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ORIGINAL
FILE COPY

December 11, 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. 950985C-TP (MCImetro)

Dear Mrs. Bayo:

Enclosed please find an original and fifteen copies of BellSouth Telecommunications, Inc.'s Rebuttal 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.

Chase

Sincerely,

Nancy B. White CAB

Nancy B. White

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Enclosures

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

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Scheye
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Banerjee
DOCUMENT NUMBER-DATE
12466 DEC 11 95
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CERTIFICATE OF SERVICE
Docket No. 950985A-TP
Docket No. 950985B-TP
Docket No. 950985C-TP
Docket No. 950985D-TP

I HEREBY CERTIFY that a copy of the foregoing has been furnished by Federal Express this 11th day of December, 1995 to:

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Nancy B. White (AO)

REBUTTAL TESTIMONY OF ANIRUDDHA (ANDY) BANERJEE
ON BEHALF OF BELLSOUTH TELECOMMUNICATIONS, INC.
BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 950985C-TP (MCImetro)
DECEMBER 11, 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 in Bedminster, NJ, a Member of Technical Staff at Bell Communications Research 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.

Q. Have you previously filed testimony before this Commission?

A. Yes. I filed direct and rebuttal testimony on behalf of BellSouth Telecommunications, Inc., in Docket 950985-TP on September 15, September 29, November 27, December 4, and December 11, 1995, respectively.

Q. What is the purpose of your testimony in this Docket?

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

Q. Did the parties raise any additional issues you need to address in their direct testimony filed on November 28, 1995 in response to the Petition filed by MCImetro on November 14, 1995?

A. No. In fact, most simply adopted their previously filed testimony by reference; therefore, I adopt by reference my rebuttal testimony dated November 27, 1995 and filed with the Florida Public Service Commission in Docket 950985A-TP. A copy of the Testimony is attached.

Q. Does that conclude your testimony?

A. Yes.

BellSouth Telecommunications Inc.
FPSC Docket No. 950985C-TP
Witness: Banerjee Rebuttal Testimony
Exhibit _________ AXB-2

TESTIMONY OF ANIRUDDHA (ANDY) BANERJEE

ON BEHALF OF BELLSOUTH TELECOMMUNICATIONS, INC.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 950985-TP

REBUTTAL TESTIMONY DOCKET NO. 950985A-TP (CONTINENTAL)

DIRECT TESTIMONY DOCKET NOS. 950985B-TP (MFS-FL),

AND 950985C-TP (MCIMETRO)

NOVEMBER 27, 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 in Bedminster, NJ, a Member of Technical Staff at Bell Communications Research 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 direct and rebuttal testimony on behalf of BellSouth Telecommunications, Inc., in Docket 950985-TP (in response to Petition by the Teleport Communications Group) on September 15 and September 29, respectively.

Q. What is the purpose of your testimony in this Docket?

A. Following the filing of the Amended Petition by Continental Cablevision, Inc., direct testimony has been filed in this Docket by several parties on 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.

These parties include Mr. A. R. (Dick) Schleiden for Continental Cablevision, Inc. (Continental), Dr. Nina W. Cornell for MCI Metro Access Transmission Services, Inc. (MCImetro), Ms. Joan McGrath for Time Warner AxS of Florida, L.P., and Digital Media Partners (Time Warner), Mr. Timothy T. Devine for Metropolitan Fiber Systems of Florida, Inc. (MFS-FL), Mr. Mike Guedel for AT&T Communications of the Southern States, Inc. (AT&T), and Mr. Joseph P. Cresse for the Florida Cable Telecommunications Association (FCTA).

In addition, following the filing of a similar petition by MCImetro, direct testimony has been filed in support by MCImetro witnesses, Dr. Cornell and Mr. Don Price (Docket No. 950985C-TP).

Similarly, a petition by MFS-FL has been accompanied by direct testimony by Mr. Devine on behalf of MFS-FL (Docket No. 950985B-TP).

My testimony presents a consolidated response to the testimony of the above-named parties. It is rebuttal testimony to Continental's petition in Docket No. 950985A-TP and direct testimony to the petitions by MCImetro (Docket No. 950985B-TP) and MFS-FL (Docket No. 950985C-TP) respectively.

Whenever I cite a position taken by a witness, I shall refer also to the page number of the relevant testimony in which the position appears and identify, in parentheses, whether the testimony was in response to Continental's, MCImetro's, or MFS-FL's petition.

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

Q. Please list the principal economic issues raised by these parties to which your testimony responds.

A. The following issues were raised by various parties 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 the intervenor testimonies?

A. I will first present the arguments made by various parties under these themes. Then, as appropriate, I will demonstrate where and how those arguments are inconsistent with economic principles. The positions of many of the witnesses coincide with those of Dr. Cornell (MCImetro). Accordingly, my rebuttal of and responses to Dr. Cornell's arguments should be taken as also applying, where appropriate, to the arguments of the other witnesses.

ENTRY BARRIERS

Q. Dr. Cornell [at 5-6 (Continental and MCImetro)], Mr. Schleiden [at 5-6 (Continental)], and Ms. McGrath [at 4-5 (Continental)] allege the existence of so-called "natural" barriers to entry in local exchange markets. To support their allegation, they argue that:

(1) entry requires very large sunk and potentially unrecoverable costs,

(2) it takes a lot of time for an entrant to grow

beyond a small area,

(3) consumers, unfamiliar with entrants, may need to be targeted in a manner that necessitates substantial unrecoverable marketing costs, and

(4) an entrant can be successful only to the degree that it can secure the cooperation of other interconnecting carriers.

Q. How significant are these factors likely to be in determining the prospects for entry in Florida's local exchange market?

