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ORIGINAL FILE COPY

December 4, 1995

Mrs. Blanca S. Bayo
Director, Division of Records and Reporting
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399

RE: Docket No. 950985D-TP

Dear Mrs. Bayo:

Enclosed please find in response to Time Warner AxS of Florida and Digital Media Partners' Petition an original and fifteen copies of BellSouth Telecommunications, Inc.'s Direct Testimony of Dr. Aniruddha (Andy) Banerjee and Robert C. Scheye in the captioned docket.

A copy of this letter is enclosed. Please mark it to indicate that the original was filed and return the copy to me. Copies have been served on the parties shown on the attached Certificate of Service.

Sincerely,

Nancy B. White (BW)

Nancy B. White

Enclosures

cc: All Parties of Record
A. M. Lombardo
R. G. Beatty
R. D. Lackey

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CERTIFICATE OF SERVICE
Docket No. 950985A-TP
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I HEREBY CERTIFY that a copy of the foregoing has been furnished by Federal Express this 4th day of December, 1995 to:

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Nancy B. White (BW)

DIRECT TESTIMONY OF ANIRUDDHA (ANDY) BANERJEE
ON BEHALF OF BELLSOUTH TELECOMMUNICATIONS, INC.
BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 950985D-TP
(TIME WARNER AND DIGITAL MEDIA PARTNERS PETITION)
DECEMBER 4, 1995

Q. Please state your name, address, and place of employment.

A. My name is Aniruddha (Andy) Banerjee. I am a Senior Consultant with National Economic Research Associates, Inc., located at One Main Street, Cambridge, MA 02142.

Q. Please give a brief description of your background and experience.

A. I earned a Bachelor of Arts (with Honors) and a Master of Arts degree in Economics from the University of Delhi, India, in 1975 and 1977 respectively. I received a Ph.D. in Agricultural Economics from the Pennsylvania State University in 1985. I have over eight years of experience teaching undergraduate and graduate courses in various fields of Economics, and have conducted academic research that has led to publications and conference presentations.

Since 1988, I have held various positions in the telecommunications industry. Prior to my present position, I have been an economist in the Market Analysis & Forecasting Division at AT&T Communications, Inc. in Bedminster, NJ, a Member of Technical Staff at Bell Communications Research, Inc. in Livingston, NJ, and a Research Economist at BellSouth Telecommunications in Birmingham, AL. In these positions, I was responsible for conducting economic and market analysis, building quantitative demand models for telecommunication services, developing economic positions and strategies, and providing expert testimony support on regulatory economic matters. In my present capacity, I provide quantitative and policy analysis for telecommunications industry clients principally on matters of concern to local exchange carriers. My curriculum vitae is attached to this testimony as Exhibit AXB-1.

Q. Have you previously filed testimony before this Commission?

A. Yes. I filed testimony on behalf of BellSouth Telecommunications, Inc., in Docket 950985-TP (in response to Petitions by the Teleport Communications Group, Continental Cablevision, Metropolitan Fiber Systems of Florida, and MCI Metro Access Transmission Services) on September 15 and 29 and November 27, respectively. I also filed direct testimony in Docket 950984-TP (in response to Petitions by Metropolitan Fiber Systems of Florida and MCI Metro Access Transmission Services) on November 27.

Q. What is the purpose of this direct testimony?

A. Following a Petition by Time Warner AxS of Florida, L.P. and Digital Media Partners (collectively "Time Warner"), direct testimony has been filed in this Docket on behalf of Time Warner by Ms. Joan McGrath. Ms. McGrath's testimony raises various issues relating to the financial terms and conditions of interconnection between BellSouth, the incumbent local exchange carrier (LEC), and alternative local exchange carriers (ALECs) in Florida.

The purpose of my testimony is to respond to and, where necessary, show why the positions taken by Time Warner are inconsistent with sound economic principles.

Many of the issues raised in Ms. McGrath's testimony were previously encountered in petitions and testimonies filed in this proceeding by several other parties to whom, as stated above, I have already responded. To avoid repetition, wherever Ms. McGrath's testimony reprises those themes, I respond by reference to my testimony in this proceeding dated November 27, 1995 ("November testimony"). This testimony responds in greater detail to issues in Ms. McGrath's testimony that are either new or worthy of additional discussion.

