

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

RECEIVED

JAN 16 1996

In the Matter of:)

Price Cap Performance Review)
for Local Exchange Carriers)

CC Docket No. 94-1)
)

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, DC 20554

DOCKET FILE COPY ORIGINAL

Comments of the United States Telephone Association
on Fourth Further Notice of Proposed Rulemaking

Mary McDermott
Linda Kent
Charles D. Cosson
1401 H Street, NW
Suite 600
Washington, DC 20005

January 16, 1996

No. of Copies rec'd
List ABCDE

029

TABLE OF CONTENTS

SUMMARY..... Page iv

INTRODUCTION Page 1

I. The Commission Should Adopt USTA’s Revised Moving Average TFP Methodology for Calculating the Productivity Offset Page 3

A. The Commission Should Reaffirm Its Decision that the TFP Methodology is the Superior Method for Calculating the Productivity Offset and Not Adopt Any of the Other Proposed Methodologies Page 4

1. The Commission Was Correct in its Tentative Conclusion that a TFP Methodology is Superior Page 4

2. Other Methodologies Are Inaccurate, Less Likely to Properly Balance Incentives and Consumer Welfare, and Not Economically Meaningful Page 6

a. Econometrics Is Too Complex and Involves Too Many Areas of Contention to Be An Effective Methodology for Development Of a Productivity Measure Page 6

b. The Historical Revenue Method Is Conceptually and Administratively Flawed Page 8

c. The Historical Price Method (including the “Frentrup-Uretsky” Study) is Less Effective than the TFP Method Page 10

d. The Combined Revenue/Price Method Suffers From the Same Flaws As Other Revenue-Based Methods .. Page 11

3. A Consumer Productivity Dividend Is Not Appropriate .. Page 12

B. The Simplified Christensen Model Fully Addresses the Commission’s Concerns and Best Meets the Criteria for a Long-Term, Economically Sound Methodology Page 14

1.	<u>The Simplified Christensen Model Properly Calculates the Output Indexes</u>	Page 14
	Issue 1a: What is the most reasonable method to develop output price indexes for TFP calculation purposes? What data sources should be used to develop output price indices?	Page 14
2.	<u>The Revised USTA Methodology Properly Calculates the Input Indexes</u>	Page 16
a.	Issue 1b: What is the most appropriate measure of the cost of capital for a TFP study?	Page 16
b.	Issue 1c: What are appropriate depreciation rates for a TFP study?	Page 18
c.	Issue 1d: What is the most reasonable method to estimate capital stock?	Page 20
d.	Issue 1e: Is the imputation of capital services from capital stock rather than from capital consumption reasonable?	Page 22
e.	Issue 1f: What is the most reasonable method to develop an implicit rental price?	Page 23
f.	Issue 1g: What is the most reasonable method of developing a labor index for inclusion in a TFP calculation?	Page 23
g.	Issue 1h: What is the most reasonable method for developing a materials index for inclusion in a TFP calculation?	Page 25
h.	Issue 1i: What is the most reasonable way to account for changes in LECs' input prices for use in a TFP approach to calculating the X-factor?	Page 25

3.	<u>Calculating the Index on a Less than Total Company Basis Will Not Yield Meaningful Results</u>	Page 27
4.	<u>Universal Service and Other Subsidy Programs Do Not Distort Productivity Measurement</u>	Page 31
5.	<u>USTA Properly Submitted Updated Figures and Corrected Data Errors Produced by Manual Data Entry Processes For The Data Submitted in the Original Christensen Study</u>	Page 32
C.	<u>The Commission Should Reaffirm its Tentative Conclusion to Avoid Costly Performance Reviews and Calculate the X-Factor as a Moving Average</u>	Page 34
II.	<u>The Commission Should Establish a Baseline Productivity Factor for the LEC Industry, and Eliminate Sharing</u>	Page 37
A.	<u>The Commission Should Establish a Baseline Productivity Factor Based on the Simplified TFP Methodology</u>	Page 37
B.	<u>Sharing Should Be Eliminated From the Price Cap Plan</u>	Page 38
C.	<u>The Commission Should Not Establish Criteria and Procedures By Which It Would Assign A Productivity Factor To Each LEC</u>	Page 41
D.	<u>The Commission Should Not Utilize Pricing Flexibility As An Incentive to Select a Higher Productivity Factor</u>	Page 43
III.	<u>The Commission Should Adopt TFP And Eliminate Any Need for a Separate Common Line Formula</u>	Page 44
IV.	<u>The Commission Should Not Limit Exogenous Cost Treatment to Changes Which Result in a Jurisdictional Cost Shift</u>	Page 46
V.	<u>The Commission Should Modify Its Treatment of the Interexchange Basket</u>	Page 47

SUMMARY

In this Further Notice proceeding, USTA encourages the Commission to adopt its tentative conclusion to establish a long-term LEC price cap plan which calculates a productivity offset based on the moving average TFP methodology, and which eliminates sharing obligations. In these comments, USTA provides further descriptive information and substantive support for a moving average TFP model for calculating the X-factor. Specifically, USTA now presents a simplified version of the original TFP study submitted in the Price Cap Review proceeding.

This simplified TFP model utilizes economically meaningful and generally accepted methods for developing input and output indices. This simplified TFP methodology is also designed to be independently verifiable and relies entirely on publicly available data. The simplified TFP methodology set forth here by USTA will enable the Commission to assess LEC productivity and develop appropriate regulations which ensure that consumers benefit from ongoing gains by the LECs, while preserving the efficiency incentives which are at the core of a price cap system of regulation.

