

**AFFIDAVIT OF PAUL W. MACAVOY IN SUPPORT OF THE APPLICATION OF
AMERITECH MICHIGAN FOR PROVISION OF IN-REGION,
INTERLATA SERVICES IN MICHIGAN**

1. My name is Paul W. MacAvoy and I hold the Williams Brothers Professorship in Management Studies at the Yale School of Management. Formerly, I was Dean of the Yale School and Dean as well as John M. Olin Professor at the University of Rochester's William E. Simon Graduate School of Business Administration. At the Massachusetts Institute of Technology in the 1970s, I was the Luce Professor of Public Policy. At Yale in the early 1980s, I was Steinbach Professor of Organization and Management and Beinecke Professor of Economics. My M.A. and Ph.D. degrees in economics are from Yale University. My A.B. degree, as well as an honorary doctorate, comes from Bates College. In 1981, I was elected to the American Academy of Arts and Sciences.

2. My professional interests have centered on regulation and strategic decision making by firms in the energy, transportation, and communications industries. I have authored numerous journal articles and seventeen books, including most recently *The Failure of Antitrust and Regulation to Establish Competition in Long-Distance Telephone Service* (The AEI Press and the MIT Press, 1996). I have served on the editorial boards of several journals and was the founding editor of the *Bell Journal of Economics and Management Science*. The Supreme Court of the United States referenced my writings on regulation in four cases and lower federal courts have referred to them in more than twenty cases.

3. A considerable part of my career has been devoted to positions in government related to these professional interests. In 1965-66, I served as staff economist on the Council of Economic Advisers and in 1966 was a member of President Johnson's Task Force on the Antitrust Laws. During the Ford Administration, I was a member of the President's Council of Economic Advisers and co-chairman of the President's Task Force on Regulatory Reform.

President Carter appointed me to the Council of the Administrative Conference of the United States. President Reagan appointed me to his National Productivity Advisory Committee, where I chaired the subcommittee on regulation's effect on productivity growth. My work in Washington has also included fellowships at both the Brookings Institution and the American Enterprise Institute ("AEI"). I now serve at AEI as co-chairman of its Telecommunications Deregulation Project.

4. I am currently a member of the board of directors of three corporations, including Alumax Corporation, Lafarge Corporation, and the Open Environment Corporation. My previous directorships have included American Cyanamid Company, the Chase Manhattan Bank Corporation, Colt Industries, Inc., Combustion Engineering, Inc., Columbia Gas, and the United States Synthetic Fuels Corporation.

5. During the period 1978-1982, as a consultant to AT&T, I developed studies of pricing strategies in regulated long-distance service markets that formed the basis for testimony for AT&T in the Federal antitrust case against this company that resulted in the 1984 divestiture. After divestiture, I undertook further research on its potential effects on efficiency of emerging markets for local and long-distance services. (See Paul W. MacAvoy and Kenneth Robinson (1983), *Winning by Losing: The AT&T Settlement and Its Impact on Telecommunications*, 1 YALE JOURNAL OF REGULATION, and Paul W. MacAvoy and Kenneth Robinson (1985), *Losing by Judicial Policymaking: The First Year of the AT&T Divestiture*, 2 YALE JOURNAL OF REGULATION). In 1994, I provided an affidavit in U.S. District Court in Washington, D.C. on behalf of four Bell operating companies seeking a waiver of the line-of-business restrictions in the divestiture decree against Bell operating company entry into long distance markets beyond local exchange areas. That affidavit provided an assessment of competition in markets for long-distance telecommunications services in the post-divestiture period. I have also filed an affidavit

in U.S. District Court in Washington, D.C. on behalf of the Pacific Telesis Group seeking the same relief from line-of-business restrictions to compete in long distance markets within California. That affidavit analyzed current competitive conditions in long-distance services in California.

6. I have consulted and testified in numerous other antitrust and regulatory proceedings, including those regulating telephone service rates at the state level.

I. INTRODUCTION AND SUMMARY

7. The *Telecommunications Act of 1996* establishes provisions under which the Bell operating companies, such as Ameritech Corporation (“Ameritech”), will be certified to offer in-region, interLATA services.¹ Central to these provisions is that the Federal Communications Commission (“FCC”) “shall not approve the authorization requested in an application . . . unless it finds that . . . the requested authorization is consistent with the public interest, convenience, and necessity.”² This affidavit examines whether granting Ameritech authorization to offer in-region, interLATA services would be consistent with the public interest.