Q. Please list the principal economic issues raised by Ms. McGrath's testimony.

A. Ms. McGrath's testimony raises the following economic issues in connection with the financial terms and conditions of interconnection: (1) entry barriers, (2) compensation principles, (3) bill and keep compensation, (4) bill and keep practice, (5) BellSouth's proposed arrangement and imputation, and (6) contribution.

Q. How do you propose to respond to these issues or themes in Ms. McGrath's testimony?

A. After presenting Ms. McGrath's arguments under these themes, I will demonstrate, as appropriate, where and how her arguments are inconsistent with economic principles.

ENTRY BARRIERS

Q. Ms. McGrath [at 8-9] expresses her concern that Time Warner will not be able to penetrate BellSouth's market without nondiscriminatory and equal interconnection to BellSouth's networks. How significant are the barriers to entry that Time Warner is likely to face and what role should regulation play?

A. In theory, high sunk costs can be an entry barrier because the prospect of being unable to recover those costs in the event of unsuccessful entry can be daunting to a potential competitor. However, this possibility can exist in *any* market, competitive or not. In regulated markets, the sole purpose of regulation ought to be to ensure that the potential entrant that needs to make significant sunk investments at entry is not unfairly handicapped by the incumbent's market behavior. Thus, while regulation that guarantees fairness in entry conditions is perfectly acceptable, it should neither handicap the incumbent by placing unnecessary onerous restrictions on it nor pick winners and losers by overtly "managing" the terms under which the firms will compete.

While, in principle, "non-discriminatory and equal interconnection" is a laudable foundation for competition, that should not automatically translate into *equal* interconnection charges between competitors if the cost structure of the incumbent differs from that of the entrant because of the former's unique obligations or burdens like universal service or "carrier of last resort."

In describing Time Warner as "unknowns to customers in the marketplace" Ms. McGrath paints an overly pessimistic view of Time Warner's likely prospects in Florida's local exchange markets. First, Time Warner has a significant national and regional market presence in the delivery of cable and entertainment services. Many Florida residents presently receive such services from Time Warner and, to the extent that it has established rapport and a business reputation with these customers, Time Warner cannot be regarded as "unknowns" by customers who will shortly be offered a choice of their local telephone service provider. Its substantial name recognition among households and its ready access to media and other information resources should enable Time Warner to rapidly build customer interest and loyalty when it enters the local exchange market in Florida.

Second, Time Warner is, arguably, among the best-prepared of cable operators for providing telecommunication services. Its relationship with US West (a Regional Bell Operating Company) and its ongoing market trials in the Omaha Nebraska area indicate that Time Warner may be much better positioned to compete in the local telephone market than Ms. McGrath is willing to allow.

Q. You remarked earlier that equal terms of interconnection should not automatically mean equal interconnection charges between BellSouth and Time Warner, if (hypothetically) BellSouth, but not Time Warner, were required to carry certain special obligations. Couldn't unequal interconnection rates (e.g., hypothetically, if Time Warner pays more to BellSouth for interconnecting than what BellSouth pays Time Warner) then be an entry barrier?

A. Unequal interconnection rates need not be a barrier to entry. In this hypothetical but plausible scenario, BellSouth will charge more for interconnection than it gets charged by Time Warner for the simple reason that BellSouth's rate will include contribution toward its special obligations, but the rate charged by Time Warner without corresponding obligations, rightfully, will not. This contribution will be lost whenever Time Warner, rather than BellSouth, provides a service to the end user.

Asymmetry in interconnection rates would be an entry deterrent (raising the entrant's costs but not the incumbent's) <u>only</u> if BellSouth were not required to recover at least as much contribution from its own retail services as it does from the interconnection service. However, with appropriate imputation of the contribution, there can be no price squeeze and, therefore, no barrier to entry. I will return to the imputation issue later in my testimony.

