Costs and Consequences of Federal Telecommunications Regulations

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I. INTRODUCTION

Economic regulation has substantial effects on telecommunications consumers 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 when, and whether consumers can decline to purchase certain services. 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 regulation. This Article seeks to fill that 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. Key issues of interest are the effects of regulation on the prices, quantity and quality of service, along with the associated effects on consumer welfare and overall economic welfare. Regulations that primarily affect applications or uses of information that pass through the infrastructure are outside the scope of this study.

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 service. 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.[1] To stimulate competition, this legislation also requires incumbent local phone companies to lease elements of their networks to competitors and permits competitors to purchase their service at wholesale rates and resell it at retail rates.[2] 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.[3]

Part I of this Article outlines the principal effects of regulation predicted by economic theory. Part II explains how the Article classifies

1. 47 U.S.C. § 253(a) (2000).

2. 47 U.S.C. § 251(c)(3)–(4) (2000).

3. *See* Vonage Holdings Corporation Petition for Declaratory Ruling Concerning an Order from the Minnesota Public Utilities Commission, *Memorandum Opinion and Order*, 19 F.C.C.R. 22404, para. 1 (2004).

costs and outcomes, employing basic concepts from price theory. Part III presents estimates of costs and assessments of outcomes for ten types of federal telecommunications regulatory activity: telecommunications regulatory spending, long-distance access charges, universal service funding, local number portability, enhanced 911, miscellaneous wireless mandates, spectrum management, satellite regulation, unbundled network elements, and resale of the incumbent's services. Part IV outlines the principal conclusions one can draw, given the state of existing research.

II. 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 equals 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.[4]

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.

Some regulations mandate that firms must offer, and consumers must pay for, particular services or network functionalities. Examples include 911 emergency service and local number portability. Such mandates may be intended to remedy market failures, such as public good problems or market power. Alternatively, they may simply be adopted because lawmakers and regulators believe they are good things that consumers

4. *See* N. GREGORY MANKIW, PRINCIPLES OF MICROECONOMICS 293–346 (2d Can. ed. 2001) (discussing a monopolistic scenario versus one of perfect competition).

should have, even if there is no market failure.

Regulation is intended to make consumers better off by producing a price equal to the competitive market price or by correcting for other market failures.[5] However, there is no guarantee that this will occur in practice. There are at least five reasons: (1) prices below competitive market levels can create shortages; (2) regulation can hold prices above costs; (3) regulation and monopoly inflate costs; (4) regulation stifles innovation and entrepreneurship; and (5) expenditures to acquire and maintain wealth transfers increase costs.

A. Below Competitive Prices

If regulators set prices below the competitive level, they create shortages. History suggests that regulators frequently succumb to this temptation.[6] 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.

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5. For the sake of simplicity, this Article defines "competitive" price the same way as most introductory economics textbooks do: as a single price charged by a firm whose behavior is constrained by the presence of competitors. We must assume that a competitive firm is already efficient, or else it would already have been displaced by competitors. We must also assume that the competition is sufficiently strong that the firm cannot unilaterally raise prices or earn profits that exceed its cost of capital. In an industry such as telecommunications, which is undergoing rapid technological change, there are several reasons why the concept of "competitive" price is more complicated. First, technological improvements normally cause prices 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 situations, the "competitive" price is actually a set of prices for different products and services that are not perfect substitutes. Third, the possibility of innovation creates substantial uncertainty as to 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 that differ from the price 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.

6. *See* ROBERT W. CRANDALL & LEONARD WAVERMAN, WHO PAYS FOR UNIVERSAL SERVICE?: WHEN TELEPHONE SUBSIDIES BECOME TRANSPARENT 112 (2000).

B. 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. Mandated services and functionalities may also contain an element of cross-subsidy. All consumers must purchase these services, and consumers for whom the cost exceeds the value might subsidize those for whom the value exceeds the cost. Regulation thus becomes an opaque way of taxing some services to fund a highly visible "free lunch."[7]

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 mandated price increase. This latter example may appear fanciful in the abstract, but it happens quite frequently in telecommunications regulation, as we shall see.

C. 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

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7. *See* Richard A. Posner, *Taxation by Regulation*, 2 BELL J. ECON. 22, 28 (1971). For empirical research, see generally CRANDALL & WAVERMAN, *supra* note 6; ROBERT W. CRANDALL, AFTER THE BREAKUP: U.S. TELECOMMUNICATIONS IN A MORE COMPETITIVE ERA (1991).

reflect costs, but the costs themselves are inflated.[8] 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. Price caps can thus help avoid the cost-increasing incentives associated with cost-of-service regulation.

D. Stifled Innovation and Entrepreneurship

Empirical studies frequently find that economic deregulation generates larger price reductions and consumer benefits than economists predicted based on pre-deregulation costs and market conditions.[9] Such findings underscore the importance of innovation and entrepreneurship in improving economic welfare. As Winston noted, "Predictions of the effects of deregulation were generally guided by static models that assumed technology and operations would not be significantly affected by the change in the regulatory regime."[10] Regulation diminishes entrepreneurial incentives to lower costs, improve quality, and develop new products and services.

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

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8. *See generally* E. Ray Canterbery et al., *Cost Savings from Nuclear Regulatory Reform: An Econometric Model*, 62 S. ECON. J. 554 (1996) (explaining how poor management or faulty execution can lead to excess costs in the construction of power plants); Leon Courville, *Regulation and Efficiency in the Electric Utility Industry*, 5 BELL J. ECON. 53 (1974) (assessing the impact of the Averch-Johnson effect as a factor in causing companies to engage in inefficient behavior); Paul M. Hayashi & John M. Trapani, *Rate of Return Regulation and the Regulated Firm's Choice of Capital-Labor Ratio: Further Empirical Evidence on the Averch-Johnson Model*, 42 S. ECON. J. 384 (1976) (describing the effects of the Averch-Johnson model in increasing costs); H. Craig Petersen, *An Empirical Test of Regulatory Effects*, 6 BELL J. ECON. 111 (1975) (providing additional evidence proving the Averch-Johnson effect); Robert M. Spann, *Rate of Return Regulation and Efficiency in Production: An Empirical Test of the Averch-Johnson Thesis*, 5 BELL J. ECON. 38 (1974) (confirming the Averch-Johnson effect).

9. *See* Jerry Ellig, *Railroad Deregulation and Consumer Welfare*, 21 J. REG. ECON. 143, 164–65 (2002). *See also* Clifford Winston, *U.S. Industry Adjustment to Economic Deregulation*, 12 J. ECON. PERSPECTIVES 89, 91 (1998); Clifford Winston, *Economic Deregulation: Days of Reckoning for Microeconomists*, 31 J. ECON. LIT. 1263, 1285–86 (1993).

10. Winston (1998), *supra* note 9, at 91.

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.[11]

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.[12] In his dissent in *AT&T v. Iowa Utilities Board*, a key case interpreting the Telecommunications Act of 1996, Justice Breyer noted:

> 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.[13]

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 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.[14] The ten-year delay in allowing local Bell telephone companies to offer voicemail, for example, cost consumers approximately $1.27 billion annually, and regulation-induced delay in the introduction of cell phone

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11. *See* Israel M. Kirzner, *The Perils of Regulation: A Market Process Approach*, *in* DISCOVERY AND THE CAPITALIST PROCESS 119 (1985).

12. *See* F. A. Hayek, *Competition as a Discovery Procedure*, *in* NEW STUDIES IN PHILOSOPHY, POLITICS, ECONOMICS AND THE HISTORY OF IDEAS 179 (1978).

13. 525 U.S. 366, 424 (1999) (Breyer, J., concurring in part and dissenting in part).

14. *See* Robert Crandall & Jerry Ellig, *Economic Deregulation and Customer Choice: Lessons for the Electric Industry* (1997), http://mercatus.org/pdf/materials/839.pdf (giving examples from various industries).

service cost consumers $50 billion annually in forgone benefits.[15]

E. Expenditures to Acquire or 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 solely 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.[16]

III. CLASSIFYING REGULATORY COSTS AND REGULATORY OUTCOMES

Ideal economic regulation benefits consumers by reducing prices to competitive levels or correcting for other market failures. 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. Much of the empirical economics literature on telecommunications regulation takes this approach. The virtue of this approach is that it offers a simple and powerful framework for understanding the effects of regulation. The principal drawback is that it likely understates the costs of regulation. Nevertheless, the measured costs are substantial.

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15. *See* Jerry A. Hausman, *Valuing the Effect of Regulation on New Services in Telecommunications*, *in* 1997 BROOKINGS PAPERS ON ECONOMIC ACTIVITY. MICROECONOMICS 2 (Martin N. Baily et al. eds., 1998), *available at* http://econ-www.mit.edu/faculty/download_pdf.php?id=470.

16. *See* Michael A. Crew & Charles K. Rowley, *Toward a Public Choice Theory of Monopoly Regulation*, 57 PUBLIC CHOICE 49 (1988); Gordon Tullock, *The Welfare Costs of Tariffs, Monopolies, and Theft*, *in* TOWARD A THEORY OF THE RENT-SEEKING SOCIETY 39 (James Buchanan et al. eds., 1980).

A. Costs

This Article classifies regulatory costs into several categories based on elementary price theory:

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. The size of the wealth transfer is equal to the price change induced by regulation times the number of units of output sold under regulation, or $p \cdot Q$.

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 forgo, minus the price they would have paid, is the forgone consumer surplus. The change in consumer welfare is approximately equal to one-half of the change in price induced by regulation times the change in quantity induced by the price change, or $.5 \cdot \Delta p \cdot \Delta q$.[17]

Total cost to consumers: This is the sum of the wealth transfer extracted from consumers plus the forgone consumer surplus, or $p \cdot Q + .5 \cdot \Delta p \cdot \Delta q$. 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 do not make is called forgone producer surplus. Forgone producer surplus is approximately equal to the change in quantity induced by the regulation times the difference between the price that would exist in the absence of the regulation minus the marginal cost, or $\Delta q \cdot (p - m)$.[18]

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. Mathematically, it is equal to $.5 \cdot \Delta p \cdot \Delta q +$

17. *See* Jerry Hausman & Howard Shelanski, *Economic Welfare and Telecommunications Regulation: The E-Rate Policy for Universal-Service Subsidies*, 16 YALE J. ON REG. 19, 40 (1999).

18. *Id.*

$\Delta q \cdot (p\text{-}m)$. 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, equal to $p \cdot Q + .5 \cdot \Delta p \cdot \Delta q + \Delta q \cdot (p\text{-}m)$. 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.

The trickiest aspect of these calculations, aside from actually getting the relevant data, is ascertaining how much of a change in quantity occurs as a result of a regulation-induced price change. The change in quantity can be calculated from the change in price with the aid of an estimate of the price elasticity of demand. The price elasticity of demand measures how responsive quantity is to price. It is equal to the percentage change in quantity divided by the percentage change in price. The elasticity of demand is defined as $(\Delta q/q)/(\Delta p/p)$.[19] If one has an estimate of the elasticity and also the values of p, Δp, and q, then one can solve for Δq.