The simplified TFP method fully addresses the Commission's concerns and best meets the criteria for a long-term, economically sound methodology. The simplified Christensen TFP approach to calculating quantity of output uses a Tornquist index of the quantity indexes for each output category. Output price index calculations use an approximation to a chain-linked Paasche index, based on methods originally developed by AT&T to measure output for the pre-divestiture Bell System. The method used in the simplified Christensen model is soundly based on the economic theory of price indexes. The simplified Christensen method simplifies the TFP calculation by sub-aggregating the multitude of services provided by LECs into seven broad revenue categories: local service, long distance service, interstate end user access, interstate switched access, interstate special access, intrastate access, and miscellaneous. These seven categories are reasonable, based on the revenue accounts reported in the ARMIS 43-02.

The simplified Christensen TFP method also properly calculates the input indexes, including measures for capital (which properly reflect economic depreciation rates), labor and materials. The simplified Christensen TFP also properly recognizes that because the long-term differential between LEC input prices and input prices for the economy as a whole is zero, the X-factor for the long-term price cap plan should not include a input price differential. The input price differential presented in Appendix F of the Price Cap Review Order is not economically meaningful. That differential was developed using inappropriate statistical techniques, and does not fully consider the evidence placed on the record.

The simplified Christensen TFP method also properly recognizes that there is no economically meaningful way to measure productivity other than on a total company basis. The Commission was correct in its tentative conclusion that, due to the inseparability of inputs

to the production function, TFP on a total company basis is the best economic approach to measuring LEC productivity and therefore best meets the Commission's stated criteria that the productivity offset be "economically meaningful."

Since the outputs created by the increased access to the public switched network facilitated by various universal service subsidy plans are included within the TFP output growth, the benefits of subsidy programs are captured by a TFP-based productivity factor. Likewise, the costs of compliance with regulatory mandates and obligations are included in the input side of the TFP method. Also, when TFP is appropriately calculated on a total company basis, the forced jurisdictional assignments embodied by subsidy programs like USF and DEM weighting, see 47 C.F.R. §§ 36.601; 36.125, will not distort productivity measurement.

The Commission should not adopt other methods for calculating the X-factor for the long term plan, such as the Historical Revenue Method or the Historical Price Method. These methodologies do not yield an economically meaningful X-factor, nor do they develop such an X-factor with the same accuracy and simplicity as the TFP methodology. Additionally, the Commission should not adopt the Price Cap Review Order's interim plan as the long-term plan. The interim plan has numerous flaws, including the retention of sharing obligations. This proceeding will develop an even more complete record, and enable the Commission to finalize its tentative conclusion to utilize a TFP-derived productivity offset in the long-term plan.

The long-term price cap plan should not include a Consumer Productivity Dividend (CPD). After five years of price cap regulation, any aberrant inefficiencies left over from rate of return regulation have been eliminated -- thus eliminating that justification for a CPD. Additionally, a CPD based on other predictive estimates of increased efficiencies are not justified. In any event, under USTA's proposed methodology for calculating a rolling average productivity offset, those productivity improvements will be automatically reflected in the TFP-derived productivity offset.

In the Price Cap Review Order, the Commission tentatively concluded that there were a number of benefits to adopting a moving average X-factor, and that a moving average X-factor would be preferable to a fixed X-factor developed through periodic reviews. Use of a moving average X-factor will adjust for any changes in productivity, after a lag period, thus flowing through to consumers the appropriate portion of any increased productivity (or provide LECs with a backstop mechanism if necessary). A properly calculated moving average TFP would incorporate five years worth of data, and include a two-year lag. An X-factor calculated as a moving average would also be superior to a fixed factor in that it could both reflect the dynamics of LEC performance and flow-through recent productivity gains. The Commission should also affirm that calculating the X-factor as a moving average is superior to utilizing periodic reviews to adjust the X-factor. Eliminating performance reviews would save substantial public and private resources, and eliminate uncertainty for both LECs and their customers.

In order to eliminate sharing and foster the development of a pure price cap plan which is administratively simple and economically meaningful, the Commission should adopt a long-term price cap plan which utilizes a baseline productivity factor, calculated as a LEC industry average of TFP. This productivity factor should have no sharing obligations associated with it. A baseline productivity factor based on a LEC industry average TFP emulates competition, and would be administratively simple and economically meaningful. There is no need to set the baseline productivity factor at a level above the industry productivity average. In areas where there are high price-to-marginal cost ratios, LECs are facing increasing competition. This competition will yield lower output growth for these areas and services. Accordingly, a productivity factor higher than the industry average would be superfluous and unfairly penalize LECs by unnecessarily setting a higher benchmark than can be achieved.

USTA agrees with the Commission that sharing has no place in a properly crafted LEC price cap plan. USTA's position is based on its view, shared by the Commission, that substantial benefits would result if sharing were eliminated. First, a sharing mechanism severely dampens LEC incentives to operate more efficiently. This is so because sharing serves to "recapture" the efficiency gains made by the carrier and deprive the LEC of the benefits of those gains. As the Commission recognized in the Price Cap Review Order, "a pure price cap plan, without earnings sharing, may encourage infrastructure development and the deployment of advanced equipment and technology." Elimination of sharing will also reduce the administrative burdens associated with price cap regulation, and will facilitate the removal of services from price cap regulation in response to competition.