COMPENSATION PRINCIPLES

Q. What principles does Ms. McGrath propose for determining the form of compensation for interconnection?

A. Ms. McGrath [at 10-11] proposes four basic principles for this purpose:
(1) the impact of different rate structures and levels on the development of competition and the promotion of customer choice and innovative technology should be considered,
(2) entrants should be given incentives to invest in plant and engage in facilities-based

competition,

(3) entrants should not be compelled by the form of compensation to duplicate the incumbent LEC's pricing structures or to subsidize the "inefficiencies" of the incumbent, and

(4) interconnection rates should not include a contribution toward universal service.

Q. Do you agree with these four basic principles?

A. It is hard to disagree with principles that are reasonable-sounding, as the first three listed above are. Any disagreement that I may have, however, is with the reasoning accompanying those principles.

For example, Ms. McGrath [at 11] appears to imply that investment in and competition based on the entrant's own facilities may not happen with certain (unspecified) interconnection arrangements in place. I interpret this to mean that entry would be deterred if those interconnection arrangements strongly favored the incumbent by, for example, allowing the incumbent to apply a price squeeze on the entrant. The answer to this, of course, is two-fold: (1) the interconnection rate must be the sum of the direct cost of providing interconnection and the opportunity cost of (lost contribution from) providing interconnection; (2) the incumbent must impute the contribution in its interconnection rate into the prices of its retail local services.

Ms. McGrath also cautions against interconnection compensation arrangements that would supposedly force the entrant to mirror the incumbent's pricing structures or to subsidize its alleged inefficiencies. Ms. McGrath does not specify how or why entrants would be forced to mirror the incumbent LEC's pricing structures simply because a particular compensation arrangement is chosen. The question that Ms. McGrath ought to be asking is whether the compensation arrangement permits full recovery of the fixed and volume-sensitive costs that the LEC or ALEC incurs in providing interconnection. There is nothing wrong with the LEC adopting, for example, a two-part pricing structure for interconnection that reflects an underlying two-part cost structure. Nor is there any direct one-to-one correspondence between a two-part interconnection price structure (should the LEC adopt one) and the pricing structure of the ALEC's retail services.

As for Ms. McGrath's claim that under certain compensation arrangements the ALEC may be compelled to subsidize the LEC's inefficiencies, the probable reference is to any contribution raised through the interconnection rate. If the level of contribution reflects the opportunity cost of providing interconnection (i.e., the lost retail contribution) and retail service prices are determined competitively in the market, there can be no opportunity for the LEC to pass on "inefficiencies" through its interconnection rate.

Finally, Ms. McGrath's preference for eliminating contribution from the interconnection rate makes little economic sense. My November testimony [at 49-53] explains this point at length.

BILL AND KEEP COMPENSATION

Q. What does Ms. McGrath propose as the preferred form of compensation for interconnection?

A. Ms. McGrath proposes [at 13] that the form of compensation should be "bill and keep." Under this arrangement, there is no actual transfer of money among interconnecting carriers; each carrier merely imposes a charge on its own customers that make calls to (hence, interconnect with) customers on the networks of other carriers. For this form of compensation to work properly, traffic between interconnecting carriers must be roughly in balance.

Q. Will traffic between interconnected LECs and ALECs be in balance?

A. As I argued in my November testimony [at 26-27], whether or not traffic between <u>competing</u> carriers will be in balance (even in the long run) is an open empirical question. Ms. McGrath's belief that "[u]nless there are significant distortions between networks, the traffic between networks tends to be in balance over time" [McGrath at 16] may apply more to traffic between non-competing, contiguous LECs than to competing LECs. I suspect the same may be said of Ms. McGrath's comment [at 20] that "... data from other states ... indicate that the traffic flow back and forth between LEC and ALEC networks tends to even out over a relatively short time."

The bottom line, however, remains that until and unless the traffic between interconnected carriers is truly in balance, bill and keep will be an inappropriate compensation arrangement.

Q. Ms. McGrath claims [at 15] that bill and keep "... is certainly the least cost method of compensation for terminating traffic." (emphasis added) Does this claim have merit?

