and mileage distributions for calls were employed to estimate prices. The results of this sensitivity analysis, reported in Appendix B, demonstrate that the price-cost margin results reported are not sensitive to the choice of representative calling patterns.

TABLE FIVE

CALLING PATTERN ASSUMPTIONS

Time-of-Day Distribution		
	MTS	WATS, 800 & Combined Services
Day	40 %	85 %
Evening	30 %	10 %
Night/Weekend	30 %	5 %

Mileage Distribution of Interstate Calls		
	MTS	WATS, 800 & Combined Services
0-292	20 %	12 %
293-430	20 %	9 %
431-925	20 %	53 %
926-1910	20 %	24 %
1911-3000	20 %	2 %

42. Figures One through Eight indicate that, across services, prices declined in the 1980s, then were steady or increased in the 1990s. The characteristic pattern is that of falling, unchanged, and then rising prices. MTS prices declined from 1987-1990, were flat from

approximately 1990 to 1992, and have increased since 1993. Prices for switched and dedicated, inbound and outbound WATS also declined until 1990 and have increased steadily since that time. Combined Service was not available until the 1990s. Initial prices were flat or declining but have risen from 1993 onward.

FIGURE ONE

PRICES FOR STANDARD MTS

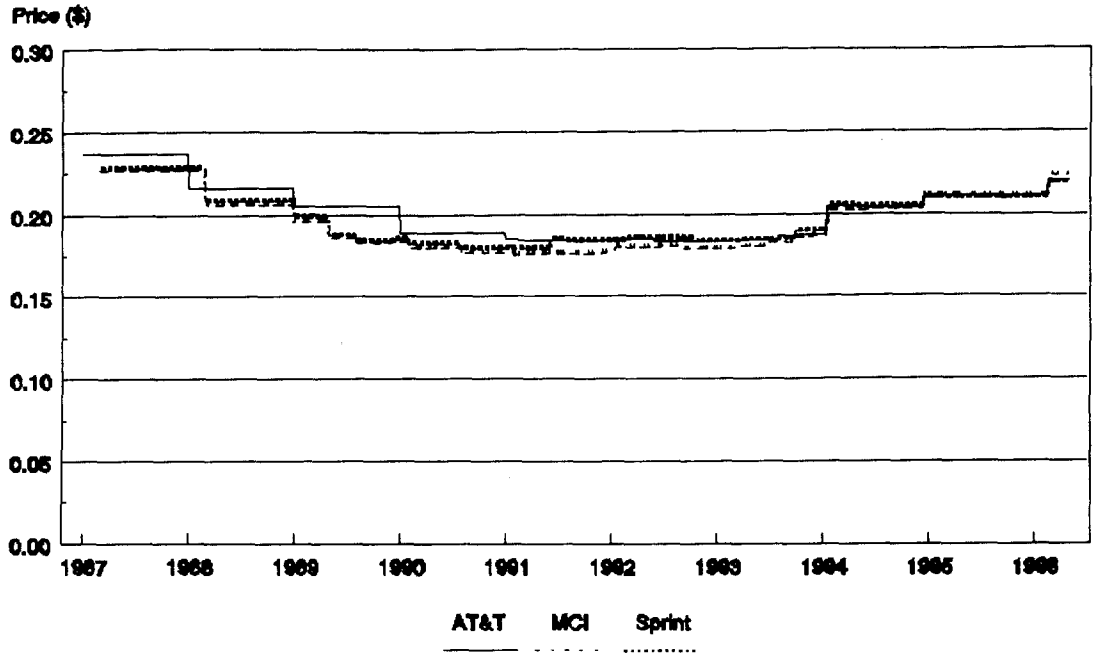


FIGURE TWO

PRICES FOR SWITCHED INBOUND WATS

(100 HOURS PER MONTH)

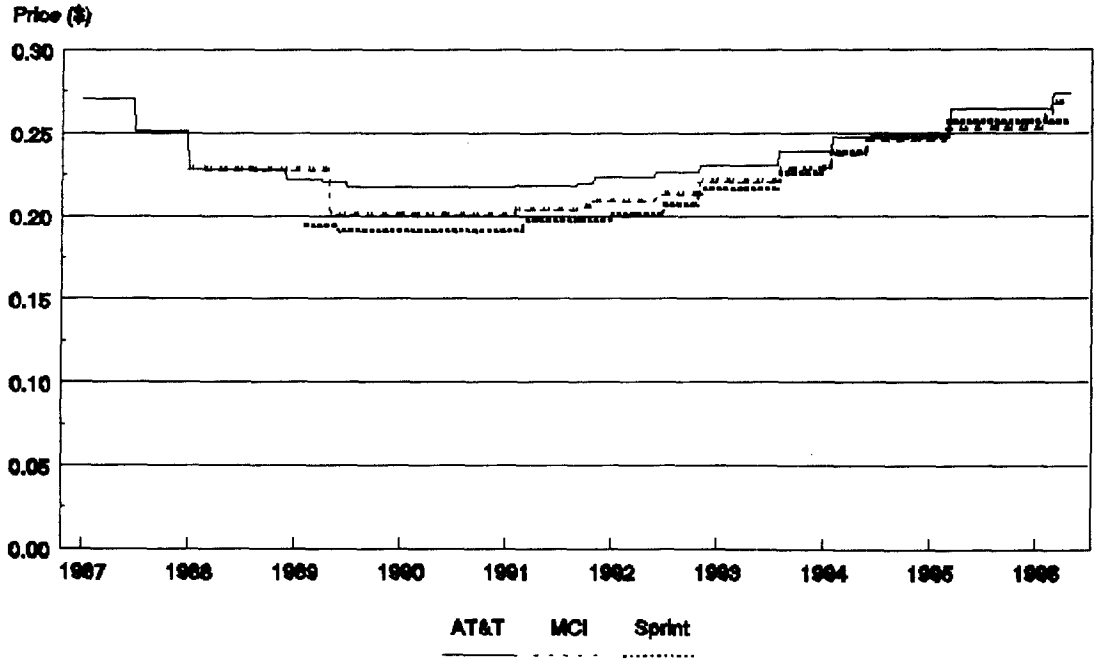


FIGURE THREE

PRICES FOR DEDICATED INBOUND WATS

(1,000 HOURS PER MONTH)

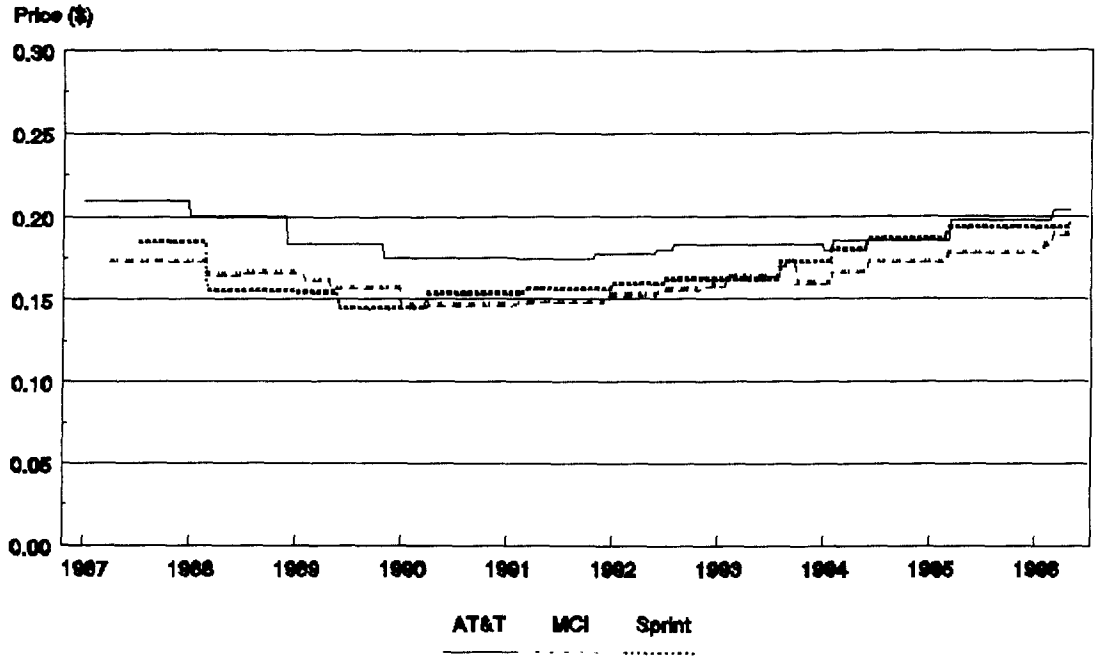


FIGURE FOUR

PRICES FOR SWITCHED OUTBOUND WATS

(100 HOURS PER MONTH)

