

Economic Welfare and Telecommunications Regulation: The E-Rate Policy for Universal-Service Subsidies

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The Telecommunications Act of 1996 attempts to address distributional issues in its “universal services” provisions, which establish a regulatory framework for equitable and affordable access to advanced communications services. This Article examines the Federal Communication Commission’s most significant and debated universal-services decision to date under the 1996 Act—the “e-rate” program for providing low-cost, educational access to the Internet—and finds that the FCC has chosen a mechanism that likely imposes high social costs compared to the costs that would be incurred under alternative policies. It argues that these costs are unnecessary to achieve the equitable goals embodied in the universal services provision and that they undermine rather than advance the statutory “public interest” criteria that guide the Commission’s regulatory decisionmaking. The authors suggest that the FCC could implement a more efficient policy without impairing the affordability or distribution of telephone service in the United States.

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Introduction

The current expansion of the communications and information sectors is unprecedented and unforeseen in scale. For example, Internet connection has increased from 3 million users in 1994 to over 100 million users in 1998.¹ In the United States, Internet usage by adults alone has more than doubled since passage of the 1996 Act.² In contrast, telephony grew merely five percent per year in its first twenty years, after which time only 1 in 280 Americans possessed a telephone.³

The impact of the current growth in communications services is widespread and diverse. Means of doing business are changing rapidly with new communications technologies, which themselves are coming to represent an ever growing percentage of American gross national product. Educational and social interaction are similarly being transformed by changes in the manner and degree to which society produces, obtains, and shares information. Communication and information services that only recently were tools for the specialized few are quickly becoming services to which general recourse is presumed in the United States. With this transformation, potential disparities in access to communications

1 See Frank Shafroth, *Hi-Tech Commerce Surges; Still Tax Protection Issue Won't Go Away*, NATION'S CITIES WKLY., Apr. 20, 1998, at 1 (citing a U.S. Commerce Department report noting this statistic).

2 See Rebecca Fairley Raney, *Politicians Woo Voters on the Web*, N.Y. TIMES, July 30, 1998, at G1.

3 See Milton Mueller, *Universal Service in Telephone History: A Reconstruction*, 17 TELECOMMUNICATIONS POL'Y 352, 356 (1993).

technologies and the effects of those disparities on educational and economic achievement have become an increasingly important public policy concern.

Telecommunications regulation has not been unresponsive to recent changes. The Telecommunications Act of 1996,⁴ the most comprehensive amendment to date of the Communications Act of 1934,⁵ reconfigures many aspects of traditional regulation. The 1996 Act's "universal services" provisions⁶ charge regulators with ensuring that certain advanced telecommunications and information services are accessible on an equitable and affordable basis throughout American society. This Article examines in detail the Commission's most visible regulatory action to date pursuant to Congress's universal-service mandates: the policy for providing subsidized Internet access for schools and libraries in order to overcome potential disparities in access to important informational resources.

Our specific conclusion is that the FCC's method of funding its Internet subsidy policy, known as the "e-rate" program, is unusually costly. The Commission's decision to raise the subsidy from long-distance charges instead of from a surcharge on local phone rates ignores empirical evidence about telephone consumption and conflicts with established principles of public finance and welfare economics. Contrary to what many regulators and commentators have argued, the structure of the FCC policy was dictated neither by specific mandates of the 1996 Act nor by the "public interest" standard for FCC decision-making. We argue that the Commission rejected an alternative that would meet statutory goals at much lower cost and with extremely small, if any, negative distributional effects.

Part I of this Article discusses the purpose of universal services policy and the meaning of the public interest standard in telecommunications law. This discussion establishes the necessary context for interpreting the relevant statutory provisions and for understanding possible constraints on the FCC's actions. Part II then examines the FCC's implementation of the Internet access subsidy for schools and libraries. Finally, Part III analyzes the FCC's decision and possible alternative policies from both economic and statutory standpoints.

I. Universal Services and the Public-Interest Standard

The Telecommunications Act of 1996 assigns the FCC the challenging tasks of reconfiguring telephone competition and restructuring

4 Pub. L. No. 104-104, 110 Stat. 56 (codified in scattered sections of 47 U.S.C.).

5 Pub. L. No. 73-416, 48 Stat. 1064 (codified as amended at 47 U.S.C. §§ 151-612 (1994)).

6 47 U.S.C. § 254 (Supp. II 1996).

universal service regulations. Section 254 of the Act establishes the Commission's mandate to work with a joint board of state and federal regulators to revise the scope of universal-service obligations and reform the subsidy mechanism for below-cost services.⁷ In that enterprise, as in many other provisions of the Act, the Commission's statutory mandate is to ensure that its regulatory actions accord with "the public interest, convenience and necessity."⁸ Whether the FCC's universal-service policy satisfies the Commission's statutory obligation to regulate in the public interest requires an understanding of both Congress's substantive goals under section 254 and the meaning of the public-interest standard for regulation. We address these in turn.

A. *The Development of Modern Universal Services Policy*

The expression "universal service" has a long history in American telecommunications. It was first used by AT&T's President, Theodore Vail, in 1907.⁹ At that time, however, the expression referred principally to AT&T's private plan for business expansion, not to social policy.¹⁰ In contrast, the modern meaning of "universal services" is of public dimension and refers to the policy that fundamental communications services should be available to everyone on "fair" terms, even if some customers must be served below cost.¹¹ Universal-service programs have long emphasized the expansion of the number of citizens connected to local telephone service.¹² Regulations designed to foster this policy have thus focused on penetration rates of basic phone services, build-out obligations of service providers, and, importantly, a system of subsidies to support the low rates necessary to make service affordable for all.

Equitable universal service goals are often said to be implicit in the 1934 Communications Act's statement that the FCC should "make available, so far as possible, to all the people of the United States a rapid, efficient, nationwide . . . communication service with adequate facilities at reasonable charges."¹³ Although there is debate over whether policies designed to maintain low local telephone rates stem from that statutory

7 Section 410 of the 1934 Act authorizes the FCC to refer matters of joint federal and state concern to a joint board of federal and state regulators for recommendation. See 47 U.S.C. § 410 (1994). The 1996 Act expressly provides that universal services matters be referred first to a joint board. See 47 U.S.C. § 254(a)(1) (Supp. II 1996).

8 § 254(b)(7).

9 See Mueller, *supra* note 3, at 353.

10 See *id.* at 357.

11 See *id.* at 355.

12 See, e.g., Angela J. Campbell, *Universal Services Provisions: The 'Ugly Duckling' of the 1996 Act*, 29 CONN. L. REV. 187, 189 (1996) (discussing the historic focus on "plain old telephone service").

13 47 U.S.C. § 151 (1994).

prescription, as some commentators suggest,¹⁴ there is little question that modern universal services policy did not receive explicit and systematic federal regulatory attention until 1970, when the Federal Communications Commission implemented the “Ozark Plan.”¹⁵ This plan arose from an effort by a joint board of state and federal regulators to overhaul the “separations” rules for apportioning costs of local networks between federally regulated rates for interstate traffic and state-regulated rates for intrastate traffic.

A uniform, national set of rate-separations protocols had been in place since the 1950s, although those rules had not been used to create systematic subsidies to increase the household penetration of basic phone service.¹⁶ The Ozark Plan, however, deliberately moved toward that goal by allocating a disproportionate amount of the fixed costs of the local telephone network to long-distance traffic. For every 1 percent of traffic consisting of long-distance calls, 3.3 percent of local network costs were to be recovered through long-distance prices.¹⁷ So, if there were 100 total calls on a network, 90 of which were local and 10 of which were long distance, 33 percent of the costs of the network would be recovered through long-distance calls and only 67 percent through local calls. In this way, the Ozark Plan expressly subsidized local rates through long-distance prices. The plan was implemented in 1971; by 1980, long-distance calls provided 25 percent of the cost recovery of local lines even though such calls constituted only 8 percent of line traffic.¹⁸ One estimate places the aggregate, annual subsidy transferred from long-distance to local at \$11 billion by the early 1980s¹⁹—about half of AT&T’s annual revenues.²⁰

After the 1984 break-up of AT&T, the Commission initiated proceedings to reduce long-distance rates and make cost recovery more efficient. The Commission’s plan had two parts. The first was to create “access charges” paid by long-distance companies to local carriers for

14 See, e.g., MICHAEL K. KELLOGG ET AL., *FEDERAL TELECOMMUNICATIONS LAW* 20-21 (1992); Campbell, *supra* note 12, at 189. Milton Mueller has argued to the contrary that universal services, in the modern equitable sense, were not a conscious policy goal until the late 1960s or 1970s. See Mueller, *supra* note 3, at 355. While Mueller presents a convincing argument, there is nonetheless some evidence that equitable goals were not entirely absent in earlier decades. For example, a 1936 treatise on the economics and regulation of telecommunications discusses how business telephone rates are usually higher than residential rates, so that service can be furnished at lower cost to “certain consumers . . . who otherwise would be unable, or unwilling, to pay the rates charged.” JAMES M. HERRING & GERALD C. GROSS, *TELECOMMUNICATIONS: ECONOMICS AND REGULATION* 135 (1936).

15 See Prescription of Procedures for Separating and Allocating Plant Inv., Operating Expenses, Taxes and Reserves Between the Intrastate and Interstate Operations of Tel. Cos., 26 F.C.C.2d 247 (1970).

16 See Mueller, *supra* note 3, at 355.

17 See KELLOGG ET AL., *supra* note 14, at 451.

18 See *id.* at 452.

19 See Alfred E. Kahn & William B. Shew, *Current Issues in Telecommunications Regulation: Pricing*, 4 YALE J. ON REG. 191, 197 (1987).