A. Dr. Cornell paints an overly pessimistic view of what is likely to happen in Florida's local exchange markets. First, as is evident from the identities of the intervenors in this Docket, the likely entrants are all firms with an already substantial or growing presence in the telecommunications industry. Some potential entrants like AT&T and MCI have world-wide name recognition, reputations, and resources that match or exceed BellSouth's. Firms, like MFS-FL (represented in this Docket by Mr. Devine) and

Teleport, have aggressively expanded into major metropolitan markets throughout the U.S. and currently have numerous customers who generate both high traffic volumes and revenues. These firms are technologically advanced, highly experienced, and well-versed in the art of competing. The inter-exchange carriers like AT&T and MCI (represented in this Docket by Mr. Guedel and Dr. Cornell, respectively) will be formidable competitors by being able to offer local, long distance, and wireless calling on a "one-stop-shopping" basis. The likely entrants in Florida's local exchange market are hardly neophytes in the business, and can be expected to expand quickly in Florida. After all, many of their potential customers for local services are already buying their long distance offerings.

Q. Dr. Cornell claims [at 9 (Continental and MCImetro)] that without reciprocity, i.e., equal charges for interconnection between BellSouth and an ALEC, there will be a serious barrier to entry by an ALEC (even one that is just as efficient as BellSouth). Is this a real or imagined threat to entry?

A. Lack of reciprocity in this sense is not a barrier to entry. BellSouth will charge more for interconnection than it gets charged by the ALEC for the simple reason that BellSouth's rate includes contribution toward its special obligations like universal service, but the rate charged by the ALEC without corresponding obligations, rightfully, does not. This contribution is lost whenever an ALEC, 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) only 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 (as parties have alleged) and, therefore, no barrier to entry. I will return to the imputation issue later in my testimony.

Moreover, if BellSouth's proposed "Alternative 1" for Florida's universal service support mechanism -- calling for the assessment of a "universal service preservation charge" to inter-exchange carriers (IXCs) and ALECs on the basis of their state-wide revenues -- is accepted, then there will no longer be a contribution element for universal service support in BellSouth's switched access charge.

Q. Are you suggesting that BellSouth, but not the ALEC, should be allowed to include that contribution element in its interconnection rates?

A. No. Such contribution should only be included in the interconnection rates of LECs or ALECs that have special obligations like universal service or carrier of last resort and are obliged to provide certain types of local service at prices below cost. This form of contribution will, of course, be required so long as the present form of support mechanism for universal service, or anything resembling it, is in effect. As I stated before, BellSouth's proposed Alternative 1 would make such a contribution unnecessary.

COMPENSATION PRINCIPLES

Q. What principles have parties proposed for determining the form of compensation for interconnection?

A. Parties have proposed that the form of compensation should be based on three basic principles:

(1) ALECs should be treated as co-carriers, not customers,

(2) efficient firms should not be prevented from entering the market, and

(3) entrant ALECs should not be compelled by the form of compensation to choose a particular technology or architecture (e.g., that of the incumbent LEC) that those firms do not want.

[Cornell at 7-8 (Continental and MCImetro)]

Q. Do you agree with these three basic principles?

A. Not entirely. Of course, any successful interconnection arrangement is predicated on there being cooperation and agreement among interconnected carriers. Also, I can find nothing exceptionable about the idea that interconnection arrangements should not deter entry by equally or more efficient firms.

I cannot imagine, however, that an entrant's choice of technology and architecture will depend on the form of compensation chosen for interconnection. In particular, I find Dr. Cornell's assertion [at 23-24 (Continental) and 24 (MCImetro)] -- that if switched access charges were chosen as the form of compensation, the entrant would be forced to mirror the incumbent's architecture -- to be highly contrived. In my direct testimony filed in Docket 950985-TP (in response to Teleport's Petition), I had critiqued Teleport's proposal that the interconnection charge should be based only on the carrier's peak-period capacity. Instead, I had proposed moving toward an optimal two-part rate structure in which the fixed part recovers the fixed costs associated with providing interconnection and the variable part recovers the traffic-sensitive usage costs. There is nothing preventing an entrant that wishes to combine fixed plant (e.g., loops) with usage-sensitive components like switching and transport in different proportions than BellSouth from devising the two-part rate structure that best recovers its costs. In that direct testimony, I had also noted that BellSouth itself is moving in the direction of the two-part rate structure which would give it additional flexibility in setting interconnection rates.

BILL AND KEEP COMPENSATION

Q. What have the parties proposed as their preferred form of compensation for interconnection?

A. All parties who filed direct testimony in this Docket proposed that the form of compensation be "bill and keep" or, as Dr. Cornell puts it, "mutual traffic exchange." [Cornell at 10-11 (Continental) and 11-12 (MCImetro), McGrath at 8 (Continental), Schleiden at 10-11 (Continental), Devine at 7 (Continental) and 33-35 (MFS-FL), Guedel at 13 (Continental), Cresse at 4 (Continental)] 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, parties agree that traffic between interconnecting carriers must be roughly in balance [Cornell at 14 (Continental and MCImetro), McGrath at 10 (Continental)] or even if it is out of balance [Devine at 38 (MFS-FL)].

Q. Dr. Cornell claims [at 11 (Continental) and 12 (MCImetro)] that bill and keep or "[m]utual traffic exchange is the most efficient means of compensating for the termination of local exchange traffic ..." because each carrier then has the incentive to minimize its termination costs and no unjustified costs are imposed on the system. Do you agree?

