total sum rather than breaking it up into the consumer and producer surplus components. The value of forgone output is also called the "excess burden" of the regulation.
- **Wealth transfer plus forgone output:** This is the widest measure of the cost of regulation.

This study explicitly focuses on policy consequences, or outcomes, rather than just economic "benefits." Some outcomes of great interest to policymakers may not fit the economist's definition of benefits. A focus on outcomes, rather than a narrower focus on benefits, permits inclusion of a broader range of information about policy results.

The FCC's Annual *Performance and Accountability Report* articulates the outcomes the commission seeks to accomplish, and it contains data on outcome trends. Scholarly researchers have also assessed the outcomes of some FCC regulations. The discussion of regulatory outcomes in this study presents the results of such research, as well as relevant outcome information from the FCC's *Performance and Accountability Report*.

The tables on the next two pages summarize the cost and outcome information contained in this study.

## Costs of Federal Telecommunications and Broadband Regulation

| Regulation (page #)                       | Outlays or<br>Wealth<br>Transfer | Forgone<br>Consumer<br>Surplus | Total<br>Cost to<br>Consumers   | Value of<br>Forgone<br>Output | Wealth transfer<br>Plus Forgone<br>Output | Excess<br>Burden<br>Percentage |
|---|----------------------------------|--------------------------------|---------------------------------|-------------------------------|---|--------------------------------|
| FCC outlays 2004 (p. 12)                  | \$361,000,000                    | N.A.                           | N.A.                            | \$144,000,000                 | \$505,000,000                             | 40                             |
| FCC net cost of 3 strategic goals (p. 12) | \$1,200,000,000                  | N.A.                           | N.A.                            | \$480,000,000                 | \$1,680,000,000                           | 40                             |
| Interstate Long-Distance                  |                                  |                                |                                 |                               |   |                                |
| Access Charges 2002 (p. 15)               | \$3,300,000,000                  | \$300,000,000                  | \$3,600,000,000                 | \$1,450,000,000               | \$4,750,000,000                           | 44                             |
| Universal Service Contributions           |                                  |                                |                                 |                               |   |                                |
| Interstate Long-Distance 2002 (p. 20)     | \$2,700,000,000                  | \$240,000,000                  | \$2,940,000,000                 | \$1,160,000,000               | \$3,860,000,000                           | 43                             |
| Wireless 2003 (p. 21)                     | \$1,400,000,000                  | \$39,000,000                   | \$1,439,000,000                 | \$873,000,000                 | \$2,273,000,000                           | 62                             |
| International                             | N.A.                             | N.A.                           | N.A.                            | N.A.                          | N.A.                                      | N.A.                           |
| Local Number Portability                  |                                  |                                |                                 |                               |   |                                |
| Wireline 2003 (p. 27)                     | \$762,000,000                    | \$0                            | \$762,000,000                   | \$0                           | \$762,000,000                             | 0                              |
| Wireless 2003 (p. 28)                     | \$952,000,000                    | \$26,000,000                   | \$978,000,000                   | \$594,000,000                 | \$1,546,000,000                           | 62                             |
| Enhanced 911                              |                                  |                                |                                 |                               |   |                                |
| Wireline 2003 (p. 33)                     | N.A.                             | N.A.                           | N.A.                            | N.A.                          | N.A.                                      | N.A.                           |
| Wireless 2003 (p. 33)                     | \$1,200,000,000                  | \$32,000,000                   | \$1,232,000,000                 | \$725,000,000                 | \$1,925,000,000                           | 60                             |
| Miscellaneous Wireless                    |                                  |                                |                                 |                               |   |                                |
| Number Pooling 2003 (p. 35)               | \$324,000,000                    | \$9,000,000                    | \$333,000,000                   | \$202,000,000                 | \$526,000,000                             | 62                             |
| CALEA 2003 (p. 35)                        | \$457,000,000                    | \$13,000,000                   | \$470,000,000                   | \$285,000,000                 | \$742,000,000                             | 62                             |
| Spectrum Management 2004                  |                                  |                                |                                 |                               |   |                                |
| (p. 37)                                   | \$54,000,000,000                 | \$23,400,000,000               | \$77,400,000,000                | \$30,000,000,000              | \$84,000,000,000                          | 56                             |
| Satellite (p. 45)                         | N.A.                             | N.A.                           | N.A.                            | N.A.                          | N.A.                                      | N.A.                           |
| Telephone Unbundling                      |                                  |                                |                                 |                               |   |                                |
| Unbundled Net. Elements 2003 (p. 47)      | \$9,700,000,000                  | \$1,400,000,000                | \$11,100,000,000                | \$5,900,000,000               | \$15,600,000,000                          | 61                             |
| Resale 2003 (p. 56)                       | \$21,000,000                     | \$6,911                        | \$21,006,911                    | \$14,000,000                  | \$35,000,000                              | 67                             |
| Broadband Unbundling 2003                 |                                  |                                |                                 |                               |   |                                |
| (p. 61)                                   | N.A.                             | N.A.                           | \$4,500,000,000                 | N.A.                          | \$4,500,000,000                           | N.A.                           |
| <b>Total</b>                              | <b>\$76,016,000,000</b>          | <b><i>\$25,459,006,911</i></b> | <b><i>\$104,775,006,911</i></b> | <b>\$41,683,000,000</b>       | <b>\$122,199,000,000</b>                  |                                |
| Total excluding FCC spending              | \$74,816,000,000                 | <i>\$25,459,006,911</i>        | <i>\$104,775,006,911</i>        | \$41,203,000,000              | \$120,519,000,000                         |                                |
| Total excluding spectrum and FCC spending | \$20,816,000,000                 | <i>\$2,059,006,911</i>         | <i>\$27,375,006,911</i>         | \$11,203,000,000              | \$36,519,000,000                          |                                |

*Italicized figures in each column are the same because estimates for some items that would make them different are unavailable.*

N.A. = Not available.

## Outcomes of Federal Telecommunications and Broadband Regulation

| Regulation (page #)   | Intended Outcomes                       | Outcomes Achieved   |
|---|---|---|
| Interstate Long-Distance Access Charges (p. 17)                               | Increased subscription                  | Negligible; net effect may be negative  |
|   | Increased low-income subscription       | Negligible; net effect may be negative  |
|   | Redistribution to low-income households | \$24 annual average per low-income household  |
| Universal Service Contributions (p. 22)                                       | Increased low-income subscription       | Best case: \$1581-\$2200 per additional subscription<br>Net effect may be negligible            |
|   | Redistribution to low-income households | Lifeline: \$98.93 annually per subsidized household<br>Linkup: \$17.77 annually per beneficiary |
|   | Increased rural subscription            | \$5155-\$11,000 per additional subscription   |
|   | Redistribution to rural households      | Unknown   |
|   | Improved educational outcomes           | Unknown   |
| Local Number Portability Wireline (p. 30)<br>Wireless (p. 30)                 | Increased competition/consumer welfare  | Unknown   |
|   | Increased competition/consumer welfare  | Unknown   |
| Enhanced 911 (p. 33)  | Improved health                         | Cardiac patients 1.62 times more likely to survive  |
|   | Public safety                           | 6-hr. cardiac mortality risk reduced 60%  |
|   | Reduced health/safety costs             | 40-hr. cardiac mortality risk reduced 35%<br>Hospital costs reduced by \$1000/cardiac patient   |
| Miscellaneous Wireless Number Pooling (p. 35)<br>CALEA (p. 35)                | More efficient utilization of numbers   | Unknown   |
|   | Improved law enforcement/natl. security | Unknown   |
| Spectrum Management (p. 42)   | Promote the "public interest"           | Implies no particular outcome   |
|   | Promote consumer welfare                | Tends to reduce consumer welfare  |
|   | Prevent signal interference             | FCC allocation not necessary to accomplish this   |
| Satellite (p. 45)   | Unknown                                 | Unknown   |
| Telephone Unbundling Unbundled Network Elements (p. 49)<br><br>Resale (p. 57) | Lower prices                            | \$9.7 billion savings, but \$1.74 spent for each \$ transferred                                 |
|   | Increased competition                   | Substituted platform competition for facilities-based competition                               |
|   | Innovative new services                 | Not possible when reselling incumbent's network   |
|   | Increased economic welfare              | \$21 spent for each \$1 gain in economic welfare  |
|   | Increased competition                   | Has not been an attractive strategy for entry   |
| Broadband Unbundling (p. 61)  | Innovative new services                 | Not possible when reselling incumbent's service   |
|   | Encourage deployment                    | Appears to retard investment  |
|   | Reduce price                            | No evidence   |

# Costs and Consequences of Federal Telecommunications and Broadband Regulations

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## **Introduction**

Economic regulation has substantial effects on telecommunications and broadband Internet service in the United States. Regulation determines which services are priced above cost, which services are priced below cost, and which consumers will be overcharged in order to subsidize others. Regulation also affects which kinds of technologies and services will be offered to consumers, and how quickly. It even helps determine who is allowed to compete, and how.

Telecommunications companies, cable companies, Internet service providers, equipment manufacturers, and various other interest groups spend millions of dollars each year to bend regulations to their liking. Economists have analyzed the effects of many individual regulations on both consumers and producers. Despite the surfeit of interest group interest and scholarly inquiry, no one has yet undertaken a comprehensive survey of the costs and outcomes of federal telecommunications and broadband regulation. This paper seeks to fill the gap by compiling scholars' estimates of the costs and outcomes of these regulations, identifying gaps in knowledge, and in some cases offering original estimates based on established methodologies. The research covered includes studies published in academic journals and books, academic working papers, and Federal Communications Commission (FCC) reports. It includes studies sponsored by industry or advocacy organizations only when they offer novel information, data unavailable elsewhere, or empirical analysis based on academic work.

The focus here is on federal regulation of telecommunications and broadband infrastructure. Key issues of interest are the effects of regulation on the prices and quantity of service, along with the associated effects on consumer welfare and overall economic welfare. Regulations that primarily affect applications or uses of information that passes through the infrastructure are outside the scope of this study. These include, for example, the National Do-Not-Call List, the Federal Trade Commission's Telemarketing Sales Rule, Gramm-Leach-Bliley privacy restrictions that may affect commerce carried on over the Internet or phone lines, various laws and regulations that affect the content of web sites, and general consumer protection laws.

As in a number of other regulated industries, the federal government and states split jurisdiction. Traditionally, states have regulated intrastate services, such as local telephone service and intrastate long-distance. The federal government regulates interstate services, such as interstate long-distance, wireless, and Internet. The 1996 Telecommunications Act redrew these boundaries somewhat. Congress prohibited states from giving local telephone companies exclusive franchises; henceforth states could no longer create barriers to entry. To stimulate competition, the legislation also requires incumbent local phone companies to lease elements of their networks to competitors and permits competitors to purchase their service at wholesale and resell it at retail. The FCC decides which elements and services are subject to these requirements and establishes pricing methodologies. State regulatory commissions, however, determine the actual prices. Most recently, the FCC decided that Internet telephony, or "Voice over Internet Protocol," service is under federal rather than state jurisdiction.

## **The Basics: Effects of Economic Regulation**

Economic theory suggests that price regulation can improve consumer welfare when the regulated firm has monopoly power. If the firm charges a price that exceeds the price it would charge if it faced competition, ideal regulation can mimic the results of competition and force the firm to charge the “competitive” price. When this occurs, regulation has two beneficial effects for consumers. First, consumers who were already buying the service receive it at a lower price; the gains to these consumers can be measured by the amount of the price reduction multiplied by the amount they were already buying at the monopoly price. Second, the lower price induces consumers to purchase more, and this increased consumption further increases consumer welfare. Conceptually, this gain to consumers is equal to the difference between the regulated price the consumer pays and the price the consumer would have been willing to pay, summed over all of the additional units that are consumed.

The Telecommunications Act of 1996 assumes that competition is possible and desirable in all markets. In some cases, it directs the FCC to promulgate regulations that are intended to move the industry from monopoly to competition, rather than substitute regulation for competition. To the extent that such regulations accomplish this goal, they should have a similar effect on consumers as ideal regulation, reducing price and increasing the amount of service purchased. In addition, the move from monopoly to competition could produce other consumer benefits that regulation rarely delivers, such as innovative new services.

### **Regulation Might Not Mimic Competition**

Regulation is intended to make consumers better off by producing a price equal to the competitive market price. However, there is no guarantee that this will occur in practice. There are at least five reasons:

- Prices below competitive market levels can create shortages
- Regulation can hold prices above costs
- Regulation and monopoly inflate costs
- Regulation stifles innovation and entrepreneurship
- Expenditures to acquire and maintain wealth transfers increase costs

#### *Below-competitive prices*

If regulators set prices below the competitive level, they create shortages. History suggests that regulators frequently succumb to this temptation. The temptation is especially strong in capital-intensive industries that require high up-front investments that have few good alternative uses. After the investment is made, public policy can reduce prices below the competitive level without immediately creating a shortage, as long as the price is high enough to cover the firm’s ongoing costs of operation. Such prices harm consumers in the long run, because firms will refrain from investing if they expect the unremunerative prices



to continue. Eventually, this reduction in investment creates shortages, deteriorations in the quality of service, or other problems that diminish consumer welfare.<sup>1</sup>

### *Above-competitive prices*

Price and entry regulation imposed on a competitive industry can actually increase prices and reduce consumption. This can occur either because policymakers imposed regulation on a competitive industry mistakenly, or because they consciously did so in response to political incentives.

Political incentives to regulate a competitive industry could come from the industry itself, which may seek regulation in order to forestall competition and increase profits. But political pressures may also come from certain segments of customers, who use regulation to obtain service at subsidized rates, with the subsidies funded through excessive charges imposed on other consumers. The history of telecommunications, as well as the actual structure of telecommunications regulation, suggests that policymakers have responded to both types of political pressures. Traditionally, telecommunications regulation created market power, then mandated that some of the monopoly overcharges must be used to make local residential phone service available at prices that failed to cover incremental costs. Regulation thus became an opaque way of taxing some services to fund a highly visible “free lunch.”<sup>2</sup>

When regulation elevates prices above costs, it reduces consumer welfare both by increasing price and by reducing output. Cross-subsidies can reduce producer welfare as well. If a monopolist is allowed to overcharge and use the money to fund cross-subsidies, the firm sacrifices some or all of the inflated profits. If regulators force competing firms to overcharge consumers and then hand the money to some other firm to subsidize its service, the firms forced to collect the excess charges will see their sales and profits fall in response to the price increase. (This latter example may appear fanciful in the abstract, but it happens quite frequently in telecommunications regulation.)

### *Inflated costs*

Cost-of-service regulation often distorts the regulated firm’s choice of inputs, so the regulated firm fails to produce at minimum cost. The resulting rates might be considered “just and reasonable,” because they reflect costs, but the costs themselves are inflated.<sup>3</sup>

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<sup>1</sup> In the U.S., this kind of effect has been especially severe in oil and gas markets, which were subject to price controls in the 1960s and 1970s. See Robert L. Bradley, Jr., *Oil, Gas, and Government: The U.S. Experience* (Lanham, MD: Rowman & Littlefield, 1996).

<sup>2</sup> Robert W. Crandall, *After the Breakup* (Washington, DC: Brookings Institution, 1991); Robert W. Crandall and Leonard Waverman, *Who Pays for Universal Service?* (Washington, DC: Brookings Institution, 2000).

<sup>3</sup> Leon Courville, “Regulation and Efficiency in the Electric Utility Industry,” *Bell Journal of Economics* 5 (Spring): 53-74; Paul M. Hayashi and John M. Trapani, “Rate of Return Regulation and the Regulated Firm’s Choice of Capital-Labor Ratio: Further Empirical Evidence on the Averch-Johnson Effect,” *Southern Economic Journal* 42 (January 1976): 384-97; H. Craig Petersen, “An Empirical Test of Regulatory Effects,” *Bell Journal of Economics* 6 (1975): 111-26; Robert M. Spann, “Rate of Return Regulation and Efficiency in Production: An Empirical Test of the Averch-Johnson Thesis,” *Bell Journal of Economics* 5 (Spring): 8-52;

Competition creates pressure for firms to squeeze out unnecessary costs and provide a combination of price and quality that consumers prefer. Where monopoly is expected to persist, both federal and state telecommunications regulators have increasingly opted for “price cap” regulation, which caps the prices firms can charge but allows them to earn additional profits by cutting costs.

### *Stifled innovation and entrepreneurship*

Regulation diminishes entrepreneurial incentives to lower costs, improve quality, and develop new products and services. Empirical studies of deregulated industries demonstrate the impact of innovation, for such studies consistently find that deregulation generates larger price reductions than economists predicted based on pre-deregulation costs and market conditions.<sup>4</sup>

Regulatory constraints on profits reduce the rewards for risky but potentially valuable innovation. In theory, regulators could prevent this problem by permitting the firm to earn a sufficient risk premium. In practice, regulators face a continual temptation to disallow the risk premium once an innovation is introduced and proven successful, because the successful innovation will likely remain in place even if regulation reduces its profitability. After the fact, it is often difficult to distinguish between high profits resulting from innovation and high profits resulting from market power. Expropriating these profits, however, reduces incentives for future innovation. And if profit regulation removes the carrot, protected markets remove the stick—the competitive threat that could otherwise spur entrepreneurship.<sup>5</sup>

In addition to altering incentives for discovery, economic regulation short-circuits the market’s normal trial-and-error process. Real-world competition is a dynamic process of trial and error. The purpose of competition is to reveal what services, costs, and prices are possible.<sup>6</sup> As Justice Breyer noted in his dissent in *Iowa Utilities Board*, a key case interpreting the Telecommunications Act of 1996, “The competition that the Act seeks is a process, not an end result; and a regulatory system that imposes through administrative mandate a set of prices that tries to mimic those that competition would have set does not thereby become any the less a regulatory process, nor any the more a competitive one.”<sup>7</sup> If there is no competitive market, actual competitive prices cannot be observed, but public policy regularly assumes that regulators can estimate prices tolerably close to those that a competitive market would have generated if it existed. In the absence of competition, we

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E. Ray Canterbery, Ben Johnson, and Don Reading, “Cost Savings from Nuclear Regulatory Reform: An Econometric Model,” *Southern Economic Journal* (Jan. 1996): 554-66.

<sup>4</sup> Clifford Winston, “Economic Deregulation: Day of Reckoning for Microeconomists,” *Journal of Economic Literature* 31 (Sept. 1993), 1263-89; Clifford Winston, “U.S. Industry Adjustment to Economic Deregulation,” *Journal of Economic Perspectives* 12:3 (Summer 1998): 89-110; Jerry Ellig, “Railroad Deregulation and Consumer Welfare,” *Journal of Regulatory Economics* 21:2 (2002): 143-67.

<sup>5</sup> Israel Kirzner, “The Perils of Regulation: A Market Process Approach,” in *Discovery and the Capitalist Process* (University of Chicago Press, 1985): 119-49.

<sup>6</sup> Friedrich Hayek, “Competition as a Discovery Procedure,” in Hayek, *New Studies in Philosophy, Politics, and Economics* (Chicago: University of Chicago Press, 1978): 179-90.

<sup>7</sup> *Iowa Utilities Board*, 119 S. Ct. at 749-50 (Breyer, J. concurring in part and dissenting in part).

do not know for sure what services, costs, and prices are possible; to estimate what competitive prices would be, these things must be assumed, and the assumptions may be wrong. In a very static industry, historical costs may be a useful guide for calculating “competitive” prices. In a dynamic industry, though, attempts to estimate competitive prices that do not actually exist will be fraught with error.

Regulation can also stifle innovation more directly, when firms must obtain regulators’ permission before entering new markets or offering new services. In some cases, firms must wait for regulators to establish the legal or institutional framework before they can deploy a new technology.<sup>8</sup> The ten-year delay in allowing local Bell telephone companies to offer voice mail, for example, cost consumers approximately \$1.27 billion annually, and regulation-induced delay in the introduction of cell phone service cost consumers \$50 billion annually in forgone benefits.<sup>9</sup>

### *Expenditures to acquire/maintain wealth transfers*

Whether it curbs or creates market power, regulation transfers wealth. The fact that regulation is a means of transferring wealth also implies another effect on the welfare of both consumers and the regulated industry. When wealth transfers are available, organized interests will expend resources to obtain them. Regulated firms will spend money to retain monopoly profits, or to protect themselves from below-competitive prices that expropriate their assets. From a society-wide perspective, money spent purely to capture wealth transfers is often considered pure waste. In some circumstances, the total amount of money wasted may even exceed the size of the wealth transfer.<sup>10</sup>

### **What is the competitive price, anyway?**

For the sake of simplicity, the foregoing discussion speaks of the “competitive” price in the same sense as most introductory economics textbooks—as a single price charged by a firm whose behavior is constrained by the presence of competitors. By assumption, the competitive firm must be as efficient as possible, or else it would have been displaced by competitors. Also by assumption, competition is sufficiently strong that the firm cannot unilaterally raise price or earn profits that exceed its cost of capital.

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<sup>8</sup> For examples from a variety of industries, see Robert W. Crandall and Jerry Ellig, *Economic Deregulation and Customer Choice* (Fairfax, VA: Center for Market Processes, 1997), available at <http://www.mercatus.org/regulatorystudies/article.php/839.html>.

<sup>9</sup> Jerry A. Hausman, “Valuing the Effect of Regulation on New Services in Telecommunications,” *Brookings Papers on Economic Activity, Microeconomics* (1997): 1-54.

<sup>10</sup> Michael Crew and Charles Rowley, “Toward a Public Choice Theory of Monopoly Regulation,” *Public Choice* 57 (1988): 49-67; Gordon Tullock, “The Welfare Costs of Tariffs, Monopolies, and Theft,” reprinted in James Buchanan, Robert Tollison, and Gordon Tullock, *Toward a Theory of the Rent-Seeking Society* (College Station: Texas A&M University Press, 1980). For empirical discussions, see, e.g., R.K. Huitt, “Federal Regulation of the Uses of Natural Gas,” *American Political Science Review* (June 1952): 455-69; Jerry Ellig, “Why Do Regulators Regulate? The Case of the Southern California Gas Market,” *Journal of Regulatory Economics* (March 1995); Jerome Ellig and Jack High, “Social Contracts and Pipe Dreams,” *Contemporary Policy Issues* 10 (January 1992): 46-48.

