The regulatory road for the BOCs to provide enhanced services has been long and tortuous. In 1981 AT&T applied to the FCC for permission to provide "Custom Calling II" services, which included voice messaging services, on an unseparated basis.[7] However, the FCC rejected AT&T's request. Subsequent to the FCC's negative decision, the Modification of Final Judgment (MFJ) went into effect. The BOCs were prohibited from providing "information services" (which had a very similar definition to the FCC "enhanced service" definition) under Section II.D.1 of the MFJ. The combined effect of the FCC decision and the MFJ caused voice messaging not to be offered to residential and small business customers by the BOCs.

The following events then transpired which permitted the BOCs to offer enhanced (information) services:

1985: The FCC begins Computer III proceedings with an emphasis on allowing BOCs to provide enhanced services subject to non-structural safeguards.

1988: (i) Judge Greene authorizes BOCs to provide "gateway" information services (which includes voice messaging under the MFJ).

(ii) BOCs file ONA plans designed to ensure competitors have Comparably Efficient Interconnection (CEI).

(iii) FCC begins approving CEI plans to allow BOCs to provide individual enhanced services on a structurally integrated basis.

1990: (i) Ninth Circuit remands Computer III to FCC.

(ii) FCC authorizes BOCs to continue to provide enhanced services on an interim basis according to CEI plans.

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competitors are subsumed into the overall measure of output when a consumer welfare calculation is done.

[7]AT&T had already designed and begun to install the services on an unseparated basis prior to the FCC's Computer II decision, which required structural separation.

1991: (i) Judge Greene removes information services restriction totally.

(ii) FCC issues remand order to allow structural integration of BOC enhanced services and approves final BOC ONA plans.

1992: BOCs begin offering integrated enhanced services under ONA plans.

1994: Ninth Circuit again remands Computer III to FCC.

1995: FCC authorizes BOCs to continue to provide enhanced services under the CEI plan regime.

From an economist's viewpoint, this regulatory imbroglio has created significant social costs. As we will discuss in the next section, consumer welfare would have been significantly higher if BOC voice messaging services had been offered sooner. Furthermore, government, management, and lawyers' time has been spent debating the issue of structural separation for nearly 20 years. A rational cost-benefit analysis demonstrates that the benefit to consumers of having BOC enhanced services available far exceeds any possible cost that hypothetically might arise. Indeed, we quantify these potential benefits and costs in the next sections of this paper.

As the above regulatory history demonstrates, the key dates were 1988 and 1991, when the MFJ restrictions were removed and the FCC decided to allow BOCs to offer enhanced services on a structurally integrated basis. Beginning in 1988, pending approval of final ONA plans, BOCs were permitted to offer specific enhanced services on a structurally integrated basis, subject to FCC approval of CEI plans for those services. The FCC ultimately approved blanket authorization for BOCs to offer enhanced services without a structural separation requirement in 1991. Thus, we consider data from 1988, 1991, and the most current data available to analyze the evolution of the enhanced services market.

Overall, information services are a large part of the U.S. economy, with estimated revenues of $135.9 billion. According to the Commerce Department, information services is

"among the fastest growing sectors of the economy."[8] Some of the largest and most sophisticated companies in the U.S. participate in this sector, including GE, AT&T, MCI, IBM, Sears, Microsoft, TCI, Time Warner, and American Airlines.

The individual segments of the information service industry, all of which use telephone lines as well as other distribution media in varying ways, are also thriving. Enhanced (information) services have grown 15 percent a year since 1991 to reach an estimated $15 billion in 1994. Some 65 percent of these services are delivered on-line, with the remainder delivered on CD-ROM or using wireless or other distribution technologies. Data processing and network services are another segment which has grown by over 14 percent a year since 1991 to over $50 billion by 1994. This segment includes services such as credit card authorizations, data entry, payroll processing, electronic mail, and electronic data interchange. Lastly, computer professional services have grown by about 9 percent a year to reach $65 billion in 1994. This segment includes systems integration and consulting services. Thus, no anticompetitive effect of BOC entry into information services has occurred. Overall, the market continues to be very competitive.

The market segment for enhanced (information) services is particularly relevant here since this segment includes many of the business which the BOCs have entered. This segment, including on-line databases, value added network services, voice messaging, and electronic mail, grew from $7.5 billion in 1988 to $10.2 billion in 1991 and to $13.6 billion in 1993, which is the last available data.[9] Market growth in 1993 was 16 percent, which was higher than the year before. The market is expected to maintain that rate of growth for the next few years.[10]

Value added network (VAN) services have grown from $0.5 billion in 1989 to $3.4 billion in 1993. Subscribership to all videotex gateways increased from 715,000 in 1988 to 6.3 million

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[8]U.S. Dep't. of Commerce, 1994 U.S. Industrial Outlook 25-21 (1994).

[9]U.S. Industrial Outlook: 1990 at 29-2, 1992 at 26-1, 1994 at 25-2. The Commerce Department discontinued this publication in 1995.

[10]1994 U.S. Industrial Outlook 25-2 and 29-7.

in 1994.[11] Electronic mail has become widely available since 1988. E-mail subscribership has grown from 6 million in 1989 to over 13 million in 1993.[12] E-mail revenues increased from $574 million in 1989 to $740 million in 1991 and an estimated $1.2 billion in 1994. BOCs have not attained anything remotely close to a dominant position in any of these enhanced market segments.