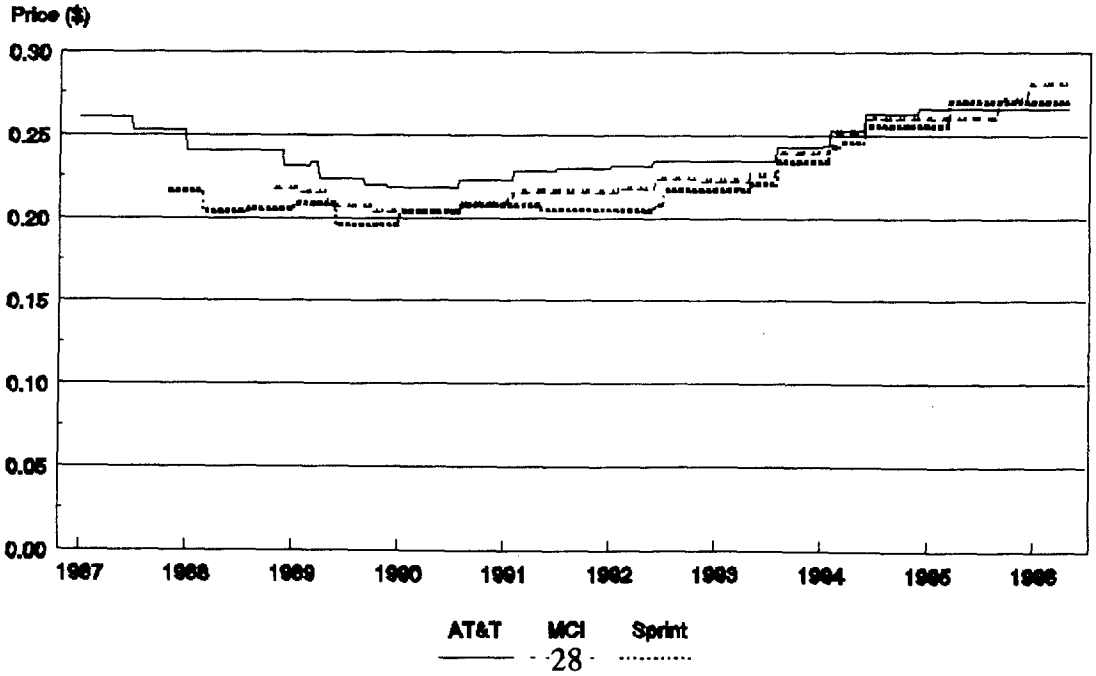


FIGURE FIVE

PRICES FOR DEDICATED OUTBOUND WATS

(1,000 HOURS PER MONTH)

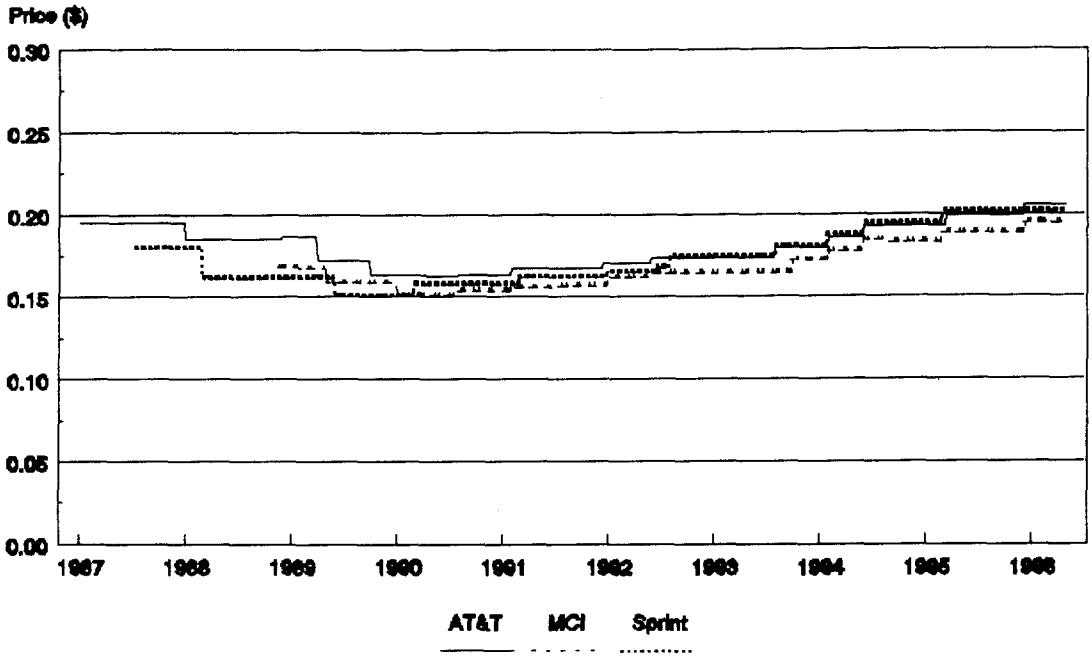
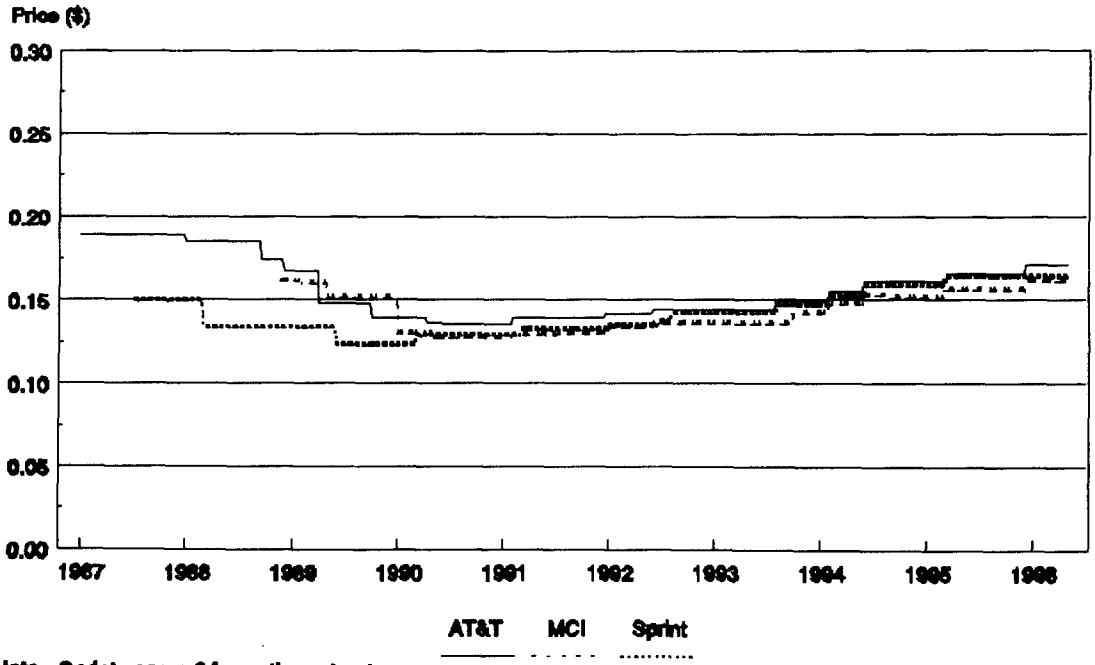


FIGURE SIX

PRICES FOR DEDICATED OUTBOUND WATS - 36 MONTH CONTRACT

(1,000 HOURS PER MONTH)



Note: Sprint uses a 24-month contract.