8. I interpret Congress’ mandate that entry must be in “the public interest, convenience, and necessity” (hereafter the “public interest”) to mean that entry improves the welfare of consumers by making markets more competitive. The public interest is served by competition, because competition reduces prices and lower prices generate increased “consumers’ surplus” (i.e., the dollar equivalent value of what consumers would gain for the

¹ TELECOMMUNICATIONS ACT OF 1996, PUB. L. NO. 104-104, 110 STAT. 56 (1996), *codified at* 47 U.S.C. § 251(c)(4). (Hereinafter “Telecommunications Act of 1996.”)

² Telecommunications Act of 1996, at § 271(d)(3)(C).

right to obtain service at the lower price).³ My study provides an assessment of the increase in competitiveness generated by entry and quantifies the gain in consumers' surplus that would result from the entry of Ameritech. My conclusion is that these consumer gains are more than sufficient to constitute gains in "the public interest," since they are likely to exceed one billion dollars per year for the Ameritech region and approximate \$400 million per year for the state of Michigan alone.

9. These conclusions are consistent with research results I have developed on competitive performance in nationwide markets for long-distance telecommunication services. The results of this research are found in *The Failure of Antitrust and Regulation to Establish Competition in Long-Distance Telephone Services* (MIT Press, 1996).⁴ Here, I have extended these results specifically to assess the "public interest" from Ameritech's entry into interLATA services in its local exchange service region. Consumer gains from price reductions for long-distance services in Ameritech's service area have been estimated for four types of service: message toll ("MTS"), outbound wide-area telecommunications ("WATS"), inbound WATS (800) service, and Combined Services.

10. This assessment is based on the finding that up to 1996 long-distance, interLATA telecommunication service in Ameritech's region has not been provided under competitive market conditions. Competitiveness would be present if, after divestiture, the major carriers' price-cost margins in Ameritech's service area declined as concentration in sales revenues

³ Stigler, G. (1966), *THE THEORY OF PRICE*, New York, NY: The Macmillan Co., p. 78; Becker, G. (1971), *ECONOMIC THEORY*, New York, NY: Alfred A. Knopf, p. 103; Samuelson, P. and Nordaus, W. (1992), *ECONOMICS*, New York, NY: McGraw-Hill, p. 92.

⁴ Paul W. MacAvoy, *THE FAILURE OF ANTITRUST AND REGULATION TO ESTABLISH COMPETITION IN LONG-DISTANCE TELEPHONE SERVICE*, Cambridge, MA, The MIT Press, (1996).

decreased. Price-cost margins, that is, the percentage by which prices exceed the marginal costs of providing various services, can be expected to be lower when competition in a market increases. As markets become less concentrated, and presumptively as the potential for competition among rivals of more equal size increases, these margins should decline. Instead, over the last twelve years, they increased systematically for long-distance services beginning and terminating in Ameritech's service area when shares of revenues of the largest carriers became less concentrated. To reverse this increasingly non-competitive condition, Ameritech should be allowed to enter interLATA service. Predictably, it would establish strategies counter to the pricing policies of the dominant interexchange carriers, so that price-cost margins will eventually decline toward competitive levels.

11. My estimates of welfare gains from the reduced price-cost margins that follow from Ameritech's entry into long-distance services for its region are summarized below, given two alternative assumptions as to firm rivalry following such entry. The estimates range from \$1.5-1.7 billion annually, and from \$19-22 billion in present value terms; they demonstrate the substantial potential gains to consumers from Ameritech's entry.

	All Carriers Price Non-Cooperatively	Entrant Prices Non-Cooperatively but Incumbents Tacitly Cooperate in Pricing
<u>Ameritech Region</u>		
Annual Consumer Gain	\$1.7 billion	\$1.7 billion
Present Value of Gain	\$21.9 billion	\$19.1 billion
<u>Michigan</u>		
Annual Consumer Gain	\$0.4 billion	\$0.4 billion
Present Value of Gain	\$4.9 billion	\$4.6 billion

12. The general findings and policy recommendations based on my research are as follows:

- Seller concentration in interLATA long distance in Ameritech's service area declined substantially from 1989 through 1995. During that period, AT&T's share decreased by over 10 percentage points while the shares of MCI and Sprint increased and then stabilized. More recently, the combined share of other smaller carriers increased.
- Price-cost margins in interLATA long distance in Ameritech's service area increased for MTS, outbound WATS, inbound WATS, and Combined Services. The sustained increases in price-cost margins, while concentration decreased, is consistent only with the theory that the major facilities-based carriers developed an ability over time to tacitly collude. Such price behavior was not limited to the carriers' standard or "list price" tariffs; discount MTS calling plans had the same pattern of increasing price-cost margins over time associated with decreasing concentration.
- Entry by Ameritech into long-distance telecommunication service in its region would be the most direct remedy for the observed lack of competitive pricing. Given its interest in higher volumes of message service in its service area, Ameritech is in a unique position to promote competitive pricing of long-distance, in-region services. Although Ameritech must incur the costs of establishing a separate long-distance subsidiary, it remains the most viable and significant potential entrant in its service area. As a reseller, Ameritech will also create competitive pressure as a result of its ability to negotiate low wholesale rates given its credible threat to enter as a facilities-based carrier.