Similarly, BOC entry into the voice messaging market segment has led to lower prices and higher demand. Between 1989 and 1991, users of voice messaging CPE more than doubled, from 5.3 million to 11.6 million, and now accounts for $1.3 billion annually.[13] The overall voice messaging market segment grew from $665 million in 1989 to $1.1 billion in 1991 and $1.54 billion 1994. Forecasts of future growth have the market doubling to over $3 billion by 2000.[14] Forecasted annual growth over this period is 12 percent. Thus, output has expanded rapidly in the voice messaging market segment which demonstrates the pro-competitive effects of changes in FCC and MFJ regulation.

Since 1991, prices have decreased by 50 percent for most voice messaging equipment. Equipment improvements such as voice messaging boards for PCs have become widely available at relatively low cost. Thus, voice messaging equipment continues to place a significant price constraint on network-based voice messaging services.

Prices for voice messaging services have decreased greatly since BOC entry into the market segment. Frost and Sullivan states that in 1990 the average monthly fee for voice messaging was just under $30. By 1993 the average monthly fee decreased by about 50%, or a decrease in price of over 20 percent per year. Frost and Sullivan attributes this "dramatic drop" in prices to the growth of a more competitive market, driven by the lower-priced voice messaging offered by the BOCs and the independent LECs. By 2000, Frost and Sullivan predicts a further

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[11] Boston Globe, Jan. 14, 1995, at 61.

[12] 1990 U.S. Industrial Outlook 31-4; 1994 U.S. Industrial Outlook 29-7.

[13] NATA, 1991 Telecommunications Market Review and Forecast 135 (1991); NATA, 1993-94 Telecommunications Market Review and Forecast 171.

[14] NATA, 1993-94 Telecommunications Market Review and Forecast 171; Frost & Sullivan. U.S. Voice Messaging Services Markets, Report 5172-63 (Dec. 1994).

decrease in the average fee for voice messaging by about another 50 percent (pp. 3-10 to 3-11). Regarding current market conditions, Frost and Sullivan reports that:

> "Today, there are numerous providers of voice messaging services in a highly competitive market. The entrance of the BOCs and independent LECs in the late 1980s create fierce competition for the local/regional service bureaus....The RHCs and independent LECs have developed the residential end-user market, which previously had little interest in or knowledge of voice messaging." (p. 1-4)

Lower prices, increased competition, and development of a new market segment have been the result of BOC entry into the voice messaging segment of the enhanced services market. All of these outcomes lead to increased consumer welfare. This pro-competitive outcome stands in stark contrast to FCC and MFJ regulatory policy in the early and mid-1980s which led to an absence of BOC participation in enhanced service markets. Consumer welfare was lower and the economic efficiency of the U.S. economy was lowered by these misguided regulatory policies. Thus, as we discuss below, the FCC policy of structural integration and removal of the MFJ restrictions on information services provision by BOCs has led to a significant increase in consumer welfare which easily exceeds over $1 billion per year.

We finally observe that the voice messaging market is very unconcentrated. The BOCs and GTE combined account for about one-sixth of voice messaging revenues combined. However, individual LEC market shares are much lower. BOC market shares for voice messaging services range from around 6 percent for Bell Atlantic, BellSouth, and Pacific Telesis, to about 1 percent for NYNEX. Competition continues to be very strong for voice messaging customers, with both service prices and equipment prices decreasing at a rapid rate.

IV. Consumer Welfare from New Telecommunications Services

A. The Economic Importance of New Telecommunications Services

Regulatory restrictions which are designed to facilitate competition may often have a potentially much larger negative effect on consumer welfare which cannot be ignored: restrictions

on the introduction of new goods and services.[15] Consider the introduction of a new telecommunications service which is not presently available -- call it home distance learning over personal computers. The demand for such a service will exist, as will a demand curve, which is a schedule of quantities which would be bought at each monthly service price. See Figure 1. At lower prices more service is demanded, but even at quite high prices some demand remains from people who value the service quite highly. If the service were offered at price p_1 in Figure 1, all those individuals who would have paid more than p_1 receive the difference between what they would have paid and what they actually pay in increased consumer welfare. This added value is called the consumer's surplus and is the area labelled A in Figure 1. Consumer's surplus is a dollar measure of increased consumer welfare, and is almost universally accepted by economists and policy makers in valuing the effects of economic policy.

Now suppose because of regulation that home distance learning is not offered. For instance, if structural separation is required, the cost of the BOCs providing home distance learning might well be sufficiently high that, at prices which would be charged, insufficient consumer demand would exist to make the economic return on the investment high enough to justify the investment.[16] The home distance learning application would then not be offered. No matter how much an individual is willing to pay, he cannot buy the home distance learning service. Indeed, the price might as well be infinity because no one can buy the service. If regulation is changed and the service is introduced, the price decreases from infinity to p_1. To measure the gain in economic welfare, we use the change in price from the "virtual or reservation price" which causes zero demand, price p_2 in Figure 1, to the price that will be charged, which

[15]The welfare effect of delayed introduction of new goods or services has not been considered in most analyses of the economic effects of regulation. See, e.g., P. Joskow and N. Rose, "The Effects of Economic Regulation," in R. Schmalensee and R. Willig, Handbook of Industrial Organization, vol. II (1989) for a review of the effects of regulation.

[16]While the demand curve in Figure 1 demonstrates that some consumer demand would exist unless prices became quite high, at high prices caused by high costs demand may not be enough to cover the fixed costs of providing the service. Fixed costs of providing enhanced services are almost always a large component of the overall costs of providing the service.

is p_1 in Figure 1.[17] The large change in price will lead to a large increase in economic welfare so long as significant demand exists for the new product or service.