Moreover, the Commission has recognized that a primary reason for incorporating the sharing mechanism in the original LEC price cap plan -- to provide a "backstop" for errors in the Commission's estimates of LEC productivity -- is no longer a valid concern after five years of actual experience under price caps. Additionally, where the productivity offset is calculated as a moving average, sharing obligations are unnecessary to ensure that productivity gains will eventually be flowed through to consumers. Accordingly, the Commission should eliminate sharing obligations from its long-term price cap plan.

The Commission is correct to conclude that the extreme of developing an individually tailored X-factor for each price cap LEC would not encourage a LEC to improve its productivity. The FNPRM therefore implicitly acknowledges that tailoring an individual productivity offset for each LEC is tantamount to rate of return regulation, recapturing any and all efficiencies gained since 1991 and completely gutting future efficiency incentives. Accordingly, the Commission should not assign each company an individually tailored X-factor.

This practice of regulating LECs in such a manner that their higher productivity level and future earnings potential made possible by efficiency measures and network investments would be taken away as soon as they are achieved, is precisely the result that would be obtained if the Commission were to retain sharing. Therefore, while mandatory assignment of

a carrier specific X-factor may be seen as a desirable way to eliminate sharing -- inasmuch as a price cap plan with mandatory assignments would not require the use of sharing as an incentive to select the highest possible offset -- the Commission cannot avoid the deleterious impact of sharing on LEC efficiency, new services and investment by assignment of a carrier specific X-factor.

The Commission asks whether relaxed regulatory relief would be a useful incentive to encourage price cap LECs to elect the X-factor most appropriate to their circumstances. Such regulatory relief is most appropriately tied to the presence of competition, not to productivity. Pricing flexibility is needed now to permit LECs to appropriately respond to competitive developments presently occurring in their service areas. Moreover, the price cap plan is designed to be a transitional mechanism to a competitive environment, not a long-term regulatory regime. The result of increased competition will be that competitive services are removed from price cap regulation. Linking pricing flexibility to the productivity offset utilized in the interim step of price cap regulation could serve to confuse the issue. While comprehensive regulatory changes are appropriate to permit all LECs to price flexibly in response to competition, not all LECs will be able to select the higher productivity factor in a multiple factor environment.

TFP is a direct measure of productivity where all inputs (labor, capital, materials), and all outputs (lines, minutes, etc) are taken into account. Specifically, the output growth measure in the TFP calculation is Carrier Common Line (CCL) minutes of use (MOU) which includes the full productivity effects of growth in minutes. Therefore, all changes in LEC productivity over time are captured regardless of whether they are driven by changes in minutes, lines, or any other output. No other adjustment or separate common line measurement is required. Using a TFP model and simultaneously further adjusting the common line basket would result in "double counting" productivity gains, due to the fact that TFP growth uses lines and minutes as measures of output growth.

The Commission should not limit exogenous cost changes to those changes which result in a jurisdictional shift. A meaningful X-factor cannot be fashioned so as to routinely include all costs currently classified as exogenous and exclude costs that the Commission has determined are not exogenous. Some exogenous cost changes permitted in the past would not have had an effect on TFP. These changes may be of at least two types: 1) shifts in jurisdictional cost allocations that do not affect total company results; and 2) accounting changes that do not affect the economic measures of inputs or outputs used in the TFP approach. USTA believes that there will always be "non-standard" exogenous cost changes that will not be captured by an X-factor.

The Commission has already limited exogenous cost treatment to those accounting rule changes that result in an economic cost change (defined as having an impact on the LEC's discounted cash flow) and are both beyond the control of the carrier and not reflected in the GDP-PI. In light of this requirement, no legitimate purpose would be served by limiting

exogenous costs to only Commission-ordered changes that result in a shift in costs between the interstate and intrastate jurisdictions. Further, it would be arbitrary to automatically exclude an exogenous cost change that did result in an economic cost to the carrier solely because it did not impact jurisdictional separations. Of course, to the extent that a TFP-based X-factor already properly reflects an exogenous cost change, a LEC should not be permitted to adjust its PCI to account for that cost change.

Lastly, the Commission should modify its treatment of the LEC's interexchange basket. These services are now competitive and should be removed from price cap regulation. At a minimum, in light of the Commission's decision to grant AT&T's motion to be declared non-dominant, it should apply the same productivity offset effectively applied to AT&T -- a productivity offset of zero.

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of:)
)
Price Cap Performance Review) CC Docket No. 94-1
for Local Exchange Carriers)
)

Comments of the United States Telephone Association

INTRODUCTION

The United States Telephone Association (USTA) submits these comments in response to the Fourth Further Notice of Proposed Rulemaking issued in the above-referenced proceeding.¹ USTA is the principal trade association of the local exchange carrier (LEC) industry. USTA comprises over 1100 LECs, with a wide variety of company sizes within its membership. USTA was an active participant in the Performance Review proceeding completed in March 1995.

In the Price Cap Review Order,² the Commission reached tentative conclusions on the broadest features of a method for calculating the productivity offset (referred to as the “X-factor” in the current plan) for a long-term price cap plan. Summarily, the Commission determined that it should replace the method of calculating the X-factor with a new method, that this method should be based on a moving average, and should be based on a total factor productivity (TFP) method. The Commission also tentatively concluded that LECs should have at least one X-factor where no sharing obligations are associated with it. See generally FNPRM, para. 9.