In an industry such as telecommunications, which is undergoing rapid technological change, the concept of the “competitive” price is somewhat more complicated, for several reasons. First, technological improvements mean that prices are likely to fall over time; thus, it is more accurate to speak of a competitive price path rather than a single competitive price. The more rapid the pace of innovation, the more rapidly prices fall—but the more rapidly prices fall, the higher they must be initially if firms expect to recoup their investments before competitors imitate or out-innovate them. Second, diverse consumer wants can lead to product differentiation; in such a situation, the “competitive” price is actually a set of prices for difference products and services that are not perfect substitutes. Third, the possibility of innovation creates substantial uncertainty about how much consumers are willing to pay for a service, and for how long. This uncertainty requires a higher level of profit to elicit investment than would be required in the absence of uncertainty. For these reasons, “the competitive price” of a telecommunications service or facility is likely to be a range of price paths which differ from the price that would be observed in a relatively stable, regulated market. To keep the language simple, though, this study will continue to use the term “competitive price” to refer to this more complicated, dynamic collection of prices.

## Accounting for Regulatory Costs

Ideal economic regulation benefits consumers by reducing prices to competitive levels. In reality, economic regulation may harm consumers by holding prices below competitive levels, raising prices above competitive levels, increasing costs, reducing innovation, or turning wealth transfers into social waste. Identifying which of these things have occurred in practice is the key to assessing the costs and consequences of economic regulation. In practice, it is often easier to identify price changes and their consequent effects than to identify forgone opportunities to cut costs or introduce new innovations.

This study classifies regulatory costs into several categories:

- **Wealth transfers:** Economic regulation redistributes wealth from some consumers and producers to other consumers and producers. Traditionally, economic researchers have not regarded such transfers as a cost of regulation, because one party's loss is another party's gain. However, if the transfer process itself is wasteful, or if firms expend resources to capture or defend themselves from wealth transfers, then some or all of the transfer is a cost.
- **Forgone consumer surplus:** When regulation raises costs or prices, consumers use less of the regulated service, and they are worse off as a result. The value that consumers forego, minus the price they would have paid, is the forgone consumer surplus.
- **Total cost to consumers:** This is the sum of the wealth transfer extracted from consumers plus the forgone consumer surplus. If some of the wealth is redistributed to consumers, it is counted as a beneficial outcome, and estimating the net effect on consumers requires a comparison of the total cost to consumers with the value of any wealth transfers or other benefits that consumers receive.
- **Forgone producer surplus:** When prices inflated by regulation prompt consumers to use less of a service, producers sell less of it. The profits they lose on the sales they don't make is called forgone producer surplus.
- **Value of forgone output:** This is the sum of forgone consumer surplus and forgone producer surplus that occurs when regulation reduces consumption by raising prices. Empirical studies frequently calculate this total sum rather than breaking it up into the consumer and producer surplus components. The value of forgone output is also called the "excess burden" of the regulation.
- **Wealth transfer plus forgone output:** This is the widest measure of the cost of regulation. It truly counts as a measure of social cost if all of the wealth transfer is wasted. To the extent that the wealth transfer is not wasted, adding the wealth transfer to the forgone output overstates the cost of regulation.

In some cases, these costs emerge simply because regulators set prices above or below competitive levels. In other cases, wealth transfers and forgone value occur because of

regulation's more complicated effects on cost levels, innovation, and entrepreneurship. The particular factors that underlie estimates of regulatory costs will vary depending on the service studied, the nature of the regulation, and the analytical method chosen by the authors of a particular study.

## Accounting for Regulatory Outcomes

This study explicitly focuses on policy outcomes, rather than the more common discussion of economic “benefits.” Regulatory outcomes may be positive or negative; all benefits are outcomes, but not all outcomes are beneficial. It is much less awkward to speak of “outcomes,” positive or negative, than to use phrases like “negative benefits” or “dis-benefits.”

More importantly, some outcomes of great interest to policymakers may not fit the economist’s definition of benefits. One goal of universal service programs, for example, may be to redistribute wealth from the rich to the poor by subsidizing telephone service for the poor. In conventional cost/benefit calculations, the wealth transfer would not count as a benefit, because one person’s loss is another person’s gain. Nevertheless, policymakers may be quite interested in knowing how effectively universal service programs accomplish the goal of progressive wealth redistribution. A focus on outcomes, rather than a narrower focus on benefits, permits inclusion of a broader range of information about policy results. The key document that identifies and assesses outcomes is the FCC’s annual *Performance and Accountability Report*.<sup>11</sup> The report articulates the outcomes the commission seeks to accomplish, and it also contains data on outcome trends.

The FCC has six strategic goals: broadband, competition, spectrum, media, homeland security, and modernization. The first three of these goals involve outcomes produced by FCC regulation of telecommunications and the Internet. The fourth goal, homeland security, involves several activities that affect the cost of telephone service, such as deployment of enhanced 911 and compliance with the Communications Assistance to Law Enforcement Act.

For each strategic goal, the FCC lists performance goals, outcome indicators, and performance measures. Virtually all of the performance measures are FCC activities and outputs that are assumed to contribute to accomplishment of the performance goals. Many of the performance goals and outcome indicators articulate outcomes the FCC strives to produce for citizens. The accompanying table lists only those performance goals and outcome indicators that identify actual outcomes in the domestic U.S.

For each outcome indicator, the *Performance and Accountability Report* provides numerical data showing trends and progress. The accompanying narrative often mentions specific regulatory initiatives that the FCC believes contributed to the outcomes. However, there is little actual proof in the report that the FCC actions caused the measured outcomes, and no estimate of how much of each outcome could be attributed to the FCC’s actions.

In fairness, we should note that the FCC’s *Performance and Accountability Report* is produced for a somewhat different purpose than this study. The FCC’s report is intended to assess outcomes of all of the FCC’s major activities; it thus focuses on what the FCC

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<sup>11</sup> FCC, *Performance and Accountability Report* (2004), available at <http://www.fcc.gov/Reports/ar2004.pdf>.

has accomplished. In a number of cases, such as spectrum auctions and reductions in long-distance access charges, market-based modernization of the FCC's regulatory approach has generated significant benefits for consumers and society. A comparison of the FCC's current approach with its approach 10 or 20 years ago would show significant improvement, and this improvement is reflected in some of the favorable trends reported in the *Performance and Accountability Report*.

This study, on the other hand, examines the costs and outcomes of specific remaining FCC regulations. It thus focuses on opportunities for improvement, rather than what the FCC has already accomplished. As a result, its tone is necessarily more critical than the FCC's *Performance and Accountability Report*.

Scholarly researchers have also assessed the outcomes of some FCC regulations. The discussion of regulatory outcomes in this study presents the results of such research, as well as relevant outcome information from the FCC's *Performance and Accountability Report*.



## **FCC 2004 Domestic Outcome-Oriented Goals and Indicators Relevant to Telecommunications and Broadband Regulation\***

### **Broadband**

#### *Performance Goal*

- Broaden the deployment of technologies across the United States and globally

#### *Outcome Indicators*

- Increasing access to broadband services
- Increasing access to broadband services and devices across multiple platforms: DSL, cable modem, satellite, terrestrial wireless, etc.
- Increasing number of types of unlicensed/licensed wireless broadband devices

### **Competition**

#### *Performance Goals*

- Ensure American consumers can choose among multiple reliable and affordable means of communications
- Ensure that all American consumers have and retain wireless and wireline phone services

#### *Outcome Indicators*

- Increasing percentage of households with competing providers for multichannel video programming and information services
- Increasing numbers of consumers and businesses having a choice among wireless and wireline service providers
- Lower relative price for wireless and wireline services

### **Spectrum**

#### *Performance Goals*

- Ensure that spectrum is used efficiently and effectively
- Facilitate domestic and international deployment of new spectrum-based technologies and services
- Promote ease of access to spectrum by more users

#### *Outcome Indicators*

- Increasing number of approvals for enhanced telecommunications equipment
- Facilitate deployment of new or existing services or devices that make efficient use of spectrum

### **Homeland Security**

#### *Outcome Indicator*

- Increasing deployment of Enhanced 911

\*This list includes *only* those items that clearly focus on outcomes. For a complete list, see the FCC's 2004 *Performance and Accountability Report*.

## Spending

In theory, the easiest cost of regulation to identify is the money spent to run the FCC. FCC outlays totaled \$351 million in fiscal 2003 and are estimated at \$361 million for fiscal 2004.<sup>12</sup>

In addition to the direct cost to taxpayers, these expenditures create an indirect cost: the reduction in economic output that occurs because of the taxes necessary to raise the revenues. The value that this lost output would have created for consumers and producers is called the “excess burden” of the tax. Economic research suggests that general taxation usually involves an excess burden of 25-40 cents per dollar raised.<sup>13</sup> Therefore, the taxes necessary to raise funds for FCC expenditures generate an excess burden of approximately \$90-144 million, for a total cost of \$451-505 million.

FCC outlays, which reflect appropriations, may either over- or under-state the FCC’s expenditures on telecommunications and broadband regulation. The FCC’s appropriation covers other regulatory initiatives, such as broadcasting, that are outside the scope of this study. On the other hand, the FCC receives revenues from the public in addition to appropriations, such as revenues from spectrum license auctions, interest on loans to spectrum buyers, penalties, and forfeitures. It retains some of these revenues to cover its costs.

The FCC’s *Performance and Accountability Report* provides an alternative estimate of federal expenditures on the regulations covered in this study. The report breaks costs down by strategic goal. The first three strategic goals—broadband, competition, and spectrum—cover most of the regulations in this study. The combined net cost of these three programs is approximately \$1.2 billion.<sup>14</sup> (This figure excludes revenues and costs for the Universal Service Fund, which are addressed separately below.) Obviously, not all of this is financed by appropriations. If the excess burden associated with the non-appropriated funds is the same as that of the appropriated funds, it would total \$300-480 million. Total spending plus the excess burden would be \$1.5-1.7 billion.

These are big numbers. But the costs that flow from FCC regulations far exceed the FCC’s expenditures. This report considers costs and outcomes in the following areas:

- Long-Distance Access Charges
- Universal Service Funding
- Local Number Portability
- Enhanced 911 Service

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<sup>12</sup> Susan Dudley and Melinda Warren, *Regulators’ Budget Continues to Rise: An Analysis of the U.S. budget for Fiscal Years 2004 and 2005* (Arlington, VA and St. Louis, MO: Mercatus Center and Weidenbaum Center, July 2004): Table A-1. Available at <http://www.mercatus.org/pdf/materials/796.pdf>.

<sup>13</sup> Jerry Hausman, “Efficiency Effects on the U.S. Economy from Wireless Taxation,” *National Tax Journal* 53 (Sept. 2000): pp. 733-42.

<sup>14</sup> FCC, *Performance and Accountability Report* (2004): 115.

- Miscellaneous Wireless Mandates
- Spectrum Management
- Satellite
- Unbundled Network Elements
- Resale of Incumbent's Services
- Broadband

## Long-Distance Access Charges

Long-distance telephone companies pay access charges to local telephone companies. There is virtually unanimous agreement among regulatory economists that historically, these charges have been used to subsidize local telephone service.<sup>15</sup> Since the 1980s, the FCC has gradually reduced access charges for interstate calls and made up the revenues with the fixed Federal Subscriber Line charge. As Figure 1 shows, access charge reductions have helped fuel large reductions in long-distance rates. However, long-distance rates net of access charges have also fallen, demonstrating that long-distance competition has generated substantial consumer benefits.

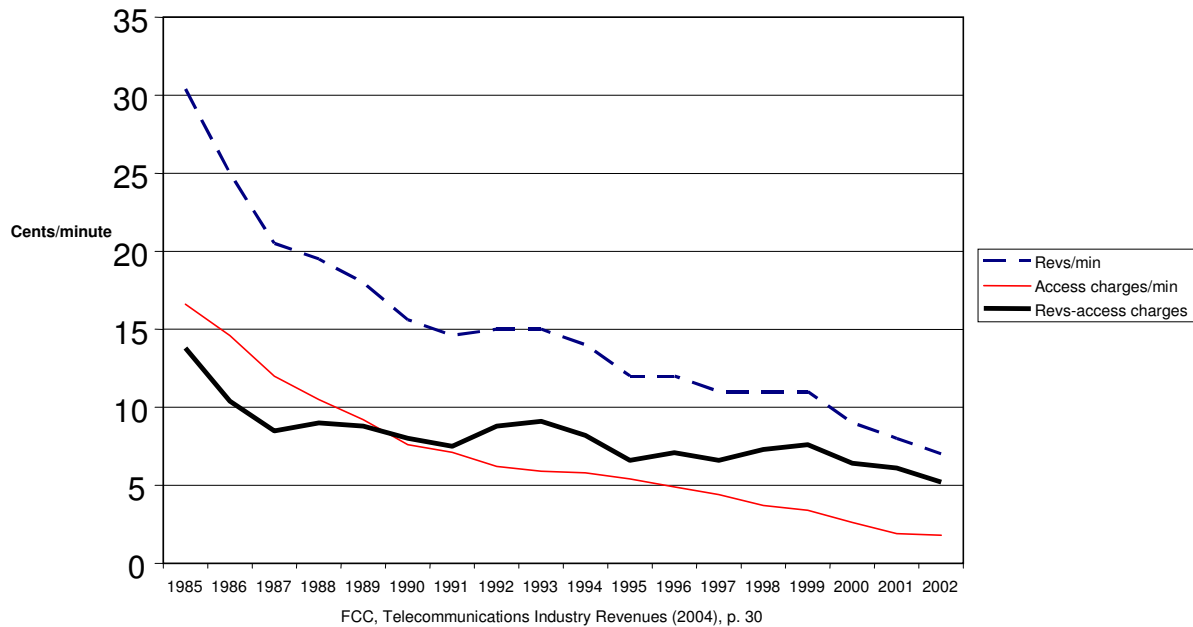
Long-distance access charges are but one example of the patchwork of charges that various carriers pay each other when they exchange traffic. For interstate calls, these charges range from 0.1 to 5.1 cents per minute, depending on the carriers. The FCC has an ongoing proceeding that seeks to rationalize and simplify these charges.<sup>16</sup> Many of these charges distort prices and generate costs for consumers. The only one whose costs have been studied extensively, however, is long-distance access charges. Cost figures for long-distance access charges should, therefore, be taken as a lower-bound estimate of the costs generated by the current intercarrier compensation arrangements.

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<sup>15</sup> Wayne Leighton, *Consumers and Cross-Subsidies: An Interest Group Theory of Telecommunications Regulation* (Ph.D. dissertation, George Mason University, 1996). The argument that long-distance service does not cross-subsidize local service is based on the assumption that local loop costs are “common costs” of producing long-distance and local service. However, the fact that customers might use local phone lines for both local and long-distance calls does not mean that local loops are common costs for the phone companies. A loop provides a customer with access to the telecommunications network. The cost of any loop is incremental to the rest of the system, and a loop receives a subsidy if it does not cover its incremental costs. For a thorough discussion of theory and evidence, see Steve G. Parsons, “Cross-Subsidization in Telecommunications,” *Journal of Regulatory Economics* 13 (1998).

<sup>16</sup> *In the Matter of Developing a Unified Intercarrier Compensation Regime*, CC Docket No. 01-92 (adopted April 19, 2002).

**Figure 1: Long distance revenues net of access charges**



## Costs

A large body of empirical research estimates the effect of access charges on consumer welfare by examining their effect on long-distance prices and usage. Because access charges have fallen greatly since the mid-1980s, the costs of the policy have also fallen.

Because consumer demand for long-distance service is very responsive to price, access charge policies that inflate the price of long-distance service generate significant reductions in consumer welfare. When an artificial price increase leads consumers to cut back on consumption by a large amount, it makes consumers substantially worse off. Most studies find that the price elasticity of demand for long-distance service is relatively large, in a range between -0.5 and -0.72; a 1 percent increase in long-distance prices reduces use by about one-half to three-quarters of one percent.<sup>17</sup> A consensus estimate of the elasticity is -0.7.<sup>18</sup> Hence, long-distance access charges generate relatively large reductions in long-distance usage and consumer welfare.

The most recent and extensive study that measures these welfare impacts was published by the Brookings Institution in 2000. Using 1996 data, Crandall and Waverman first

<sup>17</sup> Jerry Hausman and Howard Shelanski, "Economic Welfare and Telecommunications Regulation: The E-Rate Policy for Universal-Service Subsidies," *Yale Journal on Regulation* 16 (Winter 1999): 36-37.

<sup>18</sup> M. H. Riordan, "Universal Residential Telephone Service," in Martin E. Cave, Sumit K. Majumdar, and Ingo Vogelsang (Eds.), *Handbook of Telecommunications Economics, Volume 1* (Amsterdam: Elsevier, 2002): 436.

employed several different cost models to estimate how much additional revenue local phone companies would earn if they could eliminate cross-subsidies and price local phone service at incremental cost. They then estimated the effect on long-distance prices and economic welfare if these additional revenues were used to reduce long-distance access charges. Depending on the specific model and assumptions, elimination of cross-subsidies increases consumer welfare by between \$1 billion and \$3.7 billion annually. Long-distance companies gain an additional \$1.6-3.4 billion annually, yielding a total increase in economic welfare of between \$2.5 billion and \$7 billion.<sup>19</sup> These estimates are consistent with findings from earlier studies, conducted when access charges were much higher, that showed repricing could increase economic welfare by \$10-17 billion.<sup>20</sup> The figures are net calculations that include changes in welfare due to the price increases for local service.

These figures possibly overstate the current cost of interstate access charges for three reasons. First, they are based on data from 1996, when interstate access charges were higher, and monthly subscriber line charges lower, than they are today. Second, they likely include the effects of reducing intrastate as well as interstate access charges. The estimates assume that local service is priced at cost, and the resulting revenues are used to reduce both interstate and intrastate access charges. Finally, the resulting revenues in some cases exceeded actual access charges.<sup>21</sup> This last result probably occurred because local telephone service receives cross-subsidies from other sources in addition to access charges. However, a rough calculation using national average data from 1996 suggests that elimination of interstate long-distance access charges would increase consumer welfare on net by approximately \$1.9 billion, and increase producer welfare by \$3.2 billion.<sup>22</sup> These results suggest that inefficiencies associated with interstate access charges are responsible for the bulk of Crandall and Waverman's findings.

A similar rough estimate can be calculated using national average data for 2002, the most recent year for which data are available. Interstate access charges averaged between 1 cent and 1.6 cents per domestic conversation minute and generated approximately \$3.3

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<sup>19</sup> Crandall and Waverman (2000): 120.

<sup>20</sup> Crandall (1991): 141.

<sup>21</sup> Crandall and Waverman (2000): 113.

<sup>22</sup> Following Hausman and Shelanski (1999), the change in consumer welfare is approximately equal to  $.5\Delta p\Delta q$ , and the change in producer welfare is approximately equal to  $\Delta q(p-m)$ , where  $m$  is the marginal cost of producing long-distance service. To measure accurately the effect of access charges in a study that measures the impact of all regulatory charges added to the cost of long-distance service, one must calculate the changes in consumer and producer welfare caused by access charges and federal universal service contributions together, then allocate the amounts proportionately to access charges and universal service contributions. Using 1996 data from *Telecommunications Industry Revenues* (2004), Table 10, average revenues per interstate domestic conversation minute ( $p$ ) were 12 cents, access costs plus universal service contributions per average conversation minute were 4.9 cents, and interstate domestic conversation minutes totaled 268.8 billion. The calculation assumes a demand elasticity of -0.7 for long-distance service. The producer welfare figure assumes, following Hausman and Shelanski (1999), that the marginal cost of long-distance service equals 25 percent of its price.

billion in revenues.<sup>23</sup> In 2002, there were 333.8 billion domestic conversation minutes, and average revenue per minute was 7 cents. The incremental cost of access is measured in tenths of a cent, so most of the access charge subsidizes local telephone service.<sup>24</sup> A 1 cent interstate access charge reduces consumer welfare by approximately \$300 million, and reduces producer welfare by about \$1.2 billion.<sup>25</sup>

## Outcomes

The current system of access charges is intended to promote universal service. The assumed public benefit is that more people subscribe to local phone service because access charge revenues are used to subsidize monthly local rates. This outcome could be read as part of the FCC's competition performance goals that focus on ensuring that all American consumers have and retain phone service, and that all Americans have "affordable" means of communications.

These outcomes may address a "market failure," reflecting the internalization of a genuine externality, under three conditions:

1. The value of telephone service to each subscriber rises when other subscribers join the network,
2. This increase in value is large enough that current subscribers would be willing to subsidize these new subscribers, and
3. Individuals fail to take this increased value into account when they decide whether to subscribe.<sup>26</sup>

Even if these conditions hold, a regulatory response may not be necessary, because the owner of the network has strong financial incentives to maximize the value of the network by crafting subsidies to new subscribers if subsidies are needed to internalize the externality.<sup>27</sup> Alternatively, policymakers may believe that an increase in telephone subscription rates is a good outcome even if there is no externality.<sup>28</sup> Regardless of whether an externality exists, most research suggests that cross-subsidies from long-distance to local service generate little increase in telephone subscriptions.

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<sup>23</sup> FCC, Wireline Competition Bureau, Industry Analysis and Technology Division, *Telecommunications Industry Revenues* (2004), Table 10, reports that in 2002, interstate access charges per domestic conversation minute averaged 1 cent, and access charges per interstate 2-ended minute averaged 1.6 cents.

<sup>24</sup> See, e.g., switching rates calculated in Billy Jack Gregg, "A Survey of Unbundled Network Element Prices in the United States," National Regulatory Research Institute (Aug. 2004).

<sup>25</sup> These figures are calculated as in footnote 22 above, using 2002 data from FCC, *Telecommunications Industry Revenues* (2004), Table 10.