20 See KELLOGG ET AL., *supra* note 14, at 465.

originating and terminating long-distance calls.²¹ The second part was to use a "subscriber line charge" (SLC) to recover more of the fixed costs of local networks from local rates. The original plan was to peg the SLC at \$6 per month, which would be offset by an immediate decrease in long-distance rates of \$0.05 to \$0.10 a minute.²² In the face of ardent opposition from Congress, consumer advocates, and state regulators, all of whom liked the idea of keeping local rates low and who apparently did not factor long-distance spending into their assessment of consumers, the Commission left the \$6 SLC in place only for business users and held the residential SLC to a level between \$2 and \$4 per month.²³ To date, those charges have not been increased for primary lines.

Although subsidies to promote penetration of telephone services were a deliberate aim of FCC policy by 1970, universal services were not addressed by federal statute until 1996. In the 1996 Act, Congress expressly endorsed universal-service goals and required that the Commission revise both the content and support mechanisms of universal-service policies; the governing principle established by the 1996 Act was that American consumers should have access to quality telecommunications services at reasonable rates, regardless of where they live in the country.²⁴

A close reading of the statute, however, shows that Congress did not automatically equate universal service principles with subsidies. The Act requires the Commission, working with the Joint Board, to further the general principles that "[q]uality services should be available at just, reasonable, and affordable rates";²⁵ that "[a]ccess to advanced telecommunications and information services should be provided in all regions of the Nation";²⁶ and that rates should be "reasonably comparable" across geographical regions.²⁷ The text of the Act does not specify the advanced services whose broad provision and accessibility the Commission's policies should encourage. It does, however, specify the services that should be subsidized and encouraged to spread. Four statutory criteria govern whether the Commission should require a given service to be supported by the universal-service subsidy program: (1)

21 See MTS & WATS Mkt. Structure, Phase I, 93 F.C.C.2d 241 (1983) (creating the first of many orders, modifications, and reconsiderations relating to access charges).

22 See KELLOGG ET AL., *supra* note 14, at 465.

23 See MTS & WATS Mkt. Structure, 97 F.C.C.2d 682, 695, 833 (1983).

24 The definition of what services should be deemed worthy of "universal" promotion is a fluid one under the Act: "Universal service is an evolving level of telecommunications services that the Commission shall establish periodically under this section, taking into account advances in telecommunications and information technologies and services." 47 U.S.C. § 254(c)(1) (Supp. II 1996).

25 § 254(b)(1).

26 § 254(b)(2).

27 § 254(b)(3).

whether the service is essential to education, public health, or public safety; (2) whether the service has been subscribed to by a substantial majority of residential customers (getting at both economic network effects and information parity); (3) whether the services are being deployed in public networks by carriers; and (4) whether subsidizing the service is “consistent with the public interest, convenience, and necessity.”²⁸

With respect to the structure and source of economic support for universal services, the Act is terse. Section 254(b)(4) states that all providers of telecommunications services should “make an equitable and nondiscriminatory contribution to the preservation and advancement of universal service”; section 254(b)(5) states that support mechanisms for the maintenance and advancement of universal services should be “specific, predictable and sufficient.” Section 254(d) states that all carriers that provide interstate telecommunications services “shall contribute, on an equitable and nondiscriminatory basis” to the subsidy mechanisms designed by the Commission. The Act follows with the general principle that any support mechanism should incorporate such features as the Commission believes necessary to protect the public interest.²⁹

The explanatory statement in the Conference Report accompanying the 1996 Act adds only general guidance.³⁰ The House and Senate explain that the state and federal Joint Board, to which the Act assigns review of universal services, “will thoroughly review the existing system of Federal universal services support” and that such support mechanisms “should be explicit, rather than implicit as many support mechanisms are today.”³¹ Congress thus clearly intended a rethinking of the subsidy methods that evolved in the period foreshadowing and following the AT&T divestiture in 1984. But Congress left the particular form of the restructured system largely to the Commission’s judgment.

While the Commission and Joint Board are given substantial discretion in defining the general scope and funding mechanisms for universal services, they are required by the Act to make special rules for certain public, institutional telecommunications users. The 1996 Act specifically addresses universal services support for, *inter alia*, rural health care providers, schools, and libraries. Section 254(h)(B) requires all telecommunications carriers serving a given area to provide schools and libraries in that area access to universal services “at rates less than the amounts charged for similar services to other parties.”³² Although the

28 § 254(c)(1)(A)-(D).

29 See § 254(b)(7).

30 See H.R. CONF. REP. NO. 104-458 (1996), reprinted in 1996 U.S.C.C.A.N. 124.

31 *Id.* at 131.

32 47 U.S.C. § 254(h)(B) (Supp. II 1996).

statute does not specify which services must be made available on special terms to public institutions, the list is not restricted to services that are part of the general universal services basket. The Commission may also require advanced services that are not part of the general universal services program to be made available at a discount to schools and libraries.³³ Carriers filling such requests are to be reimbursed through the universal-services support mechanism.

One of the Joint Board's earliest actions in the post-1996 Act universal-services docket was to address the school and library issue, establishing a general recommendation as to the range of discounts they should receive, the means for compensating carriers providing those discounts, and what new services should be accessible to schools and libraries through the universal service rules.³⁴ In assessing how well the Commission performed its statutory obligation and met the public interest standard, we focus on the Commission's decision to provide Internet access for schools and libraries, under what has come to be called the "e-rate" plan. The mechanism established for subsidizing such access raises interesting questions regarding the FCC's administration of section 254 and its adherence to the mandate that it regulate in "the public interest." It is to the latter standard that we turn before proceeding to the FCC's substantive policy.

B. *The Public Interest Standard in FCC Common-Carrier Regulation*

In implementing the universal services provision of the 1996 Act, the Commission is charged with "protection of the public interest, convenience and necessity."³⁵ The public-interest standard in communications regulation has a long history with different meanings in various contexts. Congress charged the Interstate Commerce Commission, whose jurisdiction included telephone companies after the Mann-Elkins Act of 1910,³⁶ to represent the public interest in its regulation of common carriers—what has been described as the "basic consumer protection and antidiscrimination policy of the 1887 [Interstate Commerce] Act."³⁷ The Communications Act of 1934 retained that regulatory obligation: When engaged in rule-making or adjudication related to changes in common-carrier services, section 214 of the 1934 Act requires the FCC to ensure

33 See § 254(c)(3) ("[T]he Commission may designate additional services for such support mechanisms for schools, libraries and health care providers for purposes of subsection (h)."); § 254(h)(2) (giving FCC authority to connect public institutions to advanced services).

34 See Federal-State Joint Bd. on Universal Serv., 12 F.C.C.R. 8776, ¶ 428, at 9004, ¶¶ 437-438, at 9009 (1997).

35 47 U.S.C. § 254(b)(7) (Supp. 1998).

36 Ch. 309, 36 Stat. 539 (1910) (repealed 1913).

37 *Essential Communications Sys. v. AT&T*, 610 F.2d 1114, 1118 (3d Cir. 1979).

that its orders are “in the interest of public convenience and necessity.”³⁸ Section 214’s general prescription appears throughout the 1934 Act and has been carried forward in specific provisions of the 1996 Act. For example, in deciding whether a local telephone company should be allowed to enter the long-distance business, the Commission must determine that such entry “is consistent with the public interest, convenience and necessity.”³⁹ Similarly, in designing subsidy mechanisms to support universal access to telecommunications services, the FCC has authority to take measures “necessary and appropriate for the protection of the public interest, convenience, and necessity.”⁴⁰

How the FCC determines whether something is in “the public interest” varies, but the inquiry is guided both by general principles and by specific statutory mandates. It has long been presumed as a matter of administrative law that “the term ‘public interest’ as thus used [in a statute] is not a concept without ascertainable criteria.”⁴¹ In broadcast and mass media regulation, for example, the touchstone of the “public interest” for decades was programming diversity and audience satisfaction.⁴² The Communications Act’s common-carrier provisions have a somewhat different focus, one that emphasizes development and dissemination of services at “reasonable” prices.⁴³ This emphasis is reflected in certain presumptions evolving from the Commission’s accumulated decisions and orders implementing public interest oversight of telephony.

For example, the Commission has consistently held that section 214, which requires public-interest review of firms’ decisions to enter or exit various telecommunications markets, “must be construed” to contain a presumption that both competitive entry and “provision of new technologies and services” serve the public interest.⁴⁴ The Commission “refrain[s] from requiring new entrants to demonstrate beneficial effects of competition in the absence of a showing that competition will produce detrimental effects”⁴⁵ and plainly presumes that “competition directly advances the public interest.”⁴⁶ The Commission accordingly adopted and

38 47 U.S.C. § 214(d) (1994).

39 47 U.S.C. § 271(d)(3)(C) (Supp. II 1996).

40 § 254(b)(7).

41 *New York Cent. Sec. Corp. v. United States*, 287 U.S. 12, 25 (1932).

42 *See, e.g.,* Howard Shelanski, *Video Competition and the Public Interest Debate*, in TELEPHONY, THE INTERNET, AND THE MEDIA 91, 91 (Jeffrey K. MacKie-Mason & David Waterman eds., 1998).

43 47 U.S.C. § 151 (1994).

44 *Time Warner Entertainment Co.*, 8 F.C.C.R. 7106, ¶ 10, at 7107-08 (1993) (applying statutory presumption of 47 U.S.C. § 157(a), which encourages the provision of new technologies and services to the public); *MTS-WATS Mkt. Structure Inquiry*, 92 F.C.C.2d 787, ¶¶ 7-8, at 790-91, ¶¶ 47-49, at 804-05 (1982).

