and level of competition in the provision of telecommunications services.[30]

Geographic density is an appropriate distinction as a basis for multiple options, since such factors have a large impact on the overall unit costs and, thus, on the productivity of various LEC companies. At least one lower X-Factor option should be available to price cap LECs which face lower productivity as a result of geographic density disadvantages.

B. Sharing Requirements And Alternatives

Issue 5a: *If we establish a plan in which LECs have a choice of X-Factor, what incentive mechanism should be used to encourage each LEC to choose an X-Factor that is appropriate for its economic circumstances? Is it possible to develop an incentive mechanism other than one based on sharing?*

Again, U S WEST proposes that the Commission base any multiple X-Factor options available to the LECs on geographic density. No sharing options are necessary or appropriate in a going-forward plan.

Issue 5b: *If we use sharing as an incentive mechanism, what sharing requirements should be associated with those X-Factors for which sharing is required? How should we structure sharing bands?*

[30] 4th FNPRM ¶ 109 (emphasis added).

As noted previously, U S WEST believes that sharing is inappropriate in a going-forward price cap plan. However, should the Commission establish a plan in which sharing is used as an incentive mechanism, it is critical that sharing should not penalize more efficient companies. The Commission needs to balance the goal of establishing an incentive for companies to elect a higher productivity factor without penalizing LECs which are unable to achieve higher productivity levels.

U S WEST agrees with the Commission's tentative conclusion that at least one X-Factor should have a no-sharing requirement. This non-sharing X-Factor should be associated with an industry-average X-Factor calculated using the Simplified Christensen TFP method as that method best models the impact of competition on prices. The Commission should then set lower X-Factors with a sharing component. To achieve the balance between setting an appropriate incentive that is not punitive, the sharing component should include a broad sharing range. As discussed below in response to Issue 5d, LEC-specific X-Factors are inappropriate. Therefore, the elimination of sharing cannot be dependent on the value of the X-Factor that applies to a particular LEC.

Issue 5c: *If we establish a plan in which LECs have a choice of X-Factor, how much flexibility should LECs have to change their choice? Should we continue to allow annual selection?*

The development of a long-term plan with multiple X-Factors should allow unlimited flexibility in their election. The LECs would be able to elect the same or a different X-Factor option each year for that year's annual filing requirements.

Issue 5d: *Instead of allowing LECs to choose among several X-Factors, should we establish criteria and procedures by which we can assign an appropriate X-Factor to each LEC?*

The Commission should not establish criteria or procedures to assign X-Factors to each LEC. Company-specific X-Factors are a throwback to rate of return regulation, and such a plan would require the annual review of each LEC's financials, thus returning to the administratively complex regulation of the past. The efficiency incentives of price cap regulation would be eliminated and higher productivity achievers would be punished and the least productive rewarded. A return to the perverse incentives of rate of return regulation would inevitably occur.

Issue 5e: *To what extent and under what conditions would it be possible to eliminate the sharing mechanism from the long-term price cap plan?*

Under U S WEST's proposed Capped Index Plan, sharing is no longer required. Additionally, if a TFP-based approach is deemed essential, U S WEST's multiple option plan which links options to measurable geographic density differences eliminates the need for a sharing mechanism. The Commission adopted sharing and the low-end adjustment to compensate for the possibility of an error in the choice of productivity factor and variations among the different LECs, not to regulate LEC earnings. The potential for such errors going forward is minimized, especially if the Commission selects a methodology which uses publicly available data to calculate the X-Factor and measurable geographic density differences for

multiple options. A sharing option is no longer necessary or appropriate in any newly developed price cap plan.

Issue 5f: *Should the low-end adjustment mechanism be eliminated?*

The elimination of sharing with all relevant election options under a price cap plan also eliminates the requirement for a low-end adjustment mechanism.

C. Common Line Formula

Issue 6a: *Under what circumstances would the adoption of a particular X-Factor method justify elimination of a separate common line formula?*

As previously stated, it is U S WEST's position that the current price cap regulatory scheme, replete with indexes, baskets, bands, and formulas, is unnecessary and unduly burdensome in the current environment. In this proceeding, we are urging the Commission to make a bold move away from this outdated form of regulation and instead adopt the proposed Capped Index Plan. With the Capped Index Plan, there are no formulas for any of the price cap baskets, including the Carrier Common Line ("CCL") basket.