FIGURE SEVEN

PRICES FOR SWITCHED COMBINED SERVICE

(100 HOURS PER MONTH)

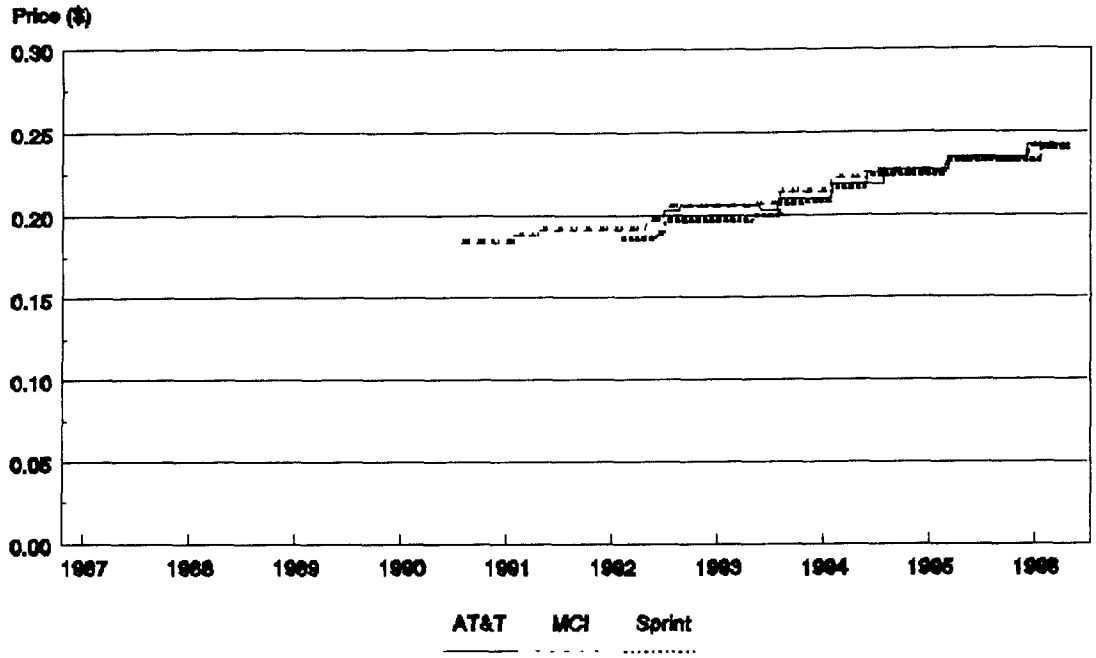
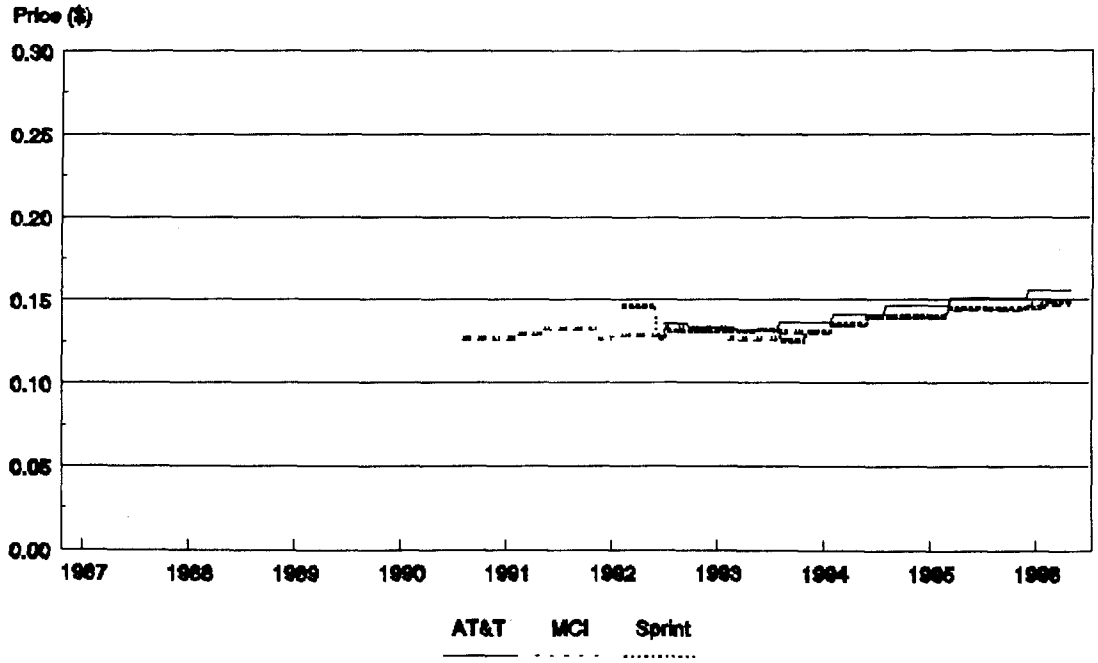


FIGURE EIGHT

PRICES FOR DEDICATED COMBINED SERVICE

(1,000 HOURS PER MONTH)



2. *The Estimation of Marginal Costs*

43. Long-distance costs at the margin include: (1) access charges levied by the local carrier on messages switched to the long-distance carrier and (2) operating expenses from increased use of the long-distance network to receive and switch those messages.[20] Both of these costs have been estimated, first for standard services and then for discount plans. Access charges for interstate calls are tariffed rates of local exchange carriers on service to long-distance carriers per conversation minute (note that dedicated access marginal costs for outbound and inbound service are adjusted for reduced access service charges.)[21] Estimates of the network operating costs per minute for a long-distance call have been reported by AT&T for outbound WATS and inbound WATS services as shown in Table Six.[22] Wharton Econometric Forecasting Associates ("WEFA") has developed an alternative measure of these operating costs, with an incremental network cost of service equal to $0.01 per minute, which is consistent with AT&T's estimates.[23] I adopt AT&T's cost estimates for WATS and Combined Services, and WEFA's estimate for the marginal cost of standard and discount MTS services.

---

[20] Marginal costs are to be distinguished from total service long-run incremental costs, measured as the change in a firm's long-run total costs when an individual service is added (or removed) from a set of existing services. Long-run incremental costs do not include access charges.

[21] Paul W. MacAvoy (1996), THE FAILURE OF ANTITRUST AND REGULATION TO ESTABLISH COMPETITION IN LONG-DISTANCE TELEPHONE SERVICE, Cambridge, MA., The MIT Press, p. 106, note 2 and accompanying text.

[22] Direct Testimony of John Sumpter on Behalf of AT&T Communications of California, Inc., APPLICATION OF AT&T COMMUNICATIONS OF CALIFORNIA, INC. (U 5002 C) FOR AUTHORITY TO PROVIDE INTRASTATE AT&T 800 READYLINE SERVICE, June 18, 1990.

[23] Wharton Econometric Forecasting Associates, ECONOMIC IMPACT OF ELIMINATING THE LINE-OF-BUSINESS RESTRICTIONS ON THE BELL COMPANIES, pp. 20-21 (July 1993) (citing Bellcore data).

44. Further evidence that these estimates of AT&T's incremental network costs are accurate comes from a 1996 study performed by Strategic Policy Research.[24] This study concluded that AT&T's incremental network costs per minute range from $0.0043 per minute to $0.0129 per minute. They were constructed using a "bottom-up" engineering approach based on a model architecture for a long distance network. Additional evidence comes from the fact that AT&T has recently entered into contracts for large-volume, wholesale purchases of long distance minutes by Bell operating companies that range from $0.01 per minute to $0.02 per minute;[25] on the assumption that AT&T does not price below marginal costs, then its marginal operating costs are below one cent per minute.

TABLE SIX
AT&T ESTIMATES OF LONG-RUN
NETWORK COSTS FOR LONG-DISTANCE CALLS
(DOLLARS PER MINUTE)

Switched Outbound WATS	Dedicated Outbound WATS	Switched Inbound WATS	Dedicated Inbound WATS
Pro WATS	Megacom WATS	Ready Line 800	Megacom 800
$0.0101	$0.0130	$0.0108	$0.0129

[24] Strategic Policy Research (September 23, 1996), A BOTTOM-UP ESTIMATE OF THE TSLRIC OF LONG-DISTANCE CALLING.