A. No. Bill and keep or mutual traffic exchange is definitely not the most efficient means of compensating for termination of calls originating on other networks. Dr. Cornell overlooks a number of critical real-world economic factors that could prevent bill and keep from being the most efficient means of compensation. These factors concern differences among (1) customer characteristics, (2) incentives of carriers to minimize costs, (3) carriers' cost characteristics, and (4) carrier requirements for recovering contribution toward the cost of special obligations.

Q. When Dr. Cornell states that bill and keep will avoid imposing unjustified costs on the system, what is she referring to?

A. According to Dr. Cornell [at 13 (Continental) and 14 (MCImetro)],

"[o]nce all the conditions for effective competition have been established, it is virtually certain that the amount of compensation that would be due to one network would be exactly offset by the amount due to the other. Unless there are significant distortions between networks, the traffic between networks tends to be in balance over time."

Predicated on such a traffic balance, Dr. Cornell believes -- a belief echoed by Ms. McGrath [at 10-11 (Continental)], Mr. Schleiden [at 13 (Continental)], and Mr. Devine [at 35 (MFS-FL)] -- that there is little to be gained by instituting a costly measurement and billing system simply for the purpose of assessing a termination-based compensation charge to interconnecting networks. Once the traffic is in balance, payments would offset and no further measurement or billing would be required. Dr. Cornell's conclusion rests primarily on her apparent conviction that:

(1) traffic between carriers will inevitably be in balance, regardless of both the types of customers involved and the relative sizes of the carriers' networks

(2) compensation need not be linked to the actual costs that a carrier will incur when it terminates a call from another carrier, at any level of traffic volume between the two carriers.

Neither of these premises is correct, nor is her conclusion.

Q. Please explain why.

A. There are at least four reasons why Dr. Cornell's reasoning is faulty. The so-called mutual traffic exchange or bill and keep proposals do not represent efficient prices, and they will certainly not lead to an efficient economic outcome. First, the bill and keep proposal ignores the significance of differences among customer types. Second, it ignores how it distorts the carriers' respective incentives to minimize costs. Third, it assumes implicitly that all carriers have identical cost characteristics. Fourth, it fails to account for BellSouth's need to recover the contribution lost when it provides interconnection to an ALEC.

Q. Please explain what you mean by the bill and keep proposal ignoring differences among customer types.

A. Whether terminating traffic between entrants and BellSouth will be in balance -- a key assumption for successful bill and keep -- will depend on the types of customers that entrants will acquire. It is important to note that the mix of customers (and their associated origination-termination ratios) selected to serve will not be independent of the interconnection rates themselves. If the terminating switched access charge is outrageously high, the entrant would seek customers with high origination-termination ratios. Conversely, if terminating switched access is free (or priced below the <u>entrant's</u> incremental cost of originating traffic), the entrant would seek customers with low origination-termination ratios. Therefore, the extent to which any traffic balance between carriers could be achieved -- if at all -- will depend strongly on the mix of customers of the interconnecting carriers. Specifically, the usage characteristics of both a carrier's customers and those on other networks that call its customers will matter greatly. This means that, contrary to Dr. Cornell's suggestion, traffic balance is neither an independent nor an inevitable outcome.

Q. Please explain how bill and keep ignores the distortion in the carriers' incentives to minimize the cost of interconnection.

A. By artificially setting the termination rate to zero, bill and keep will bring about inefficient behavior. Under bill and keep, no payment is actually made by one carrier to another. Since no payment is made, neither carrier has an incentive (or the means by which) to recognize the level of terminating costs incurred by the other. Thus, each carrier would focus only on minimizing its <u>own</u> cost of <u>delivering</u> traffic to the other carrier, rather than acting to minimize the total of both -- their own traffic delivery costs and the other carrier's terminating costs.

As an example, consider the two points of interconnection proposed by BellSouth: the local switch and the tandem switch. Tandem interconnection, for example, requires that traffic be (1) switched at the tandem, (2) transported to a local switch, (3) switched again, and finally (4) delivered to the called party. Thus, tandem interconnection imposes additional switching costs and additional transport costs, which could be avoided if interconnection was to occur at the local switch. Usually, when interconnection is made at the local switch, it is switched once and then delivered to the called party. Entrants, on the other hand, would likely find it more cost-effective to deliver their traffic to BellSouth's tandem switches because that would minimize <u>their</u> costs of carrying traffic to multiple points of interconnection. Thus, under bill and keep, entrants would not face a price which reflects BellSouth's underlying costs of interconnection. Entrants would minimize only <u>their</u> own cost of delivering traffic to BellSouth, but would not take into account the additional interconnection costs imposed on BellSouth because of their decisions. This is <u>not</u> efficient economic behavior. Simply put, under bill and keep, no single party has any incentive to unilaterally act in ways that would minimize the <u>total</u> end-to-end cost of a call between interconnecting networks. As the example of terminating traffic at tandems rather than at central offices shows, incentives to produce the socially most efficient outcome are diminished under bill and keep. The price of interconnection is an important signal that provides all carriers information concerning the costs imposed by their actions. Only when such information is available and carriers face the cost consequences of their actions will efficient economic decisions be made.

Q. Please explain how bill and keep is affected by differences in carriers' costs?

A. Bill and keep assumes that all carriers will have identical cost characteristics. It does not recognize that networks developed by entrants in the future are likely to have different engineering and cost characteristics than the BellSouth network already in place. Indeed, contrary to Dr. Cornell's assertions, the competitive ALECs seeking mutual interconnection will differ by basic technology: we may expect to see broadband optical fiber wireline networks and cellular and PCS radio-based networks. It would be very unlikely for ALECs based on this range of technologies to have termination costs that are similar to BellSouth's. As discussed in the previous paragraph, ignoring cost differences will foster inefficient behavior.