45 *MTS-WATS Mkt. Structure*, 81 F.C.C.2d 177, ¶ 103, at 201-02 (1980).

46 *Market Entry & Regulation of Foreign-Affiliated Entities*, 11 F.C.C.R. 3873, ¶ 10, at 3878 (1995).

successfully defended in court a standing presumption that entry of new carriers into communications markets would serve the public interest.⁴⁷

The presumptions regarding competition and innovation demonstrate the FCC's general emphasis on economic efficiency in its public-interest precedents. The more fundamental goal, which competition and efficiency serve, is to increase consumer welfare by lowering rates and increasing availability and quality of telecommunications services. One former Commissioner phrased the test this way: "First . . . every action must be judged by the public interest benchmark: does it advance or diminish consumer welfare?"⁴⁸ Thus, in deciding whether to grant certain regulatory waivers to a local telephone company with a regional monopoly in return for increased opening of that local market to competitors, the FCC focused on whether competitive local access would "help[] to maximize consumer welfare."⁴⁹ And, in assessing whether to replace traditional rate-of-return regulation (which limits profits earned by carriers) with incentive-based rules (which limit prices charged by carriers), the Commission stated that "[o]ur goal in this proceeding is to determine if the price cap model could be adapted so that it better protects and promotes consumer welfare and the public interest in an efficient and reasonably priced telecommunications network."⁵⁰

Despite the public-interest standard's emphasis on efficiency and consumer benefits, courts have made clear that "the use of the words 'public interest' in a regulatory statute is not a broad license to promote the general public welfare. Rather, the words take meaning from the purposes of the regulatory legislation."⁵¹ Where Congress chooses expressly to pursue distributional or other goals that contradict overall economic welfare, "broad 'public interest' mandates must be limited to 'the purposes Congress had in mind when it enacted [the] legislation.'"⁵² Thus, the FCC's application of the public interest standard is guided by the particular statutory provision at issue in a given case. With respect to universal services regulation, the FCC might be constrained in pursuing general economic efficiency if doing so would compromise section 254's specific distributional goals. For example, an efficient subsidy mechanism supporting advanced communications for rural hospitals might be off

47 See *Washington Utils. & Transp. Comm'n v. FCC*, 513 F.2d 1142, 1155, 1168 (9th Cir. 1975).

48 *GTE Sprint Communications Corp.*, No. 85-348, 1986 FCC LEXIS 3217, at *40 (F.C.C. June 3, 1986) (Remarks of Commissioner Patrick).

49 *Ameritech Operating Cos. Petition for a Declaratory Ruling & Related Waivers to Establish a New Regulatory Model for the Ameritech Region*, 11 F.C.C.R. 14,028, 14,082 (1996).

50 *Policy & Rules Concerning Rates for Dominant Carriers*, 2 F.C.C.R. 5208, ¶ 3, at 5208 (1987).

51 *NAACP v. Federal Power Comm'n*, 425 U.S. 662, 669 (1976).

52 *Business Roundtable v. SEC*, 905 F.2d 406, 413 (D.C. Cir. 1990) (quoting *Federal Power*, 425 U.S. at 670).

limits as a matter of administrative law if the mechanism causes prices to rise for some other service that the universal-services provisions also aim to promote.

II. The Public Interest and Universal Services: Implementing Section 254 of the Telecommunications Act of 1996

With the fundamental principles of universal services and public interest regulation in place, we turn next to the Commission's implementation of section 254, focusing on the decision to subsidize Internet access for schools and libraries. Subsidized wiring and access to advanced communications technologies for schools and libraries has been an important policy initiative both in the Executive Branch and for various interests in Congress. Yet in the wake of the Commission's order on subsidized Internet access, the particular policy adopted by the agency has been strongly criticized by members of the House and Senate and has been the subject of Congressional hearings.⁵³ We will briefly discuss recent criticisms and the resultant policy change after we examine the Commission's initial regulatory decision.

A. *Internet Subsidies: What to Provide and How to Pay the Tab?*

On May 8, 1997, the FCC issued its mammoth universal services order—990 paragraphs and nearly 500 pages, not counting appendices and Commissioner statements.⁵⁴ In that Order, the Commission adopted the Joint Board's recommendation that Internet access, although not yet to be part of the general universal services policy, should be subsidized for schools and libraries.⁵⁵ The Commission drew directly on its authority under sections 254(c)(3) and 254(h)(1)(B) to make special provisions for subsidizing advanced services to public institutions.⁵⁶ The Joint Board and the FCC shared the view that Internet access was necessary to fulfill Congress's intention "to provide the ability to browse library collections, review the collections of museums, or find new information . . . to Americans everywhere via schools and libraries."⁵⁷

53 See, e.g., *Hearings on Funding Mechanisms for the "E-Rate" Program Before the Subcomm. on Oversight of the House Comm. on Ways and Means*, 105th Cong. (1998), available at 1998 WL 476697 [hereinafter *Funding Mechanisms Hearings*] (testimony of Representative Blumenthal) (discussing others' criticisms of agency policy).

54 See Federal-State Joint Bd. on Universal Serv., 12 F.C.C.R. 8776 (1997).

55 See *id.* ¶ 428, at 9004, ¶¶ 437-438, at 9009.

56 See *id.* ¶¶ 437-444, at 9009-10.

57 *Id.* ¶ 426, at 9003 (quoting H.R. CONF. REP. 104-458, at 132 (1996), reprinted in 1996 U.S.C.C.A.N. 124, 144).

Once the FCC decided to subsidize institutional Internet access, the critical question became how to pay the bill. The Commission adopted the Joint Board's recommendation that eligible schools and libraries receive discounts ranging from twenty to ninety percent on Internet connections, subject to an aggregate annual limit of \$2.25 billion.⁵⁸ The funds for the subsidy could, in principle, come from a number of sources: general tax revenues, fees on carriers, or surcharges on particular telecommunications services.⁵⁹ The universal-service system had traditionally worked within the latter option—although through opaque assignment of local network costs to long-distance services rather than by explicit connection between specific subsidy amounts and the prices of unsubsidized services. The alternative of subsidizing universal services through general tax revenues, while a good option from the standpoint of efficient public finance, was not part of the framework established by Congress and is thus not open to the FCC. Instead, the Commission is constrained in formulating universal-service subsidies to work within the basket of telecommunications services over which the FCC has authority. Congress made clear that it wanted the FCC to make support for universal services “explicit, rather than implicit as many support mechanisms” had been.⁶⁰ It was thus incumbent upon the Commission to specify the mechanism by which the targeted amount of annual school and library telecommunications subsidies would be funded.

As a practical matter, the Commission's options were limited. There were only two major candidates for bearing the subsidy load: local telephone rates and long-distance telephone rates.⁶¹ The FCC had a long history of regulating both the local and long-distance lines of business, and the use of these services was sufficiently widespread to distribute the subsidy burden broadly. Recall that in the years surrounding the divestiture of AT&T, several specific charges were created. The two major charge classifications were access charges, built into long-distance charges on a

58 *See id.* ¶ 425, at 9003.

59 We will often in this Article refer to increased regulatory fees, like access or SLC surcharges, as “taxes.” We recognize that as a legal matter, only Congress can raise taxes in the federal domain, and thus, as a technical matter, regulatory fees are not taxation. From an economic standpoint, however, surcharges, fees, and taxes are analytically the same.

60 H.R. CONF. REP. NO. 104-458, at 131 (1996), *reprinted in* 1996 U.S.C.C.A.N. 124, 142.

61 In theory, Internet access providers could also be candidates for taxation for universal services purposes, but it is unclear whether enough revenue could be generated from such entities. Indeed, it might even be efficient to have Internet users pay for usage costs, from which they are now exempt by regulation. There is, however, evidence of political barriers to considering Internet fees. The House of Representatives recently approved, by unanimous voice vote, a measure that would protect Internet services from FCC or local regulation for three years. *See* Internet Tax Freedom Act, H.R. 4105, 105th Cong. § 2 (1998) (passed by the House of Representatives on June 23, 1998). The Senate is considering a similar bill. *See* S. 1888, 105th Cong. (1998). Cable rates are another potential candidate for contributing to the e-rate subsidy: The 1992 Cable Act authorizes the Commission to regulate local cable fees. *See* Cable Television Consumer Protection and Competition Act of 1992, 47 U.S.C. § 543 (1994). But again, regulators might be loathe to add a tax burden to cable operators given the hope that they will become competitors to the incumbent local telephone networks.

per-minute basis, and subscriber-line-charges (SLCs), built into local service charges at a flat, monthly rate. The Commission debated whether it should fund school and library Internet access through one of these charges or some combination of both.

It ultimately elected to put the load on interstate access charges and leave the SLC unchanged, effectively imposing a tax on long-distance services. The FCC credited the Joint Board's conclusion that "the level of the SLC cap affects affordability" and therefore should not be raised.⁶² Although the Commission acknowledged arguments that raising the SLC might be a good way to raise the universal services subsidy, it felt it "inappropriate" to make changes in the rate amidst the current regulatory flux.⁶³ The FCC made clear, however, that its principal reason for maintaining the SLC at current levels and leaving subsidies to the interstate rates was that "concern about affordability prevents us from increasing the SLC for primary residential and single-line business lines at this time."⁶⁴ The Commission thus interpreted the Act to constrain it from enacting any regulations that might decrease local subscribership.⁶⁵

B. *Criticism and Subsequent Revision of the Regulations*

In the wake of the FCC's order on universal services, several long-distance providers and, eventually, a coalition in Congress objected to the e-rate regulations. The gravamen of the criticism was that the maximum subsidy permitted by the FCC rules is too high and that the institution set up to administer the program is illegal and too costly.⁶⁶ In this Article, we do not take a position on either issue, but we do note that at the time of the hearings, 30,000 schools and libraries had applied for roughly \$2 billion from the e-rate program.⁶⁷ This suggests that on its face the annual \$2.25 billion permissible under the Commission's original regulations was not out of line with the costs of funding a serious access program.