<sup>26</sup> The first condition defines the existence of an externality. The second condition determines whether it is a "Pareto-relevant marginal externality," an often-overlooked precondition for a subsidy or regulatory action to improve consumer welfare. A.H. Barnett and David L. Kaserman, "The Simple Welfare Economics of Network Externalities and the Uneasy Case for Subscriber Subsidies," *Journal of Regulatory Economics* 13 (1998).

<sup>27</sup> Stanley J. Liebowitz and Steve Margolis, "Network Effects," in M. Caves, S. Majumdar, and I. Vogelsang (eds.), *Handbook of Telecommunications Economics* (Elsevier, 2002): 76-94.

<sup>28</sup> John C. Panzar, "A Methodology for Measuring the Costs of Universal Service Obligations," *Information Economics and Policy* 12 (2000): 213.

Consumer decisions to subscribe to telephone service are not very sensitive to the fixed monthly charge.<sup>29</sup> In other words, local service has a relatively low price elasticity of demand. This elasticity appears to have fallen over time. Several recent studies using census data, for example, have found that the elasticity in 1990 was about one-third of the value in 1970, and in 2000 it was only one-eighth of 1970 value.<sup>30</sup> It may even be equal to zero in the United States and other developed countries.<sup>31</sup> Surveying the findings of multiple studies, Jerry Hausman and Howard Shelanski note,

A comparison of price elasticities of demand for local and long-distance telephone services thus reveals that an increase in long-distance prices is probably more harmful to society's economic welfare than is an increase in local service prices. Long-distance demand, with a price elasticity of -0.7, will contract substantially more in the face of a price increase than will local-service demand, with a price elasticity of -0.005.<sup>32</sup>

These differing elasticities suggest that cross-subsidies from long-distance to local service may at best generate small increases in telephone subscription at the cost of a large reduction in consumer welfare due to inflated long-distance prices.

Yet even this tradeoff may be an illusion. Higher long-distance rates tend to reduce telephone subscription, since consumers subscribe to local phone service in part so that they can make long-distance calls. Some studies find that subscription is more sensitive to changes in long-distance rates than to changes in local rates. Therefore, a reduction in the cross-subsidy from long-distance to local rates may actually increase telephone penetration. The principal study examining these offsetting effects estimated that the reduction in cross-subsidies that the FCC ordered between 1984 and 1990 actually increased telephone penetration rates by 0.45 percent, bringing 450,000 additional households onto the telephone network.<sup>33</sup>

Other, more recent studies using a variety of statistical techniques find very little evidence that the cost of monthly service affects telephone penetration rates, even for low-income households; in that case, access charges generate consumer costs but simply

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<sup>29</sup> Barnett and Kaserman (1998): 252-53; Riordan (2002): 431; David L. Kaserman, John W. Mayo, and Joseph E. Flynn, "Cross-Subsidization in Telecommunications" *Beyond the Universal Service Fairy Tale*, *Journal of Regulatory Economics* 2 (Sept. 1990): 231-49.

<sup>30</sup> Christopher Garbacz and Herbert G. Thompson, "Estimating Demand with State Decennial Census Data from 1970-1990," *Journal of Regulatory Economics* 21:3 (2002): 326; Christopher Garbacz and Herbert G. Thompson, "Estimating Telephone Demand with State Decennial Census Data from 1970-1990: Update with 2000 Data," *Journal of Regulatory Economics* 24:3 (2003): 376.

<sup>31</sup> Crandall and Waverman (2000): 91; Christopher Garbacz and Herbert G. Thompson, Jr., "Universal Telecommunication Services: A World Perspective," manuscript (Dec. 29, 2004): Table 5.

<sup>32</sup> Hausman and Shelanski (1999): 39.

<sup>33</sup> Jerry Hausman, Timothy Tardiff, and Alexander Belinfante, "The Effects of the Breakup of AT&T on Telephone Penetration Rates in the United States," *American Economic Review* 83 (May 1993): 182-83. Garbacz and Thompson (2002, 2003) also find that higher long-distance prices reduce telephone penetration rates, and the size of the effect falls between 1970 and 2000. This is a logical finding, given the large reductions in long-distance prices that occurred over that period.



fail to promote universal service.<sup>34</sup> In short, the policy of cross-subsidizing local rates with revenues from long-distance access charges generates little increase in telephone subscription rates, and may even reduce them.

The principal indicator the FCC's *Performance and Accountability Report* cites relevant to "affordability" of telephone service is a 4 percent decline in the Consumer Price Index for telephone services between 1998 and 2004.<sup>35</sup> However, this index includes long-distance and wireless service, as well as the local service that gets subsidized in the name of "affordability." Clearly, telephone service has become more affordable. However, it is doubtful that access charges have done anything to make telephone service more affordable. If anything, it is the FCC's efforts to reduce access charges that have reduced the per-minute cost of telephone service by enabling large reductions in long-distance rates that spurred increased usage.

Another potential goal of the cross-subsidy may be to redistribute income via the phone lines. The evidence suggests that the cross-subsidy is difficult to justify on equity grounds. Even in households with incomes less than \$10,000, long-distance accounts for more than 40 percent of average monthly telephone expenditures. In all income classes, long-distance usage is quite variable, with some households using a lot and some very little. It is thus safe to say that many low-income households use a great deal of long-distance service, and so the cross-subsidy may actually diminish the welfare of these households.<sup>36</sup> In addition, the local service subsidy is not targeted based on income, in marked contrast to the practice in other regulated utilities, such as electricity and natural gas. Rich and poor households alike are entitled to one cheap residential phone line—an odd way of redistributing income to the poor.<sup>37</sup>

Crandall and Waverman's study found that cross-subsidies from long-distance to local service transfer only \$2.00 per month to low-income households on average. Put differently, the nation forgoes \$2.5-\$7 billion in order to redistribute about \$435 million to low-income households. The authors note, "Regardless of the assumed cost model, this is a very costly income redistribution policy."<sup>38</sup>

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<sup>34</sup> Crandall and Waverman (2000): 94-104; Garbacz and Thompson (2004).

<sup>35</sup> FCC, *Performance and Accountability Report* (2004): 33.

<sup>36</sup> Crandall and Waverman (2000): 57-68.

<sup>37</sup> Crandall and Waverman (2000): 26, 69-88.

<sup>38</sup> Crandall and Waverman 2000: 112-120.

## Universal Service Funding

In addition to authorizing access charges on some carriers, FCC regulations require universal service “contributions” from providers of interstate and international telecommunications services to subsidize basic phone service for low-income customers, subsidize high-cost phone companies, provide reduced-price Internet service to schools and libraries, and offer reduced-price telecommunications services to rural health care facilities. Providers typically pass these charges through to consumers on their bills.

The federal government spent approximately \$5.7 billion on these universal service programs in 2003. More than half of this money—\$3.3 billion—went to subsidize high-cost carriers, and \$713 million (12.5 percent) was spent on programs for low-income customers that help pay initial connection charges (Linkup) and subsidize monthly phone bills (Lifeline). Most of the rest (\$1.7 billion, or 30 percent) subsidized internal wiring, telecommunications, and Internet service to schools and libraries.<sup>39</sup> Thus, about 70 percent of the funds were devoted to subsidizing basic telephone service, with the remainder spent on the newer “universal service” programs created by the 1996 Telecommunications Act, which reduce the cost of Internet service to specified types of institutions.

### Costs

The contributions take the form of a percentage assessment against sales of interstate and international services—primarily interstate long-distance and wireless phone services. Readjusted quarterly, the universal service “contribution factor” was 8.7 percent for the first two quarters of 2004 and 8.9 percent for the second two quarters. The FCC has proposed a 10.7 percent contribution factor for the first quarter of 2005.<sup>40</sup> Though not formally called a tax, the assessment has all the economic effects of a tax. This funding mechanism for universal service programs generates substantial consumer costs in addition to the revenue it raises to fund universal service. This occurs because the contribution mechanism acts as a tax on services with relatively high price elasticities of demand, such as long-distance and wireless.

MIT economist Jerry Hausman estimated that the contributions required from long-distance service to fund discount Internet service for schools and libraries reduce the sum of consumer plus producer welfare by approximately 65-79 cents for every dollar of revenue raised.<sup>41</sup> The marginal effect—that is, the effect of additional contributions—is even higher: \$1.25 for each additional dollar raised. Thus, in addition to the \$1.89 billion that Hausman estimated the program would transfer from consumers of long-distance

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<sup>39</sup> FCC, Wireline Competition Bureau, Industry Analysis and Technology Division, *Trends in Telephone Service* (May 2004), Table 19.1.

<sup>40</sup> See FCC press releases at [http://www.fcc.gov/wcb/universal\\_service/quarter.html](http://www.fcc.gov/wcb/universal_service/quarter.html).

<sup>41</sup> Hausman and Shelanski (1999). pp. 42-43.

service to schools and libraries, the program would cost the economy \$2.36 billion annually due to reduced output of long-distance service.<sup>42</sup>

It is possible to construct a similar estimate using FCC data from the most recent year available, 2002. For domestic interstate long-distance, federal universal service contributions averaged 0.8 cents per conversation minute. This price increase raised approximately \$2.7 billion in revenues, but it also reduced consumption of long-distance service. As a result, the price increase reduced consumer welfare by about \$240 million and reduced producer welfare by about \$920 million, for a total reduction in economic welfare of \$1.16 billion.<sup>43</sup>

Like long-distance service, demand for wireless service is relatively responsive to price, with U.S. demand elasticity most recently estimated in the range of -1.12 to -1.29.<sup>44</sup> Estimates using international data are even higher, in the range of -1.71 to -3.62.<sup>45</sup> In a separate study, Hausman estimated the impact on the economy of all taxes applied to wireless, including the universal service contributions imposed by the FCC. He calculated that every dollar raised reduced consumer plus producer welfare by approximately 53 cents, which implies that wireless taxes cost the economy \$2.56 billion annually in addition to the \$4.79 billion raised annually in the late 1990s. Additional taxes or contributions would, on average, entail a cost of 72 cents for each dollar of revenue raised.

An adaptation of Hausman's method permits an estimate of the effects of wireless universal service contributions in more recent years. Universal service assessments on

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<sup>42</sup> Jerry Hausman, "Taxation Through Telecommunications Regulation," *Tax Policy and the Economy* 12 (1998): 31.

<sup>43</sup> Calculations follow the method in footnote 22 and employ data in FCC, *Telecommunications Industry Revenues* (2004), Table 10. Although the revenue figure is larger than Hausman's estimate in 1998, the effects on economic welfare are smaller than he calculated because this study uses average figures derived from an estimate of the joint effects of interstate long-distance access charges and universal service contributions. Hausman's figures are estimates of the marginal effect of adding the universal service contributions on top of existing access charges. Since the efficiency loss associated with raising additional dollars exceeds the average efficiency loss, Hausman's marginal figures are higher.

<sup>44</sup> J. Gregory Sidak, "Is State Taxation of the Wireless Industry Counterproductive?," manuscript, Criterion Economics (April 2, 2003). Sidak used 1999-2001 data. Using 1988-93 U.S. data, Hausman estimates a demand elasticity of approximately -0.5. See Jerry Hausman, "Cellular Telephone, New Products, and the CPI," *Journal of Business & Economic Statistics* 17:2 (April 1999): 191. A 2002 study using data from 2000 and 2001 estimated that the overall price elasticity of demand is -0.6. Mark Rodini, Michael R. Ward, and Glenn A. Woroch, "Going Mobile: Substitutability Between Fixed and Mobile Access," paper prepared for conference organized by the Public Utility Research Center at the University of Florida (Dec. 2002).

<sup>45</sup> Thomas W. Hazlett and Roberto E. Muñoz, "A Welfare Analysis of Spectrum Allocation Policies," AEI-Brookings Joint Center for Regulatory Studies related Publication 04-18 (Aug. 2004): 15; Gary Madden and Grant Coble-Neal, "Economic Determinants of Global Mobile Telephony Growth," *Information Economics and Policy* 16 (2004): 531. Using 1996-2001 data for developed countries, Garbacz and Thompson (2004, Table 5) find a price elasticity of -0.45 with respect to the monthly charge. An earlier study, however, found that connection prices, monthly subscription charges, and the cost of a 3-minute call rarely had statistically significant effects on the national subscription rate to wireless. Hyungtaik Ahn and Myeong-Ho Lee, "An Econometric Analysis of the Demand for Access to Local Telephone Networks," *Information Economics and Policy* 11 (1999): 297-305.

interstate wireless service raised approximately \$1.4 billion in 2003.<sup>46</sup> All of the data necessary to perform a calculation similar to Hausman's for 2003 are not yet available. However, combining available 2003 data on wireless subscribership, the universal service assessment percentage, and universal service contributions from wireless with 2002 data on minutes and revenues per minute yields a consumer welfare loss of \$39 million and a producer welfare loss of \$835 million, for a total reduction in economic welfare of \$874 million.<sup>47</sup>

## Outcomes

The low-income and high-cost support programs are most closely related to the FCC's goals of ensuring that all Americans have affordable means of communications and remain on the telephone network. While these programs clearly transfer large amounts of money between different groups of users, the extent to which they promote universal service by actually increasing subscribership is much less clear.

### *Low-income programs*

A 1997 study by Christopher Garbacz and Herbert G. Thompson, using data from the 1990 Decennial Census, found that expenditures on Lifeline and Linkup programs increase telephone penetration, but by very small amounts. A 10 percent increase in expenditures would lead to less than a one tenth of one percent increase in the percentage of households with telephones.<sup>48</sup> Studies by the same authors using 2000 census data estimate that Lifeline and Linkup increase subscription at a cost of \$1581-\$2200 per additional subscription.<sup>49</sup> The authors conclude, "This is a direct result of the fact that a high proportion of program monies go to households that are already on the network and do not plan to leave. How to target those not on the network, while denying payments to those already on the network who are in no danger of leaving, is a conundrum."<sup>50</sup> More

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<sup>46</sup> These figures are calculated by multiplying total universal service outlays, shown in FCC, *Trends in Telephone Service* (2004), Table 19.1, by the percentage of contributions from wireless, shown in Table 19.15.

<sup>47</sup> These calculations estimate the change in consumer welfare as  $.5\Delta p\Delta q$ , and the change in producer welfare as  $\Delta q(p-m)$ , where  $m$  is the marginal cost of producing wireless service. We first estimated the combined changes in consumer and producer welfare caused by five regulatory mandates on wireless: universal service, local number portability, number pooling, enhanced 911, and Communications Assistance for Law Enforcement Act (CALEA). Then we calculated the proportion attributable to each of the five mandates. Average wireless revenues per minute and average minutes were calculated from data in *Trends in Telephone Service* (2004), Tables 11.3 and 11.4. Universal service contributions from wireless were calculated from figures on universal service outlays, shown in Table 19.1, and the percentage of contributions from wireless, shown in Table 19.15. Following Hausman (2000), the calculation assumes that the marginal cost of wireless is 5 cents/minute. Following Sidak (2003), the calculation assumes a demand elasticity for wireless of -1.12 (his lower-bound estimate). Cost estimates for local number portability, number pooling, enhanced 911, and CALEA are taken from calculations in Thomas M. Lenard and Brent D. Mast, "Taxes and Regulation: The Effects of Mandates on Wireless Phone Users," *Progress on Point* 10 (Oct. 18, 2003).

<sup>48</sup> Christopher Garbacz and Herbert G. Thompson, Jr., "Assessing the Impact of FCC Lifeline and Link-Up Programs on Telephone Penetration," *Journal of Regulatory Economics* 11 (1997): 77.

<sup>49</sup> Garbacz and Thompson (2002): 320, 328; Garbacz and Thompson (2003): 377.

<sup>50</sup> Garbacz and Thompson (2002): 328.

recently, Garbacz and Thompson used the same method to assess the effects of Lifeline and Linkup separately. They found that Linkup had no effect on telephone penetration, and Lifeline was responsible for most of the effect they previously attributed to both programs jointly.<sup>51</sup>

A 2004 study confirms these estimates and inferences, finding that Lifeline and Linkup programs increase total subscribership by about 0.155 percent in 2000.<sup>52</sup> Overall, the programs cost about \$97 per household that receives subsidies, but increased subscribership at a cost of approximately \$1899 per additional subscriber.<sup>53</sup>

Finally, some studies find that the low-income programs have no effect on subscribership at all. One of the most extensive recent studies found that monthly charges have no influence on telephone penetration rates, and Linkup programs sometimes increase and sometimes decrease penetration, depending on the data set used to estimate the relationship.<sup>54</sup>

Studies of phoneless households help explain these results. The most common reasons that phoneless households give for not subscribing to telephone service is concern about uncontrollable usage-based charges, not the cost of basic local service. A pathbreaking 1994 study of low-income households in New Jersey found that the cost of usage-related charges and optional services—such as long-distance, collect calls, calling-card calls, and voice mail—were the most common reasons that households lacked phone service. Heads of households noted that other family members or friends living with them had run up large usage-related bills in the past, often without their knowledge or approval. The authors concluded, “Income, employment, and other measures of wealth or poverty are strongly related to low penetration not because the price of basic local phone service is too high, but because low-income users who run up large usage-related bills are unable to cover them.”<sup>55</sup>

A 1995 survey of Texas households without telephones found that about half of them said the cost of local service makes it difficult to afford a telephone, but about 80 percent said they could afford to pay \$16 per month, the actual average cost of local service in Texas at the time of the survey. The primary barriers to phone service were the fact that long-distance charges are variable and hence perceived as harder to control, the cost of reinstallation for people who previously had service disconnected due to nonpayment of bills, and difficulty in controlling who uses the phone.<sup>56</sup>

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<sup>51</sup> Garbacz and Thompson (2004): fn. 14.

<sup>52</sup> Daniel J. Ryan, “Universal Telephone Service and Rural America,” unpublished manuscript (April 30, 2004): 18.

<sup>53</sup> Ryan (2004): 18-19.

<sup>54</sup> Crandall and Waverman (2000): 94-104.

<sup>55</sup> Milton L. Mueller and Jorge Reina Schement, “Universal Service from the Bottom Up: A Study of Telephone Penetration in Camden, New Jersey,” *The Information Society* 12 (1996): 287.

<sup>56</sup> John B. Horrigan and Lodis Rhodes, *The Evolution of Universal Service in Texas* (Sept. 1995), available at [www.apr.org/policy/lbjbrief.html](http://www.apr.org/policy/lbjbrief.html).

Overall, the low-income programs (particularly Lifeline) appear to be a very ineffective way of increasing subscribership among low-income households; they may have no effect at all. On the federal level, they redistributed about \$700 million to low-income households in 2003; thus, only about 13 percent of total universal service funding was targeted to low-income recipients. About 6.6 million Lifeline subscribers received an average of \$98.93, and 1.7 million Linkup beneficiaries received one-time payments averaging \$17.77.<sup>57</sup> Whether these programs are efficient means of redistributing income to the poor depends on how one defines their cost and relevant alternatives.

All of these cost-per-additional-subscriber figures measure only expenditures, not the additional loss of consumer and social welfare that results from the assessments on long-distance and wireless service. If one attributes 13 percent of the reduction in economic welfare caused by universal service programs to the low-income programs, then they are responsible for a \$196 million reduction in overall economic welfare, or 28 cents per dollar transferred.

#### *High-cost support*

The high-cost support programs, which account for more than half of the universal service fund's expenditures, appear to be a very costly way of increasing subscribership. The most recent study on this topic estimates that the cost of adding one subscriber through loop support was at least \$11,000 in 2000, up from \$3350 in 1990. The cost of adding one subscriber through local switching support was \$5155, up from approximately \$2000 in 1990.<sup>58</sup> This cost is substantially higher than the \$666 estimated by another study for 1985-93.<sup>59</sup>

Another potential goal of high-cost support could be redistribution of wealth to rural households. Superficially, the program appears to accomplish substantial redistribution, with expenditures of \$3.3 billion in 2003. Two factors, however, suggest that high-cost support is a highly inefficient redistribution program. First, the payments go to telephone companies, not households, and there is no guarantee that the \$3.3 billion subsidy actually creates \$3.3 billion worth of value for rural households. Many of the high-cost telephone companies are rural companies that still operate under rate-of-return regulation, which is notorious for creating incentives for inefficiency. Second, any resulting reductions in rural telephone rates are funded in large part by universal service assessments on long-distance and wireless. To the extent that rural subscribers use a substantial amount of long-distance service (because many of the people they call are outside the local calling area) or also subscribe to wireless, the high-cost program merely rearranges figures on their phone bills rather than providing any genuine savings. But

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<sup>57</sup> Calculated from figures in Federal-State Joint Board on Universal Service, *Universal Service Monitoring Report* (May 2004): Tables 2.1 and 2.4.

<sup>58</sup> Ryan (2004): 18-19.

<sup>59</sup> R.C. Eriksson, D.L. Kaserman, and J.W. Mayo, "Targeted and Untargeted Subsidy Schemes: Evidence from Post-Divestiture Efforts to Promote Universal Service," *Journal of Law & Economics* 41 (1998): 477-502. This study uses data only for the Bell telephone companies, which receive a small portion of total high-cost support and may not be typical.

because long-distance and wireless use are highly sensitive to price, universal service assessments on those services reduce economic welfare substantially.

### *Schools and Libraries*

The schools and libraries program might be interpreted as one means of accomplishing the FCC's performance goal of increasing broadband deployment. Outcome indicators in the *Performance and Accountability Report*, however, focus on broadband deployment to homes and businesses, so they provide no information about the effects of the schools and libraries program.<sup>60</sup>

The schools and libraries program is targeted in the sense that it gives lower discounts to wealthier institutions, but it is not clear whether this program has actually induced more schools and libraries to obtain Internet access. The National Center for Education Statistics reports that Internet access in public schools has increased steadily since 1994, to the point that 99 percent of schools now have Internet access. Several of the center's statistical releases speculate that the schools and libraries program may have helped increase Internet access, but they provide no analysis demonstrating that the program caused Internet access to be any higher than it would have been in the absence of the program.<sup>61</sup>

The most sophisticated analysis of the program has been conducted by the Urban Institute under contract to the U.S. Department of Education. This study finds that Internet connectivity for both high-poverty and low-poverty schools increased after implementation of the schools and libraries program, but connectivity for both was also increasing prior to the program. Funding is effectively targeted to high-poverty and rural schools. Schools receiving subsidies report increases in deployment of Internet technology. The study contains no data or analysis demonstrating that Internet connectivity is higher than it would be in the absence of the program; indeed, several statistical tests in the study find no effect.<sup>62</sup>

Similarly, there are no studies demonstrating whether any increase in Internet subscription or usage generated by the program has actually improved educational outcomes. The Urban Institute study notes, "...the data from this study do not allow comment on the benefits of expanding access to the Internet and other digital technology..."<sup>63</sup> The Office of Management and Budget's Program Assessment Rating Tool analysis concludes that the results of this program have not been demonstrated, awarding a score of seven out of a possible 100 points for results and accountability.<sup>64</sup>

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<sup>60</sup> FCC, *Performance and Accountability Report* (2004): 24-25.