Dr. Cornell suggests [at 11 and 16 (Continental) and at 12 and 16 (MCImetro)] that only bill and keep will allow carriers to choose their technology in a neutral fashion, i.e., without being influenced by the incumbent LEC's technology and architecture or by the form of compensation elected for interconnection. Neither she nor any of the parties provide any systematic analysis or discussion of why this would be necessarily true. Significantly, they also make no attempt to analyze how bill and keep may break down when there <u>are</u> differences or asymmetries in cost among the interconnecting carriers.

Q. Please explain the effect of the failure of bill and keep to account for BellSouth's need to recover its lost contribution.

A. Bill and keep does not accommodate the requirement that BellSouth be compensated for the lost contribution associated with the provision of interconnection or wholesale network functions. Some of BellSouth's retail local exchange services have always been priced above the relevant incremental costs to contribute towards recovery of:

(1) the fixed common costs of the ubiquitous network,

(2) subsidies to services priced inefficiently (e.g. basic local services and service to rural customers) to achieve certain regulatory

objectives, and
(3) historical costs not yet accounted for because of uneconomic regulatory depreciation rates.

Bill and keep would permit entrants' customers to avoid paying this contribution despite the fact that:

(1) by law, BellSouth must apparently continue to fulfill its carrier of last resort responsibilities,
(2) BellSouth's network (or network elements) will continue to be used to provision services offered by entrants, and
(3) BellSouth's retail customers (or its stockholders) must still provide this contribution.

Q. Please summarize the principal weaknesses in the bill and keep proposal.

A. The bill and keep proposal submitted by various parties in this Docket is based on an over-simplified view of both incentives and demand and cost circumstances that are likely to prevail in Florida's competitive local exchange market. Indeed, Mr. Guedel [at 13 (Continental)] speaks admiringly of the bill and keep arrangement: "The beauty of this arrangement is its simplicity." In my opinion, such an arrangement is more simplistic than simple. Endorsing the bill and keep arrangement purely because of its apparent simplicity reveals an unwillingness to confront the tricky details of a compensation system that can -- and should -- reflect accurately and fairly the variations in demand, cost, and other market conditions. It is doubly ironic, therefore, that Mr. Guedel (alone among all parties) recommends bill and keep for the <u>initial</u> phase of interconnection (when the traffic between carriers will almost certainly be out of balance) but a migration to a measured system of termination charges eventually.

There is also no economic basis for the claim made by Mr. Schleiden [at 12 (Continental)] that bill and keep is "... necessary in order to achieve traffic flow balance." This is an unsupported conjecture which, in my opinion, puts the cart before the horse. The more relevant question is whether or not traffic balance must first occur before bill and keep can be successful. Another example of a witness missing the critical importance of the traffic balance precondition for effective bill and keep is found in Mr. Devine's testimony [at 63 (MFS-FL)]. Mr. Devine misquotes the Stipulation between Teleport and BellSouth as follows: "[Teleport and BellSouth should bill and keep whenever] it is mutually agreed that the administrative costs associated with local interconnection are no (sic) greater than the net moneys exchanged." This readiness to move to bill and keep on the part of the two service providers is understandable: whenever traffic is in balance so that the net compensation between the parties is zero or "small" relative to administrative costs, bill and keep is a feasible "compensation" method. Mr. Devine appears not to recognize the significance of the balanced traffic feature.

Q. You said earlier that, contrary to Dr. Cornell's assertions, traffic balance between interconnecting carriers is not an inevitable outcome. Doesn't Dr. Cornell, in fact, acknowledge this possibility when she says that:

"[u]nless <u>very</u> strong incentives exist to try to select customers on the basis of their incoming or outgoing traffic patterns, the way entrants will build their networks should produce the same outcome." [at 17 (Continental) and 18 (MCImetro), emphasis in original]

A. Yes, but Dr. Cornell makes it seem like traffic imbalance can persist only in extreme situations, i.e., traffic balance is almost inevitable. It is, of course, difficult to be clairvoyant about likely traffic patterns under interconnection in a competitive local exchange market, particularly when the interconnection arrangements themselves may create uneconomic incentives to pursue niche-marketing or opportunities for rate arbitrage. It is certainly possible for traffic to move <u>toward</u> balance over time. There is anecdotal evidence that similarly situated customers tend to call each other just as often (a form of "social reciprocity compact"). However, there is no reason to believe the same is necessarily true for traffic between customers who are <u>not</u> similarly situated: for example, between a business and its customers, or between more affluent and less affluent individuals. This would be true not only for the frequency of calling, but for duration as well. There is no a priori reason to expect that traffic between, say, a major airline or bank and its regular customers or even casual information-seekers will be in balance, even in the long run. The imbalance of origination-termination ratios among certain classes of customers is a fact of life, not an unusual or extreme situation.

It is also likely for entrants to pursue a strategy of seeking out niche customers that represent the highest potential for revenues and profit to them. The targeted success of alternative access vendors (AAVs) in densely-populated metropolitan business centers is a case in point. By delivering high-quality service based on the latest "hi-cap" technology at prices that could not be matched by incumbent carriers subject to rate averaging, these AAVs made the most of their niche-entry strategy. Therefore, it is perfectly reasonable to expect entrants in Florida's local exchange market to forsake entry "on all fronts" in favor of profit potential-laden sectors of the market. An entrant may never seek to equalize market share with the incumbent; there is no necessary straight-line relationship between market share and profitability. In fact, it is conceivable that even a "small" share of customers could, if the customers are selected with care, be associated with a disproportionately "large" share of revenues from interconnected traffic. That is why I find Dr. Cornell's example [at 19 (Continental) and 20 (MCImetro)] about balance despite unequal network sizes to be contrived and unpersuasive. It is offered in support of her point, but it definitely does not exhaust all possibilities including, for example, that an entrant with 10 percent of all customers may have enough incoming traffic relative to outgoing traffic to generate over 50 per cent of local interconnection revenues.