The economic theory of the valuation of new goods was developed by the Nobel Prize winning British economist Sir John Hicks in 1940. In recent papers, Hausman further developed the theory and has applied it to measuring the consumer welfare cost of the delay in the introduction of cellular telephone.[18] We will first apply the theory to the case of voice messaging, which had a delayed introduction of approximately 5-7 years, to demonstrate the large potential losses in consumer welfare from regulatory-caused delays or even permanent postponement in the introduction of new telecommunications services.

B. Consumer Welfare Losses from the Delay in Voice Messaging

Voice messaging using central office-based telephone technology was sufficiently developed to begin operation in the early 1980's in the U.S.[19] As noted, AT&T applied for permission with the FCC in 1981 to provide "Custom Calling II" services, which included voice messaging services, on an unseparated basis. However, the FCC rejected AT&T's request, mainly because of fears of cross subsidy.[20] AT&T had claimed that it would need to redesign its network equipment to provide messaging on a structurally separated basis, but the FCC rejected the claim. AT&T stated that a redesigned system for structural separation would take three years to introduce, and the additional cost would be substantial. The FCC decided that, since it was "technically possible" to provide structurally separated voice messaging, AT&T would not be

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[17]For an application of the theory of the valuation of new goods and extension of the theory in a non-regulated context, see J. Hausman, "Valuation of New Goods Under Perfect and Imperfect Competition," MIT Working Paper (June 1994a).

[18]The papers are J.R. Hicks, "The Valuation of the Social Income," Economic Journal (1940); Hausman, 1994a, op. cit.

[19]See R.F. Rey, ed., Engineering and Operations in the Bell System (1983) for an early description of the development of AT&T's custom calling services.

[20]AT&T Petition for Waiver of Section 64.702 of the Commission's Rules and Regulations ¶18, 88 F.C.C. 2d 1 (1981). The FCC recognized the presence of economies of scope in voice messaging (¶17) but feared a "slippery slope" that would create regulatory uncertainty.

allowed to provide it on an integrated basis (¶53). Extra economic costs due to structural separation had only a minor role in the FCC decision. Subsequent to the FCC's negative decision, the Modification of Final Judgment (MFJ) went into effect. The BOCs were prohibited from providing "information services" (which had a very similar definition to the FCC "enhanced service" definition) under Section II.D.1 of the MFJ. The combined effect of the FCC decision and the MFJ caused voice messaging not to be offered to residential and small customers by the BOCs.[21] Competing service providers did not offer voice messaging services, despite their previous claims that the equipment already existed which would permit them to offer the services, and despite the FCC's belief that competing service providers would offer the services (¶85, ¶103). Thus, residential and small business customers did not have the opportunity to purchase voice messaging services.

In March 1988 Judge Greene authorized the BOCs to provide transmission (but not content) based information services. Also in 1988 the FCC began approving comparably efficient interconnection (CEI) plans which allowed the BOCs to provide individual enhanced services, such as voice messaging, on a structurally integrated basis. These changes in regulation permitted the BOCs to begin to offer the voice messaging services they had originally petitioned the FCC to provide in 1981. In practice, the BOCs began to offer voice messaging services in 1990. Demand growth for voice messaging has been extremely rapid, with current BOC subscriptions at about 6 million customers. Clearly, the demand for voice messaging existed in the U.S. in the 1980's. The technology also existed to permit voice messaging to be offered on an economical basis. However, the combination of FCC regulation and the information services prohibition of the MFJ delayed the introduction of voice messaging services in the U.S. for somewhere between 5-7 years. We now calculate the effect on consumer welfare of the delay in voice messaging services in the U.S.

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[21]AT&T had told the FCC that it would not be economic to provide voice messaging services on a structurally separated basis, but the FCC rejected the claim. Medium and large businesses were able to use voice messaging services through their internal PBXs. These PBXs often had extremely similar designs to the Central Office Switches (COS) used by the BOCs, e.g. the Northern Telecom switches. However, the BOCs were prohibited from using their COSs to offer voice messaging services to their customers due to FCC rules and the MFJ.

In 1994 LEC voice messaging demand in the U.S. exceeded 6 million subscribers. Voice messaging, along with on-line information services, has been the great success story of enhanced services offered in the past 15 years. The average monthly price of LEC voice messaging service in 1994 was approximately $8.00. We now consider lost welfare, asking the question of how much voice messaging would have benefitted consumers in 1988 if the FCC and MFJ delay had permitted voice messaging to be introduced in the mid-1980's. Initially, we will assume that in 1988 voice messaging would have accomplished the same consumer penetration at the same price in 1988 as it actually did in 1994. To make the calculation corresponding to Figure 1, we use the estimate of the voice messaging demand curve, described in Appendix A. The main parameter of the demand curve is the estimated price elasticity of -1.10 (standard error = 0.31). To make an exact estimate of the lost consumer welfare we use the formulae which are given in Appendix A to this paper.[22]

For the initial case of similar demand and price in 1988 as 1994, we estimate the lost consumer welfare to be $5.7 billion (in current 1994 dollars). Thus, each residential and small business customer lost approximately $44 per year in consumer welfare for each year that voice messaging was delayed, which demonstrates the extremely high costs of regulatory delay in the introduction of new telecommunications services. Note that the economic efficiency loss to the U.S. economy was even larger than this calculation of $5.7 billion because the calculation ignores the contribution from voice messaging services to the joint and common costs of the BOCs and the further effect that the contribution has in decreasing other telecommunications prices.[23] The delay caused by the FCC and MFJ prohibition cost each voice messaging user on average about $946 using only the lost consumer's surplus.

