ATTACHMENT 3

"ECONOMIC EVALUATION OF "Q" FACTOR PROPOSED BT AT&T"

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ECONOMIC EVALUATION OF "Q" FACTOR PROPOSED BY AT&T

Prepared for the United States Telecom Association

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AT&T, in its Comments dated October 29 1999, calls for the use of a "q" factor to adjust the Commission's Price Cap Index (PCI) formula. According to AT&T, current interstate pricing rules have allowed the LECs to enjoy a windfall gain. The alleged gain supposedly results from a misalignment between costs driven by nontraffic-sensitive factors and revenues collected on a traffic-sensitive basis. The important but unstated inference is that the present X-Factor is somehow insensitive to growth in local switching minutes and to changes in LEC capacity utilization, i.e. changes in minutes of use per unit of capacity. A similarly important inference is that the "windfall" has occurred in spite of the Commission's aggressive use of its own X-Factor model (May 1997).

This study has three objectives. First, it uses economic principles to evaluate the conceptual basis for AT&T's "q" factor proposal. It turns out that the Commission's present X-Factor model already incorporates design features that automatically capture the growth in local switching minutes per unit of capacity. Incorporating AT&T's "q" factor engages double counting. Second, this study empirically demonstrates that the Commission's X-Factor would be sensitive to the adoption of AT&T's "q" factor or any "q" factor for that matter. Incorporating the data presented in the AT&T Comment into the X-Factor model suggests that the X-Factors for 1998 would be reduced from 3.03 to 1.74. The five-year average factor would fall from 4.06 to 3.20. Third, this study examines LEC earnings using a framework that does not require the use of ad hoc separations. Available data, both from the Commission's own X-Factor model and from external sources, refute the claim that the LECs have enjoyed any windfall gain.

This study's primary conclusions can be summarized as follows:

- The alleged misalignment of costs, output, and revenue that is AT&T's central concern already is addressed by the Commission's X-Factor. Changes in capacity utilization, changes in the peak/off-peak mix of traffic, and changes in the capacity/usage structure of costs are captured in the present X-Factor model. Even "costless" increases in usage (off-peak or peak) mathematically translate into higher TFP growth and therefore an increased X.
- Superimposing AT&T's "q" factor would double count growth in switched access minutes, leading to a downward biased PCI.

- If the Commission adopts AT&T's "q" factor proposal for pricing purposes, it likewise must redefine output in the X model. Output both for pricing and regulatory (X) purposes must be defined consistently.
- Implementing AT&T's "q" factor will have a significant downward influence on measured X. Based on a simulation for the 1991-98 period and using local switch data relied upon by AT&T in its own filing, the X-Factor is found to decrease, on average, by 0.83 percentage points in each year for which a "q" adjustment is made.
- Since X-Factors can only be adjusted on a going-forward basis, any considered "q" adjustment similarly can be implemented only on a going-forward basis. To do otherwise would engage in double counting.
- AT&T's concern is stimulated by its belief that the LECs have enjoyed a windfall gain. Empirical analysis guided by economic principles and the Commission's decisions over the evolution of price-cap regulation fails to uncover any windfall gain. The LECs' superior productivity performance has been transferred to the IXC customers. The price of a representative unit of interstate service decreased by 37% between 1990 and 1998. Over the same period, output prices in the non-farm business sector increased by 10.5%. That represents a 47.5 percentage point spread—the result of the Commission's aggressive stance on X.

As a final prefacing note, it is important to emphasize that any attempt to incorporate a "q" factor into the PCI necessarily influences the X-Factor. The current 6.5% X-Factor already is 2.44 percentage points above the measured X of 4.06% for the most recent five-year period. Consequently, if the Commission and AT&T are truly concerned about the alignment of revenues and costs, any "q" adjustment must be made on a going-forward basis only and will require a reduction in X of 3.27% (the present 2.44% overage plus an additional 0.83% for "q").

In fact, recently announced revisions to U.S. government data series for the nonfarm economy suggest that the FCC must now consider yet another source of downward revision to its X-Factor. In May 1997, the Commission found that "the X-Factor should include LEC TFP and an input price differential" (par. 143, 4th R&O). To determine the LEC TFP differential, the Commission adopted the BLS estimate of U.S. TFP growth (page D12 and fn. 8, 4th R&O). Consequently, this BLS measurement of U.S. TFP has a direct effect on the price-cap X-Factor.