A. No. This claim is unsubstantiated and is rebutted in detail in my November testimony [at 14-20].

Q. Ms. McGrath claims [at 15] that only bill and keep "... is neutral in terms of both the technology and architecture that Time Warner might choose ..." Does this claim have merit?

A. No. This claim too is unsupported by actual evidence and, as such, stretches credulity. In fact, as I argued in my November testimony, bill and keep rests on the presumption that all interconnected carriers have identical cost characteristics [at 21]. That presumption is clearly unwarranted. Ms. McGrath makes no attempt to analyze how bill and keep may break down when there <u>are</u> differences in cost among interconnected carriers.

Also, contrary to Ms. McGrath's assertion, the competitive ALECs seeking mutual interconnection will very likely differ by basic technology: we may expect to see broadband optical fiber wireline networks and cellular and radio-based networks. It is highly unlikely that the form of compensation arrangement chosen will be the critical determinant of a competitive ALEC's technology and architecture.

Q. In the final analysis, is bill and keep a suitable form of compensation among interconnecting, competing LECs and ALECs?

A. Bill and keep is only appropriate in the presence of a number of conditions, of which traffic balance is foremost. Other conditions include (1) customers of the competing LECs should have similar calling characteristics, (2) the competing LECs should have similar costs characteristics, and (3) the competing LECs' private incentives to minimize costs should not conflict with the public policy goal of minimizing the overall social costs of providing interconnection. I refer to my November testimony [at 17-21]. Absent those conditions, bill and keep will distort the competitive process and result in unnecessary inefficiencies. I refer to my November testimony [at 13-30] for a detailed critique of bill and keep.

BILL AND KEEP PRACTICE

Q. According to Ms. McGrath [at 14], "[b]ill and keep is the local interconnection arrangement most often employed between incumbent LECs today in Florida." Should this justify bill and keep for competing LECs and ALECs in Florida?

A. No. As I pointed out in my November testimony [at 31-32], the arrangement Ms. McGrath is referring to is that between non-competing, contiguous LECs in Florida. It is an entirely different matter when the interconnecting LECs and ALECs are competing for the same customer base and within the same service territory - a matter also discussed in my November testimony [at 31-32].

Q. Ms. McGrath also claims [at 18-19] that "[b]ill and keep is gaining approval in key states that have addressed interconnection issues." Is this sufficient reason for Florida to adopt bill and keep?

A. Certainly not. Even if other states have authorized bill and keep, the Florida Commission has an obligation to <u>independently</u> evaluate the economic merits or otherwise of that and alternative arrangements. When states adopt bill and keep as an <u>interim</u> solution, pending a final and more definitive arrangement, that should hardly be considered a precedent to be followed without question. As I argued in my November testimony [at 32-37], nearly all of the very few of states cited by Ms. McGrath have adopted bill and keep conditionally, and some other states have even rejected it outright. Regulators and public policy makers in other states still view bill and keep with uncertainty and regard it as merely a temporary and expedient device.

BELLSOUTH'S PROPOSED ARRANGEMENT AND IMPUTATION

Q. What is Ms. McGrath's opinion of BellSouth's proposal for a terminating switched access charge as the form of interconnection compensation?

A. Predictably, Ms. McGrath [at 20-21] finds nothing acceptable about BellSouth's proposal for a switched access-based charge. From my standpoint as an economist, however, it is difficult to analyze her objections because Ms. McGrath does not offer a critique of the economics underlying BellSouth's proposal.

Q. In the event that the Commission does not adopt bill and keep, Ms. McGrath [at 21] recommends that BellSouth and Time Warner should charge each other equal rates for interconnection and that BellSouth should be required to pass an imputation test. Do you agree?