[25] "Bell South Corp. Awards AT&T Contract," WALL STREET JOURNAL, June 20, 1996, p. D6. Merrill Lynch, "Bell South/AT&T Contract Reinforces the RBOC/GTE Investment Case", June 20, 1996.

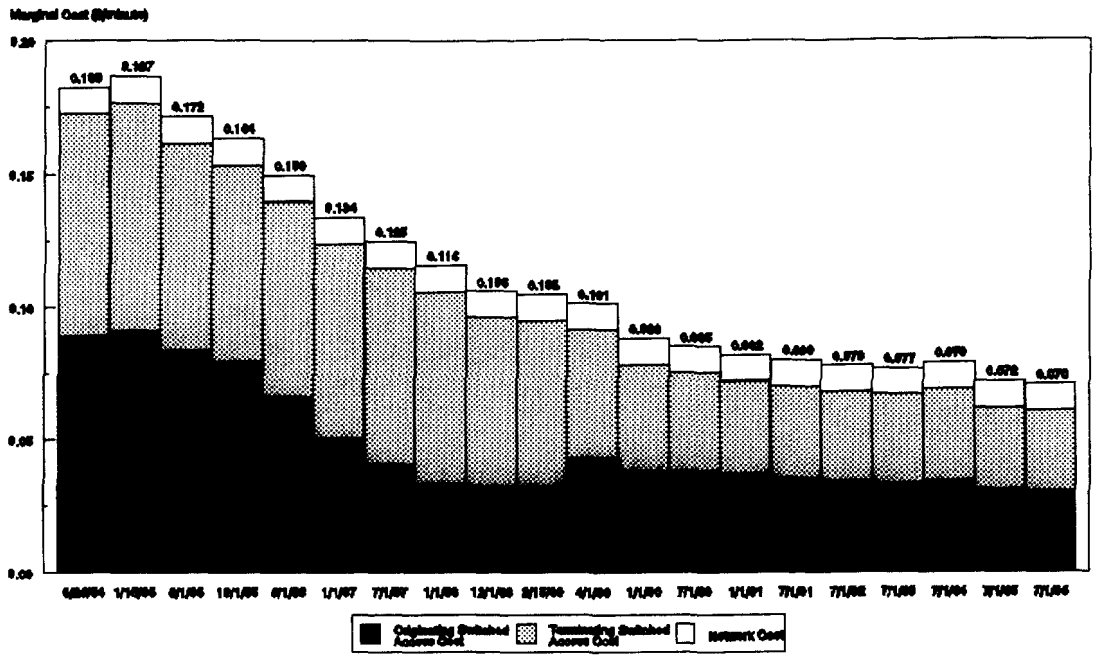
Source: *Direct Testimony of John Sumpter on Behalf of AT&T Communications of California, Inc., Application of AT&T Communications of California, Inc. (U 5002 C) for Authority to Provide Intrastate AT&T 800 READYLINE Service*, June 18, 1990.

45. Access charges and network operating costs at the margin together equal marginal costs as shown in Figures Nine through Twelve. There is a declining trend since 1984 in each series, with costs falling by 50 percent or more,[26] resulting from state and federal regulatory decisions that reduced access charges by more than ten cents per minute for switched and five cents per minute for dedicated services.

[26] Network operating costs likely have fallen over the past decade as a result of productivity and technological gains in the telecommunications industry. The assumption that incremental network costs have remained constant constitutes the most cautious approach to estimating price-cost margins since that assumption has the effect of reducing the resulting margins.

FIGURE NINE

INTEREXCHANGE CARRIERS' MARGINAL COST OF INTERSTATE SWITCHED SERVICE



Note: Includes MTS, switched outbound WATS, switched inbound WATS, and switched Combined Services.