Now suppose that the FCC had not delayed, but instead had allowed the BOCs to provide voice messaging service in 1988 on an integrated basis. For illustrative purposes, suppose that regulation had been highly imperfect and that the BOCs had impeded competition. We will

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[22]J. Hausman, "Exact Consumer's Surplus and Deadweight Loss," American Economic Review 71 (1981).

[23]In fact, the FCC's rules "over allocate" certain costs to unregulated services under Part 64 accounting rules.

assume in this scenario that price would have been higher by 50 percent, corresponding to an increase from $\bar{p}_1$ to p_3 in Figure 2.[24] Consumer's surplus would decrease by $229 million. However, the FCC regulatory delay and the MFJ prohibition still cost consumers $5.4 billion in lost welfare in 1993. Thus, these calculations, which are summarized in Table 1, demonstrate the very large losses in consumer welfare caused by regulatory delay in the introduction of new goods.

Table 1: Estimated Lost Consumer Welfare in 1988 Due to Voice Messaging Delay (1994 Dollars)

Scenario	Penetration	Assumed Price	Lost Welfare
1. Similar to 1994	1994 level	1994 price	$5.7 billion
2. Higher price	1994 level	50% higher	$5.4 billion

As the estimates in Table 1 demonstrate, regulatory delay or regulatory prohibitions on the introduction of new goods and services in the U.S. economy can have an especially large negative effect on economic welfare. Billions of dollars of losses to the U.S. economy can occur for each year of delay in the introduction of a new service which consumers will value and purchase, once the service is available.

This result follows from an elementary principle in microeconomics that, even in the most extreme case, a monopolist creates significant consumer welfare when it introduces a new good. The economic reasoning is an important factor in the result that patents are awarded for 17 years. In the current situation where structural separation may lead to the outcome that new enhanced services are not introduced, the result could well be billions of dollars of lost consumer welfare and even greater losses in economic efficiency to the U.S. economy.

[24]Of course, this hypothetical outcome would have been extremely unlikely given the possible substitution of CPE-based substitutes through either PBXs or home answering machines.

C. Consumer Losses from Delay in Telecommunications Services Not Currently Being Offered

FCC and state regulation together with the MFJ prohibition on "incidental" interLATA services, e.g., interLATA service used to supply on-line services such as videotex or voice messaging, has deterred the introduction of new telecommunications services by the BOCs. Using these examples of unnecessary restrictions, we demonstrate that regulatory delay creates very large potential losses in consumer welfare. We now calculate the cost in consumer welfare of these regulatory prohibitions and delays using survey data collected by the Pennsylvania PUC and another survey conducted by a BOC, SBC. We use the same methodology to compute the losses in consumer welfare that we use above for calculations for voice messaging. While the future prospects for any new good or service are uncertain, these calculations demonstrate how large the losses are across these potential services. If only a few of the services prove to be successful, consumer welfare in the U.S. will increase significantly if the regulatory restrictions that inhibit the introduction of new services by the BOCs are reduced or eliminated.

(a) Pennsylvania PUC Study

We use data developed in a survey conducted for the Pennsylvania PUC in a 1993 study.[25] The study considered benefits to citizens of Pennsylvania from expanded telecommunications services. When we calculate gains in economic welfare, we do it on a national basis using the Pennsylvania PUC data to make nationwide estimates. We only consider enhanced (information) services which were included in the Pennsylvania PUC study.

1. Residential Customers

The first service we consider is expanded information services. These are the type of advanced information services which would permit increased working at home. While the BOCs are currently permitted to provide some information services, they are hampered by federal and state regulation, as well as the MFJ. About 47 percent of the respondents in the Pennsylvania

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[25]See Deloitte and Touche, DRI/McGraw Hill, Pennsylvania Telecommunications Infrastructure Study, vol. III (Mar. 1993).

PUC study stated they would buy advanced information services, with the mean amount people were willing to pay being $13.41 per month (p. VI-48). Calculation of the gain in economic welfare from these information services is $20.4 billion per year. Even if the subscription rate were only half as large as the survey predicts, the increase in consumer welfare would still be about $9.9 billion per year. Thus, the welfare gain from provision of information services which would permit increased working at home is substantially greater than the gain from voice messaging which we estimated above, because of the higher demand for these types of information services.

Another new service which received a high value from consumers in the Pennsylvania PUC study is distance learning and medical services by telecommunications. The amount in increased economic welfare is in the range of $40 billion per year. Therefore, for the two services from the Pennsylvania PUC study, the total increase in consumer welfare is about $60 billion per year. On a per household basis the amount is in the range of $600 per year. Thus, introduction of new telecommunications services currently deterred or prohibited by regulation would lead to a significant gain in economic welfare for U.S. households.

2. Small Business Customers

We now consider services designed for small- and medium-businesses. Note that we only calculate the direct increase in welfare using the derived demand for these services; we do not consider welfare increases from increased employment or competitiveness of these small businesses. We calculate gains in economic welfare using the derived demand approach for these telecommunications services.

Interest among small businesses in advanced telecommunications services was very high in the Pennsylvania PUC study. One service that small businesses responded would be quite useful is database use. These responses are consistent with greatly increased interest in usage of the Internet and on-line services such as Compuserve. In the Pennsylvania PUC study, 68 percent responded they would buy the service at an average payment of $16 per month. Increased economic welfare from this service is $8.9 billion per year; even with a subscription rate of only half of the survey response, increased economic welfare would still be $4.4 billion per year.