All of the cost estimates in this Article are derived from these simple mathematical relationships. In some cases, data or estimates of p, q, Δp, and elasticities of demand were readily available from published studies or FCC reports. In other cases, studies report only a figure for forgone consumer surplus or total cost to consumers, but combining these study results with data on other variables of interest allows one to calculate the missing figures.

In some cases, the costs estimated in this Article emerge simply because regulators set prices above or below competitive levels. In other cases, wealth transfers and forgone consumer and producer surplus 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.

Federal telecommunications regulations have significant costs, as Table 2 on page 98, *infra*, shows. These regulations cost consumers at least $25 billion annually in forgone consumer surplus, or as much as $100 billion if one includes the wealth transfers as a cost to consumers. Total deadweight loss is approximately $41.7 billion annually. If all of the wealth transfer is counted as a cost, the total social cost is approximately $118 billion annually. The figures fall only slightly if FCC regulatory

19. *Lecture 4—Price Elasicity of Demand*, DIGITAL ECONOMIST, Dec. 16, 2002, http://www.digitaleconomist.com/DE_micro_4.pdf.

expenditures are subtracted from the totals.

B. 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."

The reason for focusing on outcomes is that 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. Economic research can shed significant light on this question. A focus on outcomes, rather than a narrower focus on benefits, thus permits inclusion of a broader range of information about policy results that economic research illuminates.

The key FCC document that identifies and assesses outcomes is its annual *Performance and Accountability Report*.[20] The *Report* articulates the outcomes the FCC 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 ("CALEA").

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. Table 2 lists only those performance goals and outcome indicators that identify actual outcomes of domestic U.S. telecommunications regulation.

For each outcome indicator, the *Report* provides numerical data

20. FCC, *Fiscal Year 2004 Performance and Accountability Report* 115 (2004), *available at* http://www.fcc.gov/Reports/ar2004.pdf [hereinafter *Report*].

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.[21]

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 *Report*.

21. In fairness, we should note that the FCC's *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 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 ten or twenty years ago would show significant improvement, and this improvement is reflected in some of the favorable trends reported in the report. Conversely, this Article 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 report.

TABLE 1

FCC 2004 DOMESTIC OUTCOME-ORIENTED GOALS AND INDICATORS RELEVANT TO TELECOMMUNICATIONS REGULATION[22]

Broadband

- *Performance Goal*
  - Broaden the deployment of technologies across the United States and globally.
- *Outcome Indicators*
  - Increase access to broadband services;
  - Increase access to broadband services and devices across multiple platforms: DSL, cable modem, satellite, terrestrial wireless, etc.; and,
  - Increase number of types of unlicensed and licensed wireless broadband devices.

Competition

- *Performance Goals*
  - Ensure American consumers can choose among multiple reliable and affordable means of communications; and,
  - Ensure that all American consumers have and retain wireless and wireline phone services.
- *Outcome Indicators*
  - Increase percentage of households with competing providers for multichannel video programming and information services;
  - Increase numbers of consumers and businesses having a choice among wireless and wireline service providers; and,
  - 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; and,
  - Promote ease of access to spectrum by more users.
- *Outcome Indicators*
  - Increase number of approvals for enhanced telecommunications equipment; and,
  - Facilitate deployment of new or existing services or devices that make efficient use of spectrum.

Homeland Security

- *Outcome Indicator*
  - Increase deployment of Enhanced-911.

22. This list includes only those items that clearly focus on outcomes. For a complete list, see *Report*, *supra* note 20.

IV. ANALYSIS OF COSTS AND OUTCOMES

A. Regulatory Expenditures

In theory, the easiest cost of regulation to identify is the money spent to run the FCC. FCC outlays totaled $351 million in fiscal year 2003 and are estimated at $361 million for fiscal year 2004.[23]

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 $0.25–$0.40 per dollar raised.[24] Multiplying $0.25–$0.40 by $361 million in FCC outlays for fiscal year 2004 yields an excess burden of approximately $90–144 million. Adding the excess burden to the outlays results in a total cost of $451–505 million; the higher figure appears in the "excess burden" column of Table 2. FCC outlays, which reflect appropriations, may either over- or understate 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 *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.[25] Obviously, not all of this is financed by appropriations. If the excess burden associated with the non-appropriated funds is also $0.25–$0.40 per dollar raised, then the total excess burden is $300–480 million.[26] Total spending of $1.2 billion plus the excess burden would be $1.5–1.7 billion.[27] These are big

23. *See* SUSAN DUDLEY & MELINDA WARREN, MERCATUS CTR. & WEIDENBAUM CTR., REGULATORS' BUDGET CONTINUES TO RISE: AN ANALYSIS OF THE U.S. BUDGET FOR FISCAL YEARS 2004 and 2005 740 (2004), http://www.mercatus.org/pdf/materials/796.pdf.

24. *See* Jerry Hausman, *Efficiency Effects on the U.S. Economy from Wireless Taxation*, 53 NAT'L TAX J. 733, 739 (2000).

25. *Report*, *supra* note 20, at 115. This figure excludes revenues and costs for the Universal Service Fund, which are addressed separately, *infra*, Part IV.D.

26. The $300 million and $480 million figures are derived by multiplying $1.2 billion times $0.25 and $0.40, respectively.

27. The $1.5 billion and $1.7 billion figures are derived when $300 million and $480

numbers, but the costs that flow from FCC regulations far exceed the FCC's expenditures.

B. 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.[28] 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 average $0.01–$0.051 per minute, depending on the carriers. The FCC has an ongoing proceeding that seeks to rationalize and simplify these charges.[29] 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.

1. 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 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 -0.05 and -0.72; a 1% increase in long-distance prices reduces use by about one-half to three-

million are added to $1.2 billion, respectively.

28. *See* Wayne Leighton, Consumers and Cross-Subsidies: An Interest Group Theory of Telecommunications Regulation 67–69 (1996) (unpublished Ph.D. dissertation, George Mason University) (on file with the Author and the *Federal Communications Law Journal*). 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. *See, e.g.*, Steve G. Parsons, *Cross-Subsidization in Telecommunications*, 13 J. REG. ECON. 157, 169–70 (1998).

29. *See* Developing a Unified Intercarrier Compensation Regime, *Further Notice of Proposed Rulemaking*, 20 F.C.C.R. 4685 (2005).

quarters of 1%.[30] A consensus estimate of the elasticity is -0.07.[31] 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 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.[32] They then estimated the effect on long-distance prices and economic welfare if these additional revenues were used to reduce long-distance access charges.[33] Depending on the specific model and assumptions, elimination of cross-subsidies increases consumer welfare by between $1–3.7 billion annually.[34] Long-distance companies gain an additional $1.6–3.4 billion annually, yielding a total increase in economic welfare of between $2.5–7 billion.[35] 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.[36] 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 were 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.[37] This last result probably occurred because local telephone service receives cross-subsidies from other sources in addition to access charges. However, a

30. *See* Hausman & Shelanski, *supra* note 17, at 36–37.

31. *See* M. H. Riordan, *Universal Residential Telephone Service, in* 1 HANDBOOK OF TELECOMMUNICATIONS ECONOMICS 436 (M. Caves et al. eds., 2002).

32. *See* CRANDALL & WAVERMAN, *supra* note 6, at 109–12.

33. *Id.* at 113–15.

34. *Id.* at 120. Range of figures is derived by subtracting Crandall and Waverman's estimates of the effect of repricing on long-distance companies' producer surplus from the net effect on economic welfare.

35. *Id*. at tbls. 6–8.

36. *See id*. at 141. This range of figures results when one converts Crandall's 1988 estimate, as well as other estimates he cites for 1983 and 1985, into 1996 dollars (using the Consumer Price Index) to make them comparable with the 1996 estimates in Crandall and Waverman, *supra* note 7.

37. *See id*. at 113–15.

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.[38] 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 $0.01–$0.016 per domestic conversation minute and generated approximately $3.3 billion in revenues.[39] In 2002, there were 333.8 billion domestic conversation minutes, and average revenue per minute was $0.07.[40] The incremental cost of access is measured in tenths of a cent, so most of the access charge subsidizes local telephone service.[41] A $0.01 interstate access charge reduces consumer welfare by approximately $300 million and reduces producer welfare by about $1.2 billion.[42]

2. 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 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

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38. For calculation method, see *infra* note 293. For data source, see JIM LANDE & KENNETH LYNCH, FCC INDUS. ANALYSIS & TECH. DIV., TELECOMMUNICATIONS INDUSTRY REVENUES 2002 30–31 tbl.10 (2004), *available at* http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/telrev02.pdf. Using 1996 data, average revenues per interstate domestic conversation minute (p) were $0.12, access costs plus universal service contributions per average conversation minute were $0.049, and interstate domestic conversation minutes totaled 286.8 billion. *Id*.

39. *See id*. (reporting that in 2002, interstate access charges per domestic conversation minute averaged $0.01, and access charges per interstate 2-ended minute averaged $0.016).

40. *Id.*

41. *See, e.g*., Billy Jack Gregg, *A Survey of Unbundled Network Element Prices in the United States*, THE NAT'L REG. RES. INST. tbl. 2 (July 2003) (showing in column G of Table 2A that cost-based unbundled network element switching rates are usually in tenths of a cent per minute).

42. For calculation method, see infra note 293. For data sources, see LANDE & LYNCH, *supra* note 38.

join the network, (2) the 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.[43]

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.[44] Alternatively, policymakers may believe that an increase in telephone subscription rates is a good outcome even if there is no externality.[45]

Regardless of whether an externality exists, most research suggests that cross-subsidies from long-distance to local service generate little increase in telephone subscriptions. Consumer decisions to subscribe to telephone service are not very sensitive to the fixed monthly charge.[46] 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 the 1970 value.[47] It may even be equal to zero in the United States and other developed countries.[48] 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-

43. 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. The third condition is the familiar "external effect," which is not by itself sufficient to justify government intervention. *See* A.H. Barnett & David L. Kaserman, *The Simple Welfare Economics of Network Externalities and the Uneasy Case for Subscribership Subsidies*, 13 J. REG. ECON. 245, 245–46 (1998).

44. *See* Stanley J. Leibowitz & Stephen E. Margolis, *Network Effects*, *in* 1 HANDBOOK OF TELECOMMUNICATIONS ECONOMICS 94 (M. Caves et al. eds., 2002).

45. *See* John C. Panzar, *A Methodology for Measuring the Costs of Universal Service Obligations*, 12 INFO. ECON. & POL'Y 211, 213 (2000).

46. *See* Barnett & Kaserman, *supra* note 43, at 252–53; Riordan, *supra* note 31, at 431; David L. Kaserman et al., *Cross-Subsidization in Telecommunications: Beyond the Universal Service Fairy Tale*, 2 J. REG. ECON. 231 (1990).

47. *See* Christopher Garbacz & Herbert G. Thompson, *Estimating Telephone Demand with State Decennial Census Data from 1970–1990*, 21 J. REG. ECON. 317, 326 (2002) [hereinafter Garbacz & Thompson (2002)]; Christopher Garbacz & Herbert G. Thompson, *Estimating Telephone Demand with State Decennial Census Data from 1970–1990: Update with 2000 Data*, 24 J. REG. ECON. 373, 376 (2003) [hereinafter Garbacz & Thompson (2003)].