According to *Business Week* (p. 34, Nov. 8, 1999), the Bureau of Economic Analysis in the U.S. Department of Commerce released on October 28 a "comprehensive revision of historical data on the gross domestic product." *Business Week* reported that

its analysis of the Commerce Department data revisions "shows that nonfarm business productivity growth in this decade will likely be revised upward, to roughly 2% a year, from 1.4%." *Business Week* reported that the first official productivity revision is scheduled for release this November. If the Commission were to adopt any forward-looking "q" adjustment, then it must revise its X-Factor not only to avoid double counting and to reflect the results of its own X-Factor model but also to incorporate the impending upward revision in U.S. nonfarm TFP.

1. The Structure of the X-Factor Model Accounts for Usage-Based Outputs as well as All Costs, Whether Usage or Capacity Driven.

The X-Factor model as designed by the FCC captures all costs and all revenues. The growth in switched access minutes is explicitly incorporated into the measure of LEC output growth and thereby enters directly into the calculation of LEC TFP growth. If, as AT&T argues in its October 1999 filing, costs (and therefore inputs) have grown more slowly than minutes, that growth differential has been captured as increased TFP growth and thereby automatically increases the measured X-Factor.

This is true whether the LEC services are being offered in peak or off-peak intervals. If off-peak output growth requires no additional inputs (to state the FCC allegation in its limiting form), off-peak output denominated in minutes is still captured in the measures of output and TFP growth. It shows up as "costless" productivity growth and translates directly into a higher X-Factor. In short, any increase in capacity utilization (i.e., the ratio of usage to available capacity) mathematically translates into higher measured productivity growth in the Commission's X-Factor model. X, of course, increases as well. Changes in capacity utilization, changes in the peak/off-peak mix of traffic, and

changes in the capacity/usage structure of costs are captured (by design) in the present X-Factor model.

Now consider the "q" factor adjustment proposed by AT&T. In particular, consider the specific adjustment proposed in footnote 30, page 20 of AT&T's Comments dated October 29, 1999:

$$PCI(t) = PCI(t-1)[1 + GDPPI - X - q],$$

where q is the growth in local switching volume.

Two unambiguous conclusions follow. First, since an increase in switched access minutes automatically raises X in the Commission's current model, any additional "q" factor adjustment (as proposed by AT&T) for that <u>same</u> growth necessarily results in double counting. Any increase in switched access minutes would lower PCI(t) once through X and a second time through q. Second, if any "q" factor adjustment is imposed in the false belief that the X factor fails to capture growth in revenue-generating minutes, consistency requires that switched access output in the X-Factor model must be converted from minutes to some measure of (interstate-only) capacity.

It is important to note that the alleged misalignment between cost drivers and revenue sources alluded to by AT&T in its Comment would exist if and only if output in the X-Factor model were measured in capacity units while rates were linked to usage. At present, there is no such misalignment. Switched access minutes are the metric for revenue and, symmetrically, are the measure of output in the X-Factor model. In short, if AT&T persists in proposing a "q" adjustment for LEC output, it likewise must call for a redefinition of switched access output in the X model. Output both for pricing and regulatory (X) purposes must be defined consistently.

2. X-Factor Simulations

The basic AT&T premise is that it believes LEC switched access production costs are driven by capacity rather than usage. Though USTA disputes this (see Taylor attachment to USTA Comments dated October 29, 1999), assume for purposes of argument that AT&T is correct. Is this sufficient to warrant a "q" factor adjustment? Absolutely not. Imposing an exogenous "q" factor in the PCI formula requires the additional assumption that the measure of TFP in the X factor does not "tax" the LECs for the "costless" growth in revenue-generating usage. This assumption, of course, is false. Growth in minutes in the FCC model increases TFP, increases X, and decreases the PCI. Therefore, any "q" factor adjustment must be based on a X-Factor model that does not already "tax" the LECs for this usage growth. Incorporating "q" into the PCI requires modifying the measure of switched access output used in the TFP growth calculation in the X-Factor model to some measure of capacity.

A simulation has been designed to demonstrate that the effect of such a change in output units has a significant downward effect on the measured X-Factor. Replacing faster growing usage with slower growing capacity not surprisingly lowers the measured rate of TFP growth and therefore X. The simulation quantifies the effect.