¹LEC Price Cap Performance Review, Fourth Further Notice of Proposed Rulemaking, CC Docket No. 94-1, FCC 95-406, (released September 27, 1995) (“FNPRM”).

²First Report and Order, LEC Price Cap Performance Review, CC Docket 94-1, released April 7, 1995 (“Price Cap Review Order”).

In this Further Notice proceeding, USTA encourages the Commission to adopt these tentative conclusions, and provides further descriptive information and substantive support for a moving average TFP methodology for calculating the X-factor. Specifically, USTA now presents a simplified version of the TFP study submitted in the Price Cap Review proceeding. This simplified TFP methodology utilizes economically meaningful and generally accepted methods for developing input and output indices. This simplified TFP methodology is also designed to be independently verifiable and relies entirely on publicly available data. The simplified TFP methodology set forth here by USTA will enable the Commission to assess LEC productivity and develop appropriate regulations which ensure that consumers benefit from ongoing gains by the LECs, while preserving the efficiency incentives which are at the core of a price cap system of regulation. USTA's comments respond to the various questions raised by the Commission in calculating the input and output indexes, including questions regarding the data sources utilized to develop these indexes. USTA includes with its comments a demonstration of the simplified TFP methodology prepared by Christensen and Associates, including an economic analysis and supporting data, as Attachment A.

To assist the Commission in evaluating the new TFP methodology, USTA includes a Total Factor Productivity Review Plan (TFPRP) to accompany the TFP results. This TFPRP is similar in concept and design to the current Tariff Review Plan (TRP), which is a familiar tool to both the Commission and all interested parties. The TFPRP provides a single place for the data to be reviewed as well as supply the sources of such data. The TFPRP also minimizes the administrative burden placed on the industry, the Commission, or any interested party, in their review of such data. The TFPRP suggested here can be found as Attachment B.

On the last page of Attachment B to these USTA comments (labeled TFP1), row 150 displays the 5 year rolling average LEC Total Factor Productivity result. For the five year period ending in 1993 (1989 to 1993), the TFP result of 2.95% is displayed in the 1993 column, and for the five year period ending in 1994 (1990 to 1994), the TFP result of 3.07% is displayed in the 1994 column. Row 160 on that page displays the 5-year rolling average US

Total Factor Productivity result, as calculated by the U.S. Department of Labor, Bureau of Labor Statistics. Those values are 0.12% and 0.29% for the 5 year periods ending in 1993 and 1994, respectively. Subtracting the US TFP values from the LEC TFP values results in the 5 year rolling average LEC TFP differential, which is displayed in row 170. Those values are 2.83% and 2.78% for the 5-year periods ending in 1993 and 1994, respectively. This material is summarized below.

Derivation of LEC TFP Differential

<u>Item</u>	<u>Source</u>	5 year average (1989-1993)	5 year average (1990-1994)
LEC TFP Result	TFP1, Row 150	2.95%	3.07%
US TFP Result	TFP1, Row 160	0.12%	0.29%
LEC TFP Differential	TFP1, Row 170	2.83%	2.78%

USTA's comments also address other issues related to the productivity offset, such as other methods for calculating the X-factor, the means of updating the offset, and the relationship of the productivity offset to sharing requirements. Finally, USTA's comments address other elements of the price cap formula, such as the common line formula and the treatment of exogenous costs.

I. The Commission Should Adopt USTA's Revised Moving Average TFP Methodology for Calculating the Productivity Offset

As the FNPRM notes, a TFP approach should be used to compute the X-factor for the future price cap plan. FNPRM, para. 25; see Price Cap Review Order, para. 155. The Commission has found that, because TFP studies actually measure productivity growth rates, a TFP approach is ideally suited to determining the X-factor. However, the Commission expressed concern that implementation of a moving average to update a TFP-based X factor might be complex and require substantial resources. FNPRM, para. 25. The simplified TFP methodology outlined in Attachment A addresses these concerns. The revised TFP

methodology also addresses other concerns that it be based on verifiable, timely, and auditable data. See FNPRM, para. 17. Most importantly, this revised TFP methodology yields an economically meaningful analysis of LEC productivity. Accordingly, the Commission should adopt the simplified moving average TFP methodology for calculating the productivity offset.

A. The Commission Should Reaffirm Its Decision that the TFP Methodology is the Superior Method for Calculating the Productivity Offset and Not Adopt Any of the Other Proposed Methodologies

1. The Commission Was Correct in its Tentative Conclusion that a TFP Methodology is Superior

The FNPRM establishes three criteria for the productivity offset for the long-term price cap plan: 1) the offset is economically meaningful; 2) it ensures that ongoing gains by the LECs in reducing unit costs are passed through to consumers; 3) calculation of the offset is reasonably simple and based on accessible and verifiable data. FNPRM, para. 16.

Implicitly, utilizing a productivity offset calculated using timely, accessible, and verifiable data means that, for the long-term plan, a purpose of the X-factor is to provide an accurate measure of LEC productivity. See FNPRM, paras. 16-21. Additionally, well-established Commission policy states that the productivity offset for the long-term plan should foster the twin goals of price cap regulation: maintaining just and reasonable rates and creating profit-based efficiency incentives for LECs to deploy advanced infrastructure and improve the quality and variety of services they offer to the public.