<sup>61</sup> Anne Cattagni and Elizabeth Farris Westat, "Internet Access in U.S. Public Schools and Classrooms: 1994-2000," *Statistics in Brief*, National Center for Education Statistics (May 2001); Catrina Williams, "Internet Access in U.S. Public Schools and Classrooms: 1994-99," *Stats in Brief*, National Center for Education Statistics (Feb. 2000).

<sup>62</sup> Michael J. Puma et. al., "The Integrated Studies of Educational Technology: A Formative Evaluation of the E-Rate Program," draft study, Urban Institute (Oct. 2002), available at [http://www.urban.org/UploadedPDF/410579\\_ERateFinalReport.pdf](http://www.urban.org/UploadedPDF/410579_ERateFinalReport.pdf).

<sup>63</sup> Puma et. al. (2002): 34.

<sup>64</sup> Office of Management and Budget, Program Assessment Rating Tool, "Schools and Libraries – Universal Service Fund," available at <http://www.whitehouse.gov/omb/budget/fy2005/pma/agencies.pdf>.

## Local Number Portability

Regulation and legislation have mandated number portability for different types of phone numbers at different times. In some sense, the earliest form of portability occurred when long-distance service was opened to competition in the 1970s, since customers did not have to switch phone numbers when switching long-distance carriers. Phone numbers for 800 service, however, were not portable until May 1, 1993. Prior to then, a business with an 800 number that wanted to switch long-distance carriers had to switch phone numbers as well.

More recently, the Telecommunications Act of 1996 required the FCC to make rules requiring wireline and wireless local service providers to implement local number portability.<sup>65</sup> Under the Act and the FCC's rules, local number portability is defined as "the ability of users of telecommunications services to retain, at the same location, existing telecommunications numbers without impairment of quality, reliability, or convenience when switching from one telecommunications carrier to another."<sup>66</sup>

Wireline carriers were required to introduce local number portability as early as February 1, 1999.<sup>67</sup> Wireless local number portability began on November 24, 2003, and with few exceptions, all wireless carriers were forced to implement the policy as of May 24, 2004.<sup>68</sup> The purpose of local number portability is outlined in the Commission's *First Report and Order* (1996): "The ability of end users to retain their telephone numbers when changing service providers gives customers flexibility in the quality, price, and variety of telecommunications services they can choose to purchase."<sup>69</sup>

Regulations requiring local number portability give consumers the ability to keep their phone numbers when switching between local service providers, be it a landline or wireless provider. The caveat, as the word "local" indicates, is that the provider is only required to "port" the number if the individual changes providers within the same metropolitan area.<sup>70</sup> An individual may switch from a landline provider to a wireless provider, as well as between wireless and landline providers. Individuals switching between wireless providers will also have to change phones, due to differences in

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<sup>65</sup> See 47 U.S.C. § 251 (b)(2), FCC, *In the Matter of Telephone Number Portability: CTIA Petitions for Declaratory Ruling on Wireline-Wireless Porting Issues*, FCC 03-284, CC Docket No. 95-116 (Released November 10, 2003): 2.

<sup>66</sup> Qtd. 47 U.S.C. § 153 (30); 47 U.S.C. § 52.21 (k). FCC, *In the Matter of Telephone Number Portability: CTIA Petitions for Declaratory Ruling on Wireline-Wireless Porting Issues*, FCC 03-284, CC Docket No. 95-116 (Released: November 10, 2003): 2-3. Original citations omitted.

<sup>67</sup> Consumer Alert, Oklahoma Corporation Commission, Public Utility Commission. See <http://www.occ.state.ok.us/MISC/CHARGES.htm>, accessed 7/9/04.

<sup>68</sup> Some small/rural companies can petition the FCC to be excluded from offering Local Number Portability.

<sup>69</sup> FCC, *Telephone Number Portability*, CC Docket No. 95-116, *First Report and Order*, FCC 96-286 (Released July 2, 1996): para. 30.

<sup>70</sup> FCC, "A Conversation on Wireless Local Number Portability: What It Is and What It Isn't," Wireless Telecommunications Bureau Chief John Muleta with Cindi Schieber, Jared Carlson, and Chelsea Fallon (Nov. 21, 2003): 2.



technology used by the different providers. FCC staff have noted, “[even] if your phone could be reprogrammed to work on a new network, carriers usually don’t allow this.”<sup>71</sup>

The principal argument for local number portability is that it facilitates consumer choice. If individuals are no longer required to change phone numbers when switching carriers, they may be more likely to switch carriers if they see enough benefit in doing so. Consumers who want to switch no longer experience the inconvenience and other costs associated with changing phone numbers. Instead, all consumers must pay for the systems and software that give them the option of taking their phone numbers with them when they switch carriers.

## Costs

No research has assessed the costs of number portability in long-distance service. Local number portability has generated more significant debate and analysis. Local number portability requires phone companies to purchase new software, acquire new equipment, construct new number databases, perform inter-carrier testing, and implement new business procedures.<sup>72</sup> Firms are allowed to charge a monthly fee to recover the costs they will incur; they may itemize it as a separate fee on customers’ bills or include it in the monthly rate.<sup>73</sup> Local wireline carriers were permitted to implement a charge for local number portability as early as February 1999.<sup>74</sup> Wireless carriers could begin charging for local number portability preceding its initial implementation in November 2003.<sup>75</sup> A local number portability charge can be assessed for a period of five years from the month it was first introduced.

### *Wireline number portability*

Local wireline carriers have been allowed to collect a local number portability charge since February 1999. In 1999, the FCC approved residential number portability charges for major phone companies that ranged from 23 cents to 48 cents per month.<sup>76</sup> A web search performed in July 2004 found a variety of number portability charges in that range. In addition, some phone companies charge businesses substantially more. It is possible to calculate a conservative estimate of wireline number portability’s cost by assuming that the average wireline carrier charges about 35 cents per month, per line—the midpoint of the figures allowed by the FCC. Multiplying this figure by the number of

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<sup>71</sup> FCC, “A Conversation on Wireless Local Number Portability” (2003): 3, quoting David Furth.

<sup>72</sup> Lenard and Mast (2003): 2. This statement was originally applied to wireless local number portability, but wireline carriers will experience these same type of costs.

<sup>73</sup> FCC, “A Conversation on Wireless Local Number Portability” (2003): 3. This paper does not discuss the technical details of number portability.

<sup>74</sup> Consumer Alert, Oklahoma Corporation Commission, Public Utility Commission. See <http://www.occ.state.ok.us/MISC/CHARGES.htm>, accessed 7/9/04.

<sup>75</sup> Bruce Meyerson, “Verizon Doubles Fee to Keep Number,” MSNBC online news (Nov. 25, 2003), <http://msnbc.msn.com/id/3606462/> accessed 7/9/04.

<sup>76</sup> “FCC Investigation Produces Lower Number Portability Charges for Customers of U.S. West Communications, Inc.,” FCC press release (July 9, 1999), available at [http://www.fcc.gov/Bureaus/Common\\_Carrier/News\\_Releases/1999/nrcc9043.txt](http://www.fcc.gov/Bureaus/Common_Carrier/News_Releases/1999/nrcc9043.txt).

incumbent and competitor phone lines yields an annual cost between \$762 million (2003) and \$809 million (2000). The cost peaked in 2000 because the total number of phone lines has fallen every year since then. The total cost over five years is approximately \$4 billion.

After five years, the phone companies will, in theory, have to absorb the cost of local number portability. It is not clear whether firms will really bear the cost of portability after five years. The additional expenditures that portability entails are a cost of doing business imposed on all competitors. As a result, competitors whose rates are not regulated (such as wireless) will likely pass these costs through to consumers in their prices even if they cannot impose an explicit number portability charge. For incumbent landline telephone companies subject to cost-based regulation, portability costs will likely make their way into the general pool of costs that can be recovered from consumers. The principal carriers unable to pass portability costs directly through to consumers after five years may be the larger incumbents that are subject to price cap regulation rather than cost-based regulation. To the extent that price caps are periodically adjusted, however, even these incumbents may have some latitude to pass portability costs through to consumers, though the passthrough would not be very transparent.

As with other price increases, those caused by the costs of mandated number portability will also tend to reduce consumer and producer welfare by reducing use of the service. In the case of wireline telephone service, this effect is likely negligible, since local wireline telephone subscription is not very responsive to price changes. Therefore, the total cost to wireline customers of number portability is likely just the cost of the monthly charge.

### *Wireless number portability*

Wireless local number portability charges are often opaque, because carriers sometimes combine them with other regulatory charges.<sup>77</sup> In mid-2004, Verizon Wireless listed a separate portability charge of 45 cents per month, and one media report pegged Sprint's portability charge at 63 cents per month.<sup>78</sup> The other major carriers lump the portability charge in with other regulatory charges.<sup>79</sup> In November 2004, Verizon Wireless announced that it would eliminate its fee, and Sprint cut its fee to 25 cents per month. Verizon claimed that costs had fallen but also noted the change would make its service

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<sup>77</sup> National wireless carriers often list the charge resulting from Local Number Portability with other regulatory charges. See Telecom Policy Report, PBI Media LLC (March 31, 2004), available at [http://www.findarticles.com/p/articles/mi\\_m0PJR/is\\_13\\_2/ai\\_114794726](http://www.findarticles.com/p/articles/mi_m0PJR/is_13_2/ai_114794726), accessed 7/8/04.

<sup>78</sup> See <http://msnbc.msn.com/id/3606462/>, and [http://www.verizonwireless.com/b2c/dispatcher?action=DISPLAY&item=FAQ\\_TOPIC&topicID=95#803](http://www.verizonwireless.com/b2c/dispatcher?action=DISPLAY&item=FAQ_TOPIC&topicID=95#803), accessed 7/8/04.

<sup>79</sup> Fees vary among carriers and have changed over time. Carriers charged the following fees in July 2004: Cingular Wireless: 32 cents–\$1.25 (latter is a fee recovering multiple regulatory costs) [http://www.cingular.com/pwln\\_terms.html](http://www.cingular.com/pwln_terms.html), accessed 7/8/04; AT&T Wireless: \$1.75 (although their own web site lists nothing) <http://msnbc.msn.com/id/3606462/>, accessed 7/8/04, Nextel: \$1.55 <http://msnbc.msn.com/id/3606462/>, accessed 7/8/04; T-Mobile USA: 86 cents [http://www.tmobile.com/regfee/regfee\\_FAQ.asp](http://www.tmobile.com/regfee/regfee_FAQ.asp), accessed 7/8/04. By November 2004, Cingular charged between 56 cents and \$1.25, AT&T charged \$1.75, T-Mobile charged 86 cents, and Nextel charged \$1.55. See Yuki Noguchi, "Verizon and Sprint to Cut Fee for Transferring Cell Numbers," *Washington Post* (Nov. 16, 2004): E05.

more competitive with other carriers.<sup>80</sup> It is not clear whether these changes in charges actually reflect cost changes or simply reflect a decision to cut prices by eliminating an opaque fee that annoys many consumers. Even if the fee falls to zero, consumers still pay costs associated with number portability, because the price of wireless service is higher than it would be in the absence of these costs.

A study released the month before wireless number portability became final used figures announced by major carriers to estimate the monthly cost per customer. The study estimated that the upfront costs of portability averaged 21.3 cents per subscriber per month, amortized over three years. Ongoing costs averaged 28.5 cents per subscriber per month for the first five years.<sup>81</sup> These figures are consistent with Verizon's and Sprint's charges in July 2004.

If the cost of wireless local number portability is approximately 50 cents per subscriber per month, the total cost was approximately \$942 million in 2003 and nearly \$1 billion in 2004, based on the 159 million wireless subscribers reported by the FCC at the end of 2003 and the 166 million reported by the wireless industry's trade association in July 2004.<sup>82</sup>

Because demand for wireless service is highly sensitive to price, these increased costs likely reduce wireless subscription, consumer welfare, and producer welfare. These effects are most accurately estimated as a proportionate share of the effects of several regulatory changes that all began to affect wireless service in 2003 and 2004. The price increases induced by wireless local number portability reduced consumer welfare by approximately \$26 million and reduced producer welfare by approximately \$568 million, for a total reduction in economic welfare of \$594 million.<sup>83</sup>

Some authors argue that the increased costs to firms associated with customer switching, or "churn," should also be counted as costs of the regulation. Predicted rates of churn would increase the cost per customer by \$1.00 or more per month.<sup>84</sup> Like expenditures on new software and databases, the marketing expenditures become an additional cost imposed on all competitors. Since wireless service is relatively competitive, there is no pool of excess profits that companies would compete away through increased marketing efforts. Consumers would ultimately have to pay for the bulk of any increased marketing efforts that companies take to retain customers.

It is not clear, however, how a significant increase in churn could be consistent with the assumption that wireless is highly competitive. If wireless is already highly competitive,

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<sup>80</sup> Noguchi (2004): E05.

<sup>81</sup> Lenard and Mast (2003): 14-19.

<sup>82</sup> See FCC, Wireline Competition Bureau, Industry Analysis and Technology Division, *Local Telephone Competition* (June 2004): Table 13, and <http://www.ctia.org>, accessed 7/8/04. CTIA's 166 million figure for July 2004 is virtually identical to the 167 million figure for June 2004 in FCC, Wireline Competition Bureau, Industry Analysis and Technology Division, *Local Telephone Competition* (December 2004): Table 13.

<sup>83</sup> The calculation method and data sources are described in footnote 47.

<sup>84</sup> Lenard and Mast (2003): 20-22.

then why would significant numbers of customers suddenly choose to switch providers? Alternatively, a sudden increase in churn associated with number portability would be consistent with the theory that wireless providers were charging above-competitive prices—at least to that segment of customers who refrained from switching solely because numbers were not portable. For these reasons, inclusion of churn as a cost of regulation is questionable.

## Outcomes

The principal outcome regulators expect from local number portability is increased competition, which should lower phone bills or generate other consumer benefits. A sufficiently large increase in competition could generate price reductions or other benefits that outweigh the effects of local number portability's costs.

The FCC's *Performance and Accountability Report* describes number portability as “an important step in promoting competition and customer choice.”<sup>85</sup> The report's outcome indicators for competition show the following statistics:

- The percentage of the U.S. population in areas with three or more wireline providers rose from 67 percent in 2000 to 84 percent in 2003.
- The percentage of the U.S. population in areas with three or more wireless providers rose from 91 percent in 2000 to 97 percent in 2003.
- The Consumer Price Index for telephone services fell by 4 percent between January 1998 and May 2004.
- The average price of wireless telephone calls fell from 18 cents per minute in 2000 to 10 cents per minute in 2003.<sup>86</sup>

Local number portability may contribute to price reductions, and it may even increase the number of competitors if it makes market entry worthwhile for some competitors who would not otherwise have entered. The FCC report, however, provides no evidence that local number portability caused the reported price reductions and increases in competitive options. Indeed, wireless number portability could not have caused any of the reported statistical results, since it did not become effective until November 2003.

The FCC quoted several industry sources in its *First Report and Order* that suggest the absence of number portability curtailed competition:

We note that several studies described in the record demonstrate the reluctance of both business and residential customers to switch carriers if they must change numbers. For example, MCI has stated that, based on a nationwide Gallup survey, 83 percent of business customers and 80 percent of residential customers would be unlikely to change local service providers if they had to change their telephone numbers. Time Warner Holdings states that consumers are 40 percent less likely to change service

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<sup>85</sup> FCC, *Performance and Accountability Report* (2004): 32.

<sup>86</sup> FCC, *Performance and Accountability Report* (2004): 32-33.

providers if a number change is required. Citizens Utilities notes that approximately 85 percent of the discussions that its subsidiary, ELI, has with potential customers about switching providers end when those potential customers learn that they must change their telephone numbers. The study commissioned by Pacific Bell concludes that, without portability, new entrants would be forced to discount their local exchange service and other competing offerings by at least 12 percent below the incumbent LECs' [Local Exchange Carriers'] prices in order to induce customers to switch carriers due to customers' resistance to changing numbers.<sup>87</sup>

Many customers balk at changing phone numbers because it is costly to do so. A consumer who changes phone numbers needs to notify others of the change. A business that changes phone numbers may need to advertise the change and would likely need to print new letterhead, business cards, etc. The absence of number portability thus creates a "switching cost" that discourages consumers from switching carriers.

A number of theoretical studies examine the possible impact of switching costs on competition and consumer welfare, both in general and with respect to phone number portability. In theory, the absence of number portability may or may not reduce consumer welfare. Switching costs decrease demand elasticity and rivalry, essentially creating sub-markets for individual firms' products that could allow firms to charge higher prices. "Differentiating functionally identical products through switching costs, however, yields no benefits to set against the cost of restricted output." On the other hand, switching costs may intensify rivalry for new customers, because it's easier to retain these customers after they have signed up. Any profit that firms hope to earn as a result of switching costs may in effect be refunded to consumers in advance, when firms compete to sign up new customers. These theoretical considerations suggest that mandated number portability is less likely to benefit consumers when the market is already competitive, and more likely to benefit consumers when the market started out monopolized.<sup>88</sup>

Few studies attempt to measure the effect of switching costs in telecommunications. One presents empirical results suggesting that switching costs impeded price reductions in long-distance service between 1984 and 1993.<sup>89</sup> Another finds that lowering the price that U.S. consumers pay when they switch long-distance carriers from \$5.00 to \$3.00 (and making up the difference through increased access charges) could increase consumer welfare by several hundred million dollars—largely by redistributing wealth from long-distance companies to consumers.<sup>90</sup> This kind of change is similar to

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<sup>87</sup> FCC, *Telephone Number Portability*, CC Docket No. 95-116, *First Report and Order*, FCC 96-286 (Released July 2, 1996): para. 29.

<sup>88</sup> Paul Klempner, "Markets with Consumer Switching Costs," *The Quarterly Journal of Economics* 102: 2 (May, 1987): 377.

<sup>89</sup> Christopher R. Knittel, "Interstate Long Distance Rates: Search Costs, Switching Costs, and Market Power," *Review of Industrial Organization* 12 (1997): 519.

<sup>90</sup> Douglas A. Galbi, "Regulating Prices for Shifting Between Service Providers," *Information Economics and Policy* 13 (2001): 195-96.

mandated number portability, because it converts a cost borne by customers when they switch carriers into a cost that all customers must bear, regardless of whether they ever switch. Another recent study estimated that the net effect of 800 number portability was to reduce the price of toll-free service by approximately 14 percent.<sup>91</sup> This result implies that the pro-competitive effects of 800 number portability outweighed any associated costs.

Unfortunately, no data or studies assess the extent to which local number portability has affected competition or prices. As of September 2004, the FCC saw no evidence that customer churn increased following implementation of wireless local number portability. The commission did, however, cite media and analyst reports suggesting that wireless firms launched aggressive customer retention efforts when portability was imminent.<sup>92</sup>

Raw FCC data show that porting of telephone numbers has steadily increased. The number of numbers ported to a wireline carrier rose from 80 in 1997 to 6.8 million in 2003. Wireless portability started in November 2003, and 807,802 numbers were ported to wireless carriers in the fourth quarter of 2003.<sup>93</sup> These figures are a small fraction of the 181 million landlines and 166 million wireless lines reported for the year.<sup>94</sup> In any case, it would be a mistake to infer that the number of ported phone numbers measures the effect of portability on competition, or even on customer switching. To find the effect of portability on switching, one would need to estimate how many of the customers who ported phone numbers would have refrained from switching carriers in the absence of number portability. To assess the ultimate effect on consumers, one would need to assess whether portability caused any price reductions or other consumer benefits to occur.

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<sup>91</sup> V. Brian Viard, "Do Switching Costs Make Markets More or Less Competitive?: The Case of 800-Number Portability," Graduate School of Business, Stanford University, Paper number 1773 R1 (May 7, 2003): 21.

<sup>92</sup> FCC, *Mobile Services Competition Report* (2004): 69.

<sup>93</sup> FCC, *Trends in Telephone Service* (2004); Table 8.8.

<sup>94</sup> FCC, *Local Telephone Competition* (June 2004); Table 6, and <http://www.ctia.org>.

## Enhanced 911 Service

Basic 911 service requires wireline and wireless carriers to route 911 calls to a “Public Safety Answering Point.” Enhanced 911 requires the carrier to identify the caller’s location to emergency dispatchers.

### Costs

We found no estimates of the costs wireline carriers incur to provide enhanced 911. The cost issues are more serious for wireless carriers, since their phones are mobile. Wireless carriers can implement enhanced 911 by using either network-based or handset-based technology (such as global positioning systems in mobile phones). Wireless carriers had to be ready to offer some aspects of enhanced 911 service in 1998. Cost data are sketchy, but a Progress and Freedom Foundation study estimated that implementing enhanced 911 would cost wireless carriers approximately 61 cents per subscriber per month during the first five years. Multiplying this figure by the number of subscribers in 2003 yields a total annual cost of \$1.2 billion. If this cost is passed through to consumers, the price increase would reduce consumer welfare by \$32 million annually and reduce producer welfare by \$693 million annually, for a total annual reduction in economic welfare of \$725 million.<sup>95</sup>

### Outcomes

To assess the outcome of its enhanced 911 initiatives, the FCC tracks the number of 911 answering centers, or “Public Service Answering Points,” that receive more precise “Phase II” location information from wireless providers. This figure grew by 444 percent, from 350 to 1904, between February 2003 and August 2004.<sup>96</sup> The report provides no statistics that put these figures in context, so it is not clear whether a substantial percentage of Public Service Answering Points or population is now covered. In addition, this information says nothing about the beneficial outcomes that occurred for citizens as a result of expanded 911 coverage.