In the event the Commission maintains the current price cap scheme of regulation, the adoption of the TFP method for productivity selection eliminates the need for a separate common line formula. Growth in access lines and minutes of use is appropriately reflected in the TFP calculation., and an additional adjustment

would double count increased usage per access line and would be punitive to the price cap companies.

With the Capped Index Plan or the continuation of the current Price Cap Plan and the adoption of the TFP methodology for productivity selection, the need for a separate common line formula is eliminated.

Issue 6b: *Assuming we decide to retain a separate common line formula, should we adopt a per-line common line formula or some other formula? What should the mechanics of that formula be?*

As previously stated, there are no circumstances under which the Commission should retain a separate common line formula. Therefore, there is no rationale which would support either a per-line or any other formula.

However, if the Commission retains a separate common line formula, regardless of the compelling evidence supporting the elimination of any such adjustment, the existing adjustment (g/2) should be retained. The g/2 formula adjustment is more appropriate than a per-line formula and would limit the double count to one-half of the growth in usage per line.

Issue 6c: *Should carrier common line rates be based on historical rather than forecasted data for end user common line revenues?*

U S WEST supports the change in the CCL formula to include the use of historical demand and historical Base Factor Productivity ("BFP") (interstate

recovery of the loop revenue requirement). Except for CCL, all data in the annual filing represents actual historical information. Modifying the CCL formula will standardize the annual filing process.

D. Exogenous Costs

Issue 7a: *Is it feasible to fashion an X-Factor that will routinely include costs currently classified as exogenous and exclude costs that the Commission has determined are not exogenous?*

Issue 7b: *Would it be reasonable to limit exogenous cost treatment to changes that result in a jurisdictional cost shift?*

The use of TFP does not eliminate the required adjustment for items which are considered exogenous under the current rules. The rule changes have narrowly defined the items to industry-specific costs which require adjustment of the indexes. These costs would not be captured in the inputs and outputs related to TFP. Christensen supports the adjustment for the exogenous items as they relate specifically to the telecommunications industry because they will not be factored in to the extent they are industry specific using an X-Factor with TFP and input price. The Christensen information provides support that the four major exogenous adjustments (Inside Wire, Reserve Depreciation Amortization ("RDA"), Subscriber Plant Factor ("SPF"), and Dial Equipment Minutes ("DEM")) in the past would not have been captured in the indexes.

E. Length Of Plan

If U S WEST's proposed Capped Index Plan is adopted, no plan-length considerations which address PCI adjustments are necessary. Should the Commission adopt a plan using a TFP-based productivity adjustment, then plan-length considerations are important. U S WEST believes there are several factors to be considered in determining the length of any newly selected price cap plan, including: 1) the plan's ability to respond to the impact of competition and competitive entry; 2) the flexibility offered by the plan's productivity options and their relevance to LEC serving area differences; and 3) the continuing validity of the assumptions and models which are the basis of the plan. As the marketplace for telecommunications services is changing rapidly, a price cap plan which meets all of the above criteria would still be relevant only for a maximum of three to five years. U S WEST proposes that the Commission undertake a limited review of the newly selected plan in three years, with another complete review of the plan in five years, if necessary. Of course, the Commission can avoid any further reviews of PCI adjustments by simply adopting U S WEST's Capped Index Plan approach.

VII. CONCLUSION

The Commission has the opportunity to avoid future debates, conserve valuable resources, and move to a much simpler form of market-based regulation by choosing to implement U S WEST's proposed Capped Index Plan. As demonstrated

herein, such a plan benefits all affected parties. The Commission should take this opportunity to move away from the current archaic and cumbersome form of price cap regulation toward a more simplified and efficient approach. The Capped Index Plan presents such an option, and U S WEST urges the Commission to adopt it forthwith.