A. Not entirely. For reasons I have discussed previously and at length in my November testimony [at 9-10], the requirement of equal interconnection rates is unjustified as long as BellSouth has certain special obligations and Time Warner does not. An imputation test is only warranted for retail services that depend upon essential facilities available <u>only</u> from one of the retail competitors. Economic theory would require that retail local services that depend upon interconnection (essential facility) pass such an imputation test, i.e., the rates of those services include the contribution earned from interconnection. In practice, however, there would be two qualifications to this requirement. First, the imputation test should also be passed by the retail local services provided by Time Warner and other local competitors because these service providers too would retain control over the interconnection they provide to BellSouth's customers. Second, for BellSouth's retail local services that are priced above cost (e.g., custom calling features), the imputation of contribution would be straightforward. For basic residential service that is priced below cost and capped, however, imputation of contribution would raise the service rate and, in the process, conflict with the public policy goal of universal and affordable service.

I strenuously object to Ms. McGrath's statement [at 22] that BellSouth be required "... to impute into its local exchange rates the same rates it charges Time Warner." This requirement has no economic justification whatsoever. Many economists accept the premise that the appropriate element to impute is the opportunity cost of providing interconnection over essential facilities. That opportunity cost is the contribution foregone when the LEC loses the opportunity to serve a customer to an interconnecting ALEC. Hence, the contribution in the interconnection rate, and not the rate itself, should be imputed into BellSouth's retail local rates. I refer to my November testimony [at 41-43] for a detailed exposition of the economically correct form of imputation and the underlying principle of competitive parity.

CONTRIBUTION

Q. What is Ms. McGrath's position on including contribution in the interconnection rate?

A. Ms. McGrath believes [at 11] that "...

interconnection rates should not include a contribution to economic service." She reasons [at 12] that "[i]ncluding a contribution to universal service in interconnection rates will discourage competition, therefore resulting in a greater need for universal service funding." Also, alleging [at 20] that switched access rates in Florida are "loaded with contribution," Ms. McGrath contends that using a switched access-based interconnection rate conflicts with the "need" to keep local interconnection rates separate from universal service.

Q, How do you respond to these positions?

A. First, I am at a loss to find any economic logic to support the belief that contribution in the interconnection rate can be detrimental to competition, given that both she and I agree that the incumbent LEC should pass an imputation test for any essential facilities used to provide interconnection.

Second, I find perplexing her connection between reduced competition and an increased need for universal service funding. In Florida, universal service makes basic local (residential) service available below cost to any one who demands it. Since the price of that service is already below cost and the service is available universally in a non-competitive environment, it is not clear how any diminution of <u>future</u> competition can result in any <u>more</u> universal service funding. Conversely, I do not see any economic basis for her apparent belief that competition will reduce universal service funding. Competition has the effect of bringing prices down to or near cost; in contrast, the price of universal service is already below cost even prior to the onset of competition.

Third, the contribution in the price of interconnection (or any other service) is intended to pay for the LEC's common and shared fixed costs as well as the costs of its special obligations. That contribution is, therefore, necessitated in part by providing universal service at a price below cost. If universal service were funded by an alternative mechanism that would relieve the need to raise contributions through service prices, clearly the only role of contribution would then be to pay for shared and common fixed costs. Thus, at present, contribution and universal service are inextricably linked. If some parties wish to de-link the two issues, the justification would clearly not be economic in nature.

I refer to my November testimony [at 48-53] for additional discussion of the role of contribution in pricing interconnection.

Q. Does this conclude your testimony?

A. Yes.

ANIRUDDHA (ANDY) BANERJEE

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Dr. Aniruddha (Andy) Banerjee is a Senior Consultant at NERA. He is responsible for providing analysis of and testimony on regulatory and economic issues of concern to telecommunications companies, preparing and responding to interrogatories in regulatory proceedings, and conducting econometric/statistical analysis to support marketing and market research activities of telecommunications companies. His market research activities are carried out, as needed, in collaboration with leading providers of telecommunications data or directly with telecommunications companies.

Before coming to NERA, Dr. Banerjee was a Research Economist at BellSouth Telecommunications where he was responsible for providing economic policy guidelines to key decision-makers and the Officer Body, preparing testimony and cross-examination questions, responding to interrogatories, and building econometric models to answer business questions. He provided quantification support on BellSouth's design of a price cap regulatory framework, and contributed to BellSouth's policies on local and toll imputation, universal service, interconnection pricing, rate rebalancing, and per use pricing of vertical services. He also represented BellSouth's participation in the National Telecommunications Demand Study, an ongoing study of demand trends in the telecommunications industry.