What has not been at issue in recent criticisms of the e-rate regulations is that some program for Internet access by schools and libraries is authorized by the 1996 Act and may be administered by the

62 Federal-State Joint Bd. on Universal Serv., 12 F.C.C.R. 8776, ¶¶ 761-762, at 9166-67 (1997).

63 *Id.* ¶ 763, at 9167.

64 *Id.*

65 Although the FCC apparently rejected an SLC increase solely from concern for affordability and subscription levels, additional distributional issues could be raised by that alternative. Most importantly, one could also argue that a flat increase in the SLC would disproportionately harm low-income consumers and amount to a regressive tax. We will address that issue below in our comparison of alternative e-rate funding policies. See *infra* notes 103-106 and accompanying text.

66 See Seth Schiesel, *Cuts Are Possible in an On-Line Plan for Schools and Libraries*, N.Y. TIMES, June 11, 1998, at A19.

67 See *id.*

FCC. Nor has anyone specifically questioned the particular subsidy mechanism—as distinct from the amount of the subsidy—devised by the Commission. Several members of Congress did ask the Commission to cut the current policy altogether, and others criticized the program on grounds that long-distance rates would increase too much.⁶⁸ The proposed solution, however, was to scale down the existing subsidy program, not to reformulate the subsidy mechanism itself. Indeed, after the recent hearings, the FCC reduced the subsidy to \$1.275 billion for 1998 but still collected the revenues from long-distance phone charges.⁶⁹ Our analysis of the subsidy mechanism is therefore of continuing relevance, especially since the FCC and Congress will revisit the e-rate subsidy in future years, and since the FCC will create additional subsidies for new communications services that meet the definition of essentiality outlined in the universal-services provisions.

III. Economic Welfare Analysis of the Commission's Decision

It seems an uncontroversial principle that statutory goals should be achieved at the lowest possible cost. If one mechanism makes American consumers just as well off as another, more expensive mechanism, the public's interest lies in having the Commission implement the cheaper option. To be sure, a specific statutory mandate—for example, not to encumber the price of a specific service or not to use a particular funding method—may constrain the FCC's discretion. But the Commission should choose the most economically efficient subsidy mechanism so long as doing so does not contradict other policy goals.

In theory, a statutory constraint could prove binding in universal services regulation. If it would be cheaper to place the “tax” for a subsidy on a service that is itself one that Congress or the Commission believes should be included in the universal services basket, then policy objectives conflict: On one side is the public's interest in the least costly way to fund universal services; on the other is the statutory goal of maximizing the penetration of certain services, even if bringing the service to marginal consumers is expensive. In evaluating the Commission's mechanism for funding school and library Internet access through the e-rate regulations, we will address the potential tension between economic efficiency and distributional policy goals and try to demonstrate that the tension in this case can be resolved.

⁶⁸ See *Funding Mechanisms Hearings*, *supra* note 53 (statement of Representative Blumenthal).

⁶⁹ See *Press Statement of Chairman William Kennard on Schools and Libraries Funding Mechanism* (June 22, 1998) <<http://www.fcc.gov/speeches/kennard/statements/stwek851.html>>.

Once it is accepted that the public interest is best served by adopting the least costly, permissible means of supporting universal services, one must answer two questions to know whether the Commission's decision to fund school and library Internet access through access charges is in the public interest: (1) Is that the least-cost feasible alternative? (2) If not, would the more efficient funding mechanism contradict some other statutory goal that supersedes the alternative mechanism's efficiency benefits, as the Joint Board and FCC assumed? We begin with the first question.

A. *Some Economic Principles of Public Finance and Cost Recovery*

It is well established that targeted subsidies paid from general income tax revenues are often the most efficient way to fund specific activities. The administrative costs from increasing general taxation may also be lower, because the necessary bureaucracy to execute the tax already exists. In section 254 of the Act, however, Congress does not authorize use of general tax revenues to fund universal services, but instead relies on the FCC to create a system of explicit cross-subsidies among the services it regulates.⁷⁰ Therefore, the feasible alternatives can probably be no better than second-best options.

In choosing which prices to increase in order to fund discounts on Internet access, economics offers some guiding principles. The starting point for the analysis is the fact that not all price increases have the same effect on consumers or on "total economic surplus," which economists often refer to as social welfare or economic efficiency. Total surplus is the sum of two quantities: (1) "consumer surplus," which is the aggregate amount by which consumers' valuation of a good—the amount they are willing to pay—exceeds the price they must pay for the good; and (2) "producer surplus," which is the amount the producer receives in excess of what it must receive to be willing to continue producing the good in question.⁷¹ The aggregate of consumer and producer surplus is total surplus—the amount by which society's valuation of a good exceeds the good's cost. Distributional issues aside, society wants to maximize total surplus.

When the price of a good rises, consumer surplus declines for two reasons. First, some consumers cut back their purchases of the good, so less quantity is demanded. Although those consumers may purchase substitute goods, overall welfare still declines by the degree to which

70 See *supra* text accompanying notes 29-33.

71 Even in a competitive market with free entry, constant marginal cost, and zero (economic) profits, price will exceed marginal cost because fixed costs will be recovered. Therefore, "producer surplus" must not be confused with the excess of price over marginal cost.

substitute goods yield less consumer satisfaction. Second, consumers who continue to purchase the product receive less surplus than before the price increase. When prices rise due to inclusion of a regulatory surcharge or a tax, producer surplus also decreases as less output is sold.⁷² The net welfare reduction resulting from a price increase is referred to as "deadweight loss." The magnitude of such a loss will vary among goods, making the welfare consequences of price increases for those goods distinct. The FCC's decision about which rate or rates should be increased to subsidize universal services thus has important implications for economic welfare in the United States. Because the Commission must get the subsidy from somewhere, it should try to do so in the manner that minimizes deadweight loss.

The fundamental problem of where most efficiently to place a tax burden in a multiple product setting is an old one that is not solely a problem of public finance. Suppose a single firm produces several goods and needs to recover certain operating costs that are not tied to the production of any particular good, such as general overhead or legal costs. Because the costs are not generated by any specific activity, general principles of efficiency are unhelpful. A firm or government must somehow decide: Should the prices of all goods the firm produces be raised in equal proportion, or should some goods bear the brunt more than others? How should tax burdens be allocated among activities that are independent of the costs the tax revenues are needed to fund?

These questions have a common problem at their core. In each case the challenge is to raise the necessary revenue in the manner that minimizes deadweight welfare losses—i.e., that least distorts efficient consumption decisions.⁷³ Some useful intuition about this problem was developed in Frank Ramsey's classic 1927 article,⁷⁴ finding that the loss-minimizing rule was to raise prices in inverse proportion to the elasticities of demand for the goods at issue. Demand elasticity is a measure of how strongly consumers respond to price changes. The higher the elasticity of demand for a product, the more consumers will reduce purchases when price increases. Demand for goods with substitutes and for many luxury goods is likely to be elastic. Demand for necessities or other particularly desirable products is likely to be inelastic and to change relatively little as prices rise.

72 When price is increased by the producer and costs are held constant, its surplus per unit sold increases, although it sells fewer units. Sometimes the producer offsets the quantity reductions with the surplus transferred to it from consumers through the higher prices. This offset does not happen in the case of taxes or fees because the producer's revenue per unit is net of the amount of tax.

73 A profit-seeking firm will of course try to maximize producer surplus rather than total surplus, but the relevant economic analysis is similar.

74 See Frank Ramsey, *A Contribution to the Theory of Taxation*, 37 *ECON. J.* 47 (1927).

For purposes of minimizing the loss of economic welfare, prices should generally be increased more on goods for which demand will change comparatively little. The intuition for this “inverse elasticity” rule is straightforward: If demand does not change much when price increases, the total surplus also will not change much. There may be a redistribution of surplus from consumers to producers (or to government coffers), but little net loss will result. Conversely, if demand drops significantly as price increases, there will be a contraction of quantity demanded, a drop in total surplus, and a shift in the proportionate share of remaining surplus from consumers to producers or to the treasury. Consequently, not all mechanisms that will raise the required sum are equally efficient. The Ramsey pricing rule provides a basic guideline: Raise prices more on the product for which demand is less sensitive to price.

The more exact statement of Ramsey’s rule—raise relative prices until the elasticity of demand times the percentage price increase is the same for each good⁷⁵—may be inappropriate for telecommunications for a variety of reasons. For one, some services may be so comparatively inelastic that they would end up bearing every tax or surcharge. Moreover, the effects of such pricing are difficult to gauge given the interdependencies that may exist among telecommunication services.⁷⁶ But the basic lesson that subsidy regulations should strive to preserve economic welfare, and that relative demand elasticities for taxed goods and services will affect economic welfare, certainly hold well beyond the particular cases where Ramsey’s exact rule should apply.

Focusing on economic surplus and on how taxes affect that quantity can help us to identify comparatively efficient policies. However, this analysis might not tell us much about other policy goals. Although inverse-elasticity pricing might preserve the maximum possible social surplus while raising revenues, it does not help policy makers to address distributional questions. In some instances, the elasticity of demand will be lowest for products that are necessities or for consumers who have few options. Poor people without cars will likely have relatively inelastic demands for public transportation; sick people will have comparatively inelastic demands for medicine; the homebound elderly or disabled cannot substitute pay phones for an in-home telephone connection. Despite the fact that economic surplus might be higher if taxes are raised on such goods rather than through prices of goods for which demand is more

75 For a thorough discussion of Ramsey pricing, see KENNETH TRAIN, *OPTIMAL REGULATION: THE ECONOMIC THEORY OF NATURAL MONOPOLY* 117-40 (1991).