FIGURE TEN

INTEREXCHANGE CARRIERS' MARGINAL COST OF INTERSTATE DEDICATED INBOUND SERVICE

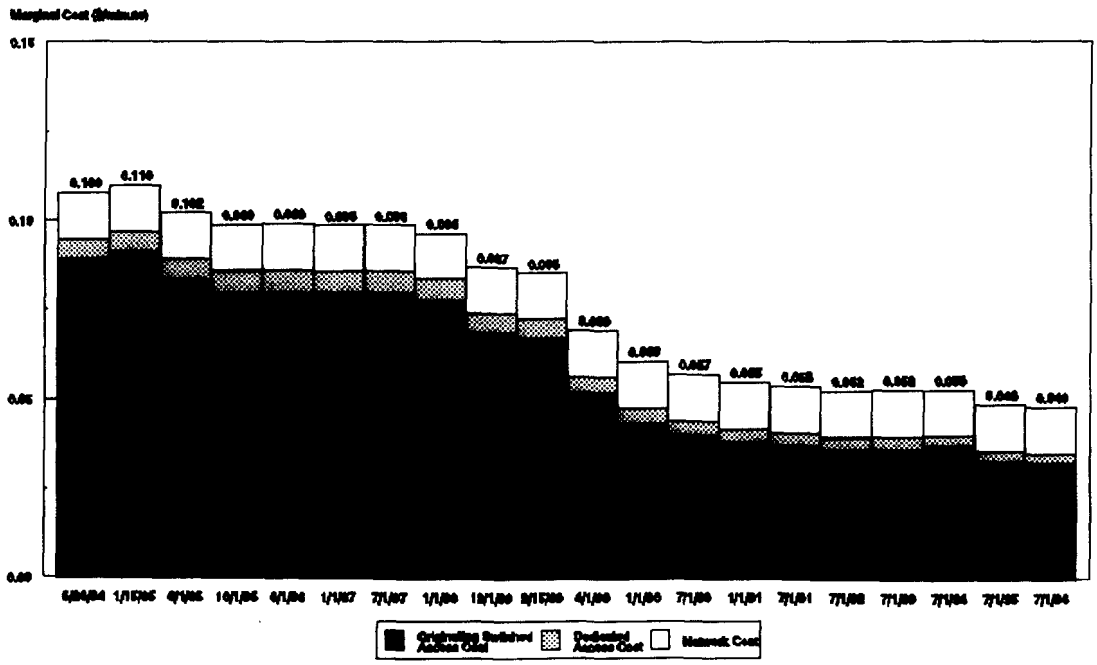


FIGURE ELEVEN

INTEREXCHANGE CARRIERS' MARGINAL COST OF INTERSTATE DEDICATED OUTBOUND SERVICE

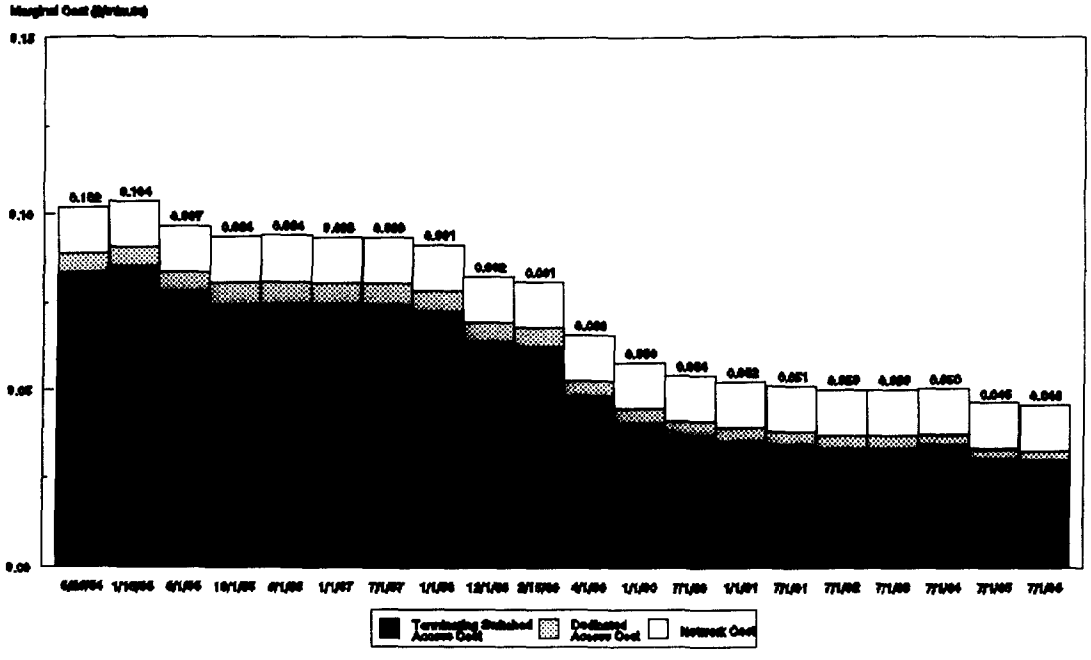
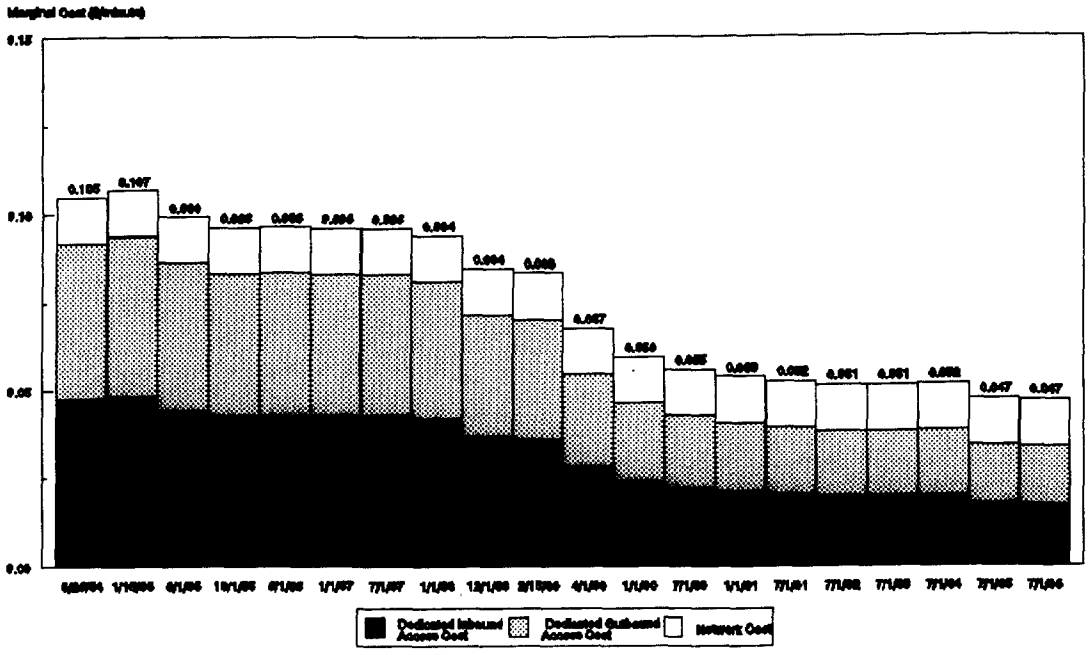


FIGURE TWELVE

INTEREXCHANGE CARRIERS' MARGINAL COST OF

INTERSTATE DEDICATED COMBINED SERVICE



46. These price and marginal cost estimates provide the basic information required to construct price-cost margins for the three large carriers for each service in each year. Price-cost margins equal the difference between price and marginal cost as a percentage of price. These margins are examined first for standard MTS and WATS services and then for discount MTS plans in interstate services.

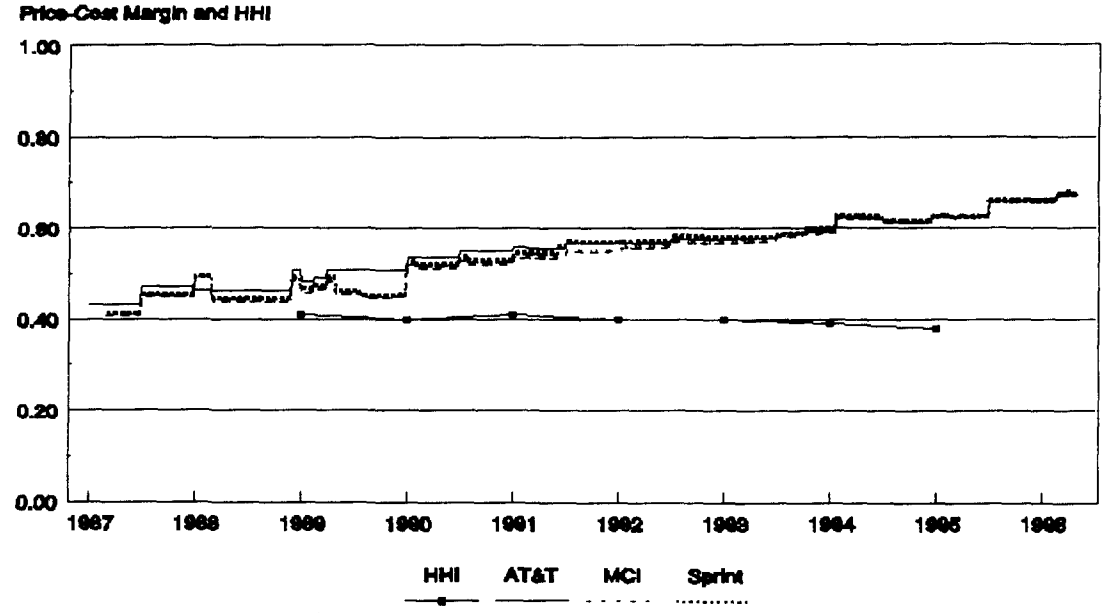
3. *Interstate MTS Price-Cost Margins in Ameritech's Service Region*

47. AT&T, MCI, and Sprint's price-cost margins on interstate MTS service offerings were increasing at slightly different rates in the 1980s (see Figure Thirteen). Margins both increased more rapidly and became more similar for the three firms in the 1990s - a reflection of the underlying increased similarity in access charges, and, as important, in all three carriers

standard tariff prices. But seller concentration, as measured by the HHI, decreased from a level of 0.41 in 1989 to 0.38 in 1995 (see Table Four and Figure Thirteen), resulting in an inverse relationship between margins and the HHI. That is, price-cost margins increased as concentration declined, exactly opposite to hypotheses of more competitive pricing in market behavior. Rising margins occur with declining HHI only if conjectural variations among carriers increase sufficiently to cancel the effect of lower HHI as would be the case with tacitly collusive behavior.

FIGURE THIRTEEN

PRICE-COST MARGINS AND MARKET CONCENTRATION FOR MTS



Sources: Marginal costs from FCC; and rates from HTL Telemanagement, Ltd.

4. *Inbound WATS Price-Cost Margins*

a. *Switched Services*

48. Margins for switched inbound WATS services, shown in Figure Fourteen, were not the same among the three firms from 1982 to 1989. AT&T had first-mover advantages in this service, and its price-cost margins were initially higher than those of MCI and Sprint. But as the two smaller carriers established their service offerings at levels comparable to that of AT&T, and as they were newly required to pay the same access charges, their margin levels became similar until in 1993 they had become virtually identical. As margins converged, their levels increased from 50 percent in 1987 to 72 percent in 1996. Because of AT&T's monopoly in this service at the time of divestiture, the HHI for inbound WATS was 1.0 in 1986 but decreased rapidly to 0.59 in 1989, and continued falling to 0.32 in 1995 (see Table Four and Figure Fourteen), a decline that is equivalent to that from the addition of two more equal-sized firms. The resulting inverse relationship between price-cost margins and concentration is even more striking than in MTS -- inbound WATS margins increased by approximately 40 percent as concentration declined by 60 percent. Such a pattern is inconsistent with competitive pricing. Only increasing coordination among carriers in price formation, as concentration declines among the same sellers, describes this inverse relation.