- Significant consumer welfare gains from \$1.5 to \$1.7 billion per year in price reductions can be expected from Ameritech's entry into long-distance service in its region and approximately \$400 million per year for the state of Michigan alone. Ameritech would most likely seek to establish itself with a major revenue share of the long-distance service markets, and, in the interactive process for reallocating shares, the other carriers would be forced to lower prices.

13. I understand that Ameritech is currently petitioning the Federal Communications Commission to allow it to offer interLATA services within Ameritech's service area. The results of my research indicate that allowing Ameritech to offer long-distance services will increase consumer welfare by approximately \$1.5 to \$1.7 billion dollars per year. Such dollar-equivalent gains definitely would be in the public interest.

14. The presentation of my analyses and conclusions is organized as follows. Section II addresses the criteria established by the Telecommunications Act of 1996 for local operating company entry into long-distance service. I also explain how more competition and competitive (lower) prices best serve the public interest mandated by the *Act*. Section III examines trends in concentration both nationally and within Ameritech's service area. Section IV presents the theoretical basis for assessing competitive performance by examining trends in concentration and price-cost margins. Section V presents my findings on the competitiveness of long-distance services in Ameritech's service territory based on changes in price-cost margins, both in standard pricing and discount-calling plans. There have been criticisms directed at my research by AT&T and MCI concentrating on this approach to measure consumer gains, and particularly of using the price-cost margin as a measure of competitiveness. My responses to this criticisms are contained in Appendix A. Appendix B presents price-cost margins calculated under mileage and time-of-day distributions that differ from the "Base Case" distribution presented in Section V. Section VI develops estimates of the magnitude of consumer benefits likely to result from Ameritech's entry into long-distance services in its region. Finally, Section VII summarizes my

findings on the social welfare effects of enhanced competition likely to result from Ameritech's entry into long-distance service.

II. THE *TELECOMMUNICATIONS ACT OF 1996* AND AMERITECH'S ENTRY INTO INTERLATA SERVICE

15. The *Telecommunication Act of 1996* restricts Bell operating company entry into long-distance markets to those locations where entry enhances the "public interest, convenience, and necessity." The *Act* does not elaborate as to how these goals would be achieved. Nevertheless, the economic welfare of long-distance telecommunications consumers is certainly a fundamental element of the public interest. Consumers' economic welfare is measured in "consumer's surplus," which is increased when carriers offer service at lower prices, or when they increase service quality at the same prices. Increased competition among carriers drives prices down towards the marginal costs of providing service while simultaneously improving the quality of service. It is the thesis of this affidavit that competition intensifies as a result of removing restrictions on Bell operating company entry into long-distance.

16. The premise is that the public interest is best served through the introduction of more competition into long-distance markets. The focus here then is on the current lack of competitiveness in markets for interLATA long-distance telecommunications services, both nationally and within Ameritech's service area. My analysis leads to findings that markets are not now competitive and that prices are now well above competitive levels. These findings hold especially for even the most recent offerings of the three major long-distance carriers, which involve significant rate increases on most consumer calls.⁵ Intensification of the competitive process through entry, where new carriers strive to take shares of market revenues from

⁵ "Long Distance Firms Raise Rates in Attempt to Offer New Services", WALL STREET JOURNAL interactive edition, November 30, 1996, pp. 1-3.

incumbent carriers, will eventually reduce prices and price-cost margins so as to benefit long-distance subscribers. In the section which follows, I define the relevant markets for long-distance services and examine concentration in those markets in the post-divestiture period.

III. CONCENTRATION IN LONG-DISTANCE SERVICES

17. The "market" for a product or service is defined along three dimensions: time, space, and form. Since telephone calls are services delivered in real time, the only aspect of the definition requiring analysis is the "space" over which calls in the same service take place; that is, the geographic scope of the market. By definition that is the area within which prices at points of sale tend to equality, after taking account of transportation costs.⁶ Since incumbent interexchange carriers charge the same prices throughout the U.S. for interstate MTS calls of given duration, time-of-day, and distance, then all calls are by definition in the same market. While they may differ among themselves as to that price schedule, the major carriers do not offer differences in the "point-to-point" price level in one region of the country compared to another that would indicate the existence of separate geographic markets across regions of the country. As defined by George Stigler: "The test of a market . . . is the similarity of price movements within the market."⁷ Each carrier charges for interstate calls according to characteristics of the subscriber (business, large volume, etc.), but not according to different "point-to-point" or city pair locations. Therefore, the market cannot be smaller than all origination and destination pairs in the country.