Prior to BellSouth, Dr. Banerjee was a Member of the Technical Staff at Bell Communications Research and a Staff Supervisor at AT&T. Dr. Banerjee has several years of experience teaching graduate and undergraduate courses in economic theory, statistics, econometrics, industrial organization, and public finance. He has conducted research on the dynamics of futures markets and various aspects of time series econometrics. He has presented a number of papers on telecommunications economics issues at national business and academic conferences.

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M.A., Economics, 1977
UNIVERSITY OF DELHI, INDIA
B.A., Economics (Honors), 1975

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NATIONAL ECONOMIC RESEARCH ASSOCIATES, INC.

1995- Senior Consultant, Communications Practice. Responsible for applying economic theory, regulatory economics, and econometric analysis to a variety of tasks: supporting telecommunications firms in litigation and regulatory matters, market research, and strategic planning.

BELLSOUTH TELECOMMUNICATIONS

1992-1995 Research Economist, Statistics and Econometrics Group. Developed, led, and disseminated economic and econometric research on issues of concern to BellSouth Telecommunications in particular and the telecommunications industry in general. Contributed to each of the following areas: regulatory economics, demand analysis (growth and elasticities), market potential, diffusion, pricing, cost, new product planning, forecasting, market research, competitive analysis, and the development of strategy/policy positions for BellSouth. Supervised and collaborated with other BellSouth economists and strategic planners and outside consultants.

BELL COMMUNICATIONS RESEARCH

1989-1992 Member of Technical Staff, Regulatory Economics and Pricing Theory, Demand Response Analysis Group. Developed various statistical and econometric methods and models that are applicable to the study of demand for various types of telephone service. The focus was on analysis, forecasting, and rate design support to client companies including BellSouth, U S West, NYNEX, and Bell Atlantic.

Developed software for demand and market potential analysis using advanced mathematical/statistical languages. Transformed original techniques research into business tools for analysts within client companies.

AT&T COMMUNICATIONS

1988-1989 Staff Supervisor, Market Analysis and Forecasting, Consumer Markets and Services. Assisted and contributed to demand analysis and forecasting efforts of the group. The focus was on demand issues related to AT&T's business and residential long distance telephone services.

THE PENNSYLVANIA STATE UNIVERSITY

1985-1988 Assistant Professor, Department of Economics. Developed and taught undergraduate and graduate courses in economics and econometrics. Conducted personal research in economics and econometrics. Supervised graduate student research leading to M.S. and Ph.D. degrees in economics. Developed the econometrics component of a new graduate program in policy analysis at Penn State. And, advised undergraduate economics students on their curriculum and course selection. Taught courses on introductory macro-economic theory, introductory and intermediate micro-economic theory, industrial organization, public sector economics, statistics, and introductory econometrics. Developed and taught advanced graduate econometrics and time series courses (frequency-domain econometrics and spectral analysis, dynamic simultaneous equations systems and state space models, causality, model testing and validation, nonlinear time series, and asymptotic theory.

1982-1985 Instructor, Department of Economics. Taught a number of undergraduate economics courses including macro-economic theory, micro-economic theory, public sector economics, and statistical foundations of econometrics.

1979-1982 Research Assistant, Department of Agricultural Economics & Rural Sociology. Assisted in research activities of Professor Robert D. Weaver of the Department of Agricultural Economics. Research areas included: stabilization of prices of internationally traded agricultural commodities; choice under risk-aversion by a firm faced with multiple sources of uncertainty; impacts of public policy on risk-averse firms; market efficiency, role of information, distribution of asset returns, and market equilibrium; and productivity and cost relations in the wheat, corn, and soybean producing areas of the U.S. using crop survey data from the U.S. Department of Agriculture. Most of the work consisted of literature research, writing computer programming, and econometric data analysis.

UNIVERSITY OF DELHI, INDIA
1977-1979 Lecturer, Department of Economics, Shri Ram College of Commerce. Taught undergraduate economics courses including micro-economic theory, public finance, and economic planning and policy.