48. *See* CRANDALL & WAVERMAN, *supra* note 6, at 91; Christopher Garbacz & Herbert G. Thompson, *Universal Telecommunication Services: A World Perspective*, INFO. ECON. & POL'Y 495, 497, 506 (2005) [hereinafter Garbacz & Thompson (2005)].

> 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.[49]

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.[50] 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%, bringing 450,000 additional households onto the telephone network.[51]

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 fail to promote universal service.[52] 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 *Report* cites as relevant to "affordability" of telephone service is a 4% decline in the Consumer Price Index for telephone services between 1998 and 2004.[53] 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

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49. Hausman & Shelanski, *supra* note 17, at 39.

50. *See* Jerry Hausman et al., *The Effects of the Breakup of AT&T on Telephone Penetration Rates in the United States*, 83 AM. ECON. REV. 178, 182–83 (1993).

51. *Id.* Garbacz and Thompson 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. Garbacz & Thompson (2002), *supra* note 47; Garbacz & Thompson (2003), *supra* note 47.

52. *See* CRANDALL & WAVERMAN, *supra* note 6, at 94–104. *See generally* Garbacz & Thompson (2005), *supra* note 48.

53. *Report*, *supra* note 20, at 33.

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 of less than $10,000, long distance accounts for more than 40% of average monthly telephone expenditures.[54] In all income classes, long-distance usage is quite variable, with some households using a lot and some very little.[55] It is thus safe to say that many low-income households use a great deal of long-distance service; consequently, the cross-subsidy may actually diminish the welfare of these households.[56] In addition, the local service subsidy funded with access charges 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.[57]

Crandall and Waverman's study found that cross-subsidies from long-distance to local service transfer only $2 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.[58] The authors note, "Regardless of the assumed cost model, this is a very costly income redistribution policy."[59]

C. 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 $5.4 billion on these

54. *See* CRANDALL & WAVERMAN, *supra* note 6, at 48.
55. *Id.* at 49.
56. *Id*. at 49–50.
57. *See id*. at 26.
58. *Id.* at 119–20.
59. *Id.* at 121.

universal service programs in 2004.[60] More than half of this money—$3.5 billion—went to subsidize high-cost carriers, and $759 million (14%) was spent on programs for low-income customers that help pay initial connection charges (Link-Up) and subsidize monthly phone bills (Lifeline).[61] Most of the rest ($1.2 billion, or 22%) subsidized internal wiring, telecommunications, and Internet service to schools and libraries.[62] Thus, about 80% 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 reduced the cost of Internet service to specified types of institutions.

1. 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% for the first two quarters of 2004 and 8.9% for the second two quarters.[63] The FCC proposed a 10.7% contribution factor for the first quarter of 2005, 11.1% for the second quarter, and 10.2% for the third quarter.[64] 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.

Hausman and Shelanski 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

60. *See* INDUS. ANALYSIS & TECH. DIV., FCC, TRENDS IN TELEPHONE SERVICE, 19-5 tbl. 19.1 (2005), http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/trend504.pdf [hereinafter TRENDS IN TELEPHONE SERVICE].

61. *Id.*

62. *Id.*

63. Public Notice, FCC, Proposed First Quarter 2004 Universal Contribution Factor, 18 F.C.C.R. 25111 (2003); Public Notice, FCC, Proposed Second Quarter 2004 Universal Contribution Factor, 19 F.C.C.R. 4052 (2004); Public Notice, FCC, Proposed Third Quarter 2004 Universal Contribution Factor, 19 F.C.C.R. 10194 (2004); Public Notice, FCC, Proposed Fourth Quarter 2004 Universal Contribution Factor, 19 F.C.C.R. 18104 (2004).

64. Public Notice, FCC, Proposed First Quarter 2005 Universal Contribution Factor, 19 F.C.C.R. 24045 (2004); Public Notice, FCC, Proposed Second Quarter 2005 Universal Contribution Factor, 20 F.C.C.R. 5239 (2005); Public Notice, FCC, Proposed Third Quarter 2005 Universal Contribution Factor, 20 F.C.C.R. (forthcoming 2006) (2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-05-1664A1.pdf.

approximately $0.65–0.79 for every dollar of revenue raised.[65] The marginal effect—that is, the effect of additional contributions—is even higher: $1.25 for each additional dollar raised.[66] Thus, in addition to the $1.89 billion that Hausman estimated the program would transfer from consumers of long-distance service to schools and libraries, the program would cost the economy $2.36 billion annually due to reduced output of long-distance service.[67]

It is possible to construct a similar estimate for interstate long distance using FCC data from the most recent year available, 2002. For domestic interstate long distance, federal universal service contributions averaged $0.08 per conversation minute.[68] This price increase raised approximately $2.7 billion in revenues, but it also reduced consumption of long-distance service.[69] 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.[70]

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.[71] Estimates using international data are even higher, in the range of -1.71 to -3.62.[72] Hausman estimated the impact on

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65. Hausman & Shelanski, *supra* note 17, at 42–43.

66. *Id.*

67. Jerry Hausman, *Taxation by Telecommunications Regulation*, *in* 12 TAX POLICY AND THE ECONOMY 29, 31 (James M. Poterba ed., 1998).

68. *See* LANDE & LYNCH, *supra* note 38, at 30. Universal service contribution per interstate domestic conversation minute was calculated by subtracting $0.01 access cost per interstate conversation minute in 2002 from $0.018 total access and universal service contribution per interstate domestic conversation minute in 2002.

69. The $2.7 billion figure is the product of $0.008 per minute universal service contribution times 333.8 billion interstate domestic conversation minutes, as reported. *Id.*

70. *See infra* note 294 for calculation method and data sources. 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.

71. J. Gregory Sidak, Is State Taxation of the Wireless Industry Counterproductive? 19 (2003), http://www.criterioneconomics.com/docs/sidak_pacific_research.pdf. *See also* Jerry Hausman, *Cellular Telephone, New Products, and the CPI*, 17 J. BUS. & ECON. STAT. 188, 191 (1999) (estimating a demand elasticity of approximately -0.5 with 1988–1993 data); Mark Rodini et al., *Going Mobile: Substitutability Between Fixed and Mobile Access* 16–17 (Center for Research on Telecommunications Policy, Working Paper 58), *available* at http://ssrn.com/abstract=379661 (estimating an overall price elasticity of demand of -0.6 with 2000–2001 data).

72. *See* THOMAS W. HAZLETT & ROBERTO E. MUÑOZ, AEI-BROOKINGS JOINT CTR. FOR

the economy of all taxes applied to wireless, including the universal service contributions imposed by the FCC.[73] He calculated that every dollar raised reduced consumer plus producer welfare by approximately $0.53, implying that wireless taxes cost the economy $2.56 billion annually in addition to the $4.79 billion raised annually in the late 1990s.[74] Additional taxes or contributions would, on average, entail a cost of $0.72 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 interstate wireless service raised approximately $1.476 billion in 2004.[75] These assessments created a consumer welfare loss of $48 million and a producer welfare loss of $930 million for a total reduction in economic welfare of $978 million.[76]

2. 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 communication 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.

a. 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 Link-Up programs increase telephone penetration, but by very small amounts.[77] A 10% increase in expenditures would lead to less than a 0.1% increase in the percentage of households with telephones.[78] Studies by the same authors using 2000 census data estimate that Lifeline and Link-Up

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REGULATORY STUDIES, A WELFARE ANALYSIS OF SPECTRUM ALLOCATION POLICIES 15 (2004), http://www.aei-brookings.org/admin/authorpdfs/page.php?id=1024; Gary Madden & Grant Coble-Neal, *Economic Determinants of Global Mobile Telephony Growth*, 16 INFO. ECON. & POL'Y 519, 531 (2004); Garbacz & Thompson (2005), *supra* note 48, tbl. 5 (finding a price elasticity of -0.45 with respect to the monthly charge using 1996-2001 data).

73. *See* Hausman, *supra* note 24.

74. *Id.*

75. *See generally* TRENDS IN TELEPHONE SERVICE, *supra* note 60 (multiplying total universal service outlays in tbl.19.1 by the percentage of contributions from wireless service providers in tbl.19.15).

76. *See infra* note 295 for calculation method and data sources.

77. Christopher Garbacz & Herbert G. Thompson, *Assessing the Impact of FCC Lifeline and Link-Up Programs on Telephone Penetration*, 11 J. REG. ECON. 67, 77 (1997).

78. *Id.*

increase subscription at a cost of $1,581–$2,200 per additional subscription.[79] 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.[80]

More recently, Garbacz and Thompson used the same method to assess the effects of Lifeline and Link-Up separately. They found that Link-Up had no effect on telephone penetration, and Lifeline was responsible for most of the effect they previously attributed to both programs jointly.[81]

A 2004 study confirms these estimates and inferences, finding that Lifeline and Link-Up programs increased total subscribership by about 0.155% in 2000.[82] Overall, the programs cost about $97 per household that receives subsidies, but increased subscribership at a cost of approximately $1,899 per additional subscriber.[83]

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 Link-Up programs sometimes increase and sometimes decrease penetration, depending on the data set used to estimate the relationship.[84]

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 path-breaking 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 voicemail—were the most common reasons that households lacked phone service.[85] Heads of households noted that other family members or friends living with them had run up large usage-related bills in the past,

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79. *See* Garbacz & Thompson (2002), *supra* note 47, at 320, 328; Garbacz & Thompson (2003), *supra* note 47, at 377.

80. Garbacz & Thompson (2002), *supra* note 47, at 328.

81. Garbacz & Thompson (2005), *supra* note 48, at 508 n.14.

82. *See* Daniel J. Ryan, Universal Telephone Service and Rural America 17–18 (Apr. 30, 2004) (unpublished manuscript), http://www.telecom-economics.com/papers/Paper3_02-01-05.pdf.

83. *Id*. at 17–18.

84. *See* CRANDALL & WAVERMAN, *supra* note 6, at 94–104.

85. *See* Milton L. Muller & Jorge Reina Schement, *Universal Service from the Bottom Up: A Study of Telephone Penetration in Camden, New Jersey*, 12 THE INFO. SOC'Y 273, 274 (1996).

often without their knowledge or approval.[86] 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."[87]

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% said they could afford to pay $16 per month, the actual average cost of local service in Texas at the time of the survey.[88] 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.[89]

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;[90] thus, only about 13% of total universal service funding was targeted to low-income recipients. About 6.6 million Lifeline subscribers received an average of $102.55, and 1.7 million Link-Up beneficiaries received one-time payments averaging $18.13.[91] Whether these programs are an 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% of the reduction in economic welfare caused by universal service programs to the low-income programs, then they are responsible for a $278 million reduction in overall economic welfare, or $0.40 per dollar transferred.[92]

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86. *Id.* at 283.

87. *Id*. at 287.