Mr. Schleiden's belief [at 13 (Continental)] that without significant distortions "... the traffic exchanged by participants tends to be in approximate balance over time" is also an unproven conjecture. There has simply not been enough experience yet with traffic exchange under competition to back up that belief.

In sum, the possibility that traffic will ever be in balance cannot be taken for granted. Given competitive entry, the more material question is how market strategies are likely to be devised that can turn information about customer demand and network cost characteristics to a carrier's advantage. As I remarked earlier, I do not expect entrants to be neophytes. Contrary to Dr. Cornell's somewhat surprising apprehension that entrants "...may not have the ability to make a distinction among customers based on whether they have mostly incoming or outgoing traffic" [at 18 (Continental) and 19 (MCImetro)], I am willing to give those entrants more credit for their marketing savvy.

Q. Please summarize your position on bill and keep.

A. Bill and keep is an inferior alternative to BellSouth's proposed terminating switched access charge. Bill and keep relies on a very simplistic and unrealistic view of real world markets. It does not generate price signals that lead to efficient economic behavior. It fails to account for fundamental differences in demand and cost characteristics and, in particular, differences in the structures, objectives, and obligations between the incumbent carrier and entrants. BellSouth's proposed interconnection rate structure is not yet textbook perfect, but it properly accounts for all costs of providing interconnection and, taken along with other rate structures BellSouth has adopted recently in Florida (e.g., its universal service funding proposal -- particularly Alternative 1 -- and its local transport restructure tariff), is headed in the right direction.

BILL AND KEEP PRACTICE

Q. What have the parties claimed about the practice of bill and keep in the United States?

A. Parties have claimed that bill and keep is a popular arrangement for interconnection between non-competing LECs in geographically contiguous territories and for exchanging extended area service calls. [Cornell at 12 (Continental) and

12-13 (MCImetro), McGrath at 8 (Continental), and Devine at 37 (MFS-FL)] They have also listed some states that have supposedly adopted bill and keep for local interconnection. [Schleiden at 13 (Continental), McGrath at 12-13 (Continental), and Devine at 36-37 (MFS-FL)]

Q. Does this provide legitimacy to the bill and keep proposal for interconnection?

A. No. It is true that there are many instances of bill and keep among non-competing, contiguous LECs. However, at stake in this Docket is the appropriate form of compensation for interconnection among LECs that (1) compete for the same set of customers, and (2) operate within the same geographical territory. Bill and keep is definitely not the proper model for interconnection in a market with those vastly different circumstances.

Competition for customers introduces a strategic variable into the interconnection decisions of carriers. Being in the same territory, the growth of an entrant will depend on (1) the proportion of customers it can entice away from the incumbent and (2) the proportion of "new" customers it can sign up. Therefore, just about every decision it makes about niche-market or growth strategy, service offerings, prices, choice of technology, etc., will be driven by the fact of competition. The incumbent will likely face a similar set of imperatives. If bill and keep does not permit a carrier (most likely the incumbent because it has the ubiquitous network) to recover the true cost of providing interconnection (including any lost contribution), then it will be handicapped unfairly in the competition for customers. These issues largely do not matter when contiguous LECs merely "hand off" traffic between themselves, but each has a secure customer base.

Q. Parties have also cited a number of states that have adopted bill and keep as the compensation arrangement for interconnection under local exchange competition. Why shouldn't Florida adopt bill and keep?

A. The whole matter of what other states have done is, in my opinion, in the eyes of the beholder.

Between them, parties have credited California, Connecticut, Iowa, and Michigan with having instituted bill and keep for interconnection. Mr. Devine states [at 36 (MFS-FL)]: "... the Iowa Utilities Board ordered use of the bill and keep method of compensation on an <u>interim</u> basis, pending the filing of cost studies." [emphasis added] In <u>Re McLeod Telemanagement Inc</u>., 161 PUR4th 605 (Iowa U.B., Docket No. TCU-94-4, 1995), however, the Iowa Utilities Board held that it was <u>not</u> an appropriate <u>permanent</u> compensation measure. The Board reasoned that:

"Bill and keep may have been acceptable in a situation where extended area service traffic was exchanged between monopoly local service providers. It is an unacceptable pricing mechanism for local service traffic exchange between competing local exchange utilities. Cost-based pricing of the services provided is essential in the competitive market. Permanent bill and keep methodology would be looking backward to the monopoly regulation of the past, rather than forward to the regulation of competitive utilities in the future."

Similarly, in Re MFS Intelenet of Maryland, Inc., 152 PUR4th 102 (MD PSC, Case No. 8584, Order No. 7155, 1994), the Maryland Public Service Commission rejected MFS's request for bill and keep arrangements for termination of traffic between it and Bell Atlantic and agreed with Bell Atlantic's proposition that it and MFS should be able to charge for access to their networks. [Id. at 120] Recognizing the need for incumbent carriers to recover their fixed network costs, the Maryland Commission held that "a competitive carrier should be required to make a contribution to that portion of the joint and common costs of the ubiquitous network that was heretofore provided by the local business service which the incumbent carrier will lose to competition." [Id. at 123]

The California Public Utility Commission (in Re Competition for Local Exchange Service, (CA PUC R.95-04-043 I.95-04-044, Decision 95-07-054, 1995), in authorizing bill and keep on an interim basis only, stated that it would, at the end of one year, re-assess the effectiveness and fairness of bill and keep and decide whether or not to adopt an alternative call termination approach. The California Commission further noted its policy preference for approving tariffed service prices that reflect costs and for applying the same principle to call termination services. Therefore, its interim bill and keep policy should in no way be regarded as its final policy choice. Indeed, the California Commission invited competing local carriers to come up with alternatives to bill and keep, provided they were not unduly discriminatory or anti-competitive.