Respectfully submitted,

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ATTACHMENT 1

TOTAL FACTOR PRODUCTIVITY METHODS FOR LOCAL EXCHANGE CARRIER PRICE CAP PLANS

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Mark E. Meitzen

December 18, 1995

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EXECUTIVE SUMMARY

TOTAL FACTOR PRODUCTIVITY METHODS FOR LOCAL EXCHANGE CARRIER PRICE CAP PLANS

Laurits R. Christensen, Philip E. Schoech
and Mark E. Meitzen
Christensen Associates
December 18, 1995

In its Fourth Further Notice of Proposed Rulemaking,[1] the FCC has raised a number of questions regarding the appropriate methods for measuring local exchange carrier total factor productivity (LEC TFP). In particular, various questions have been posed by the FCC regarding the TFP study we submitted in May of 1994 and updated in January of 1995.[2] In this paper, we respond to the issues directly relevant to the Christensen TFP methods.

In particular, the FCC has stated a concern that some of the data used in our TFP study are not accessible and verifiable. Because of this concern, we have developed a simplified method of TFP measurement based solely on publicly-available data. We have also simplified some of the computations, while continuing to apply standard practices in TFP

[1] Federal Communications Commission, Fourth Further Notice of Proposed Rulemaking, FCC 95-406, September 27, 1995.
[2] Laurits 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 Operating Companies Subject to Price Cap Regulation, 1993 Update," Christensen Associates, January 10, 1995. We refer to these collectively as our original study.

measurement. We believe that the simplified TFP method maintains accuracy and addresses concerns about verifiability.

Overview of Simplified TFP Method

The simplified TFP method is consistent with accepted productivity measurement practices and provides an accurate measure of productivity trends for LECs. It is based entirely on publicly-available data and contains other modifications to address concerns raised by the FCC. This allows the simplified model to be updated and verified in a straightforward manner. The simplified approach forms the basis of the "TFP Review Plan," submitted with the United States Telephone Association's comments in this proceeding.

We now summarize the differences between the methods and data sources in our original study and the methods and data sources in the simplified TFP study:

Output. The only way in which the measurement of output in the simplified model differs from the measurement of output in the original study is that the quantity of long distance service and the quantity of intrastate access service are derived by dividing booked revenue (as opposed to billed revenue), reported in the Form M (ARMIS 43-02), by the price indexes for long distance and intrastate access service.

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Capital. There are five differences between the simplified model and the original TFP study regarding the measurement of capital. First, the simplified study uses the U.S. economy cost of capital implicit in the U.S. National Income and Product Accounts as the cost of capital in the rental price equation, instead of Moody's average yield on public utility bonds. Second, the simplified TFP method uses investment price indexes published by the U.S. Bureau of Economic Analysis instead of Telephone Plant Indexes. Third, the simplified TFP method employs beginning-of-year 1988 book values of gross plant, reported in the Form M, in the derivation of the capital benchmarks, instead of end-of-year 1984 current-cost of gross plant. Fourth, the simplified TFP method uses three-year moving averages of the cost of capital and capital gains in the rental price equation. Fifth, since some of the asset classes have the same BEA price indexes and depreciation rates, it is possible to simplify the computational procedures by consolidating those accounts. This consolidation does not affect the computed value of capital input. Buildings and cable and wire are consolidated into structures. Switching, transmission, and information origination/termination equipment are consolidated into communications equipment. General support equipment is not affected by this consolidation.

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Labor. The simplified TFP method bases the quantity of labor input on the number of employees, reported in the Form M, instead of an index of management and non-management hours worked.

Materials. There is no difference in the way materials input is computed in the original TFP study and the simplified TFP method.

Simplified TFP Method Results

Table E-1 shows the results from the simplified method applied to the nine price cap companies included in our original study--Ameritech, Bell Atlantic, BellSouth, GTE, Nynex, Pacific Telesis, Southern New England, Southwestern Bell, and US West.

Shown in Table E-1 are the annual rates of growth in total output, total input, and TFP. In the original study, average annual TFP growth was found to be 2.4 percent over the 1984-1993 period and 2.8 percent over the 1988-1993 period. Using the simplified method with the nine companies in the original study, average annual TFP growth is 2.9 percent over the 1984-1993 period and 3.0 percent over the 1988-1993 period.