One economic study has assessed health and hospital cost outcomes that could be attributed to enhanced 911 service. It examines effects solely for cardiac patients, for whom timeliness of emergency care can be a crucial survival factor. Data for the study cover several years but were gathered prior to 2000, so it can best be interpreted as a study of the effects of wireline enhanced 911. Enhanced 911 reduced the risk of death within six hours of the emergency phone call by 60 percent, and reduced the risk of death within 48 hours by 35 percent. Even assuming a relatively low value of life saved (\$450,000), the authors estimated annual benefits of \$684,000 for a typical county, compared to an estimated annual cost of \$800,000. In addition, adoption of either basic or enhanced 911 lowered hospitals’ average total costs of treating cardiac patients by 16 percent—about \$1000 per patient, or \$304,000 for the average county. The combination of risk and cost reduction suggests that enhanced 911 reduced the need for more

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<sup>95</sup> The calculation method and data sources are described in footnote 47.

<sup>96</sup> FCC, *Performance and Accountability Report* (2004): 59.

extensive treatment by enabling patients to receive care sooner. Since cardiac emergencies account for less than 10 percent of all 911 calls, these figures suggest that the benefits of wireline 911 are substantial.<sup>97</sup> The finding is consistent with a 1985-89 study in Iowa, which found that cardiac patients with ordinary 911 service were 1.62 times more likely to survive than patients without 911.<sup>98</sup>

No studies assess whether similar benefits flow from wireless 911. Consumers clearly make an increasing number of emergency calls from wireless phones, but it is not clear whether these are the same types of emergencies for which wireline 911 has generated benefits.<sup>99</sup>

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<sup>97</sup> Susan Athey and Scott Stern, "The Impact of Information Technology on Emergency Health Care Outcomes," *Rand Journal of Economics* 33:3 (Autumn 2002): 399-432.

<sup>98</sup> Sue A. Joslyn, Paul R. Pomrehn, and Donald D. Brown, "Survival from Out-of-Hospital Cardiac Arrest: Effects of Patient Age and presence of 911 Emergency Medical Services Phone Access," *American Journal of Emergency Medicine* 11 (1993): 200-06.

<sup>99</sup> Lenard and Mast (2003): 39-40.



## Miscellaneous Wireless Mandates

Two other regulatory mandates currently have more of an effect on the cost of wireless service than the cost of wireline service: number pooling and the Communications Assistance to Law Enforcement Act (CALEA). The FCC started wireless number pooling in November 2002. CALEA applies to both wireline and wireless carriers, but the legislation appropriated \$500 million to help cover the cost of necessary modifications to equipment installed prior to 1995. Thus, it is likely that taxpayers rather than wireline telephone subscribers bore most of the costs CALEA imposed on wireline carriers, and these costs are largely in the past. Wireless subscribers, on the other hand, receive no similar benefit. No federal appropriation subsidizes the CALEA-related expenses of wireless firms. Since all wireless carriers must bear these costs, it is likely that they are passed on to consumers.

### Number Pooling

Number pooling means the assignment of wireless phone numbers to companies in blocks of 1000 instead of 10,000. The FCC did this because carriers were using fewer than half of their assigned numbers, and they were running out of area codes. When numbers were assigned in blocks of 10,000, all numbers under the same “central office code” (the first three local digits of the number) were assigned to the same company. With pooling, multiple companies may use the same central office code within an area code.

Number pooling requires network upgrades to route calls to the right company sharing a central office code. Cost estimates are even less exact than for enhanced 911. The principal economic study estimating the costs finds that they would average 16.8 cents per customer per month during the first five years.<sup>100</sup> Multiplying this figure by the number of subscribers in 2003 yields a total annual cost of \$324 million. If this cost is passed through to consumers, the price increase would reduce consumer welfare by \$9 million annually and reduce producer welfare by \$193 million annually, for a total annual reduction in economic welfare of \$202 million.<sup>101</sup> We found no estimates of the benefits of number pooling.

### CALEA

CALEA requires telecommunications firms to modify their networks to permit electronic surveillance by law enforcement officials. The estimated monetary cost is 23.8 cents per customer per month during the first five years.<sup>102</sup> Multiplying this figure by the number of subscribers in 2003 yields a total annual cost of \$457 million. If this cost is passed through to consumers, the price increase would reduce consumer welfare by \$13 million annually and reduce producer welfare by \$274 million annually, for a total annual

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<sup>100</sup> Lenard and Mast (2003): 26.

<sup>101</sup> The calculation method and data sources are described in footnote 47.

<sup>102</sup> Lenard and Mast (2003): 29.

reduction in economic welfare of \$285 million.<sup>103</sup> No estimates are available of the additional costs borne by law-abiding citizens who have their privacy invaded unnecessarily.<sup>104</sup>

Beneficial impacts of CALEA would be improvements in law enforcement and national security. Statistics show that the number of wiretaps has increased steadily over the past several decades, but it is not obvious from the raw data that CALEA has affected this trend.<sup>105</sup> The FCC's *Performance and Accountability Report* mentions CALEA-related activities but provides no information about relevant outcomes.<sup>106</sup> An assessment of outcomes would need to demonstrate not just that CALEA improved law enforcers' ability to gather information through wiretaps, but also that such information has had a material effect on public safety or national security.

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<sup>103</sup> The calculation method and data sources are described in footnote 47.

<sup>104</sup> Lenard and Mast (2003): 30.

<sup>105</sup> Lenard and Mast (2003): 30-33.

<sup>106</sup> FCC, *Performance and Accountability Report* (2004): 56.

## Spectrum Management

Electric and magnetic fields produce waves that move through space at different frequencies. A wave's "frequency" is the number of times that its crest passes a given point in a period of time. The electromagnetic spectrum is the set of all possible frequencies, and the radio spectrum is the set of frequencies used for radio, broadcasting, and other communications. The FCC manages and allocates portions of the spectrum used by parties other than the federal government.

Technically, the FCC does not assign, allocate, auction, or license spectrum. Rather, it licenses devices that use various portions of the spectrum. FCC spectrum policy affects telecommunications competition and consumer welfare in two ways. First, an FCC rulemaking determines the amount of spectrum that can be used for a given purpose, such as broadcasting or wireless communications, and myriad other details.<sup>107</sup> Second, the FCC's method for issuing licenses to use spectrum determines who receives licenses, and how quickly.

A major improvement in spectrum management occurred when Congress authorized the FCC to auction licenses in 1993. Prior to 1981, the FCC decided whose equipment could use which spectrum through "comparative hearings." In 1981, Congress authorized the FCC to allocate licenses through lotteries. The methods used to award licenses prior to auctions cost consumers billions of dollars due to delayed adoption of wireless communications services.<sup>108</sup> Lottery entrants, for example, had to manufacture applications that "proved" they were qualified to operate wireless telecommunications systems, at a cost of \$500 million-\$1 billion between 1986 and 1989. (Most licenses awarded by lottery were then resold.) Auctions eliminated such waste.<sup>109</sup> The first license auctions occurred 34 years after they were proposed by Nobel Laureate Ronald Coase, who was asked by an FCC commissioner when he testified before on his proposal before the FCC in 1959, "Is this all a big joke?"<sup>110</sup>

Spectrum has not, however, been privatized; the auction winners simply get to operate equipment that uses the spectrum for specified purposes.<sup>111</sup> Formally, spectrum is owned

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<sup>107</sup> The rulemaking "defines the service allowed, what business model that business will be conducted under (common carrier, private carrier, broadcaster, etc.), technical standards, the number of competitors in the marketplace, geographic size of licenses, terms of license renewal and license transfer, and myriad business details." Thomas W. Hazlett et. al., *Sending the Right Signals: Promoting Competition Through Telecommunications Reform*, Report to the U.S. Chamber of Commerce (Sept. 22, 2004): 40.

<sup>108</sup> For numerous examples of the waste involved in comparative hearings and lotteries, as well as extensive cites to relevant scholarly research, see Thomas W. Hazlett, "The Wireless Craze, the Unlimited Bandwidth Myth, the Spectrum Auction Faux Pas, and the Punchline to Ronald Coase's 'Big Joke,'" An Essay on Airwave Allocation Policy," AEI-Brookings Joint Center on Regulatory Studies Working Paper No. 01-01 (Jan. 2001) and FCC, Wireless Telecommunications Bureau, *The FCC Report to Congress on Spectrum Auctions*, WT Docket No 97-150 (Adopted Sept. 30, 1997; released Oct. 9, 1997): 7-9.

<sup>109</sup> Hazlett (2001): 111.

<sup>110</sup> Hazlett (2001): 5; Ronald Coase, "The Federal Communications Commission," *Journal of Law & Economics* 2 (1959).

<sup>111</sup> As 37 prominent economists noted several years ago, "[A]uctions for licenses have not changed the underlying system of spectrum allocation. Radio frequencies are allocated to services by an FCC rule

in common by the American public, and the FCC merely regulates its use by issuing licenses.<sup>112</sup> The design and implementation of license auctions has generated substantial scholarly research and commentary, often focused on whether the design of the auction ensures that each license will go to the bidder that values it most highly. Aspects of the FCC's auction design have generated substantial criticism, but there appears to be a general consensus among researchers that auctions are a vast improvement over prior methods of awarding licenses.<sup>113</sup>

## Costs

Spectrum management policy, however, continues to generate substantial consumer costs. Licenses have become somewhat more flexible in recent years. Nevertheless, FCC decisions rather than market transactions determine the general uses to which various blocks of spectrum will be put.<sup>114</sup> Defense and local government get to use large

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making. The opportunity cost of spectrum is evaluated not by market participants but by regulators. With few exceptions, spectrum continues to be offered to the market only as allocated and no price can be offered to reallocate it from the officially designated use." "Comments of 37 Concerned Economists," *In the Matter of Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, WT Docket No. 00-230 (Feb. 7, 2001): 3. "Indeed, to be issued an FCC license, an applicant must first certify that it will not assert any property interests in radio spectrum. This is so fundamental to U.S. communications law that it predates the 1927 Radio Act, being enacted in Senate Joint Resolution 125, signed into law by President Calvin Coolidge on Dec. 8, 1926." Hazlett (2001): 102.

<sup>112</sup> Hazlett (2001): 41-42.

<sup>113</sup> For analyses and evaluations of the FCC's auction design, see FCC (1997); Evan R. Kwerel and Gregory L. Rosston, "An Insiders' View of FCC Spectrum Auctions," *Journal of Regulatory Economics* 17:3 (2000): 253-89; Peter Cramton, "Spectrum Auctions," in Martin Cave, Sumit Majumdar, and Ingo Vogelsang (eds.), *Handbook of Telecommunications Economics* (Amsterdam: Elsevier Science, 2002): 2; David Porter, Stephen Rassenti, Vernon Smith, and Anil Roopnarine, "Combinatorial Auction Design," manuscript, Interdisciplinary Center for Economic Science, George Mason University (March 1, 2003); David Porter, "An Experimental Examination of Demand Reduction in Multi-Unit Versions of the Uniform-Price, Vickrey, and English Auctions," manuscript, Interdisciplinary Center for Economic Science, George Mason University (undated manuscript); Anthony M. Kwasnica, John O. Ledyard, David Porter, and Christins DeMartini, "A New and Improved Design for Multi-Object Iterative Auctions," manuscript, Interdisciplinary Center for Economic Science, George Mason University (April 25, 2002); Thomas W. Hazlett, "Spectrum Flash Dance: Eli Noam's Proposal for 'Open Access' to Radio Waves," *Journal of Law & Economics* 41:2:2 (Oct. 1998): 810; Hazlett and Muñoz (2004); Lawrence M. Ausubel, Peter Cramton, R. Preston McAfee, and John McMillan, "Synergies in Wireless Telephony: Evidence from the Broadband PCS Auctions," *Journal of Economics and Management Strategy* 6:3 (1997): 497-527; Patrick S. Moreton and Pablo Spiller, "What's In the Air: Interlicense Synergies in the Federal Communications Commission's Broadband Personal Communication Service Spectrum Auctions," *Journal of Law & Economics* 41:2 (Oct. 1998): 677-716; Mark M. Bykowski, Robert J. Cull, and John O. Ledyard, "Mutually Destructive Bidding: The FCC Auction Design Problem," *Journal of Regulatory Economics* 17:3 (2000): 205-28.

<sup>114</sup> "[T]he Commission has never permitted an existing licensee to voluntarily discontinue providing the service for which it was licensed and provide a completely different service with the spectrum that was occupied by the old service." Evan Kwerel and John Williams, "A Proposal for a Rapid Transition to market Allocation of Spectrum," FCC, Office of Plans and Policy Working Paper No. 38 (Nov. 2002): 2. See also Arthur De Vany, "Implementing a Market-Based Spectrum Policy," *Journal of Law & Economics* 41:2 (Oct. 1998): 627-46.

blocks of spectrum for free, and as a result such spectrum is often used inefficiently.<sup>115</sup> As the FCC's Spectrum Policy Task Force noted:

As a general proposition, flexibility in spectrum regulation is critical to improving access to spectrum. In this context, "flexibility" means granting both licensed users and unlicensed device operators the maximum possible autonomy to determine the highest valued use of their spectrum, subject only to those rules that are necessary to afford reasonable opportunities for access by other spectrum users and to prevent or limit interference among multiple spectrum uses...In most cases, a flexible use approach is preferable to the Commission's traditional "command and control" approach to spectrum regulation, in which allowable spectrum uses are limited based on regulatory judgments.<sup>116</sup>

The FCC affects the price of wireless telephone and data services by determining how much spectrum can be used for each service. The fact that spectrum users must now purchase licenses through auctions does not increase the prices consumers pay for wireless services; auctions merely allow the government to collect some of the profit from the firms using the spectrum.<sup>117</sup> But by creating an artificial scarcity of spectrum, a critical input, regulators increase the prices that wireless firms can charge consumers by reducing the supply of wireless services. These price increases and resulting consumer welfare losses would occur regardless of whether the FCC awarded licenses through auctions, hearings, or lotteries.

The explosive growth of wireless service in the 1990s demonstrates how spectrum policy can have large effects on consumer welfare. In the 1980s, the federal government licensed only two cellular providers in each market. In 1993, Congress directed the FCC to begin to auction spectrum, and the FCC responded by auctioning almost twice as much spectrum as it had already allocated to cell phone service, effectively making room for at least six wireless providers.

Between 1984 and 1995, when there were just two cell phone companies per market, inflation-adjusted rates fell by an average of between three and four percent annually. Entry of new competitors prompted price reductions averaging 17 percent annually between 1995 and 1999.<sup>118</sup> More recent trends show up in the U.S. Bureau of Labor

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<sup>115</sup> Jerry A. Hausman, "From 2G to 3G: Wireless Competition for Internet-Related Services," in Robert W. Crandall and James H. Alleman (eds.), *Broadband* (Washington, DC: The Brookings Institution, 2002): 120-21.

<sup>116</sup> FCC, *Spectrum Policy Task Force Report*, ET Docket No. 02-135 (Nov. 2002): 16. For an update on FCC initiatives implementing the Task Force's recommendations as of 2003, see "Spectrum Policy Task Force: One Year Later," Presentation to the Federal Communications Commission (Nov. 13, 2003), available at <http://www.fcc.gov/sptf/files/presentation-111303.pdf>.

<sup>117</sup> Evan Kwerel, "Spectrum Auctions Do Not Raise the Price of Wireless Services: Theory and Evidence," manuscript, FCC Office of Plans and Policy (2000).

<sup>118</sup> Robert W. Crandall and Jerry A. Hausman, "Competition in U.S. Telecommunications Services: Effects of the 1996 Legislation," in Sam Peltzman and Clifford Winston (eds.), *Deregulation of Network Industries: What's Next?* (Washington, DC: AEI-Brookings Joint Center for Regulatory Studies, 2000): 102-03.

Statistics' index of wireless telecommunications prices, which begins in 1997. During the past six years, inflation-adjusted wireless prices have fallen by approximately 40 percent. The value that wireless telephone service has created for consumers is truly staggering. One estimate suggests that consumers valued the first generation of cell phone service at \$50 billion per year.<sup>119</sup>

Currently, approximately 170 MHz of radio spectrum are used for wireless service.<sup>120</sup> Some additional spectrum is currently unused because it was purchased when the FCC auctioned 120 MHz of spectrum for wireless in 1994, but the winning bidders went bankrupt and the spectrum was tied up in bankruptcy proceedings. The FCC regained some of these licenses and re-auctioned them in January 2005.

Various FCC reports have identified between 183 and 438 MHz of unused or little-used spectrum that could be reallocated for mobile phone, fixed wireless telephony, and wireless broadband. Even the larger figure represents only 23 percent of the most valuable spectrum.<sup>121</sup> A 2004 study estimates the effect on consumer welfare of reallocating up to 200 MHz of that spectrum to mobile phone service. Industry sources have suggested that 200 MHz would be needed to complete nationwide rollout of "third generation" wireless services. The per-minute price of wireless service would fall by 50 percent, generating an increase in consumer welfare of \$77.4 billion per year.<sup>122</sup>

From the data and results in this study, one can also calculate the separate effects on consumers and producers. A 50 percent price reduction would save consumers approximately \$54 billion on the amount of wireless service they currently use. Consumers would gain an additional \$23.4 billion from the increased wireless usage that would accompany the price reduction. The increased usage would also increase wireless firms' profits by about \$6.6 billion, for a total increase in economic welfare (reduction in excess burden) of \$30 billion. Many wireless firms would, however, be worse off if more spectrum were allocated to wireless, for two reasons. First, \$54 billion of the reduction in consumers' bills would come out of wireless firms' revenues. Second, since the new licenses would be auctioned, wireless firms would pay some of their \$6.6 billion in expected new revenues to the U.S. Treasury.<sup>123</sup> The firms most likely to gain from more

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<sup>119</sup> Hausman (1997): 1-38.

<sup>120</sup> Hazlett et. al. (2004): 67.

<sup>121</sup> Kwerel and Williams (2002).

<sup>122</sup> Hazlett et. al. (2004): 69, 100.

<sup>123</sup> These figures were calculated from the price and consumer benefits data in Hazlett et. al. (2004). That study estimates a \$77.4 billion increase in consumer surplus accompanying a 5.6 cent per minute reduction in wireless prices. Wireless consumers used 966 billion minutes in 2003 (calculated based on data from the Cellular Telecommunications & Internet Association reported in FCC, *Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services*, WT Docket No. 04-111, released Sept. 28, 2004: paras. 175 and 181). A 5.6 cent per minute price reduction implies that consumers gain \$54 billion in price reductions on the minutes they were already using, which leaves a \$23.4 billion gain in consumer surplus due to increased wireless usage. Wireless firms lose \$54 billion due to the price reduction on the minutes consumers were already using, which is partially offset by a \$6.5 billion gain due to the increased number of minutes sold. This figure is the difference between the new price of wireless (5.6 cents/minute) and the marginal cost of wireless (5 cents/minute, following Hausman 2000), multiplied by the estimated increase in minutes (using a demand elasticity of 2.32 as calculated in Hazlett and Muñoz

liberal spectrum allocation would be new entrants or incumbents that need more spectrum to expand services. This may explain why liberalization has been slow in coming despite the enormous consumer benefits.

All of these figures are based on an international statistical analysis which estimates the elasticity of demand for wireless service of between -1.71 and -3.62. This range exceeds the most recent measures of the elasticity calculated using U.S. data, which range between -1.12 and -1.29.<sup>124</sup> The larger elasticity based on the international data leads to a larger predicted change in consumer welfare when prices fall. Even if the true change in consumer welfare is only half as large, that is still billions of dollars—much larger than the effects of many other telecommunications regulations.

The foregoing estimate involves only 200 MHz of spectrum and assumes it would be used for wireless telephony. Several hundred more MHz are likely available, and these could also be used for broadband or for fixed wireless to provide the “last mile” of local telephone service. Unfortunately, no estimates of the impact of such increases in competition or consumer welfare are available.

The costs of current spectrum allocation policy can be expected to fall sometime after 2006, if the FCC carries through on its plan to auction an additional 90 MHz of spectrum in that year.<sup>125</sup> More fundamentally, the multi-billion dollar figure cited above should only be taken as a rough approximation of the negative effect of spectrum allocation policy on consumer welfare. A truly market-based approach would allow market transactions to allocate spectrum rather than licenses. Potential users could buy or lease spectrum, then choose how to use it. The amount of spectrum allocated to wireless telephone, broadcasting, broadband, and other services would be determined by market transactions and decisions of users, rather than regulatory proceedings. As Ronald Coase noted in 1959,

Certainly, it is not clear why we should have to rely on the Federal Communications Commission rather than the ordinary pricing mechanism to determine whether a particular frequency should be used by the police, or for a radiotelephone, or for a taxi service, or for an oil company for geophysical exploration, or by a motion-picture company to keep in touch with its film stars or for a broadcasting station. Indeed, the multiplicity of

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2004, on which the calculations in Hazlett et. al. 2004 are based). The total deadweight loss or excess burden associated with the status quo is the forgone increase in consumer surplus (\$23.4 billion) plus the forgone increase in producer surplus (\$6.5 billion).

<sup>124</sup> Hazlett and Muñoz (2004): 16-17; Sidak (2003): 19.