88. *See* John B. Horrigan & Lodis Rhodes, *The Evolution of Universal Service in Texas, Alliance for Public Technology* (Sept. 1995), http://www.apt.org/policy/lbjbrief.html.

89. *Id*.

90. *See* FEDERAL-STATE JOINT BOARD ON UNIVERSAL SERVICE, UNIVERSAL SERVICE MONITORING REPORT, tbl. 2.4 (2004), http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/Monitor/mr04-0.pdf.

91. *Id.* at tbls. 2.1, 2.4.

92. Table 2, *infra*, indicates that universal service contributions from long-distance service generated an excess burden of $1.16 billion, and universal service contributions from wireless generated an excess burden of $978 million, for a total of $2.14 billion. Thirteen percent of $2.14 billion is $278 million. Dividing $278 million by the amount of

b. 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 $3,350 in 1990.[93] The cost of adding one subscriber through local switching support was $5,155, up from approximately $2,000 in 1990.[94] This cost is substantially higher than the $666 estimated by another study for 1985–93.[95]

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 $3.5 billion in 2004.[96] 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 $3.5 billion subsidy actually creates $3.5 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 because long-distance and wireless uses are highly sensitive to price, universal service assessments on those services reduce economic welfare substantially.

c. 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

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money transferred by low-income programs—$700 million—equals 40%.

93. *See* Ryan, *supra* note 82, at 19.

94. *Id*. at 21.

95. *See* R.C. Eriksson et al., *Targeted and Untargeted Subsidy Schemes: Evidence from Post-Divestiture Efforts to Promote Universal Service*, 41 J.L. & ECON. 477, 498 (1998) (using data only for the Bell telephone companies, which receive a small portion of total high-cost support and may not be typical).

96. *See* TRENDS IN TELEPHONE SERVICE, *supra* note 60.

program.[97]

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 98% of schools now have Internet access.[98] 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.[99] 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.[100] Funding is effectively targeted to high-poverty and rural schools.[101] Schools receiving subsidies report increases in deployment of Internet technology.[102] 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.[103]

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 sought to determine whether the technology subsidies have in fact expanded access to the Internet, but it does not purport to assess whether Internet access in schools has improved the quality of education.[104] The Office of Management and Budget's Program Assessment Rating Tool analysis

97. *Report*, *supra* note 20, at 24–25.

98. *See* Anne Cattagni & Elizabeth Farris Westat, U.S. Dep't of Educ., Internet Access in U.S. Public Schools and Classrooms: 1994–2000, (2001), *available at* http://nces.ed.gov/pubs2001/2001071.pdf.

99. *See id.*; *see also* Catrina Williams, U.S. Dep't of Educ., Internet Access in U.S. Public Schools and Classrooms: 1994–99, (2000), *available at* http://nces.ed.gov/pubs2000/2000086.pdf.

100. *See* MICHAEL E. PUMA ET AL., THE URBAN INST., THE INTEGRATED STUDIES OF EDUCATIONAL TECHNOLOGY: A FORMATIVE EVALUATION OF THE E-RATE PROGRAM 21 (2002), *available at* http://www.urban.org/UploadedPDF/410579_ERateFinalReport.pdf.

101. *Id.* at v.

102. *Id.* at vii.

103. *Id*. at app. C.

104. *See id.* at 34.

concludes that the results of this program have not been demonstrated, awarding a score of 7 out of a possible 100 points for results and accountability.[105] The "results not demonstrated" rating means that data or measures are insufficient to permit assessment of whether the program has accomplished intended results.

D. 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.[106] 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.[107] 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."[108]

Wireline carriers were required to introduce local number portability as early as February 1, 1999.[109] Wireless local number portability began on November 24, 2003.[110] The purpose of local number portability is outlined in the Commission's *First Report and Order*: "The ability of end users to

105. OFFICE OF MGMT. AND BUDGET, OTHER INDEPENDENT AGENCIES PART ASSESSMENTS 58-60 (2004), *available at* http://www.whitehouse.gov/omb/budget/fy2005/pma/agencies.pdf.

106. V. Brian Viard, Do Switching Costs Make Markets More or Less Competitive?: The Case of 800-Number Portability 4 (Sept. 9, 2004) (unpublished manuscript), *available at* https://gsbapps.stanford.edu/researchpapers/library/RP1773R2.pdf.

107. 47 U.S.C. § 251(b)(2) (2000). *See also* Telephone Number Portability; CTIA Petitions for Declaratory Ruling on Wireline-Wireless Porting Issues, *Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 18 F.C.C.R. 23697, para. 3 (2003) [hereinafter Telephone Number Portability].

108. 47 U.S.C. § 153(30) (2000). *See* Telephone Number Portability, *supra* note 107.

109. *See* 47 C.F.R. § 52.33(a)(1) (2004); *see also* FCC, CONSUMER INFORMATION: LOCAL TELEPHONE NUMBER PORTABILITY (Jan. 1999), http://www.fcc.gov/Bureaus/Common_Carrier/Factsheets/portable.html.

110. Thomas M. Lenard & Brent D. Mast, *Taxes and Regulation: The Effects of Mandates on Wireless Phone Users*, PROGRESS ON POINT, Oct. 2003, at 10, *available at* http://www.pff.org/issues-pubs/pops/pop10.18wirelessmandates.pdf.

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."[111]

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.[112] 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 technology used by the different providers. FCC staff have noted, "[e]ven if your phone could be reprogrammed to work on a new network, carriers usually don't allow this."[113]

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.

1. 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 intercarrier testing, and implement new business procedures.[114] 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.[115] Local wireline carriers were permitted to implement a charge for local number portability as early as

111. Telephone Number Portability, *First Report and Order and Further Notice of Proposed Rulemaking*, 11 F.C.C.R. 8352, para. 30 (1996) [hereinafter *First Report and Order*].

112. *See A Conversation on Wireless Local Number Portability: Video Updated* (FCC May 24, 2005), http://wireless.fcc.gov/wlnp/ [hereinafter *Conversation*].

113. *See id.*

114. *See* Lenard & Mast, *supra* note 110, at 2 (indicating that these costs originally applied only to wireless local number portability, but wireline carriers will experience these same types of costs).

115. *See Conversation*, *supra* note 112.

February 1999.[116] All other carriers—wireless and wireline—can recover number portability costs however they choose, so long as they do not violate other FCC regulations in the process.[117]

a. Wireline Number Portability

Local wireline carriers have been allowed to collect a local number portability charge since February 1999.[118] In 1999, the FCC approved residential number portability charges for major phone companies that ranged from $0.23 to $0.48 per month.[119] 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 $0.35 per month, per line—the midpoint of the figures allowed by the FCC. Multiplying this figure by the number of incumbent and competitor phone lines yields an annual cost between $762 million in 2003 and $809 million in 2000.[120] The cost peaked in 2000 because the total number of wireline phone lines has fallen every year since then.[121] The total cost over five years is approximately $4 billion.[122]

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

116. 47 C.F.R. § 52.33(a)(1) (2004).

117. *Id.*

118. *Id.*

119. *See* Public Notice, FCC, FCC Investigation Produces Lower Number Portability Charges for Customers of U S West Communications, Inc., (July 9, 1999), http://www.fcc.gov/Bureaus/Common_Carrier/News_Releases/1999/nrcc9043.html.

120. There were 193 million wireline lines in 2000. That number fell to 181 million in 2003. *See* FCC, Local Telephone Competition: Status as of December 31, 2003, tbl.1 (2004),http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/lcom0604.pdf [hereinafter Local Telephone Competition].

121. *Id.*

122. Figure calculated by multiplying $0.35 times annual line counts from 1999–2003 that appear. *Id.*

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 pass-through 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.

b. Wireless Number Portability

Wireless local number portability charges are often opaque because carriers sometimes combine them with other regulatory charges.[123] In mid-2004, Verizon Wireless listed a separate portability charge of $0.40 per month, and one media report pegged Sprint's portability charge at $0.63 per month.[124] The other major carriers lump the portability charge in with other regulatory charges.[125] In November 2004, Verizon Wireless announced that it would eliminate its fee, and Sprint cut its fee to $0.25 per month.[126] Verizon claimed that costs had fallen but also noted the change would make its service more competitive with other carriers.[127] 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

123. *See FCC Urged to Ban 'Misleading' Charges on Phone Bills*, TELECOM. POL'Y REPORT, Mar. 31, 2004, http://www.findarticles.com/p/articles/mi_m0PJR/is_13_2/ai_114794726 (last visited Nov. 19, 2005) (national wireless carriers often list the charge resulting from local number portability with other regulatory charges).

124. *See* Bruce Meyerson, *Verizon Doubles Fee to Keep Number*, MSNBC, Nov. 25, 2003, http://msnbc.msn.com/id/3606462.

125. Fees vary among carriers and have changed over time. Carriers charged the following fees as of July 2004: Cingular charged between $0.56 and $1.25, AT&T charged $1.75, T-Mobile charged $0.86, and Nextel charged $1.55. Yuki Noguchi, *Verizon and Sprint to Cut Fee For Transferring Cell Numbers*, WASH. POST, Nov. 16, 2004, at E05, *available at* http://www.washingtonpost.com/wp-dyn/articles/A52986-2004Nov15.html.

126. *Id.*

127. *Id.*

monthly cost per customer.[128] The study estimated that the upfront costs of portability averaged $0.213 per subscriber per month, amortized over three years.[129] Ongoing costs averaged $0.285 per subscriber per month for the first five years.[130] These figures are consistent with Verizon's and Sprint's charges in July 2004.

The FCC reported that there were 159 million wireless subscribers at the end of 2003 and 182 million at the end of 2004.[131] Average subscribership for 2004 was likely close to 170 million, the midpoint of these two year-end figures. If the cost of wireless local number portability is approximately $0.50 per subscriber per month, the total cost was $6 per subscriber per year, or approximately $1.02 billion. 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 $28 million and reduced producer welfare by approximately $540 million, for a total reduction in economic welfare of $568 million.[132]

Some authors argue that the increased costs to firms associated with customer switching, or "churn," should also be counted as costs of the regulation.[133] Predicted rates of churn would increase the cost per customer by $1 or more per month.[134] 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.

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

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128. *See* Lenard & Mast, *supra* note 110, at 14.

129. *Id.* at tbl. 3.

130. *Id*. at 19.

131. *See* Implementation of Section 6002(b) of the Omnibus Budget Reconcilitation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Tenth Report*, 20 F.C.C.R. (forthcoming 2006), tbl 2 (2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-05-173A1.pdf [hereinafter *Tenth Report*].

132. For calculation method and data sources see *infra* note 296.

133. *See* Lenard & Mast, *supra* note 110, at 20–22.

134. *Id.*

wireless is already highly competitive, 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.

2. 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 *Report* describes number portability as "an important step in promoting competition and customer choice."[135] The *Report*'s outcome indicators for competition show the following statistics: (1) the percentage of U.S. population in areas with three or more wireline providers rose from 67% in 2000 to 84% in 2003; (2) the percentage of the U.S. population in areas with three or more wireless providers rose from 91% in 2000 to 97% in 2003; (3) the Consumer Price Index for telephone service fell by 4% between January 1998 and May 2004; and (4) the average price of wireless telephone calls fell from $0.18 per minute in 2000 to $0.10 per minute in 2003.[136]

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's *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

135. *Report*, *supra* note 20, at 32.