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Table E-1
Comparison of LEC TFP Growth for Nine Companies in Original Christensen LEC TFP Study:
Original Results Versus Simplified Method
1984-1993

Year	Total Output Original	Total Output Simplified	Total Input Original	Total Input Simplified	TFP Growth Original	TFP Growth Simplified
1984						
1985	2.4%	2.8%	1.3%	0.6%	1.1%	2.2%
1986	3.0%	3.1%	0.2%	0.8%	2.8%	2.3%
1987	3.7%	3.8%	1.9%	1.1%	1.8%	2.7%
1988	5.2%	5.5%	3.1%	2.0%	2.1%	3.5%
1989	4.8%	4.6%	2.7%	2.8%	2.0%	1.8%
1990	3.7%	4.1%	-0.9%	-0.2%	4.6%	4.3%
1991	2.3%	2.4%	1.1%	0.6%	1.2%	1.8%
1992	1.9%	2.3%	-1.6%	-0.9%	3.5%	3.2%
1993	3.6%	4.2%	1.0%	0.1%	2.6%	4.1%
Average Growth						
1984-93	3.4%.	3.6%	1.0%	0.8%	2.4%	2.9%
1988-93	3.3%	3.5%	0.5%	0.5%	2.8%	3.0%

Table E-2 shows results of the simplified method for 1988 through 1994 with Lincoln and Sprint added to the sample. The starting year for the simplified study with the expanded sample of companies is 1988 rather than 1984. This is done to eliminate adjustments required to 1984-1987 data because of the Uniform System of Accounts Rewrite (USOAR) that took effect in 1988. The expanded sample also contains results for 1994. Using the expanded sample of companies, the simplified method produces average annual TFP growth of 2.9 percent over the 1988-1993 period. Over this

same period, U.S. economy TFP growth averaged 0.1 percent per year, resulting in a TFP growth differential between the LECs and the U.S. economy of 2.8 percent for the 1988-1993 period. For the 1989-1994 period, LEC TFP growth averaged 3.1 percent per year, U.S. TFP growth averaged 0.3 percent per year, resulting in a TFP growth differential of 2.8 percent.

Table E-2
LEC TFP Using the Simplified Method
Results for Expanded Sample of Eleven Price Cap Companies
1988-1994

Year	Total Output Growth	Total Input Growth	TFP Growth
1988			
1989	4.7%	2.9%	1.8%
1990	3.8%	0.0%	3.8%
1991	2.7%	0.7%	2.0%
1992	2.0%	-1.5%	3.5%
1993	4.0%	0.3%	3.7%
1994	3.8%	1.4%	2.4%
Average Growth			
1988-93	3.5%	0.5%	2.9%
1989-94	3.3%	0.2%	3.1%

Summary

In our original TFP study, our goal was to use the most accurate data available on LEC inputs and outputs to measure LEC TFP growth. In this paper, we show that the methods used in our original study provide an accurate measurement of LEC TFP growth since divestiture. We also

EXECUTIVE SUMMARY

discuss how the simplified TFP method maintains accuracy while meeting the concerns raised by the FCC.

The methods we employed in our original LEC TFP study are rigorously developed from economic theory, and they provide economically meaningful measures of total factor productivity growth. These methods have been widely employed by numerous other productivity studies at the firm, industry, and national level. These methods are also very similar to those used by the U.S. Bureau of Labor Statistics (BLS), which has been publishing total factor productivity for the U.S. economy since 1983.

In most instances, the data in our original study were obtained from publicly-available sources. In some instances the data were obtained from internal company records, and in a few cases were derived from proprietary data. Since the FCC has stated a concern that some of the data used in our TFP study are not accessible and verifiable, we have developed a simplified method of TFP measurement based completely on publicly-available data. We believe that the simplified TFP method maintains accuracy as well as a proper balance between precision in measurement and verifiability.

TOTAL FACTOR PRODUCTIVITY METHODS FOR LOCAL EXCHANGE CARRIER PRICE CAP PLANS

Laurits R. Christensen, Philip E. Schoech
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December 18, 1995

In its Fourth Further Notice of Proposed Rulemaking,[1] the FCC has raised a number of questions regarding the appropriate methods for measuring local exchange carrier total factor productivity (LEC TFP). In particular, various questions have been posed by the FCC regarding the TFP study we submitted in May of 1994 and updated in January of 1995.[2] We respond herein to the issues directly relevant to the Christensen TFP methods.