<sup>125</sup> “FCC to Commence Spectrum Auction that will Provide American Consumers New Wireless Broadband Services,” FCC press release (Dec. 29, 2004), available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-255802A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-255802A1.pdf). The auction cannot occur until June 2006 because the Commercial Spectrum Enhancement Act of 2004 requires the FCC to notify the National Telecommunications and Information Administration at least 18 months prior to the auction of any frequencies mentioned in the legislation, so that any public sector users can be relocated to other spectrum.

these varied uses would suggest that the advantages to be derived from relying on the pricing mechanism would be especially great in this case.<sup>126</sup>

The FCC's mid-2004 decision regarding 190 MHz of spectrum allocated for use by educational institutions and wireless cable illustrates the difference. On the one hand, the decision gives license holders greater flexibility in leasing spectrum to others and expanding new uses, such as wireless broadband. These are positive steps. On the other hand, the decision still provides that this spectrum can only be used for the range of purposes the FCC specifies, and the decision reshuffles allocations of frequencies within the range in an attempt to ensure that adjacent spectrum can be utilized efficiently.<sup>127</sup> The latter provisions would be unnecessary if license holders were actually spectrum owners. Owners could either decide how to use their spectrum or sell it to someone else, and the efficient reallocations that the FCC seeks to achieve through administrative procedure would occur through market transactions.

Under market-based allocation, the FCC, courts, or other government body would still have a significant role in preventing signal interference, but they would not decide which bits of spectrum could be used for which purposes. In theory, an accurate measure of the effects of spectrum policy would compare the effects of current allocations to the effects of the allocations that a competitive market might be expected to produce.

## Outcomes

The FCC's strategic goal for spectrum is to "Facilitate the highest and best use of spectrum domestically and internationally to promote the growth and rapid deployment of innovative and efficient communications technologies and services." Performance goals focus on efficient and effective use of spectrum, deployment of new technologies and services, and promoting ease of access to spectrum by more users. The *Performance and Accountability Report* offers two outcome indicators. The first—increasing the number of approvals for enhanced telecommunications equipment—is actually an output measure, but the report makes a plausible case that this is a leading indicator of new devices on their way to the market. The data indicate that, while the FCC made about as many new equipment authorizations in 2004 as in 2003, certification bodies approved by the FCC made about 900 more authorizations in 2004 than in 2003, an 18 percent increase. The second indicator—facilitating deployment of new or existing services that make efficient use of spectrum—could be characterized as an outcome, but the accompanying text principally outlines ongoing changes in FCC policies and procedures that the commission believes will lead to more flexible use of spectrum for new technologies and services, avoid signal interference, encourage "intense and efficient" spectrum use, award licenses as rapidly as possible, and ensure that licensees actually use

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<sup>126</sup> Coase (1959): 16.

<sup>127</sup> FCC, *In the Matter of Amendment to Parts 1, 21, 73, 74, and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands* (and numerous other proceedings), WT Docket No. 03-66 et. al. (Adopted June 10, 2004), available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-04-135A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-135A1.pdf).



the spectrum in a timely fashion. The report describes a large number of activities and initiatives but does not indicate whether the listed outcomes for the public have actually been achieved.<sup>128</sup>

In the past, having the FCC allocate spectrum to various uses was purported to advance several policy outcomes. These include promotion of the “public interest,” promotion of consumer welfare, and prevention of signal interference when different parties try to use the same frequency at the same time.

At least in the FCC context, the “public interest” implies no specific outcome. A number of FCC chairmen, general counsels, and legal experts have noted that the “public interest” standard means precisely what its author, Sen. C.C. Dill, said it meant: “It covers just about everything.”<sup>129</sup> Thus, the public interest standard is too broad to provide a definition of specific outcomes that FCC spectrum allocation policy might be intended to affect.

Another possible outcome is promotion of consumer welfare (as opposed to the welfare of the regulated industry). However, the research cited above suggests that FCC spectrum allocation often reduces consumer welfare by reducing competition. Consumers benefit when license holders have more flexibility to choose which services they will offer, which technologies they will employ, and which business model they will follow. The more flexibility license holders have to use spectrum as they see fit, the more competitive are the markets for services that use the spectrum. Consumers receive more service at lower prices, and license holders pay less for licenses because restrictions on the uses of spectrum no longer protect license holders from competition. Empirical research using data from more than 1,400 license auctions in 27 countries finds that liberal policies allowing license holders to determine services, technologies, and business models reduce the price paid for licenses by 38 percent. A more liberal spectrum regime is also associated with lower retail prices for wireless service.<sup>130</sup>

The classic argument for government ownership of the airwaves, and administrative allocation of licenses to use spectrum, was that regulation is needed to prevent interference between parties attempting to use the same frequency. A “chaotic” period in 1926, when 200 new radio stations were established and operators used any power or frequencies they desired, is often cited as proof. However, the chaos during that period resulted from court interpretations of the 1912 Radio Act, which prevented the Commerce Department from issuing exclusive licenses for particular wavelengths in order to prevent interference. The problem during that period was the absence of *any* method for assigning exclusive use of frequencies to prevent interference. The 1927 act establishing the Federal Radio Commission allowed the commission to prevent interference, but also gave it the discretion to award licenses only when “the public interest, necessity, or convenience would be served” and prohibited licensees from

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<sup>128</sup> FCC, *Performance and Accountability Report* (2004): 40-41.

<sup>129</sup> Hazlett (2001): 43; Coase (1959): 8.

<sup>130</sup> Four countries—Australia, New Zealand, Guatemala, and El Salvador—leave these decisions to the license holder rather than the regulator. See Hazlett (2004).

asserting any ownership claim over the airwaves.<sup>131</sup> Regulators could prevent interference by issuing licenses to use particular frequencies without specifying how much of which frequency bands must be devoted to which types of services. Therefore, avoiding interference cannot be an outcome attributed to spectrum *allocation*.

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<sup>131</sup> Coase (1959): 4-6.

## Satellite

The FCC licenses non-defense satellites for a variety of purposes, including television broadcasting, subscription television, radio, telephone, Internet, and various private communications. Satellites can be either geostationary (which remain in a fixed position above the earth) or non-geostationary (which travel around the earth on a fixed path). The FCC licenses the spectrum that satellites use to communicate with transmitters and receivers on earth. In addition, a satellite owner who wants to use an orbital slot or path allocated to the United States by international agreement must obtain an FCC license. In practice, the satellite operator's license specifies both the satellite's location and the communications spectrum it uses.

FCC decisions thus affect the supply of and competition in satellite services. For example, the FCC recently issued a Public Notice seeking comment on proposals to allow geostationary direct broadcast satellites (the type used to provide consumers with television and broadband Internet service) to be spaced more closely than nine degrees apart.<sup>132</sup> If regulators find this proposal feasible and adopt it, substantially more satellite capacity could be available for television and broadband Internet service.

When awarding certain types of satellite licenses, federal regulators are constrained by a provision of the ORBIT Act, which privatized Intelsat and Inmarsat. The Act explicitly states:

Notwithstanding any other provision of law, the Commission shall not have the authority to assign by competitive bidding orbital locations or spectrum used for the provision of international or global satellite communications services. The President shall oppose in the International Telecommunication Union and in other bilateral and multilateral fora any assignment by competitive bidding of orbital locations or spectrum used for the provision of such services.<sup>133</sup>

The FCC's *Performance and Accountability Report* mentions several satellite-related projects and initiatives but offers no outcome goals or measures focused specifically on satellites. No studies assess the effects of the law or FCC satellite regulations on competition in broadband service or telephone service. Satellite telephone service is much more expensive than wireless phone service, but an increase in satellite capacity for television and broadband could spur telephone competition in several indirect ways. More intense video competition from satellite-based providers could prompt greater packaging of satellite video with landline telephone service. In addition, widely available and inexpensive satellite broadband service could give consumers (especially rural consumers) another conduit for Internet telephony.

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<sup>132</sup> FCC, "International Bureau Seeks Public Comment on Proposals to Permit Reducing Orbital Spacings Between U.S. Direct Broadcast Satellites," Public Notice DA 03-3903 (Dec. 16, 2003).

<sup>133</sup> 47 USC 765f.

## Unbundled Network Elements<sup>134</sup>

The Telecommunications Act of 1996 requires incumbent telephone companies to lease parts of their networks—“unbundled network elements”—to competitors at regulated rates. The most obvious example of a network element might be the local “loop”—the wire that connects a home or business to a switch located in the phone company’s central office. A competitor leasing only local loops would install its own switches in the incumbent’s central office and make its own arrangements to transport calls between its switches. In addition to individual network elements, the FCC also requires incumbents to lease the entire set of network elements necessary to provide local service—the “unbundled network element platform.” Leasing the unbundled network element platform is equivalent to buying the incumbent’s service at a wholesale discount.

The Telecommunications Act instructs the FCC to consider whether access to an incumbent’s proprietary network elements is “necessary” and whether an incumbent’s failure to provide access to non-proprietary elements would “impair” a competitor’s ability to provide service.<sup>135</sup> In practice, which network elements must be made available to competitors depends in large part on how one defines “impair.” On multiple occasions, federal courts have held that the FCC’s list of unbundled network elements is based on unreasonable definitions of “impair.” Courts have called upon the FCC to articulate a definition of “impair” that is linked to natural monopoly and/or weighs the benefits of unbundling against the costs.<sup>136</sup> Such a definition would likely lead to a smaller list of network elements that must be unbundled and eliminate the requirement that incumbents offer an entire unbundled network element platform. (The platform requirement appears to be based on the assumption that entire local telephone networks, rather than just certain elements, are natural monopolies.) In August 2004, the FCC announced one-year transition measures while it tries again.<sup>137</sup> New rules announced in December 2004 scale back the unbundling requirements and effectively end the unbundled network element platform. If the new rules are upheld, the platform would be phased out over one year.

Prices for network elements, determined by state commissions, are based on a method called “Total Element Long Run Incremental Cost” (TELRIC) pricing. TELRIC pricing is based not on the incumbent firm’s actual historical costs, but rather on regulators’ estimate of the costs that would be borne today by a hypothetical firm building the most efficient network regulators believe is possible. Proceedings to calculate TELRIC prices have generated significant disagreement. In 2003 the FCC began a proceeding to

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<sup>134</sup> This section draws heavily on Jerry Ellig and James Nicholas Taylor, “The Opportunity Costs of Unbundled Network Element Regulation,” Mercatus Center Working Paper (November 2004), available at <http://www.mercatus.org/pdf/materials/980.pdf>.

<sup>135</sup> 47 USC Sec. 251(d)(2).

<sup>136</sup> *United States Telecom Assn. vs. Federal Communications Commission*, No. 00-1012 (March 2, 2004): 7-11, 19, 24.

<sup>137</sup> FCC, *In the Matter of Unbundled Access to Network Elements; Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, Order and Notice of Proposed Rulemaking, WC Docket No. 04-313, CC Docket No. 01-338 (Adopted July 21, 2004, Released Aug. 20, 2004). Available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-04-179A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-179A1.pdf).

reconsider how the TELRIC pricing methodology deals with the firm's cost of capital and depreciation.<sup>138</sup>

Unbundling affects both consumer and business telecommunications services. Most studies focus on unbundling as it relates to ordinary telephone service for residential and small business customers. (Price and quantity data for more complex service to businesses, or service to large businesses, are often confidential.)

## Costs

The Telecom Act mandated wealth transfers from the incumbents, which creates some unusual types of costs due to the structure of telecommunications regulation. The purpose of unbundling is to encourage competition in local telephone service. Local residential service, however, has traditionally been priced below cost.<sup>139</sup> By regulating the price that incumbent telephone companies charge for network elements, regulators seek to encourage competition—and hence lower prices—for some services that are already often sold below cost. And by mandating price reductions for unbundled network elements, policymakers forego the opportunity to reduce the prices of services that have traditionally been “taxed” in order to subsidize local service, such as long-distance and wireless.<sup>140</sup> In other words, instead of trying to reduce the price of local service, policymakers could have reduced long-distance access charges or universal service contributions from long-distance or wireless. The price reductions and increases in economic welfare that could have been created through these alternative policies are the opportunity cost of unbundled network element regulation. These opportunity costs should be weighed against benefits to determine whether consumers and society are better or worse off.

A 2004 Mercatus Center working paper calculates these opportunity costs for one significant form of unbundling: the unbundled network element platform.<sup>141</sup> Competitors using the platform accounted for a large majority of competitor lines furnished using unbundled network elements— 71 percent in 2002, 78 percent in 2003, and 80 percent in 2004.<sup>142</sup> The Mercatus study finds that unbundled network element platform regulation transferred approximately \$3.1 billion from incumbent phone companies to competitors in 2003. If used to reduce interstate long-distance access charges or universal service assessments, these wealth transfers would have cut the price of long-distance service by 9/10 of a cent per minute in 2003. This price reduction would have generated a \$148 million gain in consumer surplus as consumers used more long-distance service. The total consumer welfare gain is the sum of the wealth transfer and the consumer surplus

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<sup>138</sup> FCC, *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*, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, CC Docket No. 01-338; CC Docket No. 96-98; CC Docket No. 98-147, FCC 03-36 (Adopted February 20, 2003, Released August 21, 2003): paragraph 675.

<sup>139</sup> Crandall and Waverman (2000): 105-28.

<sup>140</sup> See sections on Access Charges and Universal Service, above.

<sup>141</sup> Ellig and Taylor (2004).

<sup>142</sup> FCC, *Local Telephone Competition* (December 2004): Table 4.

gain. These figures suggest that the opportunity cost of platform regulation was about \$3.3 billion in 2003. Put differently, platform regulation did not benefit consumers on net unless it increased consumer welfare by more than \$3.3 billion, or about \$240 for each line furnished by competitors using the platform.

These figures measure one opportunity cost of platform regulation to consumers. However, they do not measure the entire opportunity cost to society as a whole. If long-distance access charges or universal service fees were reduced, telecommunications companies that sell these services would also benefit from increased sales. The companies benefit from these sales to the extent that the increased revenues exceed the additional costs. Conversely, the welfare of both companies and consumers falls when excessive charges increase long-distance rates. Transferring \$3.1 billion to consumers by reducing long-distance and wireless universal service contributions would have increased the welfare of consumers, long-distance, and wireless companies by an additional \$1.9 billion due to increased use of long-distance and wireless service.<sup>143</sup>

The Mercatus study focuses on the effects of the unbundled network element platform. In a forthcoming book, Robert Crandall examines the effects of the Telecom Act's unbundling provisions more generally.<sup>144</sup> Using rather generous assumptions, he estimates that in 2003 unbundling may have transferred approximately \$1.3 billion from incumbent phone companies to residential and small business consumers and \$8.4 billion to large business customers, for a total of \$9.7 billion. The Mercatus methodology can be used to calculate the opportunity cost of making these transfers via unbundling policy instead of reducing access charges and universal service contributions from long-distance and wireless carriers. A \$9.7 billion reduction in these charges would generate a \$1.4 billion increase in consumer surplus, for a total gain to consumers of \$11.1 billion. Overall economic welfare would have increased by \$5.9 billion.<sup>145</sup> Thus, the opportunity costs of unbundling have been substantial, and they should be weighed against any savings consumers received.

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<sup>143</sup> The Mercatus working paper calculates the excess burden in a manner similar to that used in the universal service section of this study.

<sup>144</sup> Robert W. Crandall, *Competition and Chaos: The U.S. Telecommunications Sector Since 1996*, Ch. 4 (Manuscript, 2005): 54-56.

<sup>145</sup> These calculations assume that unbundling resulted in a dollar-for-dollar transfer from incumbent phone companies to consumers. Ellig and Taylor (2004), however, found that for every dollar transferred from the incumbent, less than a dollar reaches consumers. Therefore, the actual amount of money transferred from incumbents likely exceeds \$9.7 billion, and the opportunity cost in terms of forgone consumer and producer surplus would be concomitantly larger.

Actual interstate access and universal service charges may currently be less than \$9.7 billion. However, there is still room to reduce these kinds of charges by that amount. States also impose access and universal service charges on intrastate long-distance and wireless service, and intrastate long-distance access charges per minute are typically higher than federal charges. For an analysis of these intrastate issues, see Robert W. Crandall and Jerry Ellig, "Texas Telecommunications: Everything's Dynamic Except the Pricing," Texas Public Policy Foundation Research Report (Jan. 2005), available at <http://www.texaspolicy.com/pdf/2005-01-telecom.pdf>.

For purposes of regulatory accounting, it is necessary to determine whether these opportunity costs are new, or if are they already incorporated in previous estimates of the effects of access charges and universal service funding.

If platform regulation merely redistributes the incumbent's monopoly profits (or forces a reduction in excessive costs), then no additional cross-subsidies are required to allow the incumbent to maintain the local telephone network. Platform regulation still entails an opportunity cost, because there are more efficient ways of redistributing that wealth to consumers. However, this opportunity cost would already be captured in estimates of the consumer welfare cost of existing cross-subsidy schemes, discussed previously in the sections on Access Charges and Universal Service.

Suppose, on the other hand, the incumbent was operating efficiently and earning no monopoly profits. In that case, the wealth transfer caused by platform regulation would have to be replaced by additional cross-subsidies if the incumbent is expected to maintain the local telephone network. These additional cross-subsidies would create additional reductions in consumer welfare, on top of those created by previously-existing cross-subsidies. In this case, the opportunity cost of platform regulation would be added to the existing costs of cross-subsidies.

A final possibility is that the incumbent had some monopoly profits or excess costs, but the size of the wealth transfer from platform regulation exceeds these. In that case, some of the opportunity cost of platform regulation would already be reflected in the costs of existing cross-subsidies, and some of the opportunity cost would correspond to additional cross-subsidies needed to ensure that the incumbent can maintain the network. Only a portion of the opportunity cost would be added to the other costs of telecommunications regulation.

The bulk of published academic research suggests that TELRIC prices calculated with FCC cost models are 19-67 percent below competitive levels, depending on the specific network element.<sup>146</sup> These results imply that the platform prices mandated by state regulators are also likely below competitive levels, though it is not clear how much below. Therefore, at least some of the opportunity cost calculated using the Mercatus methodology is likely a new cost, in addition to previously-estimated inefficiencies of access charges and universal service policies.

## **Outcomes**

The desirable outcomes associated with unbundling would be increased competition and, ultimately, the lower prices or other consumer benefits that competition traditionally

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<sup>146</sup> David M. Mandy, "Pricing Network Elements When Costs are Changing," *Telecommunication Policy* 26:1-2 (Feb.-March 2002): 53-67; 55, 64; David M. Mandy, "TELRIC Pricing With Vintage Capital," *Journal of Regulatory Economics* 22:3 (November 2002): 215-249; 218; David M. Mandy and William W. Sharkey, "Dynamic Pricing and Investment from Static Proxy Models," OSP Working Paper Series, Paper #40, (September 2003): 8-9; Jerry Hausman, "The Effect of Sunk Costs in Telecommunications Regulation," paper presented at a conference at Columbia University (October 2, 1998). Available at [http://econ-www.mit.edu/faculty/download\\_pdf.php?id=258](http://econ-www.mit.edu/faculty/download_pdf.php?id=258).

brings. The FCC's *Performance and Accountability Report* shows data on trends in the telecommunications consumer price index and on the percentage of households with access to three or more wireline telecommunications providers. By these measures, competition has increased and prices have fallen over the past several years.<sup>147</sup> The report does not offer evidence of a causal link between the FCC's unbundling policies and these favorable trends.

FCC statistics reported elsewhere show that the number of lines served by competitors using unbundled network elements rose from about two million in 1999 to almost 19 million in June 2004. These lines accounted for 61 percent of all competitors' lines in 2004. As the number of lines served with unbundled network elements rose significantly, the number served by non-cable competitors using their own facilities rose by only 1 million between 2000 and 2004. Facilities-based lines fell from 33 percent of competitors' lines in 1999 to 23 percent in June 2004.<sup>148</sup> (The remaining 16 percent of competitors' lines are resold pursuant to other provisions of the Telecommunications Act, discussed below.)

Most of the available empirical studies suggest that unbundling has largely led to a substitution of one type of competition for another.

Crandall, Ingraham, and Singer examined the effect of regulated rates for unbundled loops—the wires that connect individual customers with telephone company switching facilities. Loops are arguably the most likely network element to be a natural monopoly. They found that in 2000 and 2001, competitors' ratio of facilities-based loops to loops leased from the incumbent was lower in states where unbundled loop rates were lower relative to the cost of building new loops. The rate of growth of competitors' facilities-based loops was also lower when unbundled loop rates were lower relative to the cost of building new loops. Lower regulated loop prices prompt competitors to lease loops rather than build their own.<sup>149</sup>

Employing 1997-2000 data from markets where the Bell companies are the incumbents, Eisner and Lehman find that lower unbundled network element prices do *not* increase the number of lines served by competitors using unbundled network elements, but they decrease facilities-based entry.<sup>150</sup> Section 271 approval, which indicates that regulators believe the Bell incumbent has unbundled sufficiently to open the local market to competition, is associated with a 260,000-336,000 increase in lines served by competitors using unbundled network elements. Since the incumbents are Bell companies and Section 271 proceedings tended to reduce unbundled network element rates, this variable may be picking up the effects of unbundled network element pricing. Lower residential rates are often associated with less facilities-based competitive entry, but lower business

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<sup>147</sup> FCC, *Performance and Accountability Report* (2004): 32-33.

<sup>148</sup> FCC, *Local Telephone Competition* (December 2004): Tables 3 and 5.

<sup>149</sup> Robert W. Crandall, Allan T. Ingraham, and Hal J. Singer, "Do Unbundling Policies Discourage CLEC Facilities-Based Investment?" *Berkeley Electronic Papers, Topics in Economics and Policy Research* (2004): 20.

<sup>150</sup> Eisner and Lehman (2002).



rates are not—a logical finding, given that business rates are usually higher than residential rates.

Analyzing data from 1998-2000, Crandall found that competitors whose revenues per dollar of assets grew the fastest were those that built their own networks, not those that relied on unbundled network elements.<sup>151</sup> There was no difference in performance between competitors targeting business or residential customers. Competitors using a mixed strategy of leasing some network elements and building some of their own network did better than those that relied wholly on unbundled network elements but worse than those using their own network entirely. This result may occur because the typical competitor seeks to offer local telephone service in combination with other services, such as long-distance, Internet, high-speed data connection, or video. A competitor building its own network can offer a wider array of services, using newer technology, than one relying heavily on the incumbent's older network, which was originally designed to carry voice traffic only. These results do not mean that a competitor that failed to invest in its own network could not be successful. They simply mean that those firms that did not invest in their own facilities were less likely to succeed.