(b) SBC Study

SBC conducted a study in 1994 for advanced services. Here we use the results of the SBC study. The SBC study allows estimation of discrete choice models which we use in the consumer welfare calculations. We find estimates of gains in economic welfare in a similar range to the gains which we estimated above from the Pennsylvania PUC study.

As an example of a service for small- and medium-sized businesses, we consider a fax overflow service. This service would allow reception of an incoming fax message when the business' fax machine was in use. When the fax machine ceases being in use, the message would be sent to the fax machine, or it could be rerouted to a PC which had the software to permit printing of the fax. The gain in economic welfare as measured by the derived demand for this service is approximately $1.4 billion per year. Even if the subscription rate were only half as large as the survey predicts, the increase in economic welfare would still be about $680 million per year.

Thus, for both residential consumers and for small- and medium-sized businesses, BOCs could offer numerous new services if the services were not prohibited by regulation. The losses in economic welfare to the U.S. economy total in the billions of dollars per year. Furthermore, much of new job growth occurs in small- and medium-sized businesses. If these businesses had advanced telecommunications services, which many large businesses currently use, small- and medium-sized businesses would be more competitive. The overall gains to the economy when the increased employment and increased competitiveness are accounted for would likely be several times larger than the billions of dollars in gains that we have estimated.

D. Potential Loss in Other Consumer Benefits

The losses from delay or complete withholding of new services from the market, while clearly the largest cost of restrictive regulations, are not the only harm done to consumers. The trend in telecommunications markets is for providers to offer a range of services in an integrated fashion -- one-stop shopping. Indeed, a recent article characterized current regulation as anachronistic in that it prevents customers from getting services on the basis that they want.

> "Amid all the rhetoric about telecommunications reform, you don't hear much about bundling. But this poorly understood rule banning carriers from packaging equipment and tariffed services under a single price tag is getting increased scrutiny from critics, who call it an anachronism. They say that the bundling rule is a regulatory straightjacket that makes it unnecessarily difficult for users to get integrated network solutions."[26]

While the reference to the bundling restriction quoted above refers primarily to large business customers, the general principle applies in all markets. By making it more difficult to obtain services, regulation can cause a real loss in consumer benefits.

Some indication of the magnitude of these losses is provided by consumer research for other products. We are aware of studies in which the ability to obtain services from a single point of contact is one of the most important factors in how consumers choose their telecommunications services. For example, a recent BellSouth study indicated that the ability to provide one-stop shopping gave interexchange carriers (IXCs) an advantage that is worth a substantial proportion of price.[27]

In summary, while smaller than the effects of new services, which generate welfare benefits that are a multiple of current expenditures, the convenience of one-stop shopping confers consumer benefits that are a substantial fraction of expenditures. Measures which artificially constrain the offering of this convenience can be costly indeed. For example, if the convenience of one-stop shopping is valued by consumers at 10 to 20 percent of price, which is a very conservative estimate compared to findings for other services, the cost to society of denying this benefit to BOC consumers would be in the $50 million - $100 million each year.

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[26]David Rohde, "Carrier Deals Raise a Bundle of Questions," Network World, Feb. 1995.

[27]Testimony of Arthur T. Smith on behalf of Southern Bell, Docket No. 930330-TP (Fla. P.S.C. July 1, 1994). This preference for one stop shopping even cuts across cultures. In a study of Japanese consumers, we estimated that the ability to obtain calling services from a single provider was worth about 14 percent of the average price. Timothy J. Tardiff, "The Effects of Presubscription and Other Attributes on Long-Distance Carrier Choice," Presented at the National Telecommunications Forecasting Conference, Boston, MA, May 1994.

E. Total Consumer Welfare Loss

Consumers and businesses gain large amounts of economic welfare with the introduction of new goods and services in the U.S. economy. To date, the economic cost of the prohibition of introduction of these services by the BOCs has not been analyzed. Our estimates, summarized in Table 2, demonstrate that the losses to the U.S. economy are most likely in the range of $50-$100 billion per year. A welfare loss of this size is about 1-2 percent of U.S. gross domestic product. The experience in voice messaging and cellular telephone service is being repeated as interested parties attempt to gain an advantage from prohibition or delay of BOC provision of new services. The loss to the U.S. economy is significant.[28] Furthermore, the loss to small- and medium-sized businesses, which provide a substantial fraction of new jobs in the U.S. economy, is also important. Overall, continued removal of regulatory restrictions on the introduction of new services will lead to significant gains to consumers, small businesses, and the U.S. economy.

Table 2: Economic Welfare Losses Per Year From Delay in New Services

Service type	Residential or Business	Welfare Loss
1. Advanced information services	Residential	$20.4 billion
2. Distance learning and medical	Residential	$40.0 billion
3. Database access	Business	$ 8.9 billion
4. Fax overflow	Business	$ 1.4 billion
Total		$70.7 billion per year

V. Diseconomies from Structural Separation

The bulk of the enhanced service revenues for the BOCs are generated by voice messaging services. Currently, these services are provided on an integrated basis with other LEC services.

[28]Hausman, 1994a, op. cit., estimated that the cost of delaying cellular telephone services was about $25 billion annually.

We have estimated the increase in unit costs of voice messaging that structural separation would impose from studies performed by two BOCs. Although these studies employed separate approaches and assumptions, the conclusions were quantitatively similar: structural separation would increase unit costs by about 30 percent.[29] Assuming that the services were still economic to provide, such cost increases would reduce economic efficiency by at least an average of $100 million per year.