49. These price-cost margins for switched inbound WATS service have consistently exceeded those for MTS.[27] Customers of switched inbound WATS service have not been able

[27] The other possible explanation is that higher margins for WATS users could be an artifact of how representative prices have been constructed. The longer the distance the higher the price, and as Table Seven shows, the assumed distribution of mileage for WATS is skewed toward medium-range distances relative to the uniform distribution for MTS. This potential bias in measurement can be tested. The sensitivity analysis (see Appendix B) shows that the calling

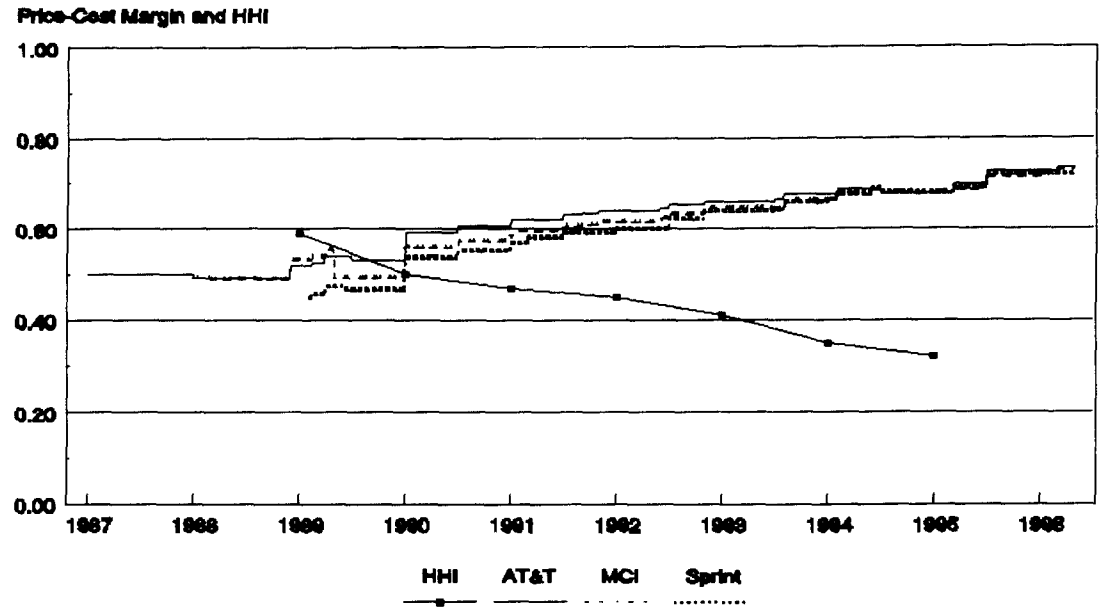
to negotiate lower prices (net of costs) from the major interexchange carriers, despite the fact that they are larger and more able to switch from one carrier to another.

FIGURE FOURTEEN

PRICE-COST MARGINS AND MARKET CONCENTRATION

FOR SWITCHED INBOUND WATS

(100 HOURS PER MONTH)



Sources: Marginal costs from FCC; and rates from HTL Telemanagement, Ltd.

b. Dedicated Services

50. Prior to 1990, margins for interstate inbound WATS services utilizing dedicated access varied substantially among the three firms. But in the 1990s, margins of the two smaller providers increased more in keeping with AT&T's margins, so that while until 1994 AT&T's margins were consistently higher, by 1996 each firm's margins were above 0.70. This increase

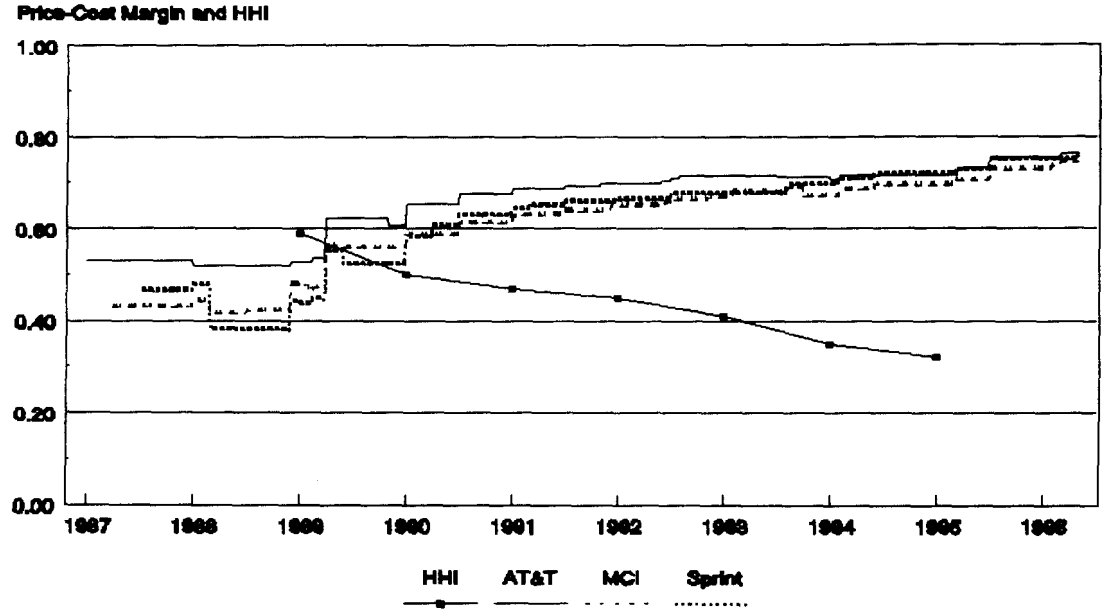
---

patterns do not affect the robustness of the margin results. When the distribution of mileage for WATS is reversed, that is, skewing the distribution pattern to short distances, margins for WATS remain above those for MTS with the original MTS base case calling pattern.

in margins by almost 75 percent was taking place while there was a substantial decline in HHI for inbound service (see Figure Fifteen). Only an increased absence of meaningful pricing competition among the three long-distance carriers would explain such large margin increases in a decade when concentration was declining.

51. Margins for dedicated inbound WATS services also exceeded the respective MTS margins by 1990. As a consequence, dedicated users of inbound WATS services have, on average, also failed to obtain prices (net of costs) lower than those paid by MTS customers.

FIGURE FIFTEEN
PRICE-COST MARGINS AND MARKET CONCENTRATION
FOR DEDICATED INBOUND WATS
(1,000 HOURS PER MONTH)



Sources: Marginal costs from FCC and Pacific Bell; and rates from HTL Telemanagement, Ltd.

5. *Outbound WATS Price-Cost Margins*

a. Switched Services

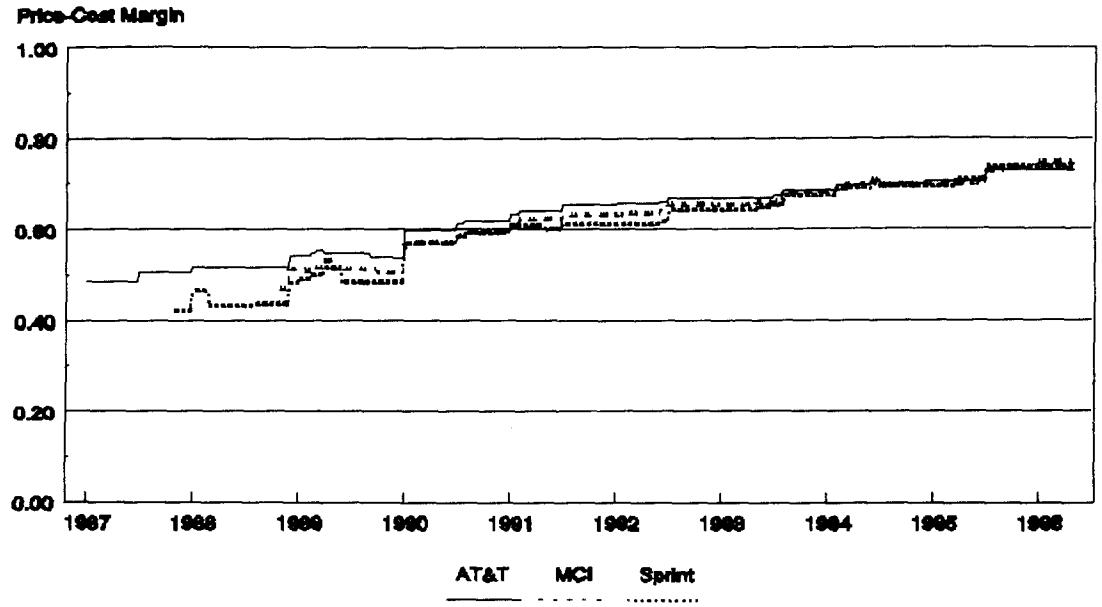
52. For outbound WATS with switched access, as illustrated in Figure Sixteen, the price-cost margins of AT&T, MCI, and Sprint increased steadily from approximately 50 percent in 1988 to in excess of 73 percent in 1996. Sprint and MCI's margins were initially below AT&T's margins but they increased more rapidly than did AT&T's margins. The three carriers' margins converged as a result of the establishment of nearly identical tariffs in the early 1990s. But this trend cannot be compared with that in concentration for outbound WATS because WATS accounted for only a small amount of the business traffic by 1995.[28] Nevertheless, the large increase in price-cost margins is inconsistent with increased competition among the three carriers - firms competing for share would drive price towards the costs of increasing sales, while those seeking to coordinate their pricing to move away from competitive levels would increase margins.