In Re Illinois Bell Telephone Company, PUR4th (IL Commerce Commission, 94-0096, 94-0117, 94-0146, 1995), regulators in Illinois adopted a reciprocal compensation scheme that sets an interconnection rate which
(1) reflects the long run service incremental cost of terminating calls,
(2) provides a reasonable level of contribution to Illinois Bell's overhead costs, and
(3) allows Illinois Bell to pass an imputation test for local traffic.

The Illinois Commission specifically rejected proposals submitted by MFS and MCI.

Finally, in Re City Signal Inc., 159 PUR4th 532, 547-48 (MI PSC, Case No. U-10647, 1995), the Michigan Public Service Commission adopted bill and keep as long as traffic between interconnecting carriers is within 5 percent of balance.

Ms. McGrath [at 13 (Continental)] has cited Washington and Texas as states that have recently addressed the interconnection compensation issue. From Ms. McGrath's own summary of the decisions in these states, it does not appear that either state has adopted bill and keep as anything more than a stopgap measure.

As these instances show, there has been no great rush to transfer the bill and keep in its purest form from the interconnection-among-contiguous-LECs world to the interconnection-among-competing-LECs world. Commissions that have considered the bill and keep arrangement for interconnection in local exchange competition have either adopted it on an interim basis, with reservations, or rejected it outright. This record provides no compelling reason for Florida to consider adopting bill and keep.

BELLSOUTH'S PROPOSED ARRANGEMENT AND IMPUTATION

Q. How have parties received BellSouth's proposal for a terminating switched access charge as the form of interconnection compensation?

A. Parties have not found BellSouth's proposed terminating switched access arrangement acceptable because allegedly

(1) it can cause prices of competitive retail services to be higher, despite competition, than they need be [Cornell at 30 (Continental) and 30-31 (MCImetro)], and

(2) without imputation of the switched access rate into BellSouth's retail local exchange service prices, there is a strong possibility of price squeeze by BellSouth against the ALECs [Cornell at 22-23 (Continental) and 23 (MCImetro), and Devine at 39-41 (MFS-FL)].

Moreover, parties claim that BellSouth's proposed arrangement would force interconnecting ALECs to mirror BellSouth's technology [Cornell at 21 (Continental) and 22 (MCImetro)] and prevent those ALECs from offering innovative new calling plans [McGrath at 15 (Continental) and Devine at 43 (MFS-FL)].

Q. Dr. Cornell asserts [at 21 (Continental and MCImetro)] that "use of switched access charges for compensation for terminating local exchange traffic under Southern Bell's current regulatory restrictions would deny the public all of the benefits that could come from local exchange competition." What do you understand Dr. Cornell's concerns as being?

A. Dr. Cornell's prime concern is that BellSouth's terminating switched access charge differs from the total service long run incremental cost (TSLRIC) of switched access by a contribution element. For example, she points [at 21 (Continental) and 22 (MCImetro)] to BellSouth's alleged inclusion of a "universal service preservation charge" in its interconnection price which, however, entrants are barred from doing (lack of reciprocity). Also [at 28 (Continental) and 29 (MCImetro)], she concludes that any markup of the interconnection rate above its "direct cost" (TSLRIC?) -- as would be the case with a switched access rate that includes contribution -- would prevent competition for retail services from achieving the lowest possible retail prices. Thus, Dr. Cornell believes, the switched access charge for interconnection would both disadvantage competitors and hurt end-user customers who buy retail services.

Q. Do you share Dr. Cornell's concerns, or consider them valid?

A. No. First, Dr. Cornell is mistaken in her belief that BellSouth's proposed universal service preservation charge (USPC) is destined <u>solely</u> to be a contribution element in the interconnection rate, specifically its switched access rate. As BellSouth has made clear, in Alternative 1 of its universal service funding proposal -- the alternative that BellSouth would most prefer be adopted -- the USPC is a separately tariffed element that would be assessed directly on the revenues of other telecommunications carriers in Florida. The purpose of the USPC will be to raise funds for supporting universal service but to do so in a manner that differs fundamentally from the service price-based contribution elements in effect today. Under Alternative 1, the USPC would make it possible for access charges to be reduced by the amount of the universal service support. Also, the USPC would eliminate the need for any separate Carrier Common Line or Residual Interconnection charges for local interconnection. This should adequately address Mr. Devine's concern [at 43 (MFS-FL)] that "[u]nless usage-based terminating access rates are set at considerably lower levels, ALECs [will be] forced to charge usage-based rates to end-user customers to recover their costs."

Second, the lack of reciprocity that Dr. Cornell alludes to is only a problem if a price squeeze on the competing ALECs results. A price squeeze can be eliminated by adopting principles of competitive parity. Also, Dr. Cornell's lament that retail prices, even under competition, will not be the lowest possible ignores the fact that pricing of services in the regulated telecommunications industry has never followed the so-called "first best" principles. Given BellSouth's regulatory history and special obligations (the costs of which it is entitled to an opportunity to recover), efficient service prices must be determined according to "second best" principles.

Q. Please explain the principle of competitive parity and how it would solve the potential price squeeze problem.

A. In theory, competitive parity in a market has two requirements. First, there must be no price or quality discrimination, overt or implicit, between competitors. Second, the margin between the incumbent LEC's interconnection charge (which entrant ALECs must pay) and its retail price (against which the entrants must compete) must reflect the LEC's economic costs of performing the retail function for which it will be competing with entrants. One key aspect of this is the price at which interconnection service is provided to competitors.