Running such a simulation requires some measure of "capacity" appropriate to switched access for interstate services. Short of engaging in an ad hoc separations calculation, such a concept is not measurable. In short, an economically meaningful "q" factor adjustment cannot be incorporated into any PCI formula relying on a total company X-Factor. However, my objective is only to demonstrate that, <u>even if one could meaningfully measure "interstate" capacity</u>, incorporating "q" necessarily leads to a significant reduction in measured X. For this purpose, I simply adopt the "local switches" data referenced on page 20 of AT&T's October 1999 filing and found in Attachment A to that filing. This is the "volume" data AT&T uses to construct its "q"

factor and therefore must be the same measure of volume used in the calculation of TFP and X to avoid what otherwise would be definitional double counting. Growth rates over the 1991-98 period in actual switched access minutes in the FCC's current model are replaced with growth rates of local switches taken from Attachment A to the AT&T filing.

The simulation also requires that interstate revenues be adjusted to reflect the effect of the proposed "q" factor. (In fact, this adjustment in itself is sufficient to affect X even if a capacity-based measure were not substituted for switched access minutes.) Appendix A to this study contains an adjusted switched access revenue series for the 1991-98 period based on the local-switch based "q" factor proposed by AT&T.

The Commission's X-Factor model is run using the revised switched output and revenue data. The following variables in the FCC X-Factor model are affected: switched access output and revenue, output revenue shares, interstate output, total company output, property income, the rental price of capital, input cost shares, total input growth, and input price growth. The complete set of charts displaying the simulation results for the FCC model is presented in Appendix B. A complete set of charts corresponding to the updated base FCC case is presented in Appendix C. (This update was filed as USTA ex parte dated September 10, 1999.)

Attention focuses on the resulting X-Factor. X-Factors taken from the base model (Appendix C) are reported in column 1 of Table 1 for each price-cap year 1991 through 1998. Column 2 presents the simulation results for X based on the revised capacity-based measure of switched access output and revenue. The decrease in X ranges from 0.20 percentage points in 1997 to 1.36 percentage points in 1998. Over the full eight-year period, the X-Factor falls by an average 0.70 percentage points per year. For the most recent five-year period, X declines by 0.83 percentage points.

The important conclusion is inescapable. Implementing any "q" factor, in particular the one proposed by AT&T, will have a significant downward influence on measured X.

Table 1

Simulated X-Factor Effects of Converting Output to Capacity-Based Units

	Base FCC Update (Appendix C)	Simulation with Switched Access Growth based on Local Switches (Appendix B)
1990	8.99	8.99
1991	6.06	5.57
1992	3.08	2.60
1993	3.51	3.02
1994	5.47	4.72
1995	6.20	5.14
1996	1.98	1.19
1997	3.62	3.42
1998	3.03	1.67
1991-98	4.12	3.42
1994-98	4.06	3.23

Other things equal, the resulting X-Factor under the AT&T proposal would decrease by an average 0.83 percentage points per year.

For purposes of demonstrating that "q" factors affect X, the above simulation assumed that capacity serving interstate switched access services can be unambiguously distinguished from productive capacity supporting intrastate output. This is an extraordinarily strong assumption and one that has been refuted by the Commission's decision to adopt a company-level analysis. After all, the same mixed use and common facilities that make it impossible to analyze X at anything other than a total company analysis make it impossible to meaningfully assign capacity (trunks, ports, switches, etc.) to intrastate and interstate categories. There is no economically meaningful way to replace interstate switched access minutes with some "interstate-only" capacity-based adjustment.

3. There Has Been No Windfall Gain.

Whether or not the LECs have enjoyed a windfall gain, as AT&T asserts in its Comment,[1] is an empirical question. Fortunately, the evolution of price-cap regulation has established three principles or guidelines by which to perform this test. First, the Total Company/Total Factor Productivity PCI/X model introduced in 1997 and its set of variables has been adopted as an economically meaningful framework within which to evaluate LEC performance. Price regulation should be linked to LEC productivity and input price performance using variables measured consistently with economic principles. It should not be governed by earnings performance measured under a rate-of-return paradigm inconsistent with incentive regulation. Second, it is now settled that any economically meaningful evaluation of LEC performance must be done at a total company level. The common-input technology of the industry prohibits any "interstate-only" analysis based on historical accounting-based separations conventions. Third, both the PCI and X formulas set up the U.S. non-farm business sector as the proper external standard for evaluating LEC performance. U.S. government data