The existing research on competition suggests that unbundled network element regulation encourages entrants to use unbundled network elements, but discourages them from building their own facilities.

A small number of studies examine the direct impact of unbundling on prices or other variables of interest to consumers. It is doubtful that unbundling has reduced the price of basic local telephone service.<sup>152</sup>

The most recent comprehensive estimate of the benefits of unbundling is in Robert Crandall's forthcoming book. He argues that the previously-cited \$1.3 billion in savings for residential and small business customers generates no increase in use of local service by these customers, since their demand is very inelastic. Since large business demand may be more responsive to price changes, Crandall estimates that the \$8.4 billion in price reductions to large business generates an additional \$800 million in consumer surplus due to increased usage. Thus, the total benefits of unbundling to telecommunications users total \$10.5 billion.<sup>153</sup>

These benefits are less than the \$11.1 billion opportunity cost to consumers and the \$15.6 billion opportunity cost to society calculated in the previous section. They are also less than the expenditures incurred by competitive local telephone companies to produce the benefits. Crandall conservatively estimates the competitors' capital costs at \$8 billion annually, and his data suggest that their selling, general, and administrative costs would

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<sup>151</sup> Robert W. Crandall, "An Assessment of the Competitive Local Exchange Carriers Five Years after the Passage of the Telecommunications Act," (January 2002). Available at <http://www.criterioneconomics.com/docs/Crandall%20CLEC.pdf>.

<sup>152</sup> Crandall (2005): 44; Ellig and Taylor (2004): 16-17.

<sup>153</sup> Crandall (2005): 56.

total about \$8.9 billion annually, for a total of \$16.9 billion.<sup>154</sup> Unbundling required the nation to spend \$1.74 to transfer each dollar to consumers, and \$21 to produce a dollar's worth of consumer surplus.

Several other studies published by various think tanks or coalitions, and several working papers on web sites, estimate consumer savings or consumer benefits for particular states or segments of consumers.

Studies sponsored by lobbying coalitions in Illinois and Michigan estimate residential consumer savings from competitors using the unbundled network element platform by calculating the difference in phone bills from incumbents and competitors for a package of local, vertical, and long-distance services. The Illinois study estimates that competitors' customers save \$11.87 per month, and the Michigan study estimates that competitors' customers save \$8.02 per month. The Illinois study also posits savings for the incumbent's customers of \$4.20 per month, and the Michigan study posits savings for the incumbent's customers of \$32.2 million annually. The studies are both based on data gathered from the third quarter of 2001 thru the third quarter of 2002.<sup>155</sup>

These studies likely overstate the savings, for several reasons.<sup>156</sup> A more sophisticated approach can be found in studies estimating the effect of unbundled network element competition on residential prices in California and New Jersey. Braunstein compares the incumbent's and AT&T's 2003 prices of packages that include local, vertical, and long-distance services with the incumbent's 2002 prices. Braunstein estimates that California residential customers in SBC's territory save \$345-625 million annually due to the unbundled network element platform. He obtained similar results in a study of New Jersey, estimating that competition via the unbundled network element platform saved residential customers \$133-217 million annually.<sup>157</sup>

Unlike the Illinois and Michigan studies, Braunstein examines comparable packages of SBC and AT&T services.<sup>158</sup> Nevertheless, his calculations likely overstate the savings, because he often uses the prior year's SBC a la carte prices as a proxy for the prices that would exist in the absence of unbundled network element regulation. As a result, some of the inherent efficiencies of packaging got counted as benefits from unbundled network element regulation, and any underlying increases in productivity or efficiency were attributed to unbundled network element regulation as well. Like the Illinois and

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<sup>154</sup> Crandall (2005): 54-56 reports that competitive local exchange carriers received \$17.7 billion in revenues in 2003, and industry analysts estimate that they spent about half their revenues on selling, general, and administrative expenses.

<sup>155</sup> Illinois Coalition for Competitive Telecommunications (ICCT). *Consumer Savings from Local Telephone Service Competition in Illinois* (2003); Michigan Alliance for Competitive Telecommunications (MACT). *Consumer Savings from Local Phone Competition in Michigan* (2003).

<sup>156</sup> For elaboration, see Ellig and Taylor (2004): 18.

<sup>157</sup> Yale M. Braunstein, "UNE-P Benefits Update: SBC's California Territory, 2004," manuscript, School of Information Management and Systems, University of California, Berkeley, (May 2004). Available at <http://sims.berkeley.edu/~bigyale/UNE/>; Yale M. Braunstein, "UNE-P Benefits in Verizon's New Jersey Territory," manuscript, School of Information Management and Systems, University of California, Berkeley (March 2004). Available at <http://sims.berkeley.edu/~bigyale/UNE/>.

<sup>158</sup> For more information, see Braunstein's spreadsheets at <http://sims.berkeley.edu/~bigyale/UNE/>.

Michigan studies, Braunstein attributes all of the price savings to competition using the unbundled network element platform, rather than other forms of competition. In addition, he ignores other factors that may explain reductions in long-distance prices over time, such as long-term price trends driven by technological change, excess capacity, and entry of the Bell companies into long-distance service. This is an especially significant factor, since a lot of the California and New Jersey price savings are driven by reductions in long-distance prices. To partially adjust for other factors affecting long-distance prices, he offers a “conservative” estimate that apportions only part of the package savings to local competition, as well as an “aggressive” estimate that assumes long-distance prices were already at competitive levels in 2002 and hence had no further room to fall.

A Phoenix Policy Center (2004) study employing 1999 data estimated nationally that “all distance” packages with no additional usage charges saved consumers about \$6.7 billion annually compared to a la carte prices. Consumer welfare increased by an additional \$3.3 billion due to increased use of telecommunications services at the lower price.<sup>159</sup> The study’s rhetoric implies that these savings are due to competition fostered by unbundling, but it does not test alternative explanations, such as competition from facilities-based carriers, technological change, or excess long-distance capacity. Nevertheless, the study makes the novel point that a long-distance carrier can achieve “do-it-yourself” reductions in access charges by becoming a competitive local exchange carrier. Of course, incumbents who are permitted to offer packages of local and long-distance services can achieve the same kinds of savings, but they were not permitted to offer long-distance service in 1999. Although presented as an estimate of the benefits of unbundling, the study’s findings actually identify a significant benefit of packaging: it reduces inefficient cross-subsidies by effectively circumventing access charges.

A Mercatus Center working paper uses information from the Illinois, Michigan, California, and New Jersey studies as a starting point for assessing the effects of unbundled network element regulation on consumer welfare. The accompanying table shows how the resulting price reductions affect consumers, after adjusting for some of the factors that led previous studies to overstate the consumer gains.

### Effects of Price Reductions Attributed to the Unbundled Network Element Platform

| State, incumbent, year                     | Annual Savings | Consumer surplus gain |          | Consumer welfare gain |          |
|--|----------------|-----------------------|----------|-----------------------|----------|
|  |                | Total                 | Per line | Total                 | Per line |
| Illinois, SBC 2002                         | \$174,213,060  | \$32,603,027          | \$9.33   | \$206,816,086         | \$59.21  |
| Michigan, SBC, 2002                        | \$63,206,008   | \$6,378,448           | \$2.29   | \$69,584,457          | \$24.98  |
| California, SBC, 2003 ("conservative")     | \$133,627,798  | \$2,625,561           | \$0.23   | \$136,253,359         | \$11.90  |
| California, SBC, 2003 ("aggressive")       | \$413,238,700  | \$25,109,064          | \$2.19   | \$438,347,764         | \$38.29  |
| New Jersey, Verizon, 2003 ("conservative") | \$7,282,065    | \$10,137              | \$0.002  | \$7,292,203           | \$1.57   |
| New Jersey, Verizon, 2003 ("aggressive")   | \$73,571,233   | \$1,034,723           | \$0.22   | \$74,605,956          | \$16.07  |

<sup>159</sup> Phoenix Policy Center, “The \$10 Billion Benefit of Unbundling: Consumer Surplus Gains from Competitive Pricing Innovations,” *Policy Bulletin* No. 8 (January 27, 2004).

These consumer benefits, however, are smaller than the consumer benefits that would result if regulators had simply reduced long-distance access charges or universal service contributions. The latter policy is superior for two reasons. First, it involves a direct wealth transfer from incumbent phone companies to consumers, thus ensuring that consumers actually receive all of the wealth that is transferred from incumbents. Under platform regulation, consumers receive only a fraction of the wealth that gets transferred from incumbents, as the accompanying table shows. The direct transfers also generate larger increases in consumer welfare as a result of lower long-distance prices. The net result is that platform regulation actually reduces consumer welfare, compared to what would occur if the wealth transfer were accomplished through a reduction in long-distance access charges.

### Inefficient Wealth Transfers

| State, incumbent, year                     | Incumbent revenue lost per line | Total transfer to competitors | Savings of competitors' Customers | Difference in wealth Transfers | Customer avg. as % of wealth Transfer |
|--|---------------------------------|-------------------------------|-----------------------------------|--------------------------------|---------------------------------------|
| Illinois, SBC, 2002                        | \$15.03                         | \$64,522,708                  | \$47,436,854                      | \$17,085,853                   | 74                                    |
| Michigan, SBC, 2002                        | \$13.34                         | \$93,695,624                  | \$51,062,008                      | \$42,633,616                   | 54                                    |
| California, SBC, 2003 ("conservative")     | \$7.83                          | \$123,516,339                 | \$46,062,288                      | \$77,454,052                   | 37                                    |
| California, SBC, 2003 ("aggressive")       | \$7.83                          | \$123,516,339                 | \$122,569,854                     | \$946,485                      | 99                                    |
| New Jersey, Verizon, 2003 ("conservative") | \$9.07                          | \$68,091,066                  | \$7,282,065                       | \$60,809,000                   | 11                                    |
| New Jersey, Verizon, 2003 ("aggressive")   | \$9.07                          | \$68,091,066                  | \$34,533,506                      | \$33,557,559                   | 51                                    |

### Reductions in access charges generate larger consumer benefits

| State, incumbent, year                     | Effect of reducing access Charges |                       |                       | Net consumer welfare effect of UNE platform regulation |          |
|--|-----------------------------------|-----------------------|-----------------------|--|----------|
|  | Wealth transfer from incumbent    | Consumer surplus gain | Consumer welfare gain | Total  | Per line |
| Illinois, SBC, 2002                        | \$191,298,913                     | \$39,311,671          | \$230,610,584         | -\$23,794,498  | -\$6.81  |
| Michigan, SBC, 2002                        | \$105,839,624                     | \$17,885,245          | \$123,724,870         | -\$54,140,413  | -\$19.44 |
| California, SBC, 2003 ("conservative")     | \$211,081,850                     | \$6,551,343           | \$217,633,192         | -\$81,379,834  | -\$7.11  |
| California, SBC, 2003 ("aggressive")       | \$414,185,185                     | \$25,224,216          | \$439,409,401         | -\$1,061,637   | -\$0.09  |
| New Jersey, Verizon, 2003 ("conservative") | \$68,091,066                      | \$887,012             | \$68,978,078          | -\$61,685,875  | -\$13.29 |
| New Jersey, Verizon, 2003 ("aggressive")   | \$107,128,792                     | \$2,195,642           | \$109,324,434         | -\$34,718,478  | -\$7.48  |

It is difficult to perform a nationwide calculation of consumer savings from platform regulation because good data on competitors' retail prices are not available. Nevertheless, the results from four large states with a significant amount of platform competition suggest that while platform regulation reduces retail prices, it does so at a high opportunity cost.

Competition often offers nonprice benefits, such as innovative new services, but such benefits are unlikely to occur under platform regulation. Since competitors leasing the platform do not build their own local facilities, platform regulation offers them no opportunity to offer local services different from those offered by the incumbent. In theory, platform regulation might eventually open the door to innovative new services if competitors use the platform as a transitional strategy to enter the market before building their own facilities. In practice, empirical research shows that platform regulation has precisely the opposite effect because it serves as a substitute for facilities-based competition. Either the “transition” theory is wrong, or platform regulation was not given enough time to work.

## Resale of Incumbent's Services

Resale is provided for in section 251(c)(4) of the Telecommunications Act. Subpart (A) declares that it is the duty of incumbent local phone companies “to offer for resale at wholesale rates any telecommunications service that the carrier provides at retail to subscribers who are not telecommunications carriers...”<sup>160</sup> Subpart (B) states that incumbents are “not to prohibit, and not to impose unreasonable or discriminatory conditions or limitations on, the resale of such telecommunications service...”<sup>161</sup> Subsection (3) of part (d) deals with wholesale pricing:

For the purposes of section 251(c)(4) of this title, a State commission shall determine wholesale rates on the basis of retail rates charged to subscribers for the telecommunications service requested, excluding the portion thereof attributable to any marketing, billing, collection, and other costs that will be avoided by the local exchange carrier.<sup>162</sup>

There was precedent for the Telecommunications Act's resale provisions. A similar policy, adopted to open the long-distance market to competition from firms like Sprint and MCI in the 1980s, seemed to work well.<sup>163</sup> In the local market, however, few competitors now seem to regard resale as the preferred business strategy. AT&T, for example, found within a year after passage of the Telecommunications Act that offering local service through resale was unprofitable, despite a wholesale discount of approximately 17 percent.<sup>164</sup> In most cases, regulated wholesale discounts have averaged between 15 and 25 percent.<sup>165</sup>

### Costs

No studies have directly estimated the costs or benefits of resale. To do so, one would need to compare actual, regulated wholesale prices with economically efficient wholesale prices. An efficient wholesale price would provide a discount equal to the costs that the incumbent actually avoids by selling at wholesale. One can calculate a rough estimate of the “opportunity costs” of resale in a manner similar to the calculation of the opportunity costs of unbundled network elements.

The total amount of wealth that the wholesale discount transfers to competitors is equal to the incumbent's average revenues per line, minus the wholesale price and the

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<sup>160</sup> 47 USC Sec. 251(c)(4)(A). Available at [http://uscode.house.gov/uscode-cgi/fastweb.exe?getdoc+uscview+t45t48+1341+0++\(Telecommunications%20Act%20of%201996\)%20%20AND%20\(USC%20w/10%20\(251\)\):CITE](http://uscode.house.gov/uscode-cgi/fastweb.exe?getdoc+uscview+t45t48+1341+0++(Telecommunications%20Act%20of%201996)%20%20AND%20(USC%20w/10%20(251)):CITE).

<sup>161</sup> 47 USC Sec. 251(c)(4)(B).

<sup>162</sup> 47 USC Sec. 252(d)(3).

<sup>163</sup> Yale M. Braunstein, “The Role of UNE-P in Vertically Integrated Telephone Markets: Ensuring Healthy and Competitive Local, Long-Distance and DSL Markets,” manuscript, School of Information Management and Systems, University of California, Berkeley (2003). Available at <http://sims.berkeley.edu/~bigyale/UNE/>.

<sup>164</sup> Crandall (2002): 32.

<sup>165</sup> Crandall and Hausman (2000):73-112; 84, 97.

incumbent's avoided cost. An efficient wholesale discount equal to the incumbent's avoided cost, therefore, would transfer no wealth from incumbents to competitors and have approximately zero cost. The actual costs of the policy seem pretty close to this ideal. Whether one assumes a wholesale discount equal to 15 or 25 percent, the cost of the FCC's resale policy is miniscule compared to most other telecommunications regulations. The policy redistributed between \$4.5 million and \$21 million from incumbents to competitors in 2004. If this money were used to reduce long-distance access charges, it would create approximately that size increase in consumer welfare and a \$7.5-\$35 million increase in social welfare.<sup>166</sup>

## Outcomes

Resale might be expected to generate several pro-competitive outcomes. First, competitors could combine the incumbent's local service with their own unique services (such as long-distance) to offer a package better than the incumbent's. Second, competitors might use resale as a transitional strategy to build market share before undertaking the expense of building their own local facilities.

A few studies have assessed the causes and consequences of resale. They suggest that resale is unlikely to produce these benefits because has not turned out to be a very effective business strategy. Employing 1991-2000 data from markets where the Bell companies are the incumbents, Eisner and Lehman found no statistically significant relationship between the size of wholesale discounts and the number of lines served by competitors via resale.<sup>167</sup> This finding is consistent with the theory that resale discounts have not been large enough to make resale profitable. Using 1998-2000 data, Crandall found that competitors relying on resale had only average revenue growth per dollar of capital assets—a finding that does not bode well, considering that competitors' "average" financial performance has not been very good.<sup>168</sup>

Reports that incumbent carriers file with the FCC indicate that there were 1.7 million resold lines in December 1997, rising to a peak of 5.4 million in December 2000 before falling back to 1.6 million in June 2004. Competitors' numbers are somewhat different; they reported acquiring 3.5 million resold lines in December 1999, rising to 5.1 million in June 2004. Despite the disparity in numbers, the competitors' figures suggest that resale has become less popular, as the percentage of their lines accounted for by resale fell steadily from 42.9 percent in December 1999 to 16 percent in June 2004.<sup>169</sup>

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<sup>166</sup> Average revenues per line for each state are from Gregg (2004). Avoided costs, estimates of unbundled network element prices, and avoided costs for each state are from "UNE-P vs. 271 LD Entry: What's the Real Tradeoff for the RBOCs?" Ex Parte Submission from Joan Marsh, AT&T, to FCC, WC Docket No 01-338 (Sept. 25, 2002). The number of resold lines for each state is the number as of June 2004, as reported in FCC, *Local Telephone Competition* (December 2004).

<sup>167</sup> James Eisner and Dale E. Lehman, "Regulatory Behavior and Competitive Entry," *For presentation at the 14<sup>th</sup> Annual Conference Center for Research in Regulated Industries* (June 28, 2001). Available at <http://www.telepolicy.com/elpaper.pdf>.

<sup>168</sup> Crandall (2002).

<sup>169</sup> FCC, *Local Telephone Competition* (December 2004): Tables 3 and 5.

One explanation is that wholesale discounts are not large enough to permit effective competition against the incumbent's local rates, which are often below incremental cost because they benefit from cross-subsidies. Another possibility is that the regulated prices of the unbundled network element platform, which are equivalent to wholesale discounts of more than 45 percent, have made unbundling more attractive than resale from the perspective of competitors.<sup>170</sup> A final explanation is that resale forces the competitor to offer a service identical to that offered by the incumbent. The most successful competitors, however, have developed their own networks that can offer innovative new services, or at least better service; therefore, resale is not a very attractive option for these competitors.<sup>171</sup> A competitor can *market* resold services along with its own (such as long-distance service), but resale offers no cost or quality advantages from *producing* services using a different type of network. Crandall concludes, "Just changing the nameplate on the service is not typically a very good strategy for attracting customers."<sup>172</sup>

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<sup>170</sup> Robert S. Pindyck, "Mandatory Unbundling and Irreversible Investment in Telecom Networks," Sloan School of Management, Massachusetts Institute of Technology, (Revised: January 2004): 7. Available at [http://www.analysisgroup.com/TC\\_VZ\\_UNE\\_Pindyck\\_01\\_04.pdf](http://www.analysisgroup.com/TC_VZ_UNE_Pindyck_01_04.pdf).

<sup>171</sup> Crandall (2002): 23-32.

<sup>172</sup> Crandall (2002): 42.



## Broadband

The ongoing explosion of Internet-based services and features is well-known. From e-mail and web browsing to newer services like instant messaging and telephony, the Internet offers a cornucopia of information and services that did not even exist when AT&T was broken up in 1984.

In a series of proceedings starting in 1966, the FCC decided that data processing, and later Internet services, should be free from the price controls, entry regulations, and other restrictions imposed on telephone service.<sup>173</sup> The 1996 Telecommunications Act includes a similar distinction between “information services” and “telecommunications services.”

Broadband Internet service has been somewhat more regulated than dialup or Internet content, but in general somewhat less regulated than telephone service. Different broadband providers are regulated differently, because they employ different technologies that have historically been subject to different forms of regulation.

Broadband can be delivered via telephone lines, cable, satellite, or various forms of wireless. The leading broadband providers are cable TV companies, which have seen their own unique cycles of regulation and deregulation over the past two decades. The vast majority of cable regulation, however, has applied to video services, not broadband Internet connections.

The FCC distinguishes between “high-speed” lines, which offer service in excess of 200 kilobits per second in at least one direction, and “advanced services” lines, which offer at least that speed in both directions. As of June 2004, there were 32 million high-speed lines in the U.S. Cable accounted for 57 percent of these lines, DSL 35 percent, and other technologies (satellite, wireless, fiber, other forms of wireline) the remainder. There were 23 million advanced services lines. Cable accounted for 75 percent of these, DSL 16 percent, and other technologies the remainder.<sup>174</sup>

The regulatory status of broadband is currently in a state of flux, due to ongoing FCC proceedings and a 9<sup>th</sup> Circuit Court of Appeals decision that will be examined by the Supreme Court in 2005. The general issue is whether, or to what extent, the companies that provide broadband service must share their facilities and services with competitors. Different regulations apply to broadband furnished via DSL and cable modem.

DSL is considered a telecommunications service, and hence potentially subject to price regulation and unbundling requirements imposed on telephone companies. By and large,

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<sup>173</sup> Jason Oxman, “The FCC and the Unregulation of the Internet,” FCC Office of Plans and Policy Working Paper No. 31 (July 1999).

<sup>174</sup> FCC, Wireline Competition Bureau, Industry Analysis and Technology Division, *High-Speed Services for Internet Access: Status as of June 30, 2004* (December 2004): Tables 1 and 2.

federal and state regulators have refrained from retail price regulation of DSL.<sup>175</sup> A key uncertainty in regard to DSL is whether telephone companies must make new facilities available to competitors at regulated rates. The FCC decided in 2003 that incumbent phone companies need not share new DSL facilities, such as optical fiber run to homes, with competitors, because new facilities are not monopoly bottlenecks. Existing copper loops, on the other hand, must be made available to competitors at regulated rates, and competitors could use these loops to offer DSL. The incumbent must also make it possible for multiple competitors to share a copper line, in the event that one competitor wishes to offer phone service and the other wishes to offer DSL.<sup>176</sup> However, the FCC reversed its earlier decision on “line sharing,” deciding that competitors who only want to offer DSL service cannot demand that the incumbent lease only the high-frequency portion of the local loop. Existing line-sharing agreements would nevertheless remain in force for a three-year transition period.<sup>177</sup> Given the controversy surrounding FCC unbundling policy, it is safe to say that there is significant regulatory uncertainty about which DSL facilities the phone companies will ultimately be required to unbundle, and at what price.