HONORS AND AWARDS
Phi Kappa Phi, inducted 1982
Gamma Sigma Delta Honor Society of Agriculture, inducted 1983
Marquis' Who's Who in the South and Southwest, 1995-96

Department Head Award, BellSouth Telecommunications, 1993
Department Head Commendation, Bell Communications Research, 1992
Vice President's Award, Bell Communications Research, 1990

AFFILIATIONS
American Marketing Association
National Association of Business Economists

PAPERS AND PUBLICATIONS

CONTRIBUTIONS TO NERA REPORTS
"Economies of Scope in Telecommunications," for Bell Canada, 1995.

"Economic Welfare Benefits from Rate Rebalancing," for Stentor Resource Centre Inc., 1995.

"Telephone Company Provision of Broadband Services: Economies of Scope, Competition, and Public Policy," for BellSouth Interactive Media Services

TESTIMONY

Direct Testimony addressing interconnection rate structure design, on behalf of BellSouth Telecommunications, to Florida Public Service Commission, Docket 950985-TP (Petition by Teleport Communications Group), September 1995.

Rebuttal Testimony critiquing bill and keep compensation for interconnection, on behalf of BellSouth Telecommunications, to Florida Public Service Commission, Docket 950985-TP (Petition by Teleport Communications Group), September 1995.

Direct Testimony on unbundling by local exchange carriers and related cost issues, on behalf of BellSouth Telecommunications, to Florida Public Service Commission, Docket 950984-TP (Petitions by Metropolitan Fiber Systems of Florida, and MCI Metro Access Transmission Services), November 1995.

Consolidated Direct and Rebuttal Testimony critiquing bill and keep compensation for interconnection, on behalf of BellSouth Telecommunications, to Florida Public Service Commission, Docket 950985-TP (Petitions by Continental Cablevision, Metropolitan Fiber Systems of Florida, and MCI Metro Access Transmission Services), November 1995.

Wrote significant sections of testimony presented to regulatory commissions on price cap and local competition (Vermont, Louisiana) and universal service issues (Louisiana, Tennessee)

TELECOMMUNICATIONS-RELATED PAPERS

"The Case Against Imputation of Access Charges in IntraLATA Toll Prices: Economic Efficiency and Fairness Reconsidered," BellSouth Telecommunications, 1994.

"Pricing of Local Exchange Interconnection Service From the Perspective of Economic Theory," BellSouth Telecommunications, 1993.

"Economies of Scale and Scope, Subadditivity of Costs, and Natural Monopoly Tests for Regulated Utilities," BellSouth Telecommunications, 1993.

"Fairness and Economic Efficiency in Regulation: Imputation v. Equal Contributions in IntraLATA Toll Pricing," Report to the Task Force on Imputation of Access Charges in IntraLATA Toll Price, BellSouth Telecommunications, 1993.

"Economic Analysis of Efficient versus Imputation-Based Pricing by a Regulated Public Utility," Report to the Task Force on Imputation of Access Charges in IntraLATA Toll Price, BellSouth Telecommunications, 1993.

"E: A Maximum Likelihood Estimation Program, A User's Guide to Some Applications," Bell Communications Research, 1992.

"Error Components Panel Data Modeling of Share Equation Systems: An Application to Telecommunications Access Demand," Bell Communications Research, 1989.

"Analysis of Demand Migration and Take Rates for Special Access High Capacity Services," Bell Communications Research, 1990.

"Business Outbound Service System: An Empirical Modeling Framework," AT&T, 1989.

MISCELLANEOUS PAPERS

"Does Futures Trading Destabilize Cash Prices? Evidence for U.S. Live Beef Cattle," (with R.D. Weaver), Journal of Futures Markets, Vol 10(1), 1990, (pp. 41-60).

"Market Structure and the Dynamics of Retail Food Prices," (with R.D. Weaver and P. Chattin), Northeastern Journal of Agricultural and Resource Economics, Vol 18(2), 1989, (pp. 160-170).
"Cash Price Variation in the Live Beef Cattle Market: The Causal Role of Futures Trade," (with R.D. Weaver), Journal of Futures Markets, Vol 2(4), 1982, (pp. 367-389).