[28] In Ameritech's service area, the use of outbound switched WATS service declined by a factor of ten during the period 1991-1995. This occurred because business customers substituted from switched WATS services to dedicated outbound services. Because of the small volume of minutes that remain in the outbound switched WATS category, no HHI was estimated.

FIGURE SIXTEEN

PRICE-COST MARGINS FOR SWITCHED OUTBOUND WATS

(100 HOURS PER MONTH)



Sources: Marginal costs from FCC; and rates from HTL Telemanagement, Ltd.

53. Contrary to expectations, switched (and dedicated) outbound WATS price-cost margins exceeded the level of the counterpart MTS margin series by 1996. WATS users are generally larger, more price-sensitive buyers than MTS customers. Based on the theory of determinants of price-cost margins discussed earlier, lower margins would be expected for WATS users owing to higher demand elasticity. But margins were higher because conjectural variation levels increased.

b. Dedicated Services

54. Interstate dedicated outbound WATS' margins increased from approximately 0.43 in 1987 to approximately 0.77 in 1996 (see Figure Seventeen), by then exceeding margins for switched outbound WATS. After a substantial increase from 1987 to 1990, margins of the three firms continued to rise gradually to a point where they converged. Again, contrary to patterns that would be found in a competitive market, lower access costs in offering switched outbound WATS did not result in commensurably lower prices.[29] Instead, prices increased.

55. By 1990, dedicated outbound WATS service margins exceeded those of interstate switched outbound WATS services and interstate MTS services. As before, this result contradicts competitiveness hypotheses. Customers taking dedicated services have more price elastic demand than customers who choose switched service, but this higher margin indicates that these customers pay relatively more, net of costs, than smaller WATS customers. Even large buyers have been unable to squeeze out lower prices, net of costs, from major interexchange carriers.

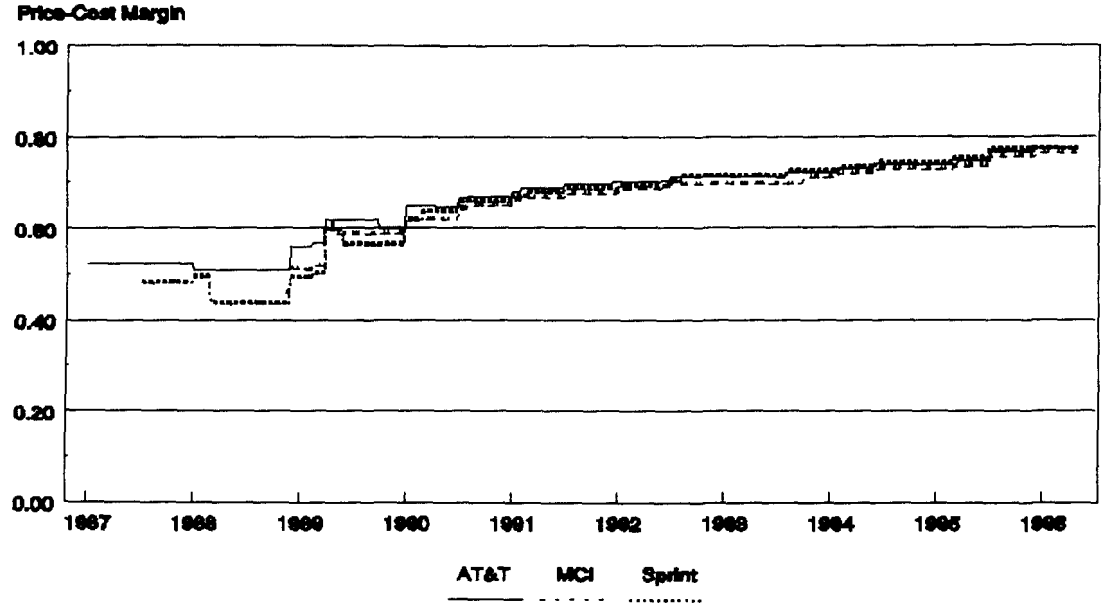
---

[29] When making comparisons between price-cost margins for switched and dedicated services, it should be recalled that the usage levels differ, being lower for switched than for dedicated. Since the fixed costs of dedicated service are higher than the fixed costs of switched service, a higher monthly usage level must be maintained by dedicated users to make the dedicated service economic relative to switched.

FIGURE SEVENTEEN

PRICE-COST MARGINS FOR DEDICATED OUTBOUND WATS

(1,000 HOURS PER MONTH)



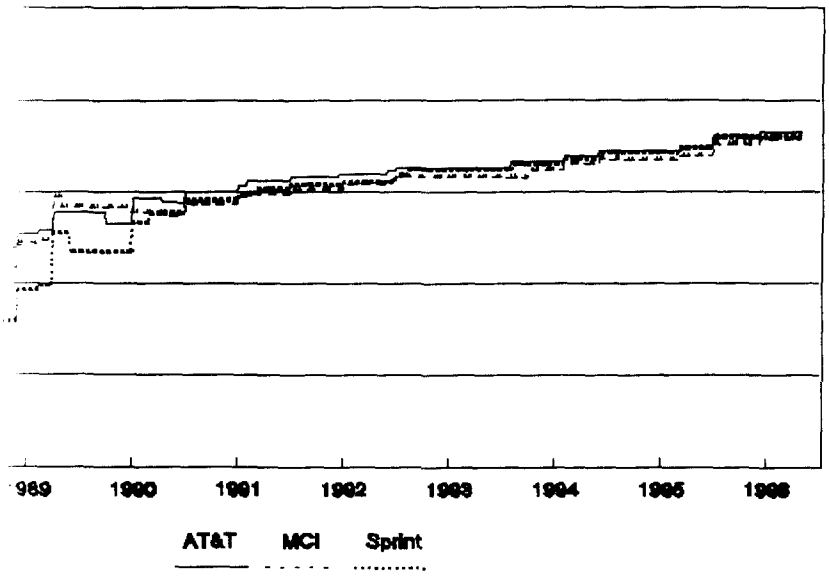
Sources: Marginal costs from FCC and Pacific Bell; and rates from HTL Telemanagement, Ltd.

56. Margins for interstate dedicated outbound WATS service offered in 36 month contracts, as opposed to service on month-to-month contracts, followed a similar pattern. These margins increased from a range of 0.31 to 0.51 in 1987 to a single value of 0.71 by 1996 (see Figure Eighteen). An initial period of dispersed and increasing margins, during 1988 to 1990, was followed after 1991 by a period in which each firm increased prices until they had essentially the same margin (although MCI evidenced somewhat lower margins than AT&T and Sprint in 1995-1996). The overall pattern of parallel increases in price-cost margins accompanied declining concentration in these services.

FIGURE EIGHTEEN

NS FOR DEDICATED OUTBOUND WATS - 36 MONTH CONTRACT

(1,000 HOURS PER MONTH)



th contract.
n FCC and Pacific Bell; and rates from HTL Telemanagement, Ltd.

Service Price-Cost Margins

Service plans offer both inbound and outbound services together with ted access. Pricing discounts from WATS tariffs are offered based on ound and outbound traffic at all of a customer's locations. As a result, o large-volume business users, especially those with multiple locations. offer deeper discounts at any volume than virtual network plans, so to reach levels in excess of 80,000 hours before a virtual network ive.[30]

T., (February 1994), *Voice Networks Pricing Update*, BUSINESS W, pp. 12 - 18.