⁶ Marshall, A., *PRINCIPLES OF ECONOMICS* (variorum ed., 1961), p. 325. *See also*, Cournot, A. (1838), *RECHERCHES SUR LES PRINCIPES MATHÉMATIQUES DE LA THÉORIE DES RICHESSES*, Paris.

⁷ Stigler, G. and Sherwin, R. (1985), *The Extent of the Market*, *JOURNAL OF LAW AND ECONOMICS*, vol. 28, pp. 555-585, at 557.

18. MTS, outbound WATS, inbound 800 WATS, and Combined Services are separate services to the extent that they do not trade with the same subscribers and their prices do not tend to equality. For example, MTS and WATS are not in the same market because MTS subscribers with relatively low demands cannot qualify for WATS discount rates; if they could, MTS subscribers would switch to lower priced WATS until prices of the two services were the same. Similarly, outbound and 800 inbound WATS services do not have the same price and the price differences cannot be driven out by subscriber switching because one cannot be used in place of the other. The separate products can be characterized as follows:

- *Message Toll Service:* purchased by residential and small businesses consumers on the basis of per call charges.
- *Outbound WATS:* services by which business customers place long-distance voice or data calls using either switched or dedicated access (and billing is based on a bulk rather than an individual call basis).
- *Inbound WATS (800) Service:* business customers receive inbound long-distance voice or data calls using either switched or dedicated access on bulk billing plans.
- *Combined Service:* inbound/outbound alternative plans to WATS and standard inbound service for switched and dedicated access.

These product markets are examined in detail in the paragraphs which follow.

19. With four relevant service markets nationwide, there are opportunities for carriers to specialize in one or the other. This would cause considerable variation in shares across markets. National market share data for the leading firms in these four separate markets are available for limited periods,⁸ and data are currently available for all product revenues on a combined basis for the last twelve years. In contrast, volume data for individual products are available within an operating company's service area, so that shares for MTS, outbound WATS,

⁸ Elsewhere, I provide nationwide statistics on market shares in these four product markets for the period 1985 to 1993. See Paul W. MacAvoy, *supra*, note 5, pp. 85-88.

and inbound WATS (800) can be shown for Ameritech's region (but not on the national market basis).

20. My prior work examined product market shares nationwide,⁹ but here, given an absence of current data on shares in these four separate markets, I analyze national data on long-distance revenue shares for all four products combined for the period 1984 through 1995. I also analyze concentration in long distance revenues in Ameritech's region to determine whether it is consistent with that at the national level. Finally, I examine estimates for those product markets separately for which there are data in Ameritech's service region. The conclusion is that trends in concentration in Ameritech's service area do not differ from those in national markets.

A. CONCENTRATION IN LONG-DISTANCE SERVICES

21. Across all services the shares of the three largest service providers changed substantially in the first five years after the divestiture decree (see Table One). Initially, AT&T had more than 90 percent of interLATA toll revenues, while MCI and Sprint had five and three percent, respectively. Over the period from 1984 to 1989, AT&T's ranking stayed the same but its share decreased by 20 percentage points, and MCI and Sprint's shares increased by eight and six percentage points, respectively. Subsequently, from 1990 through 1992, the rate of change in the share of the largest carrier diminished, with AT&T losing only three percentage points to MCI and none to Sprint. AT&T then continued to lose up to three percentage points per year in total long-distance revenue share from 1993 to 1995. MCI and Sprint, however, were not the recipients of these losses. Rather, numerous, smaller facilities-based providers and service resellers gained share of long-distance services, moving in the aggregate from seven percent in

⁹ *Ibid.*

1993 to 13 percent in 1995, while Sprint and MCI's share each remained the same throughout this three year period.

22. Seller concentration is measured by the widely-used Herfindahl-Hirschman Index ("HHI") calculated for the three-largest firms.¹⁰ With convergence toward more equal market shares across the three leading firms, the HHI follows a similar pattern of steep decline from 1984 to 1989, followed by gradual decline from 1990 to 1995. At the time of divestiture, the HHI indicates that there was the equivalent of one and one-fifth equal-sized firms. Overall, the changes in HHI from 1984-1995 indicate the emergence of the equivalent of an additional one and a half equal-sized firms, but with more of that emergence occurring from 1984 to 1990.