A. Bell Atlantic

Bell Atlantic compared cash flows over a 10 year period (1995 to 2004) for their current operation and for a structurally separated subsidiary. Based on these cash flows, we estimate that structural separation would increase the cost of enhanced services by about 30 percent of price. Bell Atlantic expects that structural separation would have two major impacts on revenues and costs: (1) establishing separate sales channels would diminish the effectiveness of the marketing of voice messaging, resulting in a decrease in volume relative to the current (business as usual) arrangement and (2) additional one-time and ongoing costs would be entailed in making the move and separating the operations, including increased advertising to offset the loss of an effective marketing channel. Consequently, revenues would decrease and costs would increase. In effect, there are three types of diseconomies in the cost study: capital costs that are fixed over the relevant volumes, extra out-of-pocket costs associated with the separation, and reduced productivity in producing the output.

Our analysis proceeded as follows. First, we calculated the net present value of revenues and total costs, using the FCC's prescribed rate of return of 11.25 percent.[30] Next, we

[29]Under different sets of assumptions, the estimated cost savings from structural integration could well differ.

[30]The results are not very sensitive to the discount rate. For example, the changes in the unit costs reported below change very little when a discount rate of 8 percent is used.

calculated the cost per unit of revenue for each of the two cases.[31] The results appear in the table below.

	Business as Usual	Separate Sub	Change
Present Value of Revenues	$973 Million	$696 Million	(28.4%)
Present Value of Cost[32]	$773 Million	$717 Mill[33]	(7.3%)
Cost Index	0.79	1.03	(29.6%)

The outcome that cost exceeds revenues in the separate subsidiary case means that voice messaging has a negative cash flow. That is, if Bell Atlantic were making this business decision anew with a separate subsidiary requirement, the service <u>might not even be offered</u>. The resulting losses to customers are large, as we previously demonstrated.

B. <u>U S West</u>

U S West's study explicitly identified the extra costs that structural separation would impose. These costs included both one-time and ongoing costs, both of which are unnecessary if vertically integrated provisioning remained in effect. These additional costs would increase the cost of enhanced services by 30 percent, as we detail below.

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[31]Because Bell Atlantic assumed the same prices would prevail in both cases and that the mix of voice messaging services would remain the same, the revenues are equivalent to a quantity index. Therefore, cost divided by revenue can be interpreted as a unit cost.

[32]The "business as usual" cash flow includes payments to the regulated part of the business under Part 64. We removed these costs, because they are transfer payments, rather than true incremental costs.

[33]Note that <u>total</u> costs are less in this case, but that output has decreased significantly compared to the business as usual case. On a per subscriber basis, (average) cost has increased by 29.6%.

U S West's study assumed that structural separation would require acquiring and equipping a new building to house personnel that are currently shared with other non-enhanced services. In addition, the equipment now located in central offices would have to be relocated to new facilities. Thus, structural separation produces large and measurable diseconomies of scope.

Our approach is to quantify the increased cost caused by structural separation as a fraction of the revenue U S West expects. We use a 10 year study life and a 10 percent discount rate. Because of differences in tax treatment, we use three different categories of cost increases.

Capital Costs: U S West estimates that relocating administration personnel to a different building would require $36 million in one-time capital costs. These costs consist of equipment (computers, phones, and the like) and furniture. Depreciation associated with these expenditures is tax deductible, but the capital expenses themselves are not.[34]

In order for the costs associated with capital to be recovered, the present value of pre-tax revenues would have to increase by more than the present value of the capital expense -- while the depreciation tax benefit reduces the size of the capital expenditure, the fact that this charge has to be recovered in after-tax dollar increases the required revenue by even more. We estimate that pre-tax revenues would have to increase by $41 million (in present value) to offset the capital expenditures.

One-Time Expenses: U S West estimates that structural separation would require $60 million of one-time expenses. These charges are for the most part associated with the labor required to equip the administrative building ($8 million) and relocate the enhanced services

[34]Precise calculation of the depreciation tax benefit would require detailed information on the types of equipment and their tax depreciation lives. As a simplification, we have used straight line depreciation over the 10 year study life. At a 10 percent discount rate and a 40 percent tax rate, the present value of the tax depreciation benefit is about 25 percent of the capital cost.

facilities ($53 million).[35] For tax purposes, these expenses are deductible in the year that they are incurred. Therefore, revenue would need to increase on a dollar-for-dollar basis to recover these expenses. We assume that these one-time expenses are incurred in 1996. The present value (in 1995) is, therefore, about $56 million.

Annual Expenses: These expenses include the annual lease for the administration building ($13.5 million) plus ongoing expenses related to the relocated facilities ($18 million).[36] The present value of these expenses over the 10 year study life is about $194 million.

Total Costs: The present value of capital, one-time, and ongoing expenses is about $292 million. This is the sum of the present values of the capital costs ($41 million), one-time expenses ($56 million), and ongoing expenses ($194 million). Therefore, ongoing expenses account for about two-thirds of the added costs.

Revenue: U S West projects that enhanced services revenues will grow at a rate of about 10 percent annually through 1998. We extended this rate to the end of our study period (2005). The revenue projection grows from about $95 million in 1995 to about $250 million in 2005. The present value of these revenues is about $960 million. Thus, the cost increases produced by structural separation are over 30 percent of expected revenues.[37]

We view this estimate as conservative, because it does not account for the decreased effectiveness of marketing under structural separation. Because LEC business offices would no longer market enhanced services, a cost-effective sales channel would be closed off. Thus, U S

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[35]A 1990 U S West study estimated that the equipment relocation expenses would be about $44 million. We have increased this estimate by 20 percent to account for inflation between 1990 and 1996 (the year in which relocation is assumed to occur).