The methods we employed in our original LEC TFP study are the same as those employed by Christensen, Christensen, and Schoech[3] in their pre-divestiture study of the Bell System. They are rigorously developed from economic theory, and they provide economically meaningful measures of total factor productivity growth. These methods have also been widely employed by numerous other productivity studies at the firm, industry, and

[1] Federal Communications Commission, Fourth Further Notice of Proposed Rulemaking, FCC 95-406, September 27, 1995.
[2] Laurits 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 Operating Companies Subject to Price Cap Regulation, 1993 Update," Christensen Associates, January 10, 1995. We refer to these collectively as our original study.
[3] Laurits R. Christensen, Dianne C. Christensen, and Philip E. Schoech, "Total Factor Productivity in the Bell System, 1947-1979," Christensen Associates, September 1981.

national level.[4] These methods are also very similar to those used by the U.S. Bureau of Labor Statistics (BLS), which has been publishing total factor productivity for the U.S. economy since 1983. (Appendix 1 lists the similarities in the methods employed by the BLS and the methods we employed in our LEC TFP study.)

In our original TFP study our goal was to use the most accurate data available on LEC inputs and outputs to measure LEC TFP growth. In most instances, the data were obtained from publicly-available sources. In some instances the data were obtained from internal company records, and in a few cases were derived from proprietary data. The FCC has stated a concern that some of the data used in our TFP study are not accessible and verifiable. Because of this concern, we have developed a simplified method of TFP measurement based completely on publicly-available data. In addition this model has simplified some of the computations, while continuing to represent standard practices in TFP measurement. We believe that the simplified TFP method maintains accuracy and addresses concerns about verifiability.

In the remainder of this paper, we respond to questions raised by the FCC. We show that the methods used in our original study provide an accurate measurement of LEC TFP growth since divestiture. We discuss

[4] Our methods and data sources have also gone through a peer review process at the Journal of Regulatory Economics, which has accepted our LEC productivity study for publication.

how the simplified TFP method maintains accuracy while meeting the concerns raised by the FCC. Finally, we summarize the main features of the simplified TFP method and present its results.

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

We believe that the methods employed in our original LEC TFP study are the most reasonable methods for developing output price indexes for TFP measurement. These methods provide a proper balance between the demands of economic theory and the constraints of data availability. Furthermore, we believe that the data sources we used in our original TFP study provide the most accurate basis for measuring LEC TFP growth. Most of the data sources are also publicly available. Only two of the data series used in the computation of output growth, billed long distance revenue and billed intrastate access revenue, are not obtained from publicly-available data sources.[5] Since concerns have been raised regarding data not obtained from publicly-available sources, the simplified TFP method that we are now proposing substitutes booked revenue--which is reported in the Form M and the ARMIS 43-02 Report--for billed revenue in the output computation. This modification results in little difference in the TFP results. By basing the

[5] Prior to the reporting of Actual Price Indexes (API's) we relied upon non-public data for the computation of the Special Access price index. However, once API's became available, they were incorporated into the study.

simplified model entirely on publicly-available data, we believe a balance is established between precision and the FCC's stated concerns that all data be accessible and verifiable.

Our computation of LEC output in the original TFP study was based on a two-step approach that is commonly used in productivity analysis. At the first stage, we identified the major categories of output: local service, interstate end-user access, interstate switched access, interstate special access, intrastate access, long distance, and miscellaneous service. Price and quantity indexes were established for each of the service categories. The quantity indexes were then aggregated into a quantity index of total output, using the Tornqvist index. The Tornqvist index is a member of the "superlative index" family, and is a proper basis for computing total output.[6]

The FCC asks whether our categorization of outputs is appropriate, specifically whether there should be more categories, fewer categories, or whether services should be combined differently. The seven service categories identified in our study are a reasonable categorization of LEC services, based on the revenue accounts reported in the Form M/ARMIS 43-02. One cannot construct a more detailed set of service categories or combine services differently with publicly-available data. One can base the

[6] A superlative index number is one that accurately reflects price and quantity changes for a wide variety of production structures. The employment of superlative index numbers guarantees that price changes are accurately captured in productivity analysis, even when the underlying production characteristics of the LECs are not known. For a discussion of superlative index numbers, see W.E. Diewert, "Exact and Superlative Index Numbers," Journal of Econometrics, Vol. 4 (1976), pp. 115-145.

output price computation on fewer categories of output if the underlying price information is maintained in the computation.