¹⁰ The HHI equals the sum of the squared shares of firm sales, so that a single-firm market (monopoly) yields an HHI equal to 1.00, while a market with a large number of small share firms yields an HHI near zero. For analytical purposes, the HHI can be converted into the number of equivalent, equal-sized firms consistent with a specific level of market concentration by dividing the HHI into one; for example, an HHI of 0.50 is consistent with $1.00/0.50$ or two equal-sized firms.

TABLE ONE
 AT&T, MCI, AND SPRINT SHARES (%)
 OF TOTAL TOLL REVENUE IN THE U.S.

Year	AT&T	MCI	Sprint	HHI
1984	91	5	3	0.83
1985	88	6	3	0.78
1986	84	8	4	0.71
1987	81	9	6	0.67
1988	78	11	7	0.63
1989	71	13	9	0.53
1990	68	15	10	0.49
1991	67	16	10	0.48
1992	65	18	10	0.46
1993	63	19	11	0.45
1994	60	19	11	0.41
1995	57	19	11	0.37

Source: FCC, *Long-Distance Market Shares: First Quarter, 1996*, Table 5.
 Note: Excludes resellers.

23. As noted above, current information on shares in the four main product markets is not available. But in my recent MIT Press publication I was able to estimate HHI for these four markets through the early 1990s.¹¹ HHI for the national MTS market was 0.76 in 1985 and 0.54 in 1990. The HHI in inbound WATS was 1.0 in 1985, and fell with the entry of MCI and Sprint to 0.53 by 1990. The HHI in outbound WATS equaled 0.75 in 1986 and fell to approximately 0.3 by 1993. And in virtual networks, HHI declined from 0.65 in 1986 to 0.47 in 1989, stabilizing at that level. Thus, concentration fell substantially in the 1980s in both total toll and in individual product markets, and continued to decline in the 1990s, but at a slower rate.

¹¹ MacAvoy, *supra*, note 5, p. 85-88.

24. What is a reasonable interpretation of this change in the rate of deconcentration in market structure? Before 1990, AT&T gave up share to the other two large carriers. After 1990, the continual decline in market share for AT&T and stability of market shares for MCI and Sprint indicate that AT&T was then giving up share to fringe firms, but no longer to other leading carriers. In a competitive market, share losses result from initiatives to make gains by one or other of the leading carriers at the expense of the rest. The stability of MCI and Sprint's market shares, and of AT&T's share with respect to those two are not consistent with such potentially competitive changes in structure.

B. CONCENTRATION IN AMERITECH'S SERVICE AREA

25. Markets are national in scope, so that variations in regional concentration do not necessarily indicate more than transient differences in market power. It is nevertheless instructive to examine concentration in Ameritech's service area to determine whether these changes over time have been similar to those at the national level. Given that the effect of entry into Ameritech's region is at issue here, it is important to determine if concentration is so variant from the national market that competition in the Ameritech region is more or less likely than that found nationally. Comparing trends in national concentration (Table One) to trends for Ameritech's area (Tables Two and Three), one can detect only limited differences, however. Starting in 1989, when regional data become available, AT&T had a higher share of total toll revenues nationally than it had of total originating or terminating minutes in Ameritech's area. By 1995, national and regional shares are almost the same. But when these shares are based on terminating minutes in Ameritech's area they are lower by five points (one twentieth of a firm) reflecting a lower share for AT&T in the five state area.

26. From 1989 through 1995, AT&T's share of originating and terminating minutes for all long-distance services in Ameritech's region experienced a steady but gradual decline.

Through 1993, MCI was the primary beneficiary of these losses while Sprint's share remained the same. In the following years, 1994 and 1995, fringe carriers (i.e., carriers other than MCI and Sprint) gained the majority of AT&T's losses.

27. As on the national level, these share changes among the three large carriers in Ameritech's region do not form a pattern of behavior clearly to be associated with inter-carrier competitiveness. Share losses by the leading firm do not accrue randomly to the next two largest carriers. The changes in shares among AT&T, MCI, and Sprint are more consistent with a tacit understanding on share stability than with competitive shifts to the price-cutting larger carrier.

TABLE TWO
AT&T, MCI, AND SPRINT SHARES (%) OF
TOTAL MINUTES-OF-USE IN AMERITECH'S SERVICE AREA
(BASED ON ORIGINATING MINUTES)

Year	AT&T	MCI	Sprint	HHI
1989	66	16	9	0.47
1990	63	18	9	0.44
1991	63	18	9	0.44
1992	62	19	9	0.43
1993	60	20	9	0.41
1994	58	20	10	0.38
1995	56	20	10	0.36

Source: Ameritech.
Note: Excludes resellers.