76 We note that if consumers’ demands for two products, for example cereal and milk, are interdependent, the general “inverse elasticity rule” of raising price on the less price-sensitive product still holds. The calculation of the optimal taxes or surcharges becomes a bit more complicated because the cross effects of the price increases—for example the effect of milk consumption when cereal prices change and vice versa—must be accounted for. *See id.* at 139.

elastic, there are often sound policy and equity reasons to depart from inverse elasticity principles. Blindness to distributional consequences may compromise important social values. But where such values are not present or will not truly be served by departure from economic efficiency, there seems to be no argument for not adopting the welfare maximizing plan.

B. *Demand Elasticities Relevant to Different Mechanisms for E-Rate Subsidies*

The FCC's decision to subsidize Internet access for schools and libraries raises a public finance problem to which the economics of minimizing welfare losses are directly relevant. In deciding where to raise prices to recoup the annual subsidy, the Commission had to choose among options that might be more or less costly in terms of economic welfare. This section presents an economic analysis of the Commission's policy and estimates its cost to American consumers. We will present evidence that the Commission reversed welfare-preserving prescriptions by choosing to subsidize school and library Internet access by taxing long-distance charges instead of the local telephone subscriber line charge (SLC). Data show that increasing the price of local service would have been a much less burdensome way for society to fund universal services, because local service demand is less price sensitive than long-distance demand. To demonstrate this, we examine estimates of relative demand elasticities for the two services. We begin with the price elasticity of demand for long-distance telephone calls.

1. Demand for Long-Distance Calling

Several studies have measured how sensitive the use of long-distance telephone service is to the price of long-distance calls. Using consumer data from the 1970s, Taylor estimated this elasticity to be about -0.7, meaning that for every percentage increase in the price of a long-distance call, demand drops by a substantially corresponding amount.⁷⁷ Other studies, based on data from the 1980s, have yielded a consensus estimate of the demand elasticity for interstate long-distance calls between -0.63 and -0.72.⁷⁸ A study by Rappoport and Taylor using data culled from

77 See LESTER D. TAYLOR, TELECOMMUNICATIONS DEMAND IN THEORY AND PRACTICE 168-74 (1994).

78 See Joseph P. Gatto et al., *Interstate Switched Access Demand Analysis*, 3 INFO. ECON. & POL'Y 333, 344 (1988) (estimating an elasticity of -0.72); William E. Taylor & Lester D. Taylor, *Post Divestiture Long-Distance Competition in the United States*, 83 AM. ECON. REV. PAPERS & PROCEEDINGS OF THE HUNDRED AND FIFTH ANN. MEETING OF THE AM. ECON. ASS'N 185, 188 (1993) (estimating an elasticity of -0.63). The elasticity for intrastate long-distance calls is significantly lower,

actual telephone bills estimates an elasticity range of -0.51 to -0.70 for interstate calling.⁷⁹ This consistent elasticity measurement is interesting since long-distance prices (in real as opposed to nominal terms) decreased about fifty percent over the three decades covered by the different studies, and the demand curve for long-distance services shifted outwards due to increased incomes and the greater role of communications services in everyday life. The price sensitivity of demand for long-distance service therefore appears robust and consistent over a variety of price, income, and demand levels.

The high elasticity of demand for long-distance service suggests that raising long-distance prices to fund the school and library Internet subsidy will have high social welfare costs. Nonetheless, the measurement of one demand elasticity, however high it is, does not tell us whether a tax on that good is inefficient compared to alternative revenue sources. Unless there is a less costly alternative, such as local telephone rates, the FCC's policy might be welfare-maximizing.

2. Demand for Local Service

Throughout the United States, most residential customers buy unlimited-use, or "flat rate," local calling.⁸⁰ This service also provides the gateway to long-distance calls, typically through a pre-subscribed interstate carrier like AT&T, MCI, or Sprint. Several commentators have observed that demand for flat-rate local phone service does not appear terribly sensitive to price, at least in the neighborhood of current or historical rate levels. For example, a 1995 University of Texas study of households without phones found that for the majority of such households, the cost of basic service was not the barrier to subscription.⁸¹ Rather, usage charges for long-distance service were the most cited reason for disconnection.⁸² A study by Milton Mueller and Jorge Schement similarly found that the basic monthly rate for local service was far less important for telephone penetration rates than were usage-related costs, which arise primarily in long-distance calling.⁸³ Data presented by Rappoport and Taylor show that monthly local-telephone expenditures vary relatively

but here we consider only interstate long-distance calls since the FCC regulates only these calls through its long-distance access charges.

79 Paul N. Rappoport & Lester D. Taylor, *Toll Price Elasticities Estimated From a Sample of U.S. Residential Telephone Bills*, 9 INFO. ECON. & POL'Y 51, 65 (1997).

80 In some areas, different combinations of flat and measured rate service are available.

81 See POLICY RESEARCH PROJECT ON THE EVOLUTION OF UNIVERSAL TELECOMMS. SERV. IN TEX., THE EVOLUTION OF UNIVERSAL SERVICE IN TEXAS 16-17 (Lyndon B. Johnson Sch. of Pub. Affairs Policy Research Project Report No. 116) [hereinafter POLICY RESEARCH PROJECT].

82 See *id.* at 18.

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

little by income.⁸⁴

The above-mentioned studies do not actually calculate or compare elasticities of demand for local service. They do, however, indicate that the price of local access has not been the limiting factor in consumer demand for telephone service. They also support the logical intuition that any quantitative measure of the elasticity of demand for local service should account for both the demand for local service and the interdependence between local and long-distance service. The interdependence stems from the simple fact that one cannot have long-distance service without local service, for the latter is the gateway to the former. The utility that consumers derive from subscribing to local telephone access is thus a function not only of their demand for local calls but also their demand for long-distance calls. Because changes in long-distance prices can aggravate or offset the effects of local rate increases, both must be taken into account in analyzing consumption of local telephone service.

A study by Hausman et al. provides such a measure of the price sensitivity of local telephone consumption.⁸⁵ A formal representation of household consumption decision which recognizes the interdependency between consumers' demands for local and long-distance calls can take the following form:

$$\tilde{u}_1 = \tilde{u}(y - p_1 - p_2, q, z, \varepsilon) \geq \tilde{u}(y, z, \varepsilon) = \tilde{u}_2 \quad (1)$$

In this model, \tilde{u}_1 is a consumer's utility after the prices of local (p_1) and long-distance (p_2) phone service have been subtracted from household income (y), where consumption includes phone usage (q) and a composite of non-telephone commodities (z). \tilde{u}_2 is the consumer's utility where she does not purchase phone service and all her consumption is of the composite (non-telephone) commodity. The ε term is a random parameter independently distributed across households. What equation (1) represents, then, is a consumption rule: A consumer will subscribe to local service if the benefit she derives from expenditures on local and long-distance telephony is greater than the benefit she would derive from saving the money or reallocating the expenditures to other goods. Importantly, whether the benefit of being a local telephone subscriber satisfies that constraint depends not just on the benefit derived from local service but also on the net satisfaction from expenditures on long-distance service.

To actually measure the effects of prices on demand for local telephone service, Hausman et al. used panel data for the years 1984-1988

84 See Rappoport & Taylor, *supra* note 79, at 55.

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

from a random sample of about 55,000 households. They estimated the elasticity of local phone service demand with respect to the basic access price to be -0.005: This means that a 10 percent price increase leads to only a 0.5 percent decrease in consumption of local service. The effect is thus very small. In concrete terms, a 10 percent rate increase would mean a drop in telephone penetration from the current level of 94.0 percent⁸⁶ to 93.5 percent. The finding of a very small, although significantly non-zero, "own" price elasticity for residential basic access demand is consistent with other studies of local telephone consumption.⁸⁷

A comparison of the price elasticities of demand for local and long-distance telephone services thus reveals that an increase in long-distance prices is probably more harmful to society's economic welfare than is an increase in local service prices. Long-distance demand, with a price elasticity of -0.7, will contract substantially more in the face of a price increase than will local-service demand, with a price elasticity of -0.005. Of course, consumers who cancel local access by necessity also cancel their long-distance service, so the contraction in local demand will not be the sole effect of an increase in the local rate. But the disparity in elasticities of demand for local and long-distance are sufficiently great that an increase in long-distance prices will have the more negative welfare effect. We next measure and compare the actual welfare losses from the FCC's long-distance tax and from the local rate alternative.

C. *Estimation of Economic Efficiency Losses*

To evaluate thoroughly the FCC's subsidy policy for school and library access to the Internet, some measures of the costs of the current policy and of alternatives are necessary. We have already demonstrated that greater diminution of total economic surplus most likely results from increasing long-distance access charges instead of the local subscriber line charge. The greater price sensitivity of demand for long-distance service than for local service means that, per dollar of tax, consumers will cut back long-distance expenditures more than they would have cut back local service expenditure, leading to a larger diminution of the overall economic pie in the telephone market. In this Section, we provide measurements of the economic welfare costs of the Commission's current policy and compare those costs to the surplus losses that would result from alternative subsidy mechanisms.

86 See ALEXANDER BELINFANTE, FEDERAL COMMUNICATIONS COMM'N, TELEPHONE PENETRATION BY INCOME BY STATE 16 tbl.2 (1998) (listing the percentage of households in the United States with telephone service in March 1997 as 94 percent).

87 See, e.g., D. Lynn Solvason, *Cross-Sectional Analysis of Residential Telephone Subscription in Canada Using 1994 Data*, 9 INFO. ECON. & POL'Y 241 (1997).