Competitive parity results in two theoretical pricing principles:

(1) where a LEC is the sole source of the service required by an ALEC, the LEC's own retail services must be subject to the same interconnection charges as it imposes on its competitors, except to the extent that the (marginal) costs of providing interconnection to itself and to its competitors differ, and

(2) the LEC's retail prices must recover both the contribution included in the interconnection charge and the incremental costs of its own retail operations.

In economic theory, these principles are both necessary and sufficient to ensure that competitors (incumbent LECs) be neither advantaged nor disadvantaged in their retail markets because (1) they supply an input (interconnection) that other competitors (entrant ALECs) must purchase, and (2) they charge an input price (interconnection rate) that exceeds the incremental cost of that input.

These pricing principles eliminate the possibility of price squeeze because the incumbent LEC is obliged to recover at least as much contribution from its retail service as it does from its interconnection service (implying, thereby, that the "real" competition is between the incumbent's and the entrant's incremental costs). If the incumbent's costs of providing interconnection to the entrant and to itself are the same, this rule amounts to imputation of the interconnection charge in the incumbent's retail service price. If the two costs are different, then this amounts to imputation of the interconnection charge adjusted for the cost differential. Either way, the contribution in the retail price is at least as large as that in the price of interconnection and a price squeeze cannot occur.

All of this would, of course, be moot if the USPC were to eliminate the need for including a contribution element in the price of a service.

Q. Please explain what "second best" pricing principles are and why they, and not Dr. Cornell's or Mr. Guedel's [at 15 (Continental)] prescription of pricing interconnection at TSLRIC, should apply.

A. First best pricing principles apply to competitive markets where there are no "market distortions." The regulatory process is a prime source of such distortions. For example, regulation often (1) constrains the regulated firm's price-setting freedoms, (2) imposes special obligations (e.g., below-cost pricing of basic residential service financed by artificial contributions from prices of other services), and (3) requires the regulated firm to depreciate its assets at less than the economic rate of depreciation. Other distortions arise from the special nature of certain firms, e.g., those with economies of scale which cannot recover all of their fixed costs by setting prices at no higher than marginal costs. When such distortions are present, economists recommend the use of "second best" pricing principles which set the lowest possible prices, recover all costs, and minimize the efficiency losses caused by the distortions. Second best prices, as Dr. Cornell correctly points out, are not as low as first best prices -- even with competition -- but they are the lowest they can be when market distortions are present. Hence, what Dr. Cornell is lamenting is nothing less than the influence of regulation on the prices of regulated firms with special obligations.

Finally, Dr. Cornell's suggestion that interconnection be priced exactly at TSLRIC is a departure from second best pricing. By not requiring interconnection to raise its share of the total contribution needed, it would be virtually impossible for BellSouth to cover all of its costs, including those due to its special obligations and regulatory legacy. This, in effect, would mean requiring BellSouth's other services to compensate by raising inefficiently high levels of contribution in their prices and exposing them, thereby, to greater competitive risks. Again, if the funds required for supporting the special obligations were to be raised by methods like the USPC, the interconnection rate could be brought down toward cost.

Q. So what ensures that second best prices will result if BellSouth's proposed terminating switched access rate is adopted as the interconnection rate?

A. There are various ways to set second best prices, the best known being Ramsey pricing (that marks up the price of each service -- wholesale or retail -- in inverse proportion to its price elasticity of demand) and non-linear pricing schemes (of which the two-part rate structure that I mentioned earlier is a special case). The end result is that as long as BellSouth must (1) provide universal service and price certain basic services below cost, and (2) follow slower than economic depreciation schedules, it has a legitimate additional cost recovery problem that unencumbered-by-regulation firms in competitive markets do not.

Q. What ensures that BellSouth cannot raise any more contribution in its service prices than is warranted by second best efficient pricing?

A. There are several factors. First, imputation ensures that BellSouth will recover at least as much contribution in its retail prices as it does in its interconnection rate. Facing potentially strong retail competition, it is unlikely that BellSouth will mark up its retail prices by any more than it absolutely has to. Thus, BellSouth will not have an <u>incentive</u> to recover unduly high contributions in its prices.

Second, under Florida law and in compliance with the Commission's Order No. 91-0172, BellSouth's rates will remain capped, and in some instances, indexed to the rate of inflation for a number of years. Therefore, the opportunities to unduly raise contributions will be minimal as well.

Finally, there will be increasing pressure from alternative technologies to keep the prices of wholesale services like interconnection down in general. Local interconnection charges are subject to the same competitive forces that led to the construction of bypass facilities when switched access rates were very high relative to costs. Higher than warranted markups will be quite unlikely in that environment.

CONTRIBUTION

Q. Please summarize the positions of parties opposed to BellSouth's proposed arrangement on the matter of contribution.

A. Parties oppose including a contribution element in the interconnection charge. Contribution is alleged to be

(1) an irreducible component, not subject to competition, that inflates the terminating switched access charge and prevents retail competition from producing the lowest possible retail service prices [Cornell at 28-29 (Continental) and 29-30 (MCImetro), Guedel at 16-17 (Continental)],

(2) a factor only in BellSouth's interconnection rate to an ALEC but not in that ALEC's rate to BellSouth, creating an additional cost and an entry barrier for the ALEC [Cornell at 21 (Continental) and 22 (MCImetro)], and

(3) appropriately recovered only from retail services, rather than wholesale services like interconnection [Cornell at 28 (Continental) and 29 (MCImetro)].