For example, the Commission has noted that its objective is “to harness the profit-making incentives common to all businesses to produce a set of outcomes that advance the public interest goals of just, reasonable, and nondiscriminatory rates, as well as a communications system that offers innovative, high quality services.” Second Report and Order, Policy and Rules Concerning Rates for Dominant Carriers, CC Docket 87-313, 5 FCC Rcd 6786, 6787 (1990).

A TFP methodology is superior to all others in accomplishing these goals of price cap regulation. The methods employed in the Christensen, Schoech and Meitzen TFP methods³ are economically meaningful: they are the methods employed by Christensen, Christensen, and Schoech in their recognized study of productivity in the pre-divestiture Bell System.⁴ These methods have also been widely employed by other productivity experts, and are similar to the methods currently used by the U.S. Bureau of Labor Statistics (BLS) in its various multifactor productivity studies.⁵ See Attachment A at vii.

By examining actual LEC productivity, the TFP methodology is the most accurate method of ensuring that the benefits of increased productivity are passed on to consumers; calculation of the X-factor as a moving average captures these benefits on an ongoing basis. At the same time, deriving a TFP-based X-factor involves a reasonably simple calculation of the differential between LEC output indexes and LEC input indexes. Economically meaningful indexes can be developed from accessible, verifiable data, as described in Attachment A.

Additionally, a TFP-based productivity offset is a key element of a coherent long-term plan. Adoption of a TFP-based offset for the long term plan will fit well with the other tentative conclusions adopted by the Commission, e.g. to calculate the offset as a moving average in order to continually incorporate increased LEC efficiency into the calculation, while eliminating the need for periodic performance reviews. A baseline industry average TFP-based offset will also foster the objective of eliminating sharing obligations from the long-term plan.

³Laurits R. Christensen, Philip E. Schoech, and Mark E. Meitzen, "Productivity of the Local Operating Telephone Companies Subject to Price Cap Regulation," Christensen Associates, May 3, 1994, and "Productivity of the Local Operating Telephone Companies Subject to Price Cap Regulation, 1993 Update," Christensen Associates, January 10, 1995.

⁴Laurits R. Christensen, Dianne C. Christensen, and Philip E. Schoech, "Total Factor Productivity in the Bell System, 1947-1979," Christensen Associates, September 1981.

⁵See, e.g. U.S. Department of Labor, Bureau of Labor Statistics, Trends in Multifactor Productivity, 1948-81, Bulletin 2178, September 1983.

See, e.g., Price Cap Review Order, para. 16 (“the sharing mechanism is not essential to ensuring that LEC rates under price cap regulation remain just and reasonable . . . a plan that captures for consumers the difference between the rate of cost change in the economy as a whole and the rate of change in the cost per unit of output for LECs under price cap regulation will attain that goal”). The Commission should adopt a TFP-based productivity offset as an integral part of the long-term price cap plan.

2. **Other Methodologies Are Inaccurate, Less Likely to Properly Balance Incentives and Consumer Welfare, and Not Economically Meaningful**

The FNPRM also raises for comment a number of alternatives to the TFP methodology for calculating the X-factor. For various reasons, described below, these methodologies do not yield an economically meaningful X-factor, nor do they develop such an X-factor with the same accuracy and simplicity as the TFP methodology.

Additionally, the Commission should not adopt the Price Cap Review Order's interim plan as the long-term plan. See FNPRM, para. 92. The interim plan has numerous flaws, including the retention of sharing obligations. More importantly, this proceeding will develop an even more complete record, and enable the Commission to finalize its tentative conclusion that the long-term price cap plan should utilize a TFP-derived productivity offset. See, FNPRM, para. 25; Price Cap Review Order, para. 155.

a. **Econometrics Is Too Complex and Involves Too Many Areas of Contention to Be An Effective Methodology for Development Of a Productivity Measure**

The FNPRM seeks comment on the appropriateness of using statistical econometric techniques to estimate “changes in TFP over time.” FNPRM, para. 75. Econometrics -- the application of statistical techniques to the study of economic problems, is useful in forecasting and hypothesis testing. With respect to TFP, what econometric methods effectively achieve is a decomposition of directly measured TFP growth into growth due to changes in the production

function over time and other sources of TFP growth such as economies of scale.⁶

However, an econometric estimation of TFP would not meet the objective of passing ongoing LEC productivity gains on to consumers. Shifts in the production function and economies of scale both produce productivity gains, and in a competitive industry, customers see both types of benefits. However, productivity gains that are achieved through economies of scale would not be passed on to customers using the econometric method, as the econometric method separately attributes these gains. Accordingly, an econometrically derived TFP would not mimic the effects of a competitive market, and not meet the Commission's goals for the productivity offset.

Additionally, econometrics fails the simplicity criteria when conducted at a level of sophistication sufficient to be economically meaningful. Because of the idiosyncracies of econometric techniques, questions regarding the correct application of various econometric techniques, model specification, the timeframe, and the treatment of apparent outliers would create uncertainty and become the subject of protracted dispute. In this regard, econometrics would not remove the concerns which affect the other methods, concerns which have already been identified and commented upon by all interested parties earlier in the proceeding. Indeed, econometric productivity estimates can vary, sometimes substantially, among academic studies based on seemingly obscure and technical differences in model specification, data and technique.⁷

⁶See Douglas W. Caves and Laurits R. Christensen, "The Importance of Economies of Scale, Capacity Utilization, and Density in Explaining Interindustry Differences in Productivity Growth," Logistics and Transportation Review, Vol. 24, Number 1 at 3-23 (discussing the different sources of TFP growth and how econometric methods can be used to distinguish these sources of TFP growth from shifts in the production function over time).