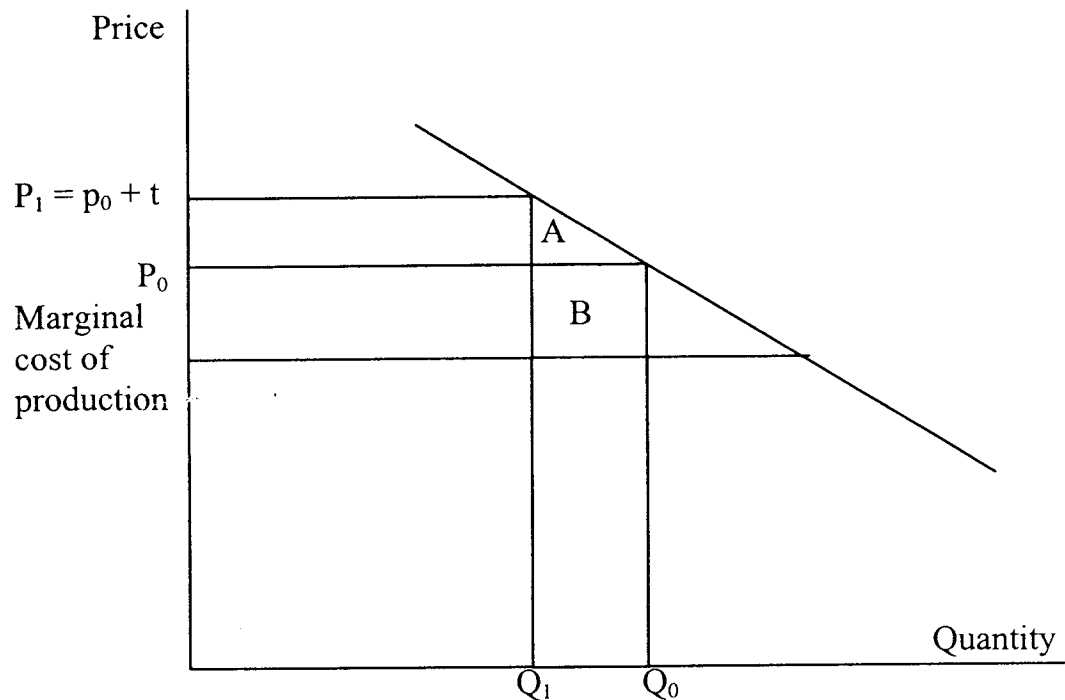
As we have discussed, when the price of a good increases, the level of total economic surplus decreases. The difference between actual price and the buyers' "reservation" prices decreases, reducing consumer welfare. Furthermore, some consumers cease to demand the good in question, leading to more deadweight loss. Producers also sell a lower quantity and, in the case of a tax, receive no higher revenue per unit. They therefore lose surplus as well. Taking into account the changes in both producer and consumer surplus, the reduction in economic efficiency from the imposition of a tax is approximated by the formula:

$$\begin{aligned} \Delta E &\approx [-\Delta q_i(p_i - m_i) - .5\Delta p_i\Delta q_i] \\ &\approx \left[\eta_i \frac{\Delta p_i}{p_i} (p_i q_i - m_i q_i) + .5\eta_i \left(\frac{\Delta p_i}{p_i} \right)^2 p_i q_i \right] \quad (2) \end{aligned}$$

The efficiency loss represented in equation (2) is composed of two terms. The first term is the loss of producer surplus. It arises because of the decrease in quantity demanded (q_i) when prices (p_i) increase because of the tax. The amount of lost producer surplus is this change in quantity multiplied by price minus marginal cost ($p_i - m_i$), which is the per unit profit the producer earns for each unit of output sold. The second term in the efficiency loss formula is the loss of consumer surplus. This loss arises because consumers decrease their purchases of the good when it is taxed. (Graphically, the loss is the area under the demand curve in between the no tax price and the price with the tax-see "A" Figure 1.) Consumers can reallocate the money they would have spent on the taxed good to other goods. However, a net surplus loss occurs because they would have preferred to purchase the original good. The expenditure is allocated to a less favored alternative.⁸⁸

⁸⁸ We do not consider for current purposes the possible distortion created by expenditure of the tax itself.

FIGURE 1
Effect of Taxation on Total Economic Efficiency



Change in efficiency when tax t is added to price $P_0 =$
Loss of consumer surplus (A) + Loss of producer surplus (B)

The second line of equation (2) shows an expanded formulation demonstrating how taxes that raise prices create efficiency losses, the size of which depends on the price elasticity (η_i), the magnitude of the price increase ($\Delta p_i/p_i$), the revenue of the good or service being taxed ($p_i q_i$), and the marginal cost of production (m_i). The resulting quantity, a measure of the total efficiency loss from the tax, can be divided by the subsidy amount to get the average efficiency loss per subsidy dollar raised.

A more nuanced calculation than the average efficiency loss from a tax is the *marginal* efficiency loss to the economy from additional taxes. That calculation is relevant here because a “tax” is already in place on interstate access, and the recent FCC action to fund the Internet subsidy to schools and libraries merely increases or maintains the tax. This is important because the marginal efficiency loss for an extra dollar raised will typically exceed the average dollar raised. In other words, the first dollar of tax revenue raised is less costly than the last dollar raised because consumption decisions change more as the tax rate rises. The formula for the marginal efficiency loss from adding to the already existing “tax” of access charges is computed by taking the marginal change in equation (2) with respect to the tax rate, $\partial E/\partial t_i$, and dividing by the marginal change in tax revenue with respect to the tax rate, $\partial TR/\partial t_i$, resulting in the

following equation:

$$\left(\frac{\partial \Delta E / \partial t_i}{\partial TR / \partial t_i}\right) \approx \frac{\eta_i \frac{(1 - m_i)}{p_i} + \eta_i \frac{t_i}{p_i} + \left[\eta_i \frac{t_i m_i}{p_i^2} - .5\eta_i \frac{t_i^2}{p_i^2}\right] \frac{\partial p_i}{\partial t_i}}{1 - \eta_i \frac{t_i}{p_i} \frac{\partial p_i}{\partial t_i}} \quad (3)$$

Equation (3) allows us to compute the additional loss to economic efficiency from increasing the tax on access surcharges already in place. The numerator to this equation makes that calculation. It is the derivative of equation (2). Note that it depends on the same terms that appeared in the previous formula: the price elasticity, the size of the tax, and the marginal cost of producing long-distance service. The denominator calculates the extra tax revenue raised when the tax rate is increased. It again depends on the price elasticity: The larger the price elasticity, the less revenue raised because consumers switch to other goods when the tax, and thus price, increases.

1. Estimation of the Efficiency Loss from Increased Long-Distance Access Charges

Equations (2) and (3) provide the structure for calculating the actual economic welfare loss that results from increasing long-distance prices by placing the universal services subsidy fee on interstate telephone charges. Into that structure we need to plug several variables: the estimated elasticity of demand for long-distance calls, the marginal cost of long-distance service, and the relevant price terms. We use the long-distance demand elasticity estimate of -0.7 from the studies previously discussed, and an estimate that the marginal cost of long distance is 0.25 of the price⁸⁹ while the long-distance access rate per minute is \$0.0605 per minute,⁹⁰ to estimate that the average efficiency loss is approximately \$0.65 per dollar of tax revenue raised from long distance. Put another way, for every dollar that goes into the universal services fund, an additional sixty-five cents leaves the economy through reduced consumption or reallocation of expenditures to less desired goods. This calculation follows from dividing equation (2) by the access revenue raised ($t_i q_i$) and using long-distance revenue and access revenue amounts collected by the FCC. Using these figures, the first term in equation (2), which is the producer surplus term

89 See PAUL W. MACAVOY, THE FAILURE OF ANTITRUST AND REGULATION TO ESTABLISH COMPETITION IN LONG-DISTANCE TELEPHONE SERVICES 119, 131-41 (1996).

90 See INDUSTRY ANALYSIS DIV., FEDERAL COMMUNICATIONS COMM'N, TRENDS IN TELEPHONE SERVICES 55 tbl.36 (1996).

(after dividing by tax revenue), is estimated to be 0.415. The second term, which is the consumer surplus term, is estimated to be 0.239. Thus, the *average* efficiency loss to the economy for each dollar raised through the access tax is \$0.65, which is quite high as will be seen below.⁹¹

Using equation (3) together with the assumption that $\partial p_i / \partial t_i = 1$, which means that each dollar of the surcharge is passed through to consumers via price, along with the fact that $t_i/p_i = 0.403$ (from FCC data), we estimate the marginal efficiency loss per dollar of subsidy raised to be even higher: approximately \$1.25 per dollar of tax revenue. In other words, for every \$1 billion of the annual Internet subsidy raised through interstate access charges, the U.S. economy will suffer an additional efficiency loss of \$1.25 billion.

Three reasons for this high marginal efficiency loss to the economy can be seen by examining equation (3): first, the elasticity of demand (η_i) is relatively high for long-distance calling; second, the ratio of marginal cost to price (m_i/p_i) is relatively low since gross margins are high in long distance,⁹² which is to be expected given the large fixed costs of telecommunications networks; and third, the ratio of the tax to price (t_i/p_i) is high because access charges are well above cost and provide a significant contribution to the local network's fixed and common costs.