136. *Id*. at 32–33.

> service providers if they had to change their telephone numbers. Time Warner Holdings states that consumers are 40 percent less likely to change service 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' prices in order to induce customers to switch carriers due to customers' resistance to changing numbers.[137]

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 submarkets 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."[138] On the other hand, switching costs may intensify rivalry for new customers because it is 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 starts out monopolized.[139]

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.[140] Another finds that lowering the price that U.S.

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137. *First Report and Order*, *supra* note 111, para. 29 (citations omitted).

138. *See* Paul Klemperer, *Markets with Consumer Switching Costs*, 102 Q.J. ECON. 375, 377 (1987).

139. *See id.*

140. *See* Christopher R. Knittel, *Interstate Long Distance Rates: Search Costs, Switching*

consumers pay when they switch long-distance carriers from $5 to $2—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.[141] This kind of change is similar to 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%.[142] This result implies that the procompetitive 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.[143] The FCC did, however, cite media and analyst reports suggesting that wireless firms launched aggressive customer retention efforts when portability was imminent.[144]

Raw FCC data show that porting of telephone numbers has steadily increased.[145] The number of numbers ported to a wireline carrier rose from 80 in 1997 to 6.8 million in 2003.[146] Wireless portability started in November 2003, and 807,802 numbers were ported to wireless carriers in the fourth quarter of 2003.[147] These figures are a small fraction of the 180 million landlines and 157 million wireless lines reported for the year.[148] 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 determine whether portability caused any price reductions or other consumer benefits to occur.

Costs, and Market Power, 12 REV. INDUS. ORG. 519 (1997).

141. *See* Douglas A. Galbi, *Regulating Prices for Shifting Between Service Providers*, 13 INFO. ECON. & POL'Y 181, 194–96 (2001).

142. Viard, *supra* note 106, at 17.

143. *See Tenth Report*, *supra* note 131, para. 165.

144. *Id*.

145. *See* TRENDS IN TELEPHONE SERVICE, *supra* note 60, at 8–11 tbl. 8.8.

146. *Id.*

147. *Id*.

148. *See* Local Telephone Competition, *supra* note 120.

E. Enhanced 911 Service

Basic 911 service requires wireline and wireless carriers to route 911 calls to a "Public Safety Answering Point."[149] Enhanced 911 requires the carrier to identify the caller's location to emergency dispatchers.[150]

1. 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 $0.61 per subscriber per month during the first five years.[151] Multiplying this figure by the estimated average of 170 million subscribers in 2004 yields a total annual cost of $1.25 billion. If this cost is passed through to consumers, the price increase would reduce consumer welfare by $34 million annually and reduce producer welfare by $659 million annually, for a total annual reduction in economic welfare of $693 million.[152]

In May 2005, the FCC decided that Voice over Internet Protocol ("VoIP") providers must include enhanced 911 as part of their standard service package.[153] No cost estimates are available for this mandate. The FCC surely reduced the cost by declining to require VoIP providers to automatically identify the customer's location. For the time being, the customer is responsible for inputting and updating this information.[154]

2. Outcomes

To assess the outcome of its wireless 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.[155] This figure grew by 444%—from

149. Lenard & Mast, *supra* note 110, at 34.

150. *Id.*

151. *Id.* at 38.

152. *Infra* note 298 (describing the calculation method and data sources).

153. *See* Public Notice, FCC, Commission Requires Interconnected VoIP Providers to Provide Enhanced 911 Service (May 19, 2005), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-258818A1.pdf.

154. *Id.*

155. *Report*, *supra* note 20, at 59.

350 to 1,904—between February 2003 and August 2004.[156] 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.[157] It examines effects solely for cardiac patients, for whom timeliness of emergency care can be a crucial survival factor.[158] 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.[159] Enhanced 911 reduced the risk of death within six hours of the emergency phone call by 60%, and reduced the risk of death within 48 hours by 35%.[160] 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.[161] In addition, adoption of either basic or enhanced 911 lowered hospitals' average total costs of treating cardiac patients by 16%—about $1,000 per patient, or $304,000 for the average county.[162] The combination of risk and cost reduction suggests that enhanced 911 reduced the need for more extensive treatment by enabling patients to receive care sooner. Since cardiac emergencies account for less than 10% of all 911 calls, these figures suggest that the benefits of wireline 911 are substantial.[163] 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.[164]

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.[165]

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156. *Id*.

157. *See* Susan Athley & Scott Stern, *The Impact of Information Technology on Emergency Health Care Outcomes*, 33 RAND J. ECON. 399 (2002).

158. *Id.* at 401.

159. *Id.* at 400.

160. *Id.* at 427.

161. *Id.* at 428.

162. *See id.* at 427–28.

163. *Id*. at 428.

164. Sue A. Joslyn et al., *Survival from Out-of-Hospital Cardiac Arrest: Effects of Patient Age and Presence of 911 Emergency Medical Services Phone Access*, 11 AM. J. EMERGENCY MED. 200, 203 tbl. 5 (1993).

165. *See* Lenard & Mast, *supra* note 110, at 39–40.

F. Miscellaneous Wireless Mandates

Two other regulatory mandates currently have more of an effect on the cost of wireless service than on the cost of wireline service: number pooling and CALEA. The FCC started wireless number pooling in November 2002.[166] 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.[167] 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.

1. Number Pooling

Number pooling means the assignment of wireless phone numbers to companies in blocks of 1,000 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 $0.168 per customer per month during the first five years.[168] Multiplying this figure by the estimated average number of subscribers in 2004 yields a total annual cost of $348 million. If this cost is passed through to consumers, the price increase would reduce consumer welfare by $9.5 million annually and reduce producer welfare by $184 million annually, for a total annual reduction in economic welfare of $193 million.[169] We found no estimates of the benefits of number pooling.

166. *See id.* at 23.
167. *Id.* at 29.
168. *See id*. at 27.
169. *Infra* note 299 (describing the calculation method and data sources).

2. CALEA

CALEA requires telecommunications firms to modify their networks to permit electronic surveillance by law enforcement officials.[170] The estimated monetary cost is $0.238 per customer per month during the first five years.[171] Multiplying this figure by the estimated average number of subscribers in 2004 yields a total annual cost of $491 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 $259 million annually, for a total annual reduction in economic welfare of $273 million.[172] No estimates are available of the additional costs borne by law-abiding citizens who have their privacy invaded unnecessarily.[173]

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.[174] The FCC's *Report* mentions CALEA-related activities but provides no information about relevant outcomes.[175] 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.

G. 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.[176] 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

170. Lenard & Mast, *supra* note 110, at 27–28.

171. *See id*. at 29.

172. *See infra* note 300 (describing the calculation method and data sources).

173. *See id*. at 30.

174. *Id*. at 30–33.

175. *Report*, *supra* note 20, at 56.

176. Electromagnetic spectrum, http://en.wikipedia.org/wiki/Electromagnetic_spectrum (last visited Nov. 19, 2005).

spectrum.[177] 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.[178] 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.[179] The methods used to award licenses prior to auctions cost consumers billions of dollars due to delayed adoption of wireless communications services.[180] Lottery entrants, for example, had to manufacture applications that "proved" they were qualified to operate wireless telecommunications systems, at a cost of $500 million to $1 billion between 1986 and 1989.[181] Most licenses awarded by lottery were then resold. Auctions eliminated such waste. 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 on his proposal before the FCC in 1959, "Is this all a big joke?"[182]

Spectrum has not, however, been privatized; the auction winners simply get to operate equipment that uses the spectrum for specified purposes.[183] Formally, spectrum is owned in common by the American

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177. Thomas W. Hazlett et al., *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* 102 (AEI-Brookings Joint Ctr. on Regulatory Studies, Working Paper No. 01-02, Jan. 2001), *available at* http://www.aei-brookings.org/admin/authorpdfs/page.php?id=140.

178. *Id.* at 40 (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.").

179. *Id.* at 41.

180. *See id*. at 41; *see also* FCC Report to Congress on Spectrum Auctions, *Report*, 13 F.C.C.R. 9601, 9612–14 (1997) [hereinafter *Spectrum Auctions Report*].

181. *See* Hazlett et al., *supra* note 177, at 111.

182. *Id*. at 5.

183. *See* Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, *Comments of 37 Concerned Economists* 3 (Feb. 7, 2001), *available at* http://www.aei-brookings.org/admin/authorpdfs/page.php?id=176, which states:

> [A]uctions for licenses have not changed the underlying system of spectrum allocation. Radio frequencies are allocated to services by an FCC rule 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

public, and the FCC merely regulates its use by issuing licenses.[184] 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.[185]

1. 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.[186] Defense and local government get to use large

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> only as allocated and no price can be offered to reallocate it from the officially designated use.

See also Hazlett, *supra* note 177, at 102, which states:

> Indeed, to be issued an FCC license, an applicant must first certify that it will not assert any propertied 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.

(citations omitted).

184. *See* Hazlett et al., *supra* note 177, at 41–42.

185. *See generally* Lawrence M. Ausubel et al., *Synergies in Wireless Telephony: Evidence from the Broadband PCS Auctions*, 6 J. ECON. & MGMT. STRATEGY 497 (1997); Mark M. Bykowski et al., *Mutually Destructive Bidding: The FCC Auction Design Problem*, 17 J. REG. ECON. 205 (2000); Peter Cramton, *Spectrum Auctions*, *in* 1 HANDBOOK OF TELECOMMUNICATIONS ECONOMICS 605 (Martin Cave et al. eds., 2002); Thomas W. Hazlett, *Spectrum Flash Dance: Eli Noam's Proposal for 'Open Access' to Radio Waves*, 41 J.L. & ECON. 805 (1998); HAZLETT & MUÑOZ, *supra* note 72; Evan R. Kwerel & Gregory L. Rosston, *An Insiders' View of FCC Spectrum Auctions*, 17 J. REG. ECON. 253 (2000); ANTHONY M. KWASNICA ET AL., INTERDISCIPLINARY CENTER FOR ECONOMIC SCIENCE, A NEW AND IMPROVED DESIGN FOR MULTI-OBJECT ITERATIVE AUCTIONS (2002), http://www.ices-gmu.org/pdf/materials/372.pdf; Patrick S. Moreton & Pablo T. Spiller, *What's In the Air: Interlicense Synergies in the Federal Communications Commission's Broadband Personal Communication Service Spectrum Auctions*, 41 J.L. & ECON. 677 (1998); DAVID PORTER ET AL., INTERDISCIPLINARY CENTER FOR ECONOMIC SCIENCE, COMBINATORIAL AUCTION DESIGN (2003), http://www.ices-gmu.net/pdf/materials/419.pdf; DAVID PORTER, INTERDISCIPLINARY CENTER FOR ECONOMIC SCIENCE, AN EXPERIMENTAL EXAMINATION OF DEMAND REDUCTION IN MULTI-UNIT VERSIONS OF THE UNIFORM-PRICE, VICKREY, AND ENGLISH AUCTIONS, http://www.ices-gmu.net/pdf/materials/403.pdf; *Spectrum Auctions Report*, *supra* note 180.