⁷One example of the way in which model specification can lead to differences in results is the recent literature on economies of scope in the telephone industry. See, e.g., Evans and Heckman, "Multiproduct Cost Function Estimates and Natural Monopoly Tests for the Bell System," in Breaking Up Bell (1983); Evans and Heckman, "A Test for the Subadditivity of the

With regard to the criteria of tracking productivity over time, the moving average TFP approach is preferable. The fact that a moving average productivity method was adopted for the railroad industry is an additional reason to support choosing the moving average method rather than the econometric method.

b. **The Historical Revenue Method Is Conceptually and Administratively Flawed**

A Historical Revenue Method, such as that proposed by AT&T, is not economically meaningful and is flawed, both conceptually and administratively. First, an earnings-based method is incompatible with the core principle of price regulation, which is to introduce efficiency incentives by severing any ties to cost-plus pricing as practiced in traditional rate of return regulation. To re-introduce an earnings based estimate of the X-factor after five years' experience with price cap regulation and the conclusion to eliminate sharing would seriously undermine the performance incentive foundation of price regulation. Reliance on an earnings-based X-factor would in fact reintroduce the disincentives associated with rate of return regulation. See, e.g., Second Report and Order, 5 FCC Rcd 6786, 6789. Also, recomputing the X-factor based on changes in earnings calculated using regulatory accounting attempts to recapture any efficiency gains achieved and penalize price cap LECs based on false signals regarding the magnitude and/or direction of economic efficiencies.

The Historical Revenue Method also would impose serious administrative burdens, including the burdens associated with the process of determining an "authorized" rate of return

Cost Function with an Application to the Bell System," American Economic Review, September 1984, at 615-623; "Natural Monopoly and the Bell System: Response to Charnes, Cooper and Sueyoshi," Management Science, January 1988, at 1-26; Lars-Hendrik Roller, "Proper Quadratic Cost Functions with an Application to the Bell System," Review of Economics and Statistics, May 1990, at 202-210; Lars-Hendrik Roller, "Modeling Cost Structure: the Bell System Revisited," Applied Economics, September 1990 at 1661-1674. These authors all have employed multi-output cost functions to determine whether economies of scope are found in the telephone industry. Based on model specification and estimation technique, the results of these researchers differ wildly.

for a price cap plan. Earnings-based methods of calculating the X-factor rely on the present set of accounting conventions such as jurisdictional and access cost allocation schemes, and depreciation rates which do not reflect the actual service lives of the associated assets. Earnings levels reflected through present accounting methods are unreliable as indicators of economic performance.

The arbitrariness of a productivity offset based on accounting earnings is easily demonstrated. Simply consider how different the interstate reported earnings since 1990 would be if the accounting, depreciation and separations rules from ten years earlier were applied, or if current rules had been applied for the past ten years. The accounting-derived earnings would differ significantly and so would any X-factor estimate implied by the accounting-based method. In contrast, the TFP method is based on economic performance measures and is consistent with the economic-based decision-making process used by competitive firms. A consistently applied TFP measure would avoid such serious accounting bias.

Additional reasons for rejecting the Historical Revenue Method are detailed in the analysis prepared by Taylor, Tardiff and Zarkadas of National Economic Research Associates (NERA) included as Attachment C to USTA's comments. These respected economists support the position that an earnings-based X-factor should not be adopted because it would reintroduce efficiency disincentives which price cap regulation is designed to eliminate, and because LEC interstate accounting earnings are typically overstated relative to actual economic profits. Thus, they conclude, an earnings-based X factor would not be economically meaningful. Additionally, NERA points out that inferring a productivity differential from earnings data is fundamentally inconsistent with price cap regulation, in that the AT&T revenue method would calculate the X-factor based on a targeted return of 11.25%, yet neither the original or the interim price cap plan required that all LECs be limited to an 11.25% rate of return. See Attachment C at 24 (noting that price cap plans contemplate a wide range of acceptable earnings outcomes, e.g. a 10.25% floor, a 50/50 sharing requirement at 12.25%, and a earnings cap at 16.25%). Carriers' earnings which deviated from 11.25% were not considered

to be inconsistent with the fundamental goals of price cap regulation, nor should they be so considered now.

c. The Historical Price Method (including the “Frentrup-Uretsky” Study) is Less Effective than the TFP Method

The Commission requests comment on whether the Historical Price Method, one example of which is the Frentrup-Uretsky Method, represents a superior alternative to a TFP-based X-factor. This method would derive an X-factor based on historical analysis of LEC productivity, calculated in some cases as a price-differential between the LEC industry and the economy as a whole. See FNPRM, para. 85. The Commission also requests comment on specific issues raised in employing the Historical Price Method, e.g., whether it would be necessary to reflect special access in the X-factor, and if so, whether reliable and accurate data can be identified for special access services. FNPRM, para. 88.