To put the efficiency loss from the FCC's Internet subsidy policy in perspective, it is useful to compare that loss with the costs of other U.S. taxation programs. Rather than taxing telecommunications usage to fund the subsidy for Internet access for schools and libraries, Congress could have used general tax revenue. While there is no generally agreed number for the value of the marginal efficiency loss to the economy from increasing overall taxes, the range of estimates is reasonably close. For example, three studies of increasing overall federal taxes, including income and capital gains taxes, yield average estimates of marginal loss ranging from \$0.26 to \$0.40 cents per dollar of tax revenue raised.⁹³ All of these estimates are less than the average efficiency loss, and much less than the marginal efficiency loss, created by the added tax on interstate long distance to fund the Internet subsidy for schools and libraries.

Given that Congress did not make general tax revenues available to fund universal services, however, the relevant question is whether, within

91 These losses would be on top of efficiency losses due to other universal services programs.

92 See MACAVOY, *supra* note 89, at 117-32 (1996) (providing estimates of long-distance price/cost margins).

93 See Charles L. Ballard et al., *General Equilibrium Computations of the Marginal Welfare Costs of Taxes in the United States*, 75 AM. ECON. REV. 128, 135 (1985) (\$0.365); A. Lans Bovenberg & Lawrence R. Goulder, *Optimal Environmental Taxation in the Presence of Other Taxes: General Equilibrium Analyses*, 86 AM. ECON. REV. 985, 990 (1996) (\$0.260); Edgar K. Browning, *On the Marginal Welfare Cost of Taxation*, 77 AM. ECON. REV. 11, 21 (1987) (\$0.395).

the constraints of the 1996 Act, the FCC could have selected a less costly mechanism to fund the Internet subsidy. To answer that question, we first examine the efficiency losses that would have resulted had the Commission placed the subsidy burden on local rates instead of long-distance rates. We then explore whether, if available, a more efficient option would be statutorily permissible in light of distributional consequences.

2. The Efficiency Effect of Increasing Local Service Rates

The alternative way the FCC could raise revenue to subsidize Internet access for schools and libraries is to increase local rates through the federally mandated Subscriber Line Charge (SLC). As already discussed, the SLC is a fixed monthly fee established in 1984 to help local carriers, many newly divested from AT&T, to recover certain infrastructure costs and cross subsidies that were previously shared by the long-distance and equipment lines of the integrated Bell business. The FCC has never increased the residential SLC from its original level of \$3.50 per line despite the roughly 50.5 percent inflation that has occurred since 1984.

Because demand for local telephone service is not very sensitive to price at current levels, with a price elasticity of only -0.005 , increasing the SLC to recoup universal services subsidies has attractive efficiency consequences.⁹⁴ As we have discussed, the lower the elasticity of demand for a service, generally the less the harm to total economic welfare from raising the price of that service. Thus, the SLC acts as a relatively efficient tax because it creates little or no economic distortion. In other words, equation (2) adds up to approximately zero since the η_i term of -0.005 is near zero.

The FCC would need to raise the SLC by approximate \$1.50 per month⁹⁵ to fund an Internet subsidy of \$2.25 billion per year, the maximum allowed by regulation. An increase of \$1.50 would in fact be just less than necessary to account for inflation over the period from 1984 to 1997, so the required increase would not even return the SLC to its original value in real terms.⁹⁶ The increase required to fund reduced

94 This estimate is for residential access. A one standard deviation change in the elasticity estimate would increase the magnitude to -0.007 so that very similar conclusions would follow. While we are unaware of similar estimates for business lines, we would expect the elasticity to be similar or even lower. The elasticity for second residential lines could well be higher, although the case is unclear given the higher income of residences with second lines.

95 This figure comes from dividing \$2.25 billion by a conservatively estimated 150 million local business and residential phone lines in the United States. INDUSTRY ANALYSIS DIV., FEDERAL COMMUNICATIONS COMM'N, TRENDS IN TELEPHONE SERVICE 97 tbl.19.1 (1998).

96 The FCC did increase the SLC for residential second lines to \$5.00, indexed for inflation. See Access Charge Reform, 12 F.C.C.R. 15,982, 16,020 (1997). Second lines are still, however, a low percentage of overall residential lines and are likely concentrated in upper income households whose

subsidy amounts would of course be much less.

To calculate the marginal efficiency effect of increasing the SLC, we use a variation of equation (3) discussed above:

$$\left(\frac{\partial \Delta E}{\partial SLC}\right) \approx \frac{\eta_j \frac{(1-m_j)}{p_j} + \eta_j \frac{t_j}{p_j} + \left[\eta_j \frac{t_j m_j}{p_j^2} - .5\eta_j \frac{t_j^2}{p_j^2}\right] \frac{\partial p_j}{\partial SLC}}{1 - \eta_j \frac{t_j}{p_j} \frac{\partial p_j}{\partial SLC}} \quad (4)$$

The second term in the numerator of equation (4) is the change in consumer surplus (after subtracting tax revenue raised). Since the ratio of the \$1.50 SLC increase to local rates (t_j/p_j) averages approximately 0.123 nationwide according to FCC data, the marginal change in consumer surplus from increasing the SLC by \$1 computes to about 0.0006. This assumes, of course, that the SLC increase is entirely passed through to customers.⁹⁷ Thus, for each additional dollar of revenue raised, the efficiency loss is about 6/100 of a penny—nearly zero. The average efficiency loss per dollar of the SLC would be even less given that higher levels of tax leads to greater loss. We do not go through the calculation but note that the result is only trivially more than zero. Compared to the marginal efficiency loss of 1.25, or even the average loss of 0.65, resulting from taxing long-distance service, the loss of 0.0006 from taxing local service is negligible. These results demonstrate that the Commission adopted the more costly of the two options for public finance of school and library Internet subsidies.⁹⁸ The next question is whether this more costly choice was, as a matter of law, necessary for the FCC.

demand is less price sensitive. See INDUSTRY ANALYSIS DIV., *supra* note 95, at 99 tbl.19.3.

97 In formal terms, we assume $\partial p_j / \partial SLC = 1$. This assumption holds true since the price of local access is set by regulation and regulatory fees such as the SLC are passed through.

98 If all long-distance companies were to add a flat surcharge to customer bills in response to the e-rate levy, the alternative plans would likely be much closer in effect. See, e.g., Pranda Joshi, *Decoding the Phone Bill: Formerly Hidden Charges Produce Confusing New Fees*, NEWSDAY, July 19, 1998, at F8 (explaining AT&T's announcement of a 93 cent-per-month flat fee to cover the universal-services surcharge). It is far from clear, however, that all long-distance carriers will use a flat additional fee or that those that do will set the amount efficiently or maintain the policy over time. Moreover, the Commission anticipated a usage-based fee and may use similar mechanisms in the future, lending continuing relevance to the analytical principles presented. Moreover, increasingly popular "10-10-xxx" plans require no pre-subscription and therefore often charge on a per-minute basis only.

D. *Did the FCC Adopt an Unnecessarily Costly Subsidy Method?*

Given that taxes create economic distortions and lead to losses in consumer and producer surplus, sound public policy suggests, *ceteris paribus*, that tax policies should be chosen to minimize their efficiency costs to the economy. To be sure, there may be distributional or other constraints that make the *ceteris* not *paribus*, thereby limiting agency discretion to minimize costs. The principal constraint in this instance is that the Commission cannot implement a funding mechanism that, though efficient for society as a whole, undermines the distributional policy goals of the universal services provision itself. The purpose of section 254 of the Act, which the FCC is required to administer in the public interest, is plainly distributional and not necessarily welfare-enhancing in aggregate. Are the distributional goals of the universal-services provisions in tension with obtaining more efficient subsidies by raising local access prices instead of long-distance rates?

The FCC's reason for rejecting the more efficient local rate option was that telephone penetration, historically the bedrock goal of universal services regulation, might decrease if the SLC were increased.⁹⁹ If the demand elasticity of -0.005 for local access is used, and one assumes the total price increase for local service is 8 percent, which follows from the fact that $t_j/p_j = 0.123$, then the estimated decrease in penetration would be about -0.04 percent, or about 40,400 households based on the latest FCC census showing that around 101 million households in the United States have telephone service.¹⁰⁰

Assuming the foregoing decrease in subscription levels actually occurs, we can calculate how much it costs the American economy to keep each of the otherwise-lost 40,400 households connected to the network. Recall that the marginal efficiency loss from the long-distance tax is \$1.25 billion for every \$1 billion in subsidy. Even if merely \$1 billion is raised through interstate charges, then the cost of retaining each subscriber is \$1.25 billion divided by 40,400, which is \$30,940 per year. Even using the lower, average efficiency loss of \$0.65 per dollar of subsidy, at the \$1 billion dollar subsidy level the cost of keeping each otherwise-lost household on the network is \$16,089 per year. These are astounding figures, especially considering that a targeted subsidy of a couple hundred dollars per year would buy each of the lost households service at the rate that included the increased SLC.

That the FCC's subsidy choice may keep marginal subscribers connected at only very high cost is important for future policy

99 See Access Charge Reform, 12 F.C.C.R. 15,982, ¶ 55, at 16,004 (1997).

100 See BELINFANTE, *supra* note 86, at 22 tbl.4 (placing the figure at 101,083,771 for 1997).

consideration by Congress and the Commission, but may be irrelevant from a strictly statutory standpoint. If the universal services provision requires the FCC not to erode local subscribership, then the cost is a matter that Congress has implicitly decided and is not a subject for FCC discretion. The traditional cost-reducing, welfare-maximizing orientation of the public interest standard is circumscribed by a more specific statutory mandate. But if the command to preserve local subscription levels is not so absolute, or if the tradeoff between subscription levels and more efficient subsidy policy need not occur, then the Commission may have increased flexibility in restructuring its regulations. Evidence is strong that the FCC, in this case, would have satisfied statutory criteria and better served the public interest by adopting the more efficient subsidy mechanism and raising fixed, local telephone rates instead of raising long-distance charges.