TABLE THREE
AT&T, MCI, AND SPRINT SHARES (%) OF
TOTAL MINUTES-OF-USE IN AMERITECH'S SERVICE AREA
(BASED ON TERMINATING MINUTES)

Year	AT&T	MCI	Sprint	HHI
1989	65	16	10	0.46
1990	63	18	10	0.44
1991	61	18	10	0.42
1992	58	19	10	0.39
1993	56	20	10	0.36
1994	53	20	10	0.34
1995	52	20	10	0.32

Source: Ameritech.
Note: Excludes resellers.

28. HHI can be estimated also for two individual products, MTS and inbound WATS (see Table Four). Both series show a decline from 1989 through 1995, with a low rate of

decline in MTS but a substantial rate for inbound WATS. The decline in HHI for inbound WATS is equivalent to adding another one and a half equal size firms.¹²

TABLE FOUR
HERFINDAHL-HIRSCHMAN INDEXES
IN MTS AND INBOUND (800) WATS MARKETS
IN AMERITECH'S SERVICE AREA
(BASED ON ORIGINATING MINUTES)

Year	MTS	Inbound WATS
1989	0.41	0.59
1990	0.40	0.50
1991	0.41	0.47
1992	0.40	0.45
1993	0.40	0.41
1994	0.39	0.35
1995	0.38	0.32

Source: Ameritech.
Note: Excludes resellers.

29. It is necessary to extend this documentation of market structure to predictions on marketplace performance. In markets with a small number of large carriers, the level of service activity of any one firm depends on the conduct or strategies of other firms' pricing and service offerings. Any one carrier has to anticipate the actions of the other carriers with respect to price structures and the effects of those actions on its own prices and service levels. Together, the large long distance carriers have the capacity to determine the nature and extent of offerings in

¹² The HHI for outbound WATS is available but not reported since outbound volume in 1995 is only five percent of that in 1989. This is because high-volume users moved to virtual private networks and then Combined Services over this period. These are largely dedicated services, using Ameritech's loops but not Ameritech's switches.

product markets. But the extent to which they determine price levels depends on the nature of their interactions and collective conduct. The ways in which the carriers can interact and the resulting effects on the competitiveness of markets is the subject of the next section.

IV. ASSESSING COMPETITIVE PERFORMANCE

30. The data series on market shares of revenues indicate the structural characteristics of long-distance service markets conform to those associated with oligopoly (or “few” sellers). Such structural indicators provide the basis for setting out hypotheses on the competitiveness of market prices. But they alone cannot be used to determine the competitiveness of markets because assessing “competitiveness” requires analyzing changes in market structure and performance over time.

31. The price-cost margin, defined as the difference between price (“ p ”) and marginal cost (“ mc ”), divided by price, is a widely accepted measure of competitiveness in market performance.¹³ As the difference between price and marginal cost decreases, the market has become more competitive. By examining the relationship between HHI and price-cost margins over time, it can be seen whether competitiveness has increased as concentration has declined.

¹³ Economists have used the price-cost margin as a theoretical and empirical measure of monopoly power for over sixty years. See Abba Lerner, *The Concept of Monopoly and the Measurement of Monopoly Power*, REVIEW OF ECONOMIC STUDIES, 1 (June 1934), pp. 157-175; Keith Cowling and Michael Waterson, *Price-Cost Margins and Market Structure*, ECONOMICA, (August 1976), pp. 267-274; Roger Clarke and Stephen W. Davies, *Market Structure and Price-Cost Margins*, ECONOMICA, 49 (August 1982), pp. 277-287; William Landes and Richard Posner, *Market Power in Antitrust Cases*, HARVARD LAW REVIEW, 95 (August 1982), pp. 1857-1874; and Dennis Carlton and Jeffrey Perloff (1994), MODERN INDUSTRIAL ORGANIZATION, (New York: Harper Collins College Publishers, 2nd. ed.), pp. 352-354 and 360-366. Carlton and Perloff cite numerous empirical studies that have used the price-cost margin to measure monopoly power, or, the inverse of “competitiveness.”

32. The hypothesis is that a decline in market concentration leads to the decline in the price-cost margin in that market, all else equal, so that markets become more competitive. Relative competitiveness can also be assessed by examining the relationship between market concentration and price-cost margins in several markets at one point in time. The hypothesis is that markets with lower concentration have lower price-cost margins, all else equal, and thus are more competitive.