186. *See* Evan Kwerel & John Williams, *A Proposal for a Rapid Transition to Market Allocation of Spectrum* 4 (Office of Plans and Policy, Working Paper No. 38, 2002), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228552A1.pdf. *See also* Arthur De Vany, *Implementing a Market-Based Spectrum Policy*, 41 J.L. & ECON. 627 (1998).

blocks of spectrum for free, and as a result such spectrum is often used inefficiently.[187] 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 instances, 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.[188]

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.[189] 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.[190] 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.[191]

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187. *See* Jerry Hausman, *From 2G to 3G: Wireless Competition for Internet-Related Services*, *in* BROADBAND: SHOULD WE REGULATE HIGH-SPEED INTERNET ACCESS? 106, 120–21 (Robert W. Crandall & James H. Alleman eds., 2002).

188. FCC, SPECTRUM POLICY TASK FORCE REPORT 16 (2002), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228542A1.pdf. *See also* FCC, SPECTRUM POLICY TASK FORCE: ONE YEAR LATER 7 (2003) (updating the FCC initiatives implementing the Task Force's recommendations as of 2003), http://www.fcc.gov/sptf/files/presentation-111303.pdf.

189. *See* EVAN KWEREL, FCC, SPECTRUM AUCTIONS DO NOT RAISE THE PRICE OF WIRELESS SERVICES: THEORY AND EVIDENCE (2000), http://wireless.fcc.gov/auctions/data/papersAndStudies/SpectrumAuctionsDoNotRaisePrices.pdf.

190. Robert W. Crandall & Jerry A. Hausman, *Competition in U.S. Telecommunications Services: Effects of the 1996 Legislation*, *in* DEREGULATION OF NETWORK INDUSTRIES: WHAT'S NEXT? 102 (Sam Peltzman & Clifford Winston eds., 2000).

191. *Id.* at 102–03.

Between 1984 and 1995, when there were just two cell phone companies per market, inflation-adjusted rates fell by an average of between 3 and 4% annually.[192] Entry of new competitors prompted price reductions averaging 17% annually between 1995 and 1999.[193] More recent trends show up in the U.S. Bureau of Labor Statistics' index of wireless telecommunications prices, which begins in 1997. During the past six years, inflation-adjusted wireless prices have fallen by approximately 40%.[194] 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.[195]

Currently, approximately 170 MHz of radio spectrum are used for wireless service.[196] 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.[197] The FCC regained these licenses and reauctioned them in early 2005.[198]

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.[199] Even the larger figure represents only 23% of the most valuable spectrum.[200] A 2004 study estimates the effect on consumer welfare of reallocating up to 200 MHz of that spectrum to mobile phone service.[201] Industry sources have suggested that 200 MHz would be needed to complete nationwide rollout of "third generation" wireless services.[202] The per-minute price of wireless service would fall by 50%, generating an increase in consumer welfare of $77.4 billion per year.[203]

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192. *Id.* at 103.

193. *Id*.

194. ROBERT W. CRANDALL & JERRY ELLIG, TEXAS PUBLIC POLICY FOUNDATION, TEXAS TELECOMMUNICATIONS: EVERYTHING'S DYNAMIC EXCEPT THE PRICING 10 (2005), http://www.texaspolicy.com/pdf/2005-01-telecom.pdf.

195. *See* Hausman, *supra* note 15, at 2.

196. *See* Thomas W. Hazlett et al., U.S. CHAMBER OF COMM., SENDING THE RIGHT SIGNALS: PROMOTING COMPETITION THROUGH TELECOMMUNICATIONS REFORM 69 (2004), http://www.uschamber.com/NR/rdonlyres/et3cydgjplrxcg7goxb5tlflazo2tw5hghhyplt7cu6wooge3bcnpqzx4bjeqb7ws5xqmgohikgclahnl77gydqmnvb/0410_telecommstudy.pdf.

197. Hazlett et al., *supra* note 177, at 122–24.

198. For full information on "Auction 58," as this auction is known at the FCC, see http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=58.

199. *See* Kwerel & Williams, *supra* note 186.

200. *See id*.

201. *See* Hazlett et al., *supra* note 196, at 69.

202. *Id.* at 100.

203. *Id.* at 69.

From the data and results in this study, one can also calculate the separate effects on consumers and producers. A 50% price reduction would save consumers approximately $54 billion on the amount of wireless service they used in 2003.[204] Consumers would gain an additional $23.4 billion from the increased wireless usage that would accompany the price reduction.[205] The increased usage would also increase wireless firms' profits by about $6.6 billion, for a total increase in economic welfare, or reduction in excess burden, of $30 billion.[206] 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.[207] 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. The firms most likely to gain from more 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.[208] This range exceeds the most recent measures of the elasticity calculated using U.S. data, which range between -1.12 and -1.29.[209] 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.[210] More fundamentally, the

204. For calculation methods and data sources see *infra* note 301.
205. *Id.*
206. *Id.*
207. *Id.*
208. HAZLETT & MUÑOZ, *supra* note 72, at 15.
209. *See* Sidak, *supra* note 71, at 19.
210. *See* Public Notice, FCC, FCC to Commence Spectrum Auction that will Provide

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 by 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 decide 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 these varied uses would suggest that the advantages to be derived from relying on the pricing mechanism would be especially great in this case.[211]

The FCC's mid-2004 decision regarding 190 MHz of spectrum allocated for use by educational institutions and wireless cable illustrates the difference.[212] On the one hand, the decision gives license holders greater flexibility in leasing spectrum to others and expanding new uses, such as wireless broadband.[213] 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.[214] 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 procedures would occur through market transactions.

Under market-based allocation, the FCC, a court, or another

American Consumers New Wireless Broadband Services (Dec. 29, 2004) (auctioning 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), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-255802A1.pdf [hereinafter Spectrum Auction Public Notice].

211. R. H. Coase, *The Federal Communications Commission*, 2 J.L & ECON. 1, 16 (1959).

212. *See* Amendment of Parts 1, 21, 73, 74, and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, *Report and Order and Further Notice of Proposed Rulemaking*, 19 F.C.C.R. 14165 (2004).

213. *Id.* para. 6.

214. *Id*.

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.

2. Outcomes

The FCC's strategic goal for spectrum is to "[f]acilitate 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."[215] Performance goals focus on efficient and effective use of spectrum, deployment of new technologies and services, and promotion of ease of access to spectrum by more users.[216] The FCC's *Report* offers two outcome indicators. The first, increasing the number of approvals for enhanced telecommunications equipment, is actually an output measure, but the *Report* argues this is a leading indicator of new devices on their way to the market.[217] 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% increase.[218] 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 FCC 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 the spectrum in a timely fashion.[219] 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.[220]

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

215. *Report*, *supra* note 20, at 11.
216. *Id.*
217. *Id.* at 38.
218. *Id.* at 40.
219. *Id.*
220. *Id*. at 40–41.

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, Senator C. C. Dill, said it meant: "It covers just about everything."[221] 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.[222] 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%.[223] A more liberal spectrum regime is also associated with lower retail prices for wireless service.[224]

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.[225] 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.[226] However, the chaos during that period resulted from courts interpreting the 1912 Radio Act to prevent the Commerce Department from issuing exclusive licenses for particular wavelengths in

221. *See* Hazlett et al., *supra* note 177, at 43; HAZLETT & MUÑOZ, *supra* note 72.

222. *See* Hazlett et al., *supra* note 177.

223. *See* Thomas W. Hazlett, *Property Rights and Wireless License Values* 4 (AEI-Brookings Joint Center for Regulatory Studies, Working Paper No. 04-08, 2004), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=519602. Four countries—Australia, New Zealand, Guatemala, and El Salvador—leave these decisions to the license holder rather than the regulator. *Id.*

224. *Id*. at 25.

225. Hazlett et al., *supra* note 177, at 19.

226. *See e.g.*, Coase, *supra* note 211, at 5.

order to prevent interference.[227] The problem during that period was the absence of *any* method for preventing interference in the use of frequencies. 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 asserting any ownership claim over the airwaves.[228] 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*.

H. 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.[229] 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 legislation that 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

227. *Id.* at 4–5.

228. *Id*. at 6 (citations omitted).

229. *See* Public Notice, FCC, International Bureau Seeks Public Comment on Proposals to Permit Reducing Orbital Spacings Between U.S. Direct Broadcast Satellites, 18 F.C.C.R. 25683 (2003).

> 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.[230]

The *Report* mentions several satellite-related projects and initiatives but offers no outcome goals or measures focused specifically on satellites.[231] 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.

I. Unbundled Network Elements

The Telecommunications Act of 1996 requires incumbent telephone companies to lease parts of their networks, "unbundled network elements," to competitors at regulated rates.[232] 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.[233] 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 required incumbents to lease the entire set of network elements necessary to provide local service, the "unbundled network element platform."[234] Leasing the unbundled network element platform is equivalent to buying the incumbent's service at a wholesale discount. In December 2004, the FCC effectively decided to stop forcing incumbents to lease the unbundled network element platform to competitors after a one-year

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230. 47 U.S.C. § 765(f) (2000).

231. *See generally Report*, *supra* note 20.

232. 47 U.S.C. § 251(c)(3) (2000).

233. Jerry Ellig & James Nicholas Taylor, *The Opportunity Costs of Unbundled Network Element Platform Regulation* 2 (Mercatus Center, Working Paper, 2004), *available at* http://www.mercatus.org/pdf/materials/980.pdf.

234. Unbundled Access to Network Elements, Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, *Order on Remand*, 20 F.C.C.R. 2533 (2005) at note 526. [hereinafter Unbundling Obligations]. The unbundled network element platform has generated substantial debate. For a more detailed discussion, see Ellig & Taylor, *supra* note 233.

transition period.[235] 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.[236] Proceedings to calculate TELRIC prices have generated significant disagreement.[237]

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.[238] Price and quantity data for more complex services to businesses, or service to large businesses, are often confidential.

1. Costs

The Telecommunications Act mandated wealth transfers from the incumbents. These transfers create 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.[239] 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 sold below cost.[240] And by mandating price reductions for unbundled network elements, policymakers forego the opportunity to reduce the prices of services that have traditionally been "taxed," such as long distance and wireless, in order to subsidize local service.[241] 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

235. *See generally* Unbundling Obligations, *supra* note 234, paras. 199–219.

236. *See* Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, *Report and Order and Order on Remand and Further Notice of Proposed Rulemaking*, 18 F.C.C.R. 16978, para. 669 (2003) [hereinafter Review of Section 251].

237. *See id.* para. 675. In 2003 the FCC began a proceeding to reconsider how the TELRIC pricing methodology deals with the firm's cost of capital and depreciation. *Id*.

238. *See* Ellig & Taylor, *supra* note 233.

239. *See* CRANDALL & WAVERMAN, *supra* note 6, at 9–10.