[36]Again, we adjusted the $15 million in annual expenses from the 1990 U S West study to account for inflation.

[37]This percentage is not very sensitive to the discount rate. For example, at 8 percent, the additional costs are 29 percent of revenue, and at 12 percent, these costs are 32 percent of revenues.

West would incur the additional cost of either increasing marketing expenses by employing less effective sales channels and/or facing reduced revenues over which to recover the increased costs.

VI. Summary and Conclusions

Requiring structural separation for the BOCs' enhanced services would impose large costs on both consumers and the BOCs themselves. New products and services may simply not be offered to consumers if structural separation is mandated. The loss to consumers from withholding such products can well be in the tens of billions of dollars annually. Even if the products were still produced, costs would be higher, on the order of $100 million annually for BOC voice messaging services. Finally, structural separation inconveniences customers by denying them the benefit of one-stop shopping. Such integrated buying is a growing trend in the industry and customers, as well as BOCs, are harmed by selectively withholding this ability from the BOCs' enhanced services.

In contrast to these clearly identified and large losses, the benefits to competition from replacing non-structural safeguards with structural separation is problematic. The robust markets for enhanced services strongly suggest that anticompetitive behavior is absent, and the ONA processes themselves seem to be conducive to non-discriminatory network access at prices that do not disadvantage unaffiliated providers. On these grounds, we conclude that the costs of replacing non-structural safeguards with structural separation far exceed any benefits to competition that could conceivably arise.

Figure 1

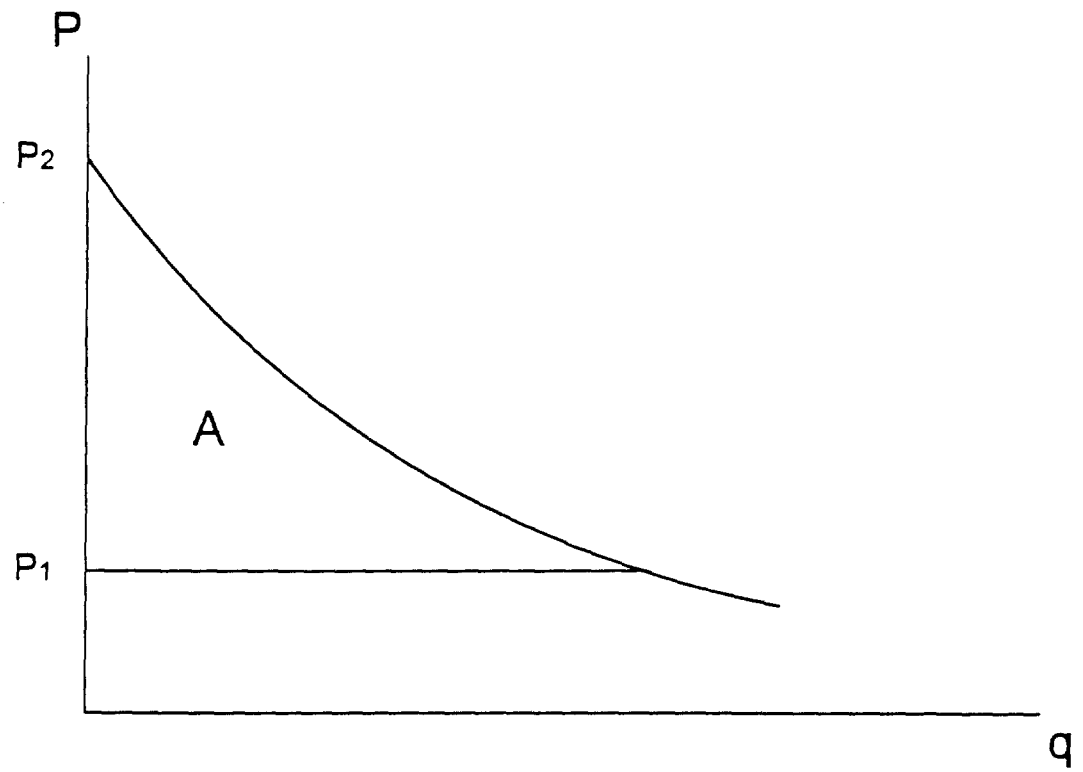
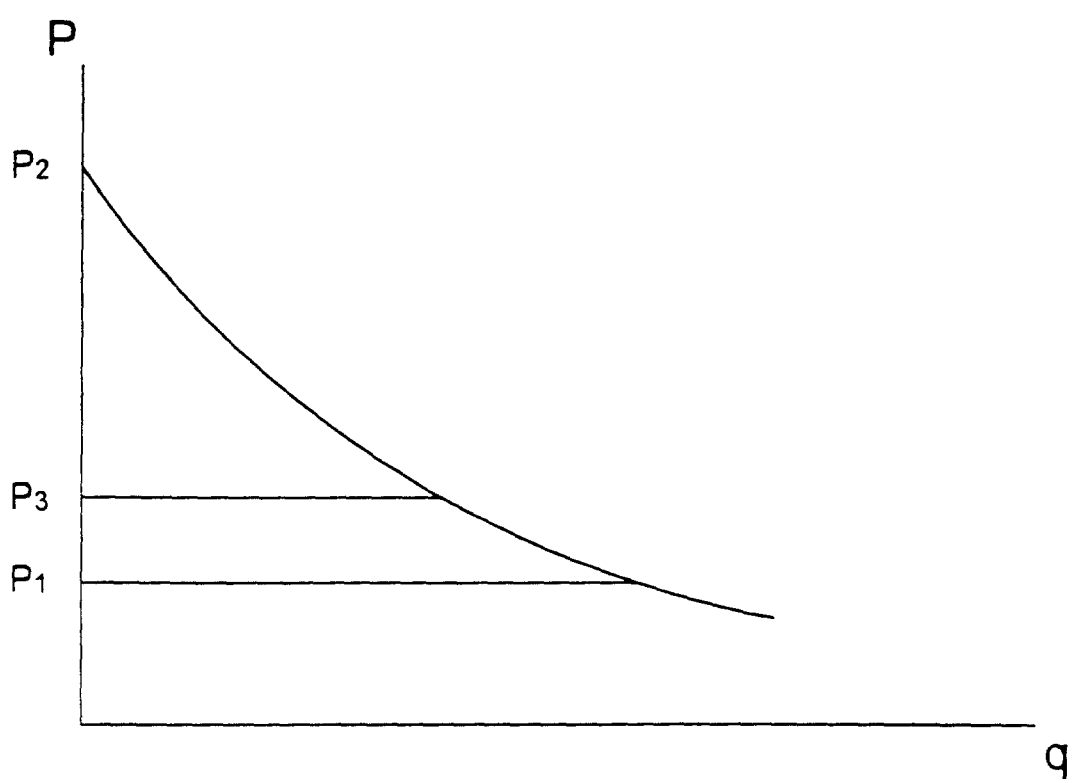