Cable modem service also faces regulatory uncertainty. In 2002, the FCC decided to classify cable modem as an information service, which means that the FCC is unlikely to regulate prices or force cable modem providers to enter partnerships that would let consumers access other Internet Service Providers as easily as they access the cable company’s own Internet Service Provider. The 9<sup>th</sup> Circuit, however, overruled the FCC, finding that cable modem service is part information service and part telecommunications service.<sup>178</sup> This decision raises the possibility that broadband via cable modem could be subject to the same types of price and unbundling regulations that are imposed on telecommunications companies. The U.S. Supreme Court announced in December 2004 that it will hear an appeal of this decision. Even if the FCC loses, it is not clear how it would decide to regulate cable modem service.

Several major cable companies are required to offer their broadband customers multiple Internet service providers as a result of agreements reached with regulators to obtain approval of mergers. The two most prominent are Time Warner, with 2.9 million high-speed subscribers in June 2003, and Comcast, with 4.4 million.<sup>179</sup> Other major cable firms, such as Cox (1.7 million) and Charter (1.3 million), offer only their own, proprietary Internet service provider.

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<sup>175</sup> Robert W. Crandall, Robert W. Hahn, Robert E. Litan, and Scott Wallstein, “Universal Broadband Access: Implementing President Bush’s Vision,” AEI-Brookings Joint Center for Regulatory Studies Regulatory Analysis 04-01 (May 2004): 5.

<sup>176</sup> FCC, *In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Report and Order on Remand*, CC Docket No. 01-338 (Released Aug. 31, 2003): paras. 248-54.

<sup>177</sup> FCC (2003): paras. 255-69.

<sup>178</sup> *Brand X Internet Services v. FCC*, 345 F.3d 1120 (9<sup>th</sup> Circuit, 2003).

<sup>179</sup> FCC, *Video Competition Report* (2004): 39-40.

## Costs

One study attempts to quantify the consumer costs associated with uncertainty about unbundling and open access regulation of broadband. Hazlett et. al. (2004) suggest a package of reforms that would largely free cable broadband and DSL from the threat that network owners would have to share their networks with competitors at unremunerative prices. In their scenario, new investments in DSL, cable, and voice over Internet would be classified as information services, exempt from economic regulation and unbundling requirements. Phone companies would not have to make new advanced technologies, such as fiber loops or DSL facilities, available to competitors. Incumbent phone companies would have to make the high-frequency portion of the local loop available to competitors at a wholesale discount that reflects the costs the incumbent avoids when leasing that portion of the line to the competitor. They estimate that these reforms would increase consumer welfare by \$4.5 billion in 2005, rising to \$12.90 billion in 2009.<sup>180</sup> If policymakers forego these reforms, consumers would forego these benefits; hence, these forgone benefits are a cost of maintaining the status quo.

## Outcomes

Three principal outcomes have been discussed in the broadband policy debate: deployment or access to broadband, increased competition in broadband, and lower prices or other related consumer benefits. All three are present, either explicitly or implicitly, in the FCC's goals and outcome indicators for broadband. The emphasis on broadband competition is also evident in one of the outcome indicators under the FCC's "competition" goal—"Increasing percentage of households with competing providers for multichannel video programming and information services." The "information services" component likely refers to broadband competition, since the broadband is the information service provided by multichannel video providers.

Data in the *Performance and Accountability Report* show that the number of high-speed lines more than doubled between the end of 2001 and the end of 2003—from just under 13 million to more than 28 million. Advanced services lines show a similar pattern. Subscribership for all broadband technologies increased, with subscribership to the two leading technologies—cable modem and DSL—more than doubling. Deployment of Wi-Fi hardware increased more rapidly, from 9.6 million units in 2001 to 45.5 million units in 2003. At the end of 2003, 93 percent of zip codes had high-speed service.<sup>181</sup> As with most other indicators, the report shows favorable trends but fails to prove how the FCC's activities have contributed to those trends. Given the direction of recent FCC initiatives, it is doubtful the FCC would argue that mandatory unbundling, or regulatory uncertainty about unbundling, encourages broadband deployment, competition, or consumer welfare.

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<sup>180</sup> Hazlett et. al. (2004): 94-99.

<sup>181</sup> FCC, *Performance and Accountability Report* (2004): 24-26. Zip codes are, of course, only a rough measure of availability, since some homes in a zip code might not have broadband access even though others do.

The FCC's semi-annual reports to Congress on broadband suggest that there is significant competition. At least two companies provide high-speed service in 80 percent of all zip codes, at least three companies do so in 64 percent of zip codes, and four or more companies do so in 48 percent of zip codes.<sup>182</sup> These figures could under- or overstate the availability of competitive alternatives for the typical consumer. Since areas with high population density tend to attract more competitors, the percentage of consumers with access to multiple broadband providers could be higher than the percentage of zip codes with multiple providers. On the other hand, the fact that some homes in a zip code have access to one or more broadband providers does not mean that all homes in the zip code do.

Whether various types of unbundling and open access regulations benefit consumers depends on whether broadband providers possess market power.<sup>183</sup> If they do, then regulation could reduce prices and spur broadband deployment. If the market for broadband is workably competitive, then unbundling and access regulation could either be redundant or retard investment and slow deployment.

FCC data show that broadband is far from monopolized. Absence of monopoly does not mean that no providers possess market power, or that regulation could not improve consumer welfare.<sup>184</sup> This is highly unlikely, however, for some of the smaller broadband providers, such as those using satellite and wireless, except perhaps for a few unusual circumstances (such as remote locations that are only reachable economically via one of those technologies). Such isolated instances are unlikely to be significant enough to distort the provider's decisions about unbundling or open access.

The broadband providers with the second largest market shares—incumbent phone companies using DSL—are also unlikely to have market power in broadband.<sup>185</sup> Several studies find that the elasticity of demand for DSL broadband service exceeds -1. They also find that the demand for cable modems increases by between 0.6 and 0.77 percent for every 1 percent increase in DSL prices, which implies that cable modem and DSL are fairly good substitutes.<sup>186</sup> Customer surveys and other qualitative evidence confirm this

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<sup>182</sup> FCC, *High-Speed Services for Internet Access* (December 2004): Table 12.

<sup>183</sup> For a more detailed analysis of broadband open access, see Jerry Ellig, "The Federal Communications Commission's Notice of Inquiry on High-Speed Access to the Internet over Cable and Other Facilities," submitted in FCC GN Docket No. 00-185, Mercatus Center Public Interest Comment No. 2000-21 (Nov. 16, 2000). For a contrary view in the context of several major mergers involving cable companies, see Jerry A. Hausman, J. Gregory Sidak, and Hal J. Singer, "Residential Demand for Broadband Telecommunications and Consumer Access to Unaffiliated Internet Content Providers," *Yale Journal on Regulation* 18:1 (Winter 2001): 129-73.

<sup>184</sup> Howard A. Shelanski, "Competition and Regulation in Broadband Communications," Robert W. Crandall and James H. Alleman (eds.), *Broadband* (Washington, DC: The Brookings Institution, 2002): 158-60.

<sup>185</sup> Jerry A. Hausman, "Internet-Related Services: The Results of Asymmetric Regulation," in Robert W. Crandall and James H. Alleman (eds.), *Broadband* (Washington, DC: The Brookings Institution, 2002): 141-43.

<sup>186</sup> Robert W. Crandall, J. Gregory Sidak, and Hal J. Singer, "The Empirical Case Against Asymmetric Regulation of Broadband Internet Access," *Berkeley Technology Law Journal* 17 (Summer 2002): 973-74; Robert W. Crandall, Robert W. Hahn, and Timothy J. Tardiff, "The Benefits of Broadband and the Effect

inference, and other indicators commonly employed by the FCC also imply that DSL providers lack market power.<sup>187</sup>

Some research focused on large cable companies involved in mergers suggests that those companies possess market power in broadband, and the researchers argue that they could extend that market power through vertical integration.<sup>188</sup> Others doubt there is much justification for regulating any broadband service providers, since cable modem faces competition from DSL and other technologies, prices of cable modem and DSL are comparable, and the cable companies' former monopoly on television is now vigorously contested by satellite TV.<sup>189</sup> Most attempts to measure the elasticity of demand for broadband—not just DSL—have found that it is highly elastic, ranging from -1.5 to -3.76.<sup>190</sup>

One empirical study directly assesses the effects of unbundling or open access requirements on broadband prices and deployment. It estimates that eliminating unbundling and open access requirements for new broadband investments would increase the number of broadband subscriptions by 10 million—which implies that broadband subscriptions are currently 10 million lower as a result of regulatory uncertainty.<sup>191</sup> This result is consistent with the studies that find unbundling tends to reduce facilities-based competition in telecommunications.<sup>192</sup> Since some of the new competitors offer data as well as voice service, it is quite possible that unbundling discourages facilities-based competition in data as well as voice.

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of Regulation,” in Robert W. Crandall and James H. Alleman (eds.), *Broadband* (Washington, DC: The Brookings Institution, 2002): 301 and references cited therein.

<sup>187</sup> Crandall, Sidak, and Singer (2002): 970-83.

<sup>188</sup> Jerry A. Hausman, J. Gregory Sidak, and Hal J. Singer, “Residential Demand for Broadband Telecommunications and Consumer Access to Unaffiliated Internet Content Providers,” *Yale Journal on Regulation* 18:1 (Winter 2001): 129-73.

<sup>189</sup> Bruce M. Owen, “Broadband Mysteries,” in Robert W. Crandall and James H. Alleman (eds.), *Broadband* (Washington, DC: The Brookings Institution, 2002): 27-35; Thomas W. Hazlett, “Regulation and Vertical Integration in Broadband Access Supply,” in Robert W. Crandall and James H. Alleman (eds.), *Broadband* (Washington, DC: The Brookings Institution, 2002): 215-20; Crandall, Hahn, and Tardiff (2002): 325; Shelanski (2002): 170.

<sup>190</sup> Austan Goolsbee, “Subsidies, the Value of Broadband, and the Importance of Fixed Costs,” in Robert W. Crandall and James H. Alleman (eds.), *Broadband* (Washington, DC: The Brookings Institution, 2002): 283-84.

<sup>191</sup> Hazlett et. al. (2004): 97-98.

<sup>192</sup> See pp. 50-51 above.

## Conclusion

The costs associated with the FCC's regulation of telecommunications and broadband far exceed the agency's estimated expenditures in fiscal 2004. As the following cost table shows, the consumer cost of regulation is more than 60 times the sum of FCC expenditures and the excess burden associated with the taxes necessary to raise that revenue. Regulation costs consumers \$105 billion annually in higher prices and forgone services. Even if the enormous costs associated with spectrum allocation are omitted, FCC regulation of telecommunications and the broadband costs consumers \$27.4 billion annually in higher prices and reduced service options. It costs telecommunications firms an additional \$9.2 billion annually, for a total overall cost of \$37 billion each year.

These cost totals should be taken as only a rough indicator of the total cost of federal telecommunications and broadband regulation. The studies on which the figures are based do not consider any synergistic effects of changing all regulations simultaneously, nor do they consider spillover effects when the regulations affecting one service are changed. For example, they ignore any improvements in wireline prices or service that might occur as a result of improvements in regulation of wireless service, and vice versa.

Aside from the total costs, a truly remarkable finding is the percentage accounted for by federal spectrum allocation policies. Although the FCC has tried to increase the flexibility of spectrum allocation policy in recent years, it remains true that regulators, rather than market transactions, determine how broad swaths of spectrum will be used. Even if the \$77 billion figure overestimates the consumer benefits from making an additional 200 MHz of spectrum available, it suggests that the benefits from wholesale overhaul of spectrum policy would be huge.

Economic regulation redistributes wealth. Yet it accomplishes even this outcome inefficiently. Economists often compare the efficiency of taxes and other policies by comparing the excess burdens as a percentage of the wealth transfers. The excess burden percentages in the cost table show how the efficiency of regulations compares to the efficiency of direct wealth transfers through taxation. In all but one case, these percentages exceed the 25–40 percent excess burden attributed to direct taxation. The one exception is wireline local number portability, which generates little inefficiency because it increases the price of a service with a very low elasticity of demand. The federal government could accomplish all of the other wealth transfers at lower total cost to society through general taxation. It could minimize the social cost by funding the transfers with flat-rate charges on local phone bills, similar to the federal subscriber line charge.

Two previously-announced changes should substantially reduce these regulatory costs within a few years. The federal government's decision to auction an additional 90 MHz of spectrum for wireless communications in 2006, while a far cry from wholesale overhaul of spectrum policy, should nevertheless generate large consumer benefits. The FCC's decision to phase out the unbundled network element platform, if upheld, should also substantially reduce the amount of money redistributed via regulation and encourage

facilities-based competition in local phone service. The extent of consumer benefits will depend on how Congress and the FCC treat emerging competitors, such as Voice over Internet Protocol and wireless.

## Costs of Federal Telecommunications and Broadband Regulation

| Regulation                                | Outlays or<br>Wealth<br>Transfer | Forgone<br>Consumer<br>Surplus | Total<br>Cost to<br>Consumers | Value of<br>Forgone<br>Output | Wealth transfer<br>Plus Forgone<br>Output | Excess<br>Burden<br>Percentage |
|---|----------------------------------|--------------------------------|-------------------------------|-------------------------------|---|--------------------------------|
| FCC outlays 2004                          | \$361,000,000                    | N.A.                           | N.A.                          | \$144,000,000                 | \$505,000,000                             | 40                             |
| FCC net cost of 3 strategic goals         | \$1,200,000,000                  | N.A.                           | N.A.                          | \$480,000,000                 | \$1,680,000,000                           | 40                             |
| Interstate Long-Distance                  |                                  |                                |                               |                               |   |                                |
| Access Charges 2002                       | \$3,300,000,000                  | \$300,000,000                  | \$3,600,000,000               | \$1,450,000,000               | \$4,750,000,000                           | 44                             |
| Universal Service Contributions           |                                  |                                |                               |                               |   |                                |
| Interstate Long-Distance 2002             | \$2,700,000,000                  | \$240,000,000                  | \$2,940,000,000               | \$1,160,000,000               | \$3,860,000,000                           | 43                             |
| Wireless 2003                             | \$1,400,000,000                  | \$39,000,000                   | \$1,439,000,000               | \$873,000,000                 | \$2,273,000,000                           | 62                             |
| International                             | N.A.                             | N.A.                           | N.A.                          | N.A.                          | N.A.                                      | N.A.                           |
| Local Number Portability                  |                                  |                                |                               |                               |   |                                |
| Wireline 2003                             | \$762,000,000                    | \$0                            | \$762,000,000                 | \$0                           | \$762,000,000                             | 0                              |
| Wireless 2003                             | \$952,000,000                    | \$26,000,000                   | \$978,000,000                 | \$594,000,000                 | \$1,546,000,000                           | 62                             |
| Enhanced 911                              |                                  |                                |                               |                               |   |                                |
| Wireline 2003                             | N.A.                             | N.A.                           | N.A.                          | N.A.                          | N.A.                                      | N.A.                           |
| Wireless 2003                             | \$1,200,000,000                  | \$32,000,000                   | \$1,232,000,000               | \$725,000,000                 | \$1,925,000,000                           | 60                             |
| Miscellaneous Wireless                    |                                  |                                |                               |                               |   |                                |
| Number Pooling 2003                       | \$324,000,000                    | \$9,000,000                    | \$333,000,000                 | \$202,000,000                 | \$526,000,000                             | 62                             |
| CALEA 2003                                | \$457,000,000                    | \$13,000,000                   | \$470,000,000                 | \$285,000,000                 | \$742,000,000                             | 62                             |
| Spectrum Management 2004                  | \$54,000,000,000                 | \$23,400,000,000               | \$77,400,000,000              | \$30,000,000,000              | \$84,000,000,000                          | 56                             |
| Satellite                                 | N.A.                             | N.A.                           | N.A.                          | N.A.                          | N.A.                                      | N.A.                           |
| Telephone Unbundling                      |                                  |                                |                               |                               |   |                                |
| Unbundled Net. Elements 2003              | \$9,700,000,000                  | \$1,400,000,000                | \$11,100,000,000              | \$5,900,000,000               | \$15,600,000,000                          | 61                             |
| Resale 2003                               | \$21,000,000                     | \$6,911                        | \$21,006,911                  | \$14,000,000                  | \$35,000,000                              | 67                             |
| Broadband Unbundling 2003                 | N.A.                             | N.A.                           | \$4,500,000,000               | N.A.                          | \$4,500,000,000                           | N.A.                           |
| <b>Total</b>                              | <b>\$76,016,000,000</b>          | <b>\$25,459,006,911</b>        | <b>\$104,775,006,911</b>      | <b>\$41,683,000,000</b>       | <b>\$122,199,000,000</b>                  |                                |
| Total excluding FCC spending              | \$74,816,000,000                 | \$25,459,006,911               | \$104,775,006,911             | \$41,203,000,000              | \$120,519,000,000                         |                                |
| Total excluding spectrum and FCC spending | \$20,816,000,000                 | \$2,059,006,911                | \$27,375,006,911              | \$11,203,000,000              | \$36,519,000,000                          |                                |

*Italicized figures in each column are the same because estimates for some items that would make them different are unavailable.*

N.A. = Not available.



The outcome table below summarizes outcome information. One regulation—Enhanced 911—has clear evidence of positive outcomes, at least in the Pennsylvania counties that were subjects of the study. Enhanced 911 significantly reduces both cardiac risk and hospital costs. The size of the risk and cost reductions suggest that the benefits to cardiac patients alone are sufficient to cover enhanced 911’s cost.

The outcome data are less sanguine for most of the other regulations. Some regulations achieve positive outcomes, but not very effectively. For example, some studies find that universal service programs increase telephone subscriptions, but at a cost of thousands of dollars annually per additional subscriber. Regulations requiring incumbent local telephone companies to lease the local network to competitors transfer \$9.7 billion to consumers, but much less effectively than alternative policies. Such regulations also reduce competitors’ investments in building their own networks.

Many regulations have negligible effects on the outcomes they are intended to influence. These include interstate long-distance access charges, low-income universal service programs, high-cost universal service programs, spectrum management, and resale of incumbent local exchange carrier services.

For some regulations, outcomes are effectively unknown. No studies or data establish that FCC regulations have accomplished desired outcomes for the schools and libraries universal service program, local number portability, number pooling, satellites, or Communications Assistance to Law Enforcement for wireless communications.

Finally, cost and outcome information are especially poor for satellite regulation. Neither costs nor outcomes could be reliably ascertained.

For telecommunications and broadband regulation, studies document costs better than they demonstrate outcomes. The FCC’s *Performance and Accountability Report* generally does a good job of identifying the outcomes regulators are trying to achieve. However, the report fails to demonstrate how, or how much, existing regulation has contributed to those outcomes. Scholarly research occasionally fills this gap, but not frequently enough to provide a comprehensive understanding of all of the effects of telecommunications and broadband regulation.

## Outcomes of Federal Telecom and Broadband Regulation

| Regulation                              | Intended Outcomes                       | Outcomes Achieved  |   |
|---|---|--|---|
| Interstate Long-Distance Access Charges | Increased subscription                  | Negligible; net effect may be negative   |   |
|   | Increased low-income subscription       | Negligible; net effect may be negative   |   |
|   | Redistribution to low-income households | \$24 average per low-income household  |   |
| Universal Service Contributions         | Increased low-income subscription       | Best case: \$1581-\$2200 per additional subscription<br>Net effect may be negligible           |   |
|   | Redistribution to low-income households | Lifeline: \$98.93 per subsidized household<br>Linkup: \$17.77 per beneficiary                  |   |
|   | Increased rural subscription            | \$5155-\$11,000 per additional subscription  |   |
|   | Redistribution to rural households      | Unknown  |   |
|   | Improved educational outcomes           | Unknown  |   |
| Local Number Portability                | Wireline                                | Increased competition/consumer welfare<br>Unknown  |   |
|   | Wireless                                | Increased competition/consumer welfare<br>Unknown  |   |
| Enhanced 911                            | Improved health                         | Cardiac patients 1.62 times more likely to survive<br>6-hr. cardiac mortality risk reduced 60% |   |
|   | Public safety                           | 40-hr. cardiac mortality risk reduced 35%  |   |
|   | Reduced health/safety costs             | Hospital costs reduced by \$1000/cardiac patient   |   |
|   |   |  |   |
| Miscellaneous Wireless                  | Number Pooling                          | More efficient utilization of numbers<br>Unknown   |   |
|   | CALEA                                   | Improved law enforcement/natl. security<br>Unknown   |   |
| Spectrum Management                     | Promote the "public interest"           | Implies no particular outcome  |   |
|   | Promote consumer welfare                | Tends to reduce consumer welfare   |   |
|   | Prevent signal interference             | FCC allocation not necessary to accomplish this  |   |
| Satellite                               | Unknown                                 | Unknown  |   |
| Telephone Unbundling                    | Unbundled Network Elements              | Lower prices   | \$9.7 billion savings, but \$1.74 spent for each \$ transferred   |
|   |   | Increased competition  | Substituted platform competition for facilities-based competition |
|   |   | Innovative new services  | Not possible when reselling incumbent's network                   |
|   | Resale                                  | Increased economic welfare   | \$21 spent for each \$1 gain in economic welfare                  |
|   |   | Increased competition  | Has not been an attractive strategy for entry                     |
| Broadband Unbundling                    | Resale                                  | Innovative new services<br>Not possible when reselling incumbent's service                     |   |
|   | Broadband Unbundling                    | Encourage deployment   | Appears to retard investment                                      |
|   |   | Reduce price   | No evidence   |