While some versions of the Historical Price Method utilize some valid premises which are shared by TFP, such as performing the calculation on a total company basis, the Historical Price Method is less effective than a TFP-based methodology in two respects. First, the TFP methodology, in utilizing actual indexes of costs and outputs, provides a more robust and realistic picture of LEC productivity than does a differential calculation based on prices, see FNPRM, para 85. As explained in Attachment C, TFP growth can theoretically be measured using either the relationship between input and output quantities or input and output prices. However, TFP measurements utilizing price are subject to greater volatility -- if prices are adjusted in each period to keep measured earnings constant, errors in the adjustment would have a greater effect on a price-based TFP than on a quantity-based TFP. Additionally, it is preferable to measure productivity growth directly by using quantity measures, rather than indirectly through the price changes that follow from productivity growth. See Attachment C at 29-31. Accordingly, empirical studies of productivity growth use quantity indexes rather than price indexes. See Id. at 30, citing Jorgenson, Gollop and Fraumeni, “Productivity and U.S. Economic Growth,” (1987) at 4 and 152-159.

Additionally, the Historical Price Method suffers from practical problems with respect to compiling the necessary data. Specifically, a Historical Price Method suffers from several data discontinuities produced by the lack of available information on LEC prices for special access services. Developing these prices from publicly available, independently verifiable data, is likely to prove impossible. In contrast, the simplified Christensen TFP methodology relies entirely on publicly available, independently verifiable data, and can be updated easily as a moving average.

The Historical Price Method, when properly adjusted, yields approximately the same historical value of the X-factor as obtained from the direct measurement of TFP growth based on input and output quantities. Accordingly, the TFP method yields the same results through a simpler and more reliable methodology. See Attachment C at 31-32. The TFP methodology is superior to the Historical Price Method, as a matter of both theory and practice.

d. The Combined Revenue/Price Method Suffers From the Same Flaws As Other Revenue-Based Methods

The Commission also requests comment on whether the X-factor could be calculated by a method which would combine elements of the Historical Revenue Method and the Historical Price Method. Under this approach, the Historical Revenue Method would be modified to create a time series of average weighted PCIs for each basket; this series would be adjusted to earn a targeted rate of return for each year. ENPRM, para. 91.

As an earnings-based method, this combined method suffers from the same conceptual and administrative flaws as the Historical Revenue Method. Simply changing the method by which analysis of earnings is utilized to adjust the PCIs does not eliminate the fact that this method yields no information about actual LEC productivity. This method would also suffer from the same administrative problems associated with calculating a targeted rate of return for each year. Moreover, administrative problems are likely to result in adjusting the series of average weighted PCIs -- the Commission would be drawn into rigorous debate regarding

issues of how to weight particular PCIs, and how the series would in fact be adjusted to yield the targeted rate of return. This approach would retain the worst aspects of rate-of-return regulation, and discourage LECs from reducing unit costs. Additionally, it would seriously undermine the performance incentive foundation of price regulation, and not facilitate the flow-through of efficiency gains to consumers - the level of any gains from reducing unit costs would be difficult to determine based on examination of earnings alone. The Commission should not adopt this approach as part of any price cap plan.

3. **A Consumer Productivity Dividend Is Not Appropriate**

The FNPRM notes that the original price cap plan included a Consumer Productivity Dividend (CPD) of 0.5 percent in the X-factor, based on the belief that there would be improvements in productivity under an incentive plan which are over and above those reflected in studies of industry performance prior to incentive regulation. The FNPRM asks whether, given the fact that the CPD was established to reflect anticipated improvements in LEC performance in the price cap period, it is appropriate to continue to include a CPD in calculating an X-factor based on actual data from the price cap period. FNPRM, para. 94-95.

The Commission's question answers itself: the basis for including a CPD in the original price cap plan was that incentive regulation would initially create greater productivity than had been historically observed under rate of return regulation. After five years of price cap regulation, any aberrant inefficiencies left over from rate of return regulation have been eliminated. This is particularly so if the X-factor adopted for the long-term plan is based on a moving average of the most recent five years of LEC performance, all of which will have been (by next year) under some form of incentive regulation.⁸ There is no basis for continuing a regulatory device which has long since served its purpose. Accordingly, the Commission

⁸Also, a large number of states have imposed various forms of incentive regulation. This is important, given the lack of severability of the production function. See Section I.B.3, "Calculating LEC Productivity on a Less than Total Company Basis Will Not Yield Meaningful Results," infra at 28.

should not adopt a long-term price cap plan which includes additives to the productivity offset such as a CPD.

The Commission suggests that an additional CPD for the long-term plan may be justified because the Commission anticipates further improvements in LEC productivity due to added incentives that might be created by the elimination of sharing. FNPRM, para. 95. To include a CPD based on an arbitrary estimate of the effects of eliminating sharing would conflict with the criteria that productivity offsets be economically meaningful and based on accessible and verifiable data. In any event, under USTA's proposed methodology for calculating a rolling average productivity offset, those productivity improvements will be automatically reflected in the TFP calculation.

As a general matter, determining an economically meaningful productivity factor should include some acknowledgment that the productivity factor does not itself provide LECs with the "incentive" which drives incentive regulation.⁹ Rather, the productivity factor compensates for the fact that LECs have historically been more productive than the economy as a whole, and therefore utilizing the GDP-PI figure for inflation in the price cap formula would not yield a PCI based on actual LEC performance. See, e.g., Second Report & Order, 5 FCC Rcd at 6796. The incentive in price caps is created by the fact that LECs are permitted to keep the benefits of increased productivity, relative to a benchmark established in part through use of the productivity offset. Setting the benchmark at a more difficult level by adding a CPD does nothing to increase the incentives, it merely puts additional downward pressure on prices.