Figure 2



Appendix A

(1) Formulae for Consumer Welfare Calculations

To estimate the overall effect on consumer welfare, we use an exact consumers surplus approach using the expenditure function for the log linear demand curve. 1. First, we use the expenditure function calculated in Hausman (1981), equation (23)[38]:

$$e\ (p,\bar{u}) = [(1-\delta)\ (\bar{u} + Ap^{1-\alpha}/(1+\alpha))]^{1/(1-\delta)} \qquad (1)$$

where A is the intercept of the demand curve, α is the price elasticity, and δ is the income elasticity estimate. The compensating variation is calculated from equation (1) where y is income:

$$CV = \left\{\frac{(1-\delta)}{(1+\alpha)}\ y^{-\delta}\ [p_1x_1 - p_0x_0] + y^{(1-\delta)}\right\}^{1/(1-\delta)} - y \qquad (2)$$

The compensating variation is used to calculate the effect of price changes on consumer welfare.

For the case of a new good, the expenditure function from equation (1) is used to calculate the compensated (Hicksian) demand curve, and the "reservation" or "virtual" price is calculated; see Hausman (1994).[39] This price can be used in the expenditure function of equation (1) to calculate consumer's surplus from introduction of the new good.

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[38]J. Hausman, "Exact Consumer's Surplus and Deadweight Loss," American Economic Review 71 (1981).

[39]J. Hausman, "Valuation of New Goods Under Perfect and Imperfect Competition," MIT Working Paper (June 1994).

(2) Econometric Results for Voice Messaging

Data on demand for BOC voice messaging was available for 14 states over a 4 year period, 1991-1994. A log-log demand specification, consistent with the consumer welfare methodology developed above, was used. Fixed effects for each state were included, as well as state specific time trends to allow for the growth in demand of voice messaging as potential customers become increasingly aware of the service. To account for potential joint endogeneity of demand and price, we use the Hausman-Taylor (1981) approach of prices from different markets as instruments for prices in a given market.[40]

The model fits quite well, with the standard error estimated to be 0.042.[41] The estimated price elasticity is -1.10, with an asymptotic standard error of 0.31. Thus, the estimated t-statistic is 3.55, which indicates quite precise estimation.

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[40]J. Hausman and W. Taylor, "Panel Data and Unobservable Individual Effects," Econometrica (1981).

[41]In terms of an R^2 measure for an OLS regression, the R^2 would be 0.999, although this measure is not appropriate for an instrumental variable estimator.

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Member, Committee to Revise U.S. Trade Statistics 1990-1992
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Board of Directors, Theseus Institute, France Telecom University, 1988-
Member, Conference on Income and Wealth, National Bureau of Economic Research, 1992-

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I. Econometrics

"Minimum Mean Square Estimators and Robust Regression," Oxford Bulletin of Statistics, April 1974.

"Minimum Distance and Maximum Likelihood Estimation of Structural Models in Econometrics," delivered at the European Econometric Congress, Grenoble: August 1974.

"Full-Information Instrumental Variable Estimation of Simultaneous Equation Models," Annals of Economic and Social Measurment, October 1974.

"Estimation and Inference in Nonlinear Structural Models," Annals of Economic and Social Measurement, with E. Berndt, R.E. Hall, and B.H. Hall, October 1974.

"An Instrumental Variable Approach to Full-Information Estimators in Linear and Certain Nonlinear Econometric Models," Econometrica, May 1975.

"Simultaneous Equations with Errors in Variables," delivered at Winter Econometric Meetings, San Francisco: December 1974; published in Journal of Econometrics 5, 1977, pp. 389-401.

"Social Experimentation, Truncated Distributions, and Efficient Estimation," delivered at the World Econometric Congress, Toronto: August 1975; Econometrica, with D. Wise, June 1977.

"A Conditional Probit Model for Qualitative Choice," delivered at World Econometric Congress, Toronto: August 1975; MIT Working Paper 173, April 1976; Econometrica, with D. Wise, March 1978.