33. Other determinants of competitiveness are market demand elasticity (“ e ”) and the nature and extent of firms’ reactions to changes in other firms’ prices (the conjectural variation, “ v ”). In markets with few firms, each is aware of rivals’ price or sales volume actions, so that the pricing strategy of any one of them depends on those of its rivals. Each carrier has to anticipate the actions of others and has to set its prices accordingly. There are numerous ways in which three large providers could so interact - they could, in one extreme, each set independent prices designed to take market share from others and in the other extreme could cooperate in regulatory tariff submissions listing all prices before they go into effect, so as to set prices to maintain market shares. Formally, the price-cost margin equals HHI times one plus the conjectural variation, (“ v ”), divided by the elasticity of demand, (“ e ”); that is, $(p - mc) / p = HHI (1 + v) / e$.¹⁴ *The range of competitiveness in market behavior is captured by the measure of conjectural variation, from -1 (perfect competition) to 0 (an intermediate position of no cooperation) to $(1/HHI - 1)$ (perfect collusion). That is, price-cost margins vary with conjectural variation as follows:*

¹⁴ See, e.g., Stephen Martin (1993), *ADVANCED INDUSTRIAL ECONOMICS*, Cambridge, MA: Blackwell Publishers, p. 167.

- A. *Firms' conjectural variations are negative* - Each firm assumes that others change their prices or sales levels in the opposite direction and by the same amount. For example, if one firm reduces its sales level, it assumes that others will increase their sales levels to absorb its reduced share. Such values of ν cause price-cost margins to decrease towards competitive levels. Where the conjectural variation equals minus one, then price-cost margins equal zero and competition is pervasive.

- B. *Firms' conjectural variations equal zero* - Each firm assumes other firms will not change their sales or price levels in response to a change in its price level. That firm's price-cost margin depends only on its share and the demand elasticity in the relevant market. The equilibrium price-cost margin in the market equals HHI times the inverse of the demand elasticity, which exceeds the competitive margin (equal to zero, as above) but is less than the monopoly margin (equal to $-1/e$ for $HHI = 1.0$).

- C. *Firms' conjectural variations are positive* - Each firm assumes others will change price or sales levels in the same direction as a change in its price level. For example, if one firm reduces its price, others will reduce theirs. Where such changes are equal, then prices are perfectly collusive, and $\nu = (1 - HHI) / HHI$, causing price-cost margins to increase to the monopoly level.

34. Recent changes in long-distance company market shares provide the basis for hypotheses as to firm behaviors – cooperation, competition, or some outcome in between. When one carrier has more than half of the sales volume, and regulatory conditions put a floor under that carrier's prices, then the other two plausibly would seek to increase their market shares at the expense of the largest carriers. These conditions should lead to more equal shares and lower price-cost margins. But when shares of the second and third largest increase to levels more comparable to that of the largest carrier, and regulation eliminates price floors for the leading carrier, the second and third firms would not be as advantaged from initiatives to increase their shares. With relatively equal-sized capacities, the largest more credibly threatens its rivals by price reductions responsive to initiatives of others seeking its share. A more profitable strategy would have each firm set its own price by means of a pre-announced adjustment of a regulated

tariff, with the presumption that all firms would do the same, because that results in a higher price level that still maintains previous shares.¹⁵

35. The effects of regulation on competitiveness hypotheses have been developed in the work of Sibley and Wilkie. They analyze the interactive behavior of two equal-sized firms, one of which is under regulation, where the regulatory regime changes at a known time from cost-of-service to a price-cap control process.¹⁶ That switch stabilizes shares and leads to higher price-cost margins. According to this analysis, the Federal Communications Commission's decision in July 1989 to replace rate-of-return with price-cap controls explains the price-cost margin increases in the 1990s. Initially, AT&T's prices were determined by the condition that it could not cut prices in response to share-gaining initiatives of other carriers. But then the new price-cap regime made the threat of AT&T responsive price cuts more credible. With this new regulatory regime put in place at a known time, with a lag between announcement and implementation of tariff changes, any other firm could signal its intentions to the leading firm to hold shares constant, in order then to induce a higher joint-price equilibrium. To the extent that the signal is credible, the dominant firm increases price levels.¹⁷

36. Thus, there are three general hypotheses on changes in concentration and price-cost margins for various long-distance service markets. First, price-cost margins should decline over time as concentration declines, all else equal, for markets to become more competitive.

¹⁵ Daniel Orr and Paul MacAvoy, Price Strategies to Promote Cartel Stability, 32 *ECONOMICA* 186 (1965), where general conditions are worked out in table 2 for three equal-sized firms (that is, $HHI = 0.33$) necessary to achieve stable tacit collusion.

¹⁶ David S. Sibley and Simon J. Wilke, A REPEATED GAME OF PRICE CAP REGULATION, (University of Texas Working Paper, revised January 1996).