Accordingly, inclusion of a CPD must be viewed as a governmental decision to force LEC prices down, over and above what the price cap formula, including the X-factor,

⁹ The Commission has previously claimed that the CPD should be viewed as an additional incentive to increased productivity. See Further Notice of Proposed Rulemaking, Policy and Rules Concerning Rates for Dominant Carriers, 3 FCC Rcd 3195, 3407-08 (1988)(purpose of the CPD is to "stimulate carriers to generate productivity gains in excess of historical experience").

establishes as a price benchmark, not as an additional incentive for greater efficiency. On this basis, a CPD which does not represent any meaningful relationship to actual LEC productivity, but merely represents a policy decision that the productivity offset should be lower than the level dictated by actual economic facts, inherently violates the Commission's policy that productivity offsets should be economically meaningful.

B. The Simplified Christensen Model Fully Addresses the Commission's Concerns and Best Meets the Criteria for a Long-Term, Economically Sound Methodology

1. The Simplified Christensen Model Properly Calculates the Output Indexes

Issue 1a: What is the most reasonable method to develop output price indexes for TFP calculation purposes? What data sources should be used to develop output price indices?

The FNPRM expresses concern that price indexes for local services, intrastate access and long distance service appear to be based on an *ad hoc* method, and invites comment on whether the construction of output price indexes in the original Christensen study is reasonable. FNPRM, para. 26. Conventional output price indexes for price cap LECs' local, toll and intrastate access revenue are not available. Ideally, the quantity and price of each service would be calculated for each year in the study. Then these price and quantities indexes would be aggregated into a price index of total output and a quantity index of total output. Price and quantity information on the thousands of LEC services was not readily available in indexed form. Accordingly, Christensen's simplified model utilizes a method which is economically meaningful and utilizes publicly available, verifiable data to calculate the output indexes. The method used in the Christensen approach to calculating quantity of output is a Tornquist index of the quantity indexes for each output category. Output price calculations use an approximation to a chain-linked Paasche index and are based on methods originally developed by AT&T to measure output for the pre-divestiture Bell System. See Attachment A, at 4-5. The method used in the Christensen model is soundly based on the economic theory of price

indexes.¹⁰

The Commission also requests comment on whether the categorization of outputs in the original Christensen study is appropriate. FNPRM, para. 27. The output categories used in the study are reasonable. The simplified Christensen method simplifies the TFP calculation by sub-aggregating the multitude of services provided by LECs into seven broad revenue categories: local service, long distance service, interstate end user access, interstate switched access, interstate special access, intrastate access, and miscellaneous. These seven categories are reasonable, based on a meaningful aggregation of the revenue accounts reported in the ARMIS 43-02. While it is not possible to construct a more detailed set of service categories or combine services differently while continuing to use publicly-available data, one can base the output price computation on fewer categories of output if the underlying price information is maintained in the computation. Developing price indexes for each of the revenue accounts reported in the ARMIS 43-02 would be difficult, if not impossible, as it would require each LEC to research and compile a detailed history of rate changes for each revenue account category.

As described in the attached simplified Christensen study, the methods for constructing the price and quantity indexes for each revenue category were based on the objective of accurately representing the true price and quantity indexes for that category. The data was obtained from the ARMIS 43-02 data submitted by the LECs, which is publicly available. As Christensen explains, using LEC output price and quantity data is superior to the alternative, the Bureau of Labor Statistics' Producer Price Indexes (PPIs). Attachment A at 4-6.

The FNPRM also raises the issue of proper weighting of the output quantity indexes. The Commission notes that since all LEC services are not equally competitive, and rates

¹⁰See, e.g., W.E. Diewert, "Index Numbers," in Eatwell, Milgate and Newman, The New Palgrave: A Dictionary of Economics, Volume 2, at 767-780.

diverge to varying degrees from the costs of producing those services, a cost-based weighting scheme may be more appropriate in the application of the TFP method to the LEC industry. FNPRM, para. 28. For purposes of setting a price cap, a revenue-weighted output index is preferred to a cost weighted output index. As Christensen showed in Chapter 2 of its original study, the revenue weighted index looks at prices from a consumer's point of view and ties in directly to the objectives of the price cap formula. The development of cost elasticities to determine the extent to which (if any) the revenue figure does not completely measure the value of the inputs would be very complicated and contentious. Also, previous work in this area suggests that a cost weighted output index grows more slowly than a revenue weighted output index; using a revenue weighted output index presents the more ambitious benchmark for the telephone companies. See, e.g., Crandall and Galst, "Productivity Growth in the U.S. Telecommunications Sector: The Impact of the AT&T Divestiture," The Brookings Institution, February 1991; Fuss, "Telecommunications Growth in Canadian Telecommunications," Canadian Journal of Economics, May 1993.

2. The Revised USTA Methodology Properly Calculates the Input Indexes

The FNPRM describes the process of calculating the capital index, and notes that the capital index is based on a number of types of assets, and requests comment on the most appropriate measure of the cost of capital for a TFP study. See FNPRM, para. 32-33. Based on discussions with the Commission staff, and in responding to specific questions in the FNPRM, Christensen Associates has made a number of specific enhancements to the methods used to calculate the capital input component in the proposed simplified TFP approach. USTA responds to these issues below.

Issue 1b: What is the most appropriate measure of the cost of capital for a TFP study?

As discussed in the attached Christensen paper, the correct measure of the cost of capital incorporates both debt and equity components. The calculation of TFP must rely on a consistent time series that reflects an economically meaningful measure of changes in the