In addition, parties ask for contribution toward BellSouth's special obligations (universal service) to be de-linked from interconnection rate matters. [Schleiden at 9 (Continental), McGrath at 7 (Continental)]

Q. You have already addressed a number of these concerns with the contribution element in the switched access charge. Do you have any other comments with respect to those concerns?

A. Yes. The first general concern is that contributions will cause local exchange service rates to be higher than they need be [Cornell at 25 (Continental) and 26 (MCImetro)]. While I have argued above that they need not be any higher than warranted in a second best world, it is worthwhile to remember that under Florida law, and in compliance with the Commission's Order No. 91-0172, BellSouth's basic local exchange service rates will stay capped until January 1, 2001 (tantamount to a decline in rates in real terms). Moreover, these rates are already below cost and below where they would have been in a first best, unencumbered, competitive market. Therefore, the prospect of these rates rising toward cost -- even if the rate cap were not in effect -- is hardly cause for concern on economic efficiency grounds.

The second general concern is that if the contribution-laden switched access rate is adopted for interconnection, BellSouth will lose the incentive to reduce costs and act efficiently [Cornell at 21 (Continental and MCImetro)]. Here, too, there may be less than meets the eye. The contribution included in BellSouth's switched access price today is equal to the <u>average</u> retail contribution from all of BellSouth's customers. Actual contribution, however, varies widely over the customer base: it varies directly with a number of customer characteristics, namely, size, usage volume, and the cost to serve. Since new entrants will more than likely concentrate their efforts on the more profitable customers -- those that generate above-average amounts of contribution -- the amount of contribution collected by BellSouth in its interconnection price will be, on average, less than the amount of contribution actually forgone when the more profitable customers are served by an alternative carrier. Hence, BellSouth will not be truly compensated for the lost contribution unless entrants also serve a customer mix that corresponds to the average BellSouth customer today.

Finally, it bears repeating that the USPC or a similar means for raising support toward BellSouth's special obligations will greatly attenuate the need for contribution-laden pricing of BellSouth's services. If such a mechanism is adopted, issues like imputation and other competitive safeguards against price squeeze would become even less important. As it stands, I believe, there are sufficient safeguards available even if contribution toward special obligations was to remain a fixed part of BellSouth's service prices.

Q. Some parties (in particular, Devine at 12-13 (MFS-FL)) have argued for de-linking the interconnection rate from universal service considerations and, therefore, to the contribution element. Others have argued that the contribution should be included in the prices only of retail services, not wholesale services like interconnection. Do you agree?

A. No. Universal service considerations cannot be ignored because, as long as USPC or similar mechanisms are not adopted, interconnection service, like all other BellSouth non-subsidized services, must continue to contribute toward universal service.

Furthermore, it is perfectly appropriate to require wholesale services to contribute as well. Wholesale services like interconnection are, in general, far less price-elastic than retail services. Efficiency losses from contributions (analogous to per-unit taxes) are minimized when the greatest (least) amount of contributions are assessed to the least (most) price-elastic services. Recovering contribution from interconnection can lead to inefficient behavior only to the extent that firms can actually avoid interconnection. As long as contribution is confined mainly to unavoidable services (like interconnection or essential network facilities), the distortions imposed on carriers would be minimal, and the associated welfare losses from recovering contribution from these services should be small. In contrast, recovering contribution only, or mainly, from more price-elastic retail services (which, in many cases, are already priced well above costs) will be correspondingly inefficient and welfare-reducing.

SUMMARY

Q. Please summarize your testimony.

A. Parties have filed direct testimony in this Docket, generally in support of the petitions by Continental, MCImetro, and MFS-FL, and against some of BellSouth's proposed arrangements for interconnection. In my testimony, I responded to these parties, primarily by way of rebutting Dr. Cornell's testimony.

This rebuttal testimony was directed at six broad categories of issues raised by the intervenors. These included (1) entry barriers, (2) compensation principles, (3) bill and keep compensation, (4) bill and keep practice, (5) BellSouth's proposed arrangements and imputation, and (6) contribution.

The thrust of my arguments was that the alleged entry barriers are more imagined than real, given the likely nature of entrants and the regulatory strictures that will continue to apply to BellSouth (particularly under its price regulation plan). I argued that the bill and keep arrangement proposed by the intervenors would be inefficient, self-serving, and likely to be inferior to the BellSouth proposed switched access charge arrangement. I pointed out the numerous errors of omission and commission in the economic analysis of bill and keep compensation, notably, the failure to take account of real-world differences in customer demand and network cost characteristics. I showed that by applying principles of competitive parity, imputation, and second best pricing, the BellSouth interconnection compensation alternative would promote efficient competition and provide incentives for minimizing costs, without penalizing BellSouth for its historical regulatory commitments and special obligations. However, even the need for imputation or other safeguards against price squeeze would disappear if universal service support were to be raised through separate elements like the universal service preservation charge, rather than through contributions included in service prices. Contrary to the fears expressed by Dr. Cornell and others, BellSouth's proposed arrangement would be a further step in the direction of the optimal interconnection rate structure and maximize the benefits to the public of local exchange competition.

Q. Does this conclude your testimony?

A. Yes.

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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.

EDUCATION

THE PENNSYLVANIA STATE UNIVERSITY
Ph. D., Agricultural Economics, 1985

UNIVERSITY OF DELHI, INDIA
M.A., Economics, 1977

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

EMPLOYMENT

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, September 1995.

Rebuttal Testimony critiquing bill and keep compensation for interconnection, on behalf of BellSouth Telecommunications, to Florida Public Service Commission, Docket 950985-TP, September 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.