E. *Telephone Demand Will Likely Not Decrease if the SLC Increases*

In the discussion above, we assumed some marginal loss of local subscribers if the SLC is raised. It is, however, not clear that the 40,400 households would have stopped subscribing to local service had the FCC increased the SLC rather than interstate access charges. As Hausman et al. discuss, households subscribe to telephone service to make both local and long-distance calls. Raising local service prices therefore may not require any tradeoff with the Commission's goal of local telephone penetration. As the University of Texas study and Mueller and Schement study also suggest, reducing long-distance prices to offset increased local fees likely would encourage interconnection to the phone system.¹⁰¹ The important fact captured by the consumption function in equation (1) is that local and long-distance telephone service are "complementary goods" that are consumed together. The price of one affects consumption of the other. To further understand the effects of placing the universal-services subsidy burden on long-distance prices, we look next at how changes in the price of long-distance service may affect local subscribership.

The relationship between consumption of one good and the price of a different good is called "cross elasticity" of demand. Because there is logically some cross elasticity of demand between local and long-distance telephone service, serious errors may result from basing policy decisions solely on the own-price elasticity of local telephone subscription. Complementary goods are consumed in combination rather than in isolation. Nuts and bolts, cars and gasoline, and peanut butter and jelly are all examples. With two complementary goods, an increase in the price of one lowers demand for both. Conversely, a decrease in the price of one

101 See *supra* text accompanying notes 81-83.

increases demand for both. This simultaneous effect is strongest where goods are necessarily (nuts and bolts) rather than optionally (peanut butter and jelly) consumed as complements. Local and long-distance telephone service are still, for the most part, mandatory complements, and price changes for one will likely affect consumption of both.

Consider how this might play out in the case of local and long-distance telephone service. If local rates rise, all else remaining the same, then both local and long-distance demand fall. But if long-distance prices drop, even in the presence of an increase in local service rates, then demand for both goods may increase. The long-distance price drop can offset the local price rise because of the interdependence between the two services. Regulators should have more seriously considered this "cross-price" effect when deciding where to recoup universal service subsidies. If consumers purchase local service based on a calculation that includes their consumption of long-distance service, then raising the price of the latter may also have an effect on the former. Similarly, dropping long-distance rates may increase local-service penetration as more consumers sign up in order to be able to make (now cheaper) long-distance calls.

Hausman et al. estimated the "cross-price elasticity" of demand for basic local access with respect to the prices of two kinds of long-distance service: "intraLATA" service (the toll service to relatively near exchanges that nonetheless are not within the fixed-price local calling area) and "interLATA" toll service (interstate and other calling that one might more conventionally consider to be "long-distance" service).¹⁰² Hausman et al. found increases in the price of intraLATA toll service to have a cross effect on local service demand of -0.0086 and increases in the price of interLATA toll service to have a cross effect of -0.0055. Therefore, when the price of long-distance goes up, demand for basic local service goes down. Conversely, when long-distance prices decline, demand for local service (as a gateway to making long-distance calls) increases. This means that opposite changes in local and long-distance rates will likely offset each other with respect to the effects on local subscribership. The numbers calculated by Hausman et al. indicate that the offset will be almost exact. An increase in the SLC offset by a decrease (or lack of increase) in long-distance rates would thus have a neutral effect on a household's decision to purchase basic local telephone service.

102 The AT&T consent decree divided the U.S. into "local access and transport areas," or LATAs. See *United States v. Western Elec. Co.*, 569 F. Supp. 990, 993 n.4 (1983). Service within a LATA was deemed "local" and assigned to the newly independent Bell Operating Companies, while interLATA calling was assigned to AT&T and other long-distance companies. See *id.* at 994. Because LATAs can be large, some *intraLATA* calls carry an extra charge. This toll service was traditionally provided by the local carrier. See *id.* at 995.

The FCC cast its objections to raising the SLC in terms of “affordability” and effects on the level of local-telephone subscription in the United States. The analysis presented above demonstrates that subscription levels are not, in fact, likely to decline if the SLC increases. Moreover, the offsetting benefit from a decrease in long-distance rates suggests that the economic pain of an SLC increase will be small or non-existent. But the analysis presented above is aggregate. Although the regressive nature of flat rates for local service has not been the focus of regulatory concern, the fact that telephone subscription levels would not decline in the face of a small increase in local rates does not mean the resulting economic burden would be the same for high and low income households. If long-distance calling correlates positively with income, then higher income households will receive more of the benefit from reduced long-distance prices. Poorer households would be left with the burden of higher local rates and less offsetting benefit on the long-distance side. The evidence is convincing, however, that despite some possible, nominal regressivity, the alternative of raising the SLC will not unduly harm poorer consumers.

First, two studies indicate that a small increase in the local rate would not be a large burden for poor consumers and that those same consumers would benefit, though perhaps not to a fully compensating degree, from a decline in long-distance rates. In surveys of phoneless households in Texas and in Camden, New Jersey, the large majority of respondents stated they could afford basic local rates and were able to correctly identify the general magnitude of those rates.¹⁰³ The studies found that households dropped, or were dropped from, service because long-distance usage charges and the initial deposit to reactivate phone service (charged to insure against uncollectible long-distance bills) were too high.¹⁰⁴ This suggests both that a small increase in the SLC would not impose hardship on poor consumers and that a decrease in long-distance prices would provide at least some offsetting benefit to low-income subscribers.

Second, although evidence suggests that long-distance phone use is sensitive to income, the evidence is also clear that reduced long-distance rates benefit even the poorest households. A recent study finds that consumers with incomes under \$10,000 per year have average long-distance bills of \$20.51.¹⁰⁵ Quadrupling household income adds less than three dollars to the average monthly bill, while the highest income class studied, households earning more than \$75,000 per year, have monthly

103 See POLICY RESEARCH PROJECT, *supra* note 81, at 16-17; Mueller & Schement, *supra* note 83, at 273.

104 See POLICY RESEARCH PROJECT, *supra* note 81, at 16-17 (noting this reason for both the Camden, New Jersey study and the Texas study).

105 See Rappoport & Taylor, *supra* note 79, at 55.

bills of \$36.97.¹⁰⁶ These data reinforce the conclusion that poor consumers would benefit significantly from lower long-distance rates and would share in any offset of an increased SLC. Even a five percent reduction in the monthly long-distance bills of the poorest households would go a long way toward offsetting the maximum \$1.50 increase in the SLC necessary to fully fund the e-rate program and would more than offset the reduced level of e-rate subsidies currently being implemented. Some nominal regressivity from a flat surcharge on local service might remain but must be kept in perspective. In the end, at most \$18 per household per year is at issue, and nearly all of that cost will be offset, even for the poorest households. On the other hand, the potential social economic gains from switching the subsidy to the SLC are potentially enormous.

The implication of this analysis is that regulators are most likely free, consistent with their public interest obligations, to choose the least-cost means of subsidizing universal services rather than inefficiently constrained to place the burden on interstate charges. In the current situation we cannot estimate the overall effect on telephone penetration that would result from removing the tax on long-distance revenues in favor of an increased SLC. Oligopoly interaction among long-distance companies may not permit a precise estimate of the expected decrease in long-distance prices. In the event existing competition is insufficient to force pass-through of reductions to consumers, the FCC could renew explicit rules on pass-through or adopt regulations that increase competitive pressure on long-distance carriers. However, the analysis strongly suggests that the Commission's decision to recoup universal service subsidies from long-distance fees is not required by principles of either administrative law or general equity, and that a more efficient subsidy scheme should therefore be implemented for the e-rate program. Given the evolving nature of universal services under the 1996 Act, the same analytic principles should also be brought to bear in future subsidy regulations to ensure that unnecessarily costly programs do not reduce economic welfare and work against the very goals the universal services provisions were designed to achieve.

Conclusion

The universal services provisions of the Telecommunications Act of 1996 aim to ensure that, as American society changes with new communication and information services, no one is left without access to essential means of social, economic and educational interaction. The e-rate program in particular seeks to avoid disparities in the critical domain

106 *See id.*

of primary and secondary school education and in the availability of resources that improve employment opportunities and civic participation. Community access to the Internet through schools and libraries thus has the potential to provide important resources for segments of society that, to their detriment, would otherwise do without.

This Article does not take issue with universal services in general or with the e-rate policy in particular. Our purpose instead is to analyze the means the FCC has chosen to reach Congress's goal and to demonstrate three things: first, that the FCC's funding method is costly; second, that a less costly alternative is available; and third, that the more economically efficient policy would not contradict distributional goals of the universal services provisions of the 1996 Act. These facts make the current e-rate policy hard to reconcile with the Commission's obligation to regulate in the public interest.

Because demand for long-distance calling has consistently been found to be highly sensitive to price—a sensitivity that only increases as substitutes like e-mail and Internet telephony become more widely used—the FCC's policy of recouping the e-rate subsidy from long-distance revenues will likely have a measurable, negative impact on economic welfare. Contrary to what the Joint Board and the Commission have suggested, the more efficient policy of imposing a modest increase on the price of basic local service would be unlikely to affect overall affordability or consumption of such service. Nor would increasing local rates be more than nominally regressive. The economic welfare costs on the other side of the ledger are, in contrast, very large.

There is no question that universal services regulation poses challenges, politically as well as economically. And the Commission's job is only likely to become harder on both fronts as changes in telecommunications require the scope and definition of universal services to be reconsidered. As the FCC works within the current framework to address a potentially expanding range of universal-service programs under the 1996 Act, it will be increasingly important that the Commission's regulatory policies preserve economic efficiency and social welfare. Unnecessarily discounting such considerations undermines both the Commission's public-interest obligations and the economic viability of Congress's equitable objectives in the rapidly changing world of telecommunications.