240. Ellig & Taylor, *supra* note 233.

241. *See* CRANDALL & WAVERMAN, *supra* note 6, at 20–21.

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.

In a recent book, Robert Crandall examines the effects of the Telecommunications Act's unbundling provisions.[242] 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.[243] These benefits come at an opportunity cost. Instead of transferring the money to consumers by mandating low unbundled network element prices, regulators could have reduced 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.[244] Overall economic welfare would have increased by $5.9 billion.[245] Thus, the opportunity costs of unbundling have been substantial, and they should be weighed against any savings consumers received.

For purposes of regulatory accounting, it is necessary to determine whether these opportunity costs are new, or if they are 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

242. ROBERT W. CRANDALL, BROOKINGS INST., COMPETITION AND CHAOS: U.S. TELECOMMUNICATIONS SINCE THE 1996 TELECOM ACT, (2005).

243. *Id.* at 54, 56.

244. For calculation methods and data sources see *infra* note 302.

245. *Id*. The calculations assume that unbundling resulted in a dollar-for-dollar transfer from incumbent phone companies to consumers. Ellig & Taylor, 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. *See* Ellig & Taylor, *supra* note 233. *See generally* CRANDALL & ELLIG, *supra* note 194 (analyzing intrastate issues).

schemes.[246]

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% below competitive levels, depending on the specific network element.[247] 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 above is likely a new cost, in addition to previously estimated inefficiencies of access charges and universal service policies.

2. Outcomes

The desirable outcomes associated with unbundling would be increased competition and, ultimately, the lower prices or other consumer benefits that competition traditionally brings. The FCC's *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.[248] By these measures, competition has increased and prices have fallen over the past several years.[249] The *Report* does not offer evidence of a causal link between the FCC's unbundling policies and these favorable trends.

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246. For discussion, see Part IV.B & C, *supra*, on Long-Distance Access Charges and Universal Service Funding, respectively.

247. *See* Ellig & Taylor, *supra* note 233.

248. *Report*, *supra* note 20, at 32–33.

249. *Id*.

FCC statistics reported elsewhere show that the number of lines served by competitors using unbundled network elements rose from about 2 million in 1999 to almost 19 million in June 2004.[250] These lines accounted for 61% of all competitors' lines in 2004.[251] 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.[252] Facilities-based lines fell from 33% of competitors' lines in 1999 to 23% in June 2004.[253] The remaining 16% of competitors' lines are resold pursuant to other provisions of the Telecommunications Act, discussed *infra,* Part IV.J.

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.[254] Loops are arguably the most likely network element to be a natural monopoly. They found that regulated loop prices prompt competitors to lease loops rather than build their own.[255]

Employing 1997–2000 data from markets where the Bell companies are the incumbents, Eisner and Lehman found 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.[256] 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.[257] 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 rates are not a logical finding given that business rates are usually higher than residential rates.[258]

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250. *See* LOCAL TELEPHONE COMPETITION, *supra* note 148, at tbl. 3.

251. *Id.*

252. For calculation of data, see *id.* at tbls. 3, 5.

253. *Id*. at tbl. 3.

254. *See* Robert W. Crandall et al., *Do Unbundling Policies Discourage CLEC Facilities-Based Investment?*, 4 TOPICS IN ECON. ANALYSIS & POL'Y 1136 (2004).

255. *Id*. at 1138.

256. *See* James Eisner & Dale E. Lehman, Presentation at the 14th Annual Conference Center for Research in Regulated Industries: Regulatory Behavior and Competitive Entry B3 (June 28, 2001), http://www.aestudies.com/library/elpaper.pdf.

257. *Id.*

258. *Id.*

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.[259] There was no difference in performance between competitors targeting business or residential customers.[260] 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.[261] 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. The results 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.[262] It is doubtful that unbundling has reduced the price of basic local telephone service.[263]

Crandall offers the most recent comprehensive estimate of the benefits of unbundling. 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.[264] Because 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.[265] Thus, the total benefits of unbundling to telecommunications users total $10.5 billion.[266]

These benefits are less than the $11.1 billion opportunity cost to

259. *See generally* Robert W. Crandall, *An Assessment of the Competitive Local Exchange Carriers Five Years after the Passage of the Telecommunications Act*, CRITERION ECONOMICS, Jan. 2002, http://www.criterioneconomics.com/docs/Crandall%20CLEC.pdf.

260. *Id.* at 41–42.

261. *Id.* at 41.

262. *See* Crandall, *supra* note 242, at 44; Ellig & Taylor, *supra* note 233.

263. *See* Crandall, *supra* note 242, at 44; Ellig & Taylor, *supra* note 233.

264. Crandall, *supra* note 242, at 54.

265. *Id.* at 56.

266. *Id.* at 56.

consumers calculated in Part IV.J.1, *supra*. 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 total about $8.9 billion annually, for a total of $16.9 billion.[267] 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.[268]

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.[269] 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. 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.

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.

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267. *Id.* at 54–56 (reporting 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).

268. $16.9 billion in costs divided by $9.7 billion transferred to consumers equals $1.74 per dollar transferred $16.9 billion in costs divided by $800 million in consumer surplus equals $21 per dollar of consumer surplus.

269. *See* Ellig & Taylor, *supra* note 233 (discussing the limitations of these studies).

J. Resale of Incumbent's Services

Resale is provided for in section 251(c)(4) of the Telecommunications Act.[270] 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 . . . ."[271] 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 . . . ."[272] 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.[273]

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.[274] 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%.[275] In most cases, regulated wholesale discounts have averaged between 15 and 25%.[276]

1. 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 policy redistributed between $4.5 million and $21 million from

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270. 47 U.S.C. § 251(c)(4) (2000).

271. § 251(c)(4)(A).

272. § 251(c)(4)(B).

273. 47 U.S.C. § 252(d)(3) (2000).

274. *See*, *e.g.*, Yale M. Braunstein, UNE-P Benefits in Verizon's New Jersey Territory (Mar. 2004) (unpublished manuscript, University of California, Berkeley), http://sims.berkeley.edu/~bigyale/UNE/UCB_NJ_UNE_study_Mar_2004.pdf.

275. *See* Crandall, *supra* note 259, at 32.

276. Crandall & Hausman, *supra* note 190, at 84.

incumbents to competitors in 2004.[277] 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.[278]

2. 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 it 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.[279] 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.[280]

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.[281] Competitors' numbers are somewhat different; they reported acquiring 3.5 million resold lines in December 1999, rising to 5.1 million in June 2004.[282] 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% in December 1999 to 16.1% in June 2004.[283]

One explanation is that wholesale discounts are not large enough to

277. For calculation method and data sources see note 303, *infra*.
278. *See id*.
279. *See* Eisner & Lehman, *supra* note 256, at B2–B3.
280. *See* Crandall, *supra* note 254, at 4–5.
281. *See* LOCAL TELEPHONE COMPETITION, *supra* note 148, at tbl. 4.
282. *Id.* at tbl. 3.
283. *Id*.

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 unbundled network element platform's regulated prices, which are equivalent to wholesale discounts of more than 45%, have made unbundling more attractive than resale from the perspective of competitors.[284] 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.[285] Therefore, resale is not a very attractive option for these competitors. 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."[286]

V. CONCLUSION

Federal telecommunications regulation costs consumers at least $25 billion annually in forgone consumer surplus, or as much as $100 billion if one includes the wealth transfers as a cost to consumers.[287] Total deadweight loss is approximately $42 billion annually. If all of the wealth transfer is counted as a cost, the total social cost is approximately $118 billion annually.

The costs associated with federal telecommunications regulation far exceed the FCC's estimated expenditures in fiscal year 2004. 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.

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

284. *See* Robert S. Pindyck, *Mandatory Unbundling and Irreversible Investment in Telecom Networks* 7 (Verizon Communications, Inc., Working Paper No. 10,287, 2004), http://web.mit.edu/rpindyck/www/VZ.UNE.Pindyck0104.pdf.

285. *See* Crandall, *supra* note 254, at 23–32.

286. *Id.* at 42.

287. The total figures are sums of the costs of individual regulations; thus, they ignore any interactions between regulations. *See* Table 2, *infra*.

from wholesale overhaul of spectrum policy would be huge. If the actual costs of U.S. spectrum allocation policy were only one-tenth the size that scholars estimate, they would still account for more than 20% of the total consumer cost of federal telecommunications regulation.[288]

Federal telecommunications regulation redistributes wealth 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 Table 2, *infra*, 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% 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 some of the 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.[289] 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.[290] The effect of this decision on competition will ultimately depend on how Congress and the FCC treat emerging competitors, such as VoIP and wireless.

Research on outcomes is much less extensive than research on costs. One regulation, enhanced 911, has clear evidence of positive outcomes. Enhanced 911 significantly reduces both cardiac risk and hospital costs, and these benefits likely exceed the costs of the regulation.

Some regulations achieve positive outcomes, but not very effectively. There is some evidence that universal service programs may increase telephone subscriptions, but at a cost of thousands of dollars annually per additional subscriber. Regulations requiring incumbent local telephone

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288. Jerry Ellig, The Economic Cost of Spectrum Misallocation: Evidence from the United States (June 9–10, 2005) (unpublished manuscript, on file with Author and the *Federal Communications Law Journal*).

289. *See* Spectrum Auction Public Notice, *supra* note 210.

290. *See generally* Unbundling Obligations, *supra* note 234.

companies to lease the local network to competitors transfer $9.7 billion annually to consumers and businesses, but much less effectively than alternative policies. Such regulations also reduce competitors' investments in building their own networks, undermining the FCC's oft-articulated goal of encouraging facilities-based competition.

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, satellite regulation, or CALEA for wireless communications.

The FCC's *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 regulation.

Despite the gaps in knowledge, the empirical research on the effects of federal telecommunications regulation is impressive in its scope and sophistication. If such studies can help achieve even a small percentage reduction in regulatory costs or improvement in regulatory outcomes, the benefits to society will likely outweigh the costs of the data collection and research.