"Unemployment Rate Dynamics and Persistent Unemployment Under Rational Expectations: A Comment," (with V. Moorthy), Working Paper No. 8-87-1, Department of Economics, The Pennsylvania State University, 1987.

"The Standard Errors of Characteristic Roots of a Dynamic Econometric Model: A Computational Simplification," Working Paper No. 5-87-3, Department of Economics, The Pennsylvania State University, 1987.

"Market Structure, Market Power, and Dynamic Price Determination in the Retail Food Industry," (with R.D. Weaver), Working Paper No. 5-87-2, Department of Economics, The Pennsylvania State University, 1987.

"Does Futures Trading Destabilize Cash Prices? Evidence for Live Beef Cattle," (with R.D. Weaver), Working Paper No. 5-87-1, Department of Economics, The Pennsylvania State University, 1987.

"Existence of Portfolios with Simultaneous Trading in Unrelated Speculative Assets," Working Paper No. 8-86-2, Department of Economics, The Pennsylvania State University, 1986.

"Models of Cash-Futures Market Complexes for Commodities Characterized by Production Lags," Working Paper No. 7-86-2, Department of Economics, The Pennsylvania State University, 1986.

"Cash Price Stability in the Presence of Futures Markets: A Multivariate Causality Test for Live Beef Cattle," (with R.D. Weaver), Staff Paper No. 45, Department of Agricultural Economics and Rural Sociology, The Pennsylvania State University, 1981.

"Optimal Interpolation and Distribution of Time Series by Related Series Using a Spectral Estimator for the Residual Variance," Bell Communications Research, 1990.

"Size and Power Characteristics of Three Tests of Nonlinearity in Time Series," AT&T, 1989.

"Model Testing and Selection in Applied Econometrics," AT&T, 1989.

RECENT CONFERENCE PRESENTATIONS

"On Modelling the Dynamics of Demand for Optional and New Services," International Communications Forecasting Conference, Toronto, Canada, June 13-16, 1995.

"The Case Against Imputation of Access Charges in IntraLATA Toll Prices: Economic Efficiency and Fairness Reconsidered," Rutgers University Advanced Workshop in Regulation and Public Utility Economics, Seventh Annual Western Conference, San Diego, CA, July 6-8, 1994.

"Future Directions in Modeling the Demand for Vertical Services," National Telecommunications Demand Study Conference, La Jolla, CA. March 24-25, 1994.

"E: A Maximum Likelihood Estimation Program," National Telecommunications Forecasting Conference, Crystal City, VA, June 1-4, 1993.

Discussant of "The National Telecommunications Demand Study," National Regulatory Research Conference on Telecommunications Demand, Denver, CO, August 3-5, 1992.

"Using Demographics to Predict New Service Take Rates: Discrete Choice Analysis vs. Categorical Data Analysis," National Telecommunications Forecasting Conference, Atlanta, GA, May 5-8, 1992.

"Price Cap Regulations for the LECs: Implications for Demand and Revenue Forecasting," National Telecommunications Forecasting Conference, Boston, MA, May 30, 1991.

"Demand Migration for Special Access High Capacity Services," Rutgers University Advanced Workshop in Regulation and Public Utility Economics, Third Annual Western Conference, San Diego, CA, July 11-13, 1990.

"Error Components Panel Data Modeling of Telecommunications Access Demand," Bellcore-Bell Canada Telecommunications Demand Analysis Conference, Hilton Head, SC, April 22-25, 1990, and Bell Atlantic Business Research Conference, Baltimore, MD, October 24-27, 1989.

"Analysis of Integrated Demand Systems," Rutgers University Advanced Workshop in Regulation and Public Utility Economics, Second Annual Western Conference, Monterey, CA, July 5-7, 1989.

Panel Discussion on "The Regulatory and Operational Impacts of Price Caps," National Telecommunications Forecasting Conference, San Francisco, CA, May, 1989.