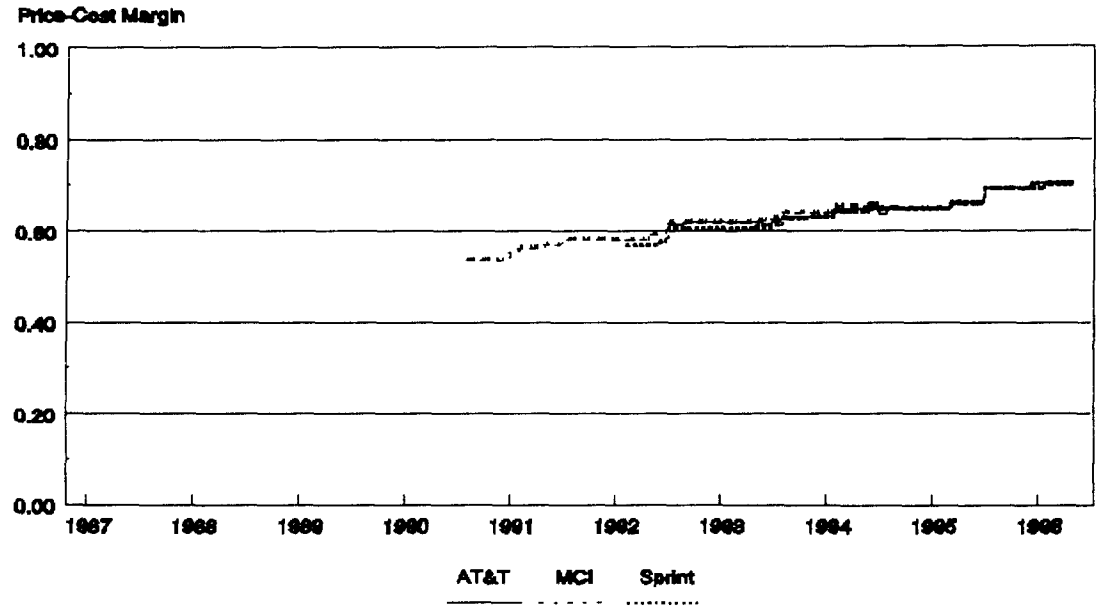
a. Switched Service

58. From the time Combined switched services were introduced in the early 1990s, the price-cost margins of the three carriers differed little from one another (see Figure Nineteen). These margins rose in concert from approximately 0.57 in 1992 to 0.70 in 1996. HHI data are not available for Combined Services, preventing the comparison of changes in HHI with changes in margins. Typically, margins on switched Combined Services have been two to three percentage points lower than for switched outbound WATS services. This difference in margins is in keeping with the profitable price structure of a discriminating monopolist, given that the price elasticity of demand for Combined Services is higher (as would be expected given the potential for subscribers to self-provide these services if prices were higher).

FIGURE NINETEEN

PRICE-COST MARGINS FOR SWITCHED COMBINED SERVICE

(100 HOURS PER MONTH)



Sources: Marginal costs from FCC; and rates from HTL Telemanagement, Ltd.

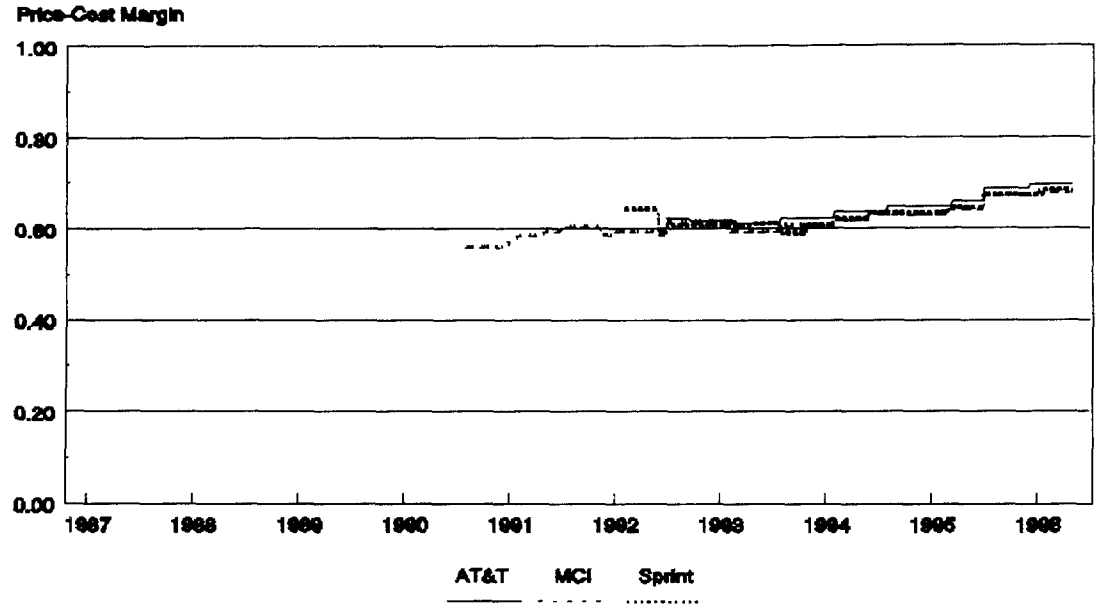
b. Dedicated Service

59. Price-cost margins for dedicated Combined Services follow a similar pattern, trending upward from approximately 0.61 in 1993 to 0.68 by 1996 (see Figure Twenty). After 1993, margins for MCI and Sprint were almost identical, while those for AT&T were consistently higher by one to two percentage points. As with switched services, margins earned on dedicated Combined Services are less than for dedicated outbound WATS services. There is no indication that markets for these services became more competitive over the 1990s.

FIGURE TWENTY

PRICE-COST MARGINS FOR DEDICATED COMBINED SERVICE

(1,000 HOURS PER MONTH)



Sources: Marginal costs from FCC and Pacific Bell; and rates from HTL Telemanagement, Ltd.

B. Sensitivity of Prices to Assumed Calling Pattern Assumptions

60. Each set of interstate price-cost margins shown in Figures Thirteen through Twenty have been constructed with prices based on stipulated calling patterns intended to be representative of Ameritech's customers (see Table Five). These calling pattern assumptions have three dimensions: (1) time-of-day usage, (2) mileage distribution, and (3) monthly calling volume. One could ask whether the observed pattern of rising margins is specific to this calling pattern only. The answer as to the sensitivity of these findings examines alternative prices based on alternative time-of-day, mileage and calling pattern distributions. Each alternative scenario tested, along with its results, are presented in Appendix B. Prices estimated with each of the alternative combinations of assumptions result in a pattern of price-cost margins that does not differ from that derived from the original set of assumptions. Price-cost margins under eight alternative scenarios increase over time and move in concert across the three interLATA providers.

C. Summary: InterLATA Price-Cost Margins and Competitiveness

61. The hypotheses as to the competitiveness of markets have been tested in two different analyses. The first has examined the relationship between price-cost margins and the HHI in a market over time, and the second between price-cost margins and HHIs in different markets at the same point in time. With respect to the first, price-cost margins for the eight long-distance services markets all increased from the late 1980s into 1996. In those markets for which concentration was known, margins increased while concentration declined. This negative relationship contradicts hypotheses that competition has increased since the AT&T divestiture. As three-firm concentration decreased, price-cost margins should have fallen from the mid-1980s

levels of 50 percent. Instead, price-cost margins increased steadily over time, to the 60 to 70 percent range (see Table Seven).

62. With respect to the second set of hypotheses, the three carriers' price-cost margins on WATS equaled or exceeded those on MTS services (see Table Seven). However, the average HHI for inbound WATS over the period 1993-1995 was somewhat lower than that for MTS, suggesting there should have been more competitiveness at least in these markets then in MTS service markets, thus contradicting the hypotheses. The ability to achieve and exceed MTS-level margins in service to WATS and Combined Service customers is more suggestive of collective ability to manage price levels than of across-market competitiveness. Large WATS and Combined Service customers, especially those using dedicated services, self-supply portions of their telecommunications facilities to a far greater extent than do small business (MTS) customers. Customers who can self-supply should be more price sensitive, causing demand for the products they purchase to be more price elastic. But instead of lower prices (net of costs) on WATS and Combined Services, designed to attract more large customers away from building their own systems, these carriers set higher prices to increase their margins to levels comparable to those on services provided to relatively price insensitive (or inelastic) MTS customers.