TABLE 2: COSTS OF FEDERAL TELECOMMUNICATIONS REGULATION

Regulation	Outlays or Wealth Transfer	Forgone Consumer Surplus	Total Cost to Consumers	Value of Forgone Output	Wealth transfer Plus Forgone Output	Excess Burden %
FCC outlays 2004[291]	$361,000,000	N.A.	N.A.	$144,000,000	$505,000,000	40
FCC net cost of 3 strategic goals[292]	$1,200,000,000	N.A.	N.A.	$480,000,000	$1,680,000,000	40
Interstate Long-Distance Access Charges 2002[293]	$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[294]	$2,700,000,000	$240,000,000	$2,940,000,000	$1,160,000,000	$3,860,000,000	43
Wireless 2004[295]	$1,760,000,000	$48,000,000	$1,808,000,000	$978,000,000	$2,738,000,000	56
International	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Local Number Portability						
Wireline 2003[296]	$762,000,000	$0	$762,000,000	$0	$762,000,000	0
Wireless 2004[297]	$1,023,000,000	$28,000,000	$1,051,000,000	$568,000,000	$1,590,000,000	56
Enhanced 911						
Wireline 2004	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Wireless 2004[298]	$1,248,000,000	$34,000,000	$1,282,000,000	$693,000,000	$1,940,000,000	56
Misc. Wireless						
Number pooling 2004[299]	$348,000,000	$9,500,000	$357,500,000	$193,000,000	$541,000,000	56
CALEA 2004[300]	$491,000,000	$13,000,000	$504,000,000	$273,000,000	$764,000,000	56

Spectrum allocation 2004[291]	$54,000,000,000	$23,400,000,000	$77,400,000,000	$30,000,000,000	$84,000,000,000	56
Telephone Unbundling						
Unbundled Net. Elements 2003[292]	$9,700,000,000	$1,400,000,000	$11,100,000,000	$5,900,000,000	$15,600,000,000	61
Resale 2003[293]	$21,000,000	$6,911	$21,006,911	$14,000,000	$35,000,000	67
Total	$76,553,000,000	*$25,472,506,911*	*$100,825,506,911*	$41,709,000,000	$118,262,000,000	
Total excluding FCC spending	$75,353,000,000	*$25,472,506,911*	*$100,825,506,911*	$41,229,000,000	$116,582,000,000	
Total excluding spectrum and FCC spending	$21,353,000,000	$2,072,506,911	$23,425,506,911	$11,229,000,000	$32,582,000,000	

Italicized figures in each column are the same because estimates for some items that would make them different are unavailable.
N.A. = Not available.

291. Outlays: *See* DUDLEY & WARREN, *supra* note 23. Value of forgone output: Assumes each dollar of outlay generated an excess burden of $0.40. *See* Hausman, *supra* note 24, at 17 tbl. A-1. Excess burden percentage is from Hausman. *Id.* at 740.

292. Outlays: *Report*, *supra* note 20, at 115. Value of forgone output: Assumes each dollar of outlay generated an excess burden of $0.40 and excess burden percentage is from Hausman, *supra* note 24.

293. Wealth transfer: $0.01 per minute access charge times 333.8 billion interstate domestic long-distance minutes. LANDE & LYNCH, *supra* note 38. Forgone consumer surplus: Calculated assuming price of $0.07 per minute and demand elasticity of -0.7. *See id.* Elasticity estimate: Riordan, *supra* note 31, at 436. Value of forgone output: Assumes marginal cost equals .25·p. *See* Hausman & Shelanski, *supra* note 17, at 42. To accurately measure 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 to access charges and universal service contributions in proportion to their share of the total price change. Excess burden percentage is value of forgone output divided by wealth transfer.

294. Wealth transfer: Universal service contribution of $0.08 per conversation minute multiplied by 333.8 billion interstate domestic conversation minutes. LANDE & LYNCH, *supra* note 38. Universal service contribution per interstate domestic conversation minute calculated by subtracting $0.01 access cost per interstate conversation minute in 2002 from $0.018 total access and universal service contribution per interstate domestic conversation minute in 2002. Forgone consumer surplus: Calculated assuming price of $0.07 per minute and demand elasticity of -0.7. These data are derived from LANDE & LYNCH, *supra* note 38. Elasticity estimate: Riordan, *supra* note 31, at 436. Value of forgone output: Assumes marginal cost equals .25·p. *See* Hausman & Shelanski, *supra* note 17. To accurately measure the effect of universal service 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 to access charges and universal service contributions in proportion to their share of the total price change. Excess burden percentage is value of forgone output divided by wealth transfer.

295. TRENDS IN TELEPHONE SERVICE, *supra* note 60, at 19-4 tbl. 19.1. Figure calculated by multiplying total universal service outlays in tbl. 19.1 ($5.4 billion) by the percentage of contributions from wireless service providers in tbl. 19.15 (32.6%). Forgone consumer surplus: Calculated assuming price of $0.092 per minute and demand elasticity of -1.12. *Tenth Report*, *supra* note 131, at tbls. 1, 9. Elasticity estimate: Sidak, *supra* note 71, at 22. Value of forgone output: Assumes marginal cost equals $0.05 per minute. *See* Hausman, *supra* note 24, at 737. To accurately measure the effect of multiple mandates in a study that measures the impact of all regulatory charges added to the cost of wireless service, one must calculate the changes in consumer and producer welfare caused by five regulatory mandates on wireless together: universal service, local number portability, number pooling, Enhanced-911, and CALEA. Then one allocates the amounts among the five mandates in proportion to their share of the total price change. Data source are derived from costs of local number portability, number pooling, enhanced 911, and CALEA. Lenard & Mast, *supra* note 110. Excess burden percentage is value of forgone output divided by wealth transfer.

296. Wealth transfer: $0.35 per minute cost times 181 million wireline phone lines. These data are derived from $0.35 per minute as being the midpoint of wireline local number portability charges approved by the FCC. *See* Public Notice, FCC, FCC Investigation Produces Lower Number Portability Charges for Customers of U S West Communications, Inc. (July 9, 1999), http://www.fcc.gov/Bureaus/Common_Carrier/News_ Releases/1999/ nrcc9043.html. For phone line data, see LOCAL TELEPHONE COMPETITION,

supra note 120. Forgone consumer surplus and forgone output: Equals zero because assumed elasticity of demand for local wireline phone service is virtually zero. *See* CRANDALL & WAVERMAN, *supra* note 6, at 91; Garbacz & Thompson (2005), *supra* note 48.

297. Wealth transfer: Calculated from subscriber data in *Tenth Report*, *supra* note 131, at tbl. 9, and cost estimate in Lenard & Mast, *supra* note 110, at tbls. 3, 5. Forgone consumer surplus and value of forgone output: Calculated using methods and sources of data described *supra* note 295. Excess burden percentage is value of forgone output divided by wealth transfer.

298. Wealth transfer: Calculated from subscriber data in *Tenth Report*, *supra* note 131, at tbl. 9, and cost estimate in Lenard & Mast, *supra* note 110, at 38. Forgone consumer surplus and value of forgone output: Calculated using methods and data sources described *supra* note 295. Excess burden percentage is value of forgone output divided by wealth transfer.

299. Wealth transfer: Calculated from subscriber data in *Tenth Report*, *supra* note 131, at tbl. 9, and cost estimate in Lenard & Mast, *supra* note 110, at 24–26. Forgone consumer surplus and value of forgone output: Calculated using methods and sources of data described *supra* note 295. Excess burden percentage is value of forgone output divided by wealth transfer.

300. Wealth transfer: Calculated from subscriber data in *Tenth Report*, *supra* note 131, at tbl. 9, and cost estimate in Lenard & Mast, *supra* note 110, at 29. Forgone consumer surplus and value of forgone output: Calculated using methods and data sources described *supra* note 295. Excess burden percentage is value of forgone output divided by wealth transfer.

301. The starting point for these calculations is a study that estimated the benefit to consumers from making an additional 200 MHz of spectrum available for mobile phone service. Since this benefit would occur naturally and swiftly under a more flexible spectrum policy but will take years under current policy, this Article assumes that this forgone benefit is a good proxy for the costs of current spectrum policy. All of the costs of spectrum policy can be calculated using the mathematical relationships defined in *supra* Part III.A. The forgone benefit, or total consumer cost, is $77.4 billion. The calculations that generated this figure imply a price reduction of 50%, or $0.056 per minute. *See* Hazlett et al., *supra* note 196. The $54 billion wealth transfer was calculated by multiplying $0.056 times the 966 billion wireless minutes used in 2003. Wireless minutes were calculated from subscriber and use data in *Tenth Report*, *supra* note 131, at tbls. 2, 9. The forgone consumer surplus figure was calculated by subtracting the $54 billion wealth transfer from the $77.4 billion total cost to consumers. Forgone producer surplus is equal to Hazlett et al.'s estimated price of wireless under a more flexible spectrum policy ($0.056 per minute) minus the marginal cost of wireless ($0.05 per minute) times the estimated increase in the number of minutes due to the price reduction. Marginal cost is from Hausman, *supra* note 24, at 737. The increase in the number of minutes is estimated using a demand elasticity of -2.32. HAZLETT & MUÑOZ, *supra* note 72, at 15. Excess burden percentage is value of forgone output divided by wealth transfer.

302. Wealth transfer: CRANDALL, *supra* note 242. at 54–56. Forgone consumer surplus: Assumes wealth transfer could have been used to reduce access and universal service charges on long distance. Calculated assuming price of $0.07 per minute and demand elasticity of -0.7. LANDE & LYNCH, *supra* note 38. Elasticity estimate: Riordan, *supra* note 31. Potential change in long-distance price is estimated by dividing $9.7 billion wealth transfer by 333.8 billion domestic interstate conversation minutes. These data are derived from LANDE & LYNCH, *supra* note 38. Value of forgone output: Calculation assumes $9.7 billion wealth transfer would have been used to reduce universal service charges on long distance and wireless. Each dollar of wealth transfer generates $0.65 of excess burden for long-distance and $0.53 for wireless. To determine how much of the wealth transfer should be allocated to each service, the $9.7 billion wealth transfer was divided between long-distance and wireless proportionate to their contributions to the federal Universal Service Fund. *See* Hausman, *supra* note 67, at 40; Hausman, *supra* note 24, at 735. Long distance and wireless contributions to federal universal service fund are from TRENDS IN TELEPHONE

SERVICE, *supra* note 60, at tbl. 19.15. Excess burden percentage is value of forgone output divided by wealth transfer.

303. Wealth transfer: The amount of wealth transferred from the incumbent to competitors equals L·(R-W-C), where L is the number of lines the incumbent leases competitors at a wholesale discount, R is the revenue per leased line that the incumbent would have earned if it had sold the line to a retail customer, W is the wholesale price per line received by the incumbent, and C is the cost per line that the incumbent avoids when it leases a line instead of selling it to a retail customer. Wealth transfers were calculated on a state-by-state basis and then summed to produce the total. Data sources: L is from LOCAL TELEPHONE COMPETITION, *supra* note 120, at tbl. 10. R is from Gregg, *supra* note 41. W is 75% of L, assuming a 25% wholesale discount. *See* Crandall & Hausman, *supra* note 190, at 84. C is from AT&T, UNE-P vs. 271 LD Entry: What's the real tradeoff for the RBOCs? 6, 8 (Sept. 17, 2002), http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513293103. Forgone consumer surplus: Assumes wealth transfer could have been used to reduce access and universal service charges on long distance. Calculated assuming a long-distance price of $0.07 per minute and demand elasticity of -0.7. These data are derived from LANDE & LYNCH, *supra* note 38. Elasticity estimate: Riordan, *supra* note 31. Potential change in long-distance price is estimated by dividing $21 million wealth transfer by 333.8 billion domestic interstate conversation minutes. These data are derived from LANDE & LYNCH, *supra* note 38. Value of forgone output: Calculation assumes $21 million wealth transfer would have been used to reduce universal service charges on long distance. Each dollar of wealth transfer generates $0.65 of excess burden for long distance. Excess burden figure is from Hausman, *supra* note 24. Excess burden percentage is value of forgone output divided by wealth transfer.