¹⁷ *Id.*

Second, price-cost margins at a point in time should be lower in markets with lower concentration, for those markets to be more competitive, all else equal. The alternative hypothesis is that price-cost margins increase regardless of changes in concentration (as ν increases with changes in regulation). These hypotheses can be explicitly stated as follows:

- A. If market concentration, as measured by the HHI, declines, all else constant, price-cost margins decline (market becomes "more competitive");
- B. If firms' conjectural variations increase, all else constant, price-cost margins should increase (market is "less competitive");
- C. If the HHI and firms' conjectural variations both decline, price-cost margins decline (market becomes much "more competitive");
- D. If the HHI and firms' conjectural variations change in opposite directions, price-cost margins will change in a direction to be determined by which effect dominates. For example, a decline in HHI dominated by an increase in firms' conjectural variations, results in higher price-cost margins (market becomes "less competitive").

37. These alternative hypotheses have been tested, as described in the following sections, using measures for Ameritech's service region. Together, the three large carriers had the capacity to determine the extent of long-distance offerings. But the extent to which they determined price levels as a result has depended on whether there were separate versus collective pricing strategies. The pattern of declining HHI up to the early 1990s is consistent with the strategy where the second and third largest carriers increase market share while the largest carrier is restricted in its response by specific regulations. This would support an hypothesis of separate pricing strategies. But thereafter, the price floor restrictions were eliminated and the three carriers acted as if each sought to maintain shares. The hypotheses would shift to increases in conjectural variations and thus price-cost margins.

38. At the same time, the three large carriers' marginal costs became virtually the same given that access charges for local exchange were the same after 1990 and that other operating costs were low (less than ten percent of prices). The growth of each carrier's capacity was so extensive that the threat was real that any one of the three could take prices down to marginal costs and serve the market if another were to seek to take away share. In effect, those conditions provided each carrier with strong incentives to limit its incursions in the shares of the other carriers in each of the key markets.

39. Regulatory price setting practices also contributed to the ease with which individual carriers could set price that maintained shares. Each large service carrier offered calling plans under tariffs submitted to the Federal Communications Commission. In particular, AT&T had to submit new tariffs, to be reviewed by all comers, including MCI and Sprint, that posted prices for a substantial period before going into effect.¹⁸ From 1990 to 1993, AT&T initiated changes in prices that MCI and Sprint followed, with the three price schedules becoming increasingly more identical. By December 1993, AT&T, MCI, and Sprint arrived at virtually the same price levels for most classes of services across the country. Public pre-announcement with price convergence was the pattern in MTS, outbound WATS, and after 1991 in inbound WATS. With virtually identical marginal costs and the same prices, then price-cost margins also converged to one level. These aspects of firm conduct all point to the possibility that market behavior was not more, but rather "less competitive" in the 1990s.

¹⁸ In October 1996, the FCC issued its *Second Report and Order* which eliminated tariff-filing requirements for non-dominant interexchange carriers. Such abolishment of tariff-filing requirements is a necessary but not sufficient condition for causing the breakdown of tacit collusion. It remains to be seen whether or not the FCC's decision will have an effect on competitiveness.

V. THE COMPETITIVENESS OF PRICE-COST MARGINS IN LONG-DISTANCE SERVICES SINCE THE AT&T DIVESTITURE IN 1984

A. *Price-Cost Margin Behavior in Ameritech's Region*

40. The "competitiveness" of long-distance markets is determined by testing hypotheses relating *changes* in HHI to *changes* in price-cost margins for the key service markets from 1987 to 1996. The direct measure of the price-cost margin, specified as $[(p - mc) / p]$, requires estimates of both prices and marginal costs for each product in Ameritech's service region.

1. *Estimation of Prices*

41. Price indices have been constructed for the following services provided by the three major carriers: message toll service ("MTS"), switched and dedicated outbound WATS, switched and dedicated inbound WATS, and switched and dedicated Combined Services. These price series have been compiled from standard tariffs submitted to the Federal Communications Commission or from discount plan tariffs. The price for a service is defined as the charge per minute on a single call that conforms to the calling patterns in Table Five, which I assume describes those of Ameritech's customers.¹⁹ The calling pattern for MTS differs from that for other services, being more evenly distributed, rather than skewed toward daytime use and a medium-range distance. To ensure that the results of this study are not dependent on specific assumptions, however, I have performed a sensitivity analysis whereby alternative time-of-day

¹⁹ InterLATA, interstate prices were estimated by HTL Telemanagement, Ltd. by taking the assumed calling patterns and applying them to tariffs that AT&T, MCI, and Sprint maintain on file at the FCC.