The FCC also questions the methods used to construct price indexes for each service category. In particular the FCC questions whether the method used to construct price indexes for local service, intrastate access, and long distance is "ad hoc." The methods chosen for constructing the price indexes were based on the objective of accurately representing price changes for each service category, subject to data availability. The ARMIS 43-02 Report contains the only publicly-available data on price cap LEC rate changes for local, long distance, and intrastate access services. The formula we employed to convert the Form M data into local, long distance, and intrastate access price indexes is an approximation to a chain-weighted Paasche price index (as we show in Appendix 2). The chain-weighted Paasche price index is a conventional price index formula that has a number of attractive properties and is theoretically superior to the traditional fixed-weight Laspeyres and Paasche price indexes.[7]

The price indexes for interstate end-user access, interstate switched access, and interstate special access also conform to the principles underlying the economic theory of price indexes and are based on publicly-

[7] The chain-weighted Paasche price index provides a first-order approximation to superlative index numbers. This implies that the chain-weighted Paasche price index will generally produce results similar to those obtained by a superlative price index. The fixed-weight Paasche and Laspeyres price indexes do not provide a first-order approximation to superlative index numbers. See W.E. Diewert, "Superlative Index Numbers and Consistency in Aggregation," Econometrica, Vol. 46 (1978), pp. 883-900.

available data. The Gross Domestic Product Price Index (GDPPI) is used as a proxy price index for miscellaneous services because of the diversity of miscellaneous services and the lack of data on prices actually paid by customers for miscellaneous LEC services. The GDPPI is based on the Laspeyres price index.

The only reasonable publicly-available alternatives to Form M data for approximating LEC output prices are Producer Price Indexes (PPIs) published by the U.S. Bureau of Labor Statistics.[8] The PPIs suffer from two methodological problems. First, the PPIs cover the entire telephone industry, not just the price cap LECs. This is particularly significant for the toll PPIs. Most LECs only provide intra-LATA toll service, and there is no reason to believe that LEC toll prices mimic toll prices for the rest of the industry. The second problem with the PPIs is that they are based on a fixed basket of services. Since PPIs do not incorporate changes in customer purchases of telephone services over time, they tend to overstate the rate of inflation in telephone rates. Therefore use of the PPIs would result in an understatement in the rate of TFP growth. Table 1 compares output growth from our original TFP study with measured output growth using the PPIs. The table documents the fact that in recent years using the PPIs for

[8]The Bureau of Labor Statistics also publishes Consumer Price Indexes (CPI) for telephone services, but these price indexes are inappropriate for measuring LEC output since the CPI indexes only look at prices paid by residential customers.

telephone service instead of the price indexes developed from Form M data would lead to a lower measured rate of LEC TFP growth.[9]

Table 1
Sensitivity Analysis:
Original Christensen LEC TFP Study Results Versus
Use of Producer Price Indexes to Deflate Local and Long Distance Revenue
1984-1993

Year	TFP Growth Original Study	TFP Growth Using PPIs
1984		
1985	1.1%	0.2%
1986	2.8%	2.5%
1987	1.8%	1.8%
1988	2.1%	2.0%
1989	2.0%	-0.5%
1990	4.6%	3.6%
1991	1.2%	1.1%
1992	3.5%	3.0%
1993	2.6%	2.4%
Average, 1984-93	2.4%	1.7%

Finally, the FCC asks whether basing the total output index on cost elasticity weights would be preferable to basing the total output index on revenue weights. As we demonstrated in our original TFP study, an output index based on revenue weights is the proper specification.[10] It is

[9] Until recently there has been a third problem with the Producer Price Indexes. Until this year, the PPIs were only designed for selected telephone services. In July of 1995, the Bureau of Labor Statistics discontinued the Producer Price Indexes for these selected telephone services and began publication of a set of Producer Price Indexes that provided comprehensive coverage of telecommunications services. The new indexes are not directly comparable to the old series. This lack of comparability is an additional reason that PPIs should not be used to compute output growth. See "New Producer Price Index for the Telecommunications Industry," Producer Price Indexes, U.S. Department of Labor, Bureau of Labor Statistics, July 1995, p.5.

[10] L.R. Christensen, P.E. Schoech, and M.E. Meitzen, Productivity of the Local Operating Telephone Companies Subject to Price Cap Regulation, May 3, 1994, p.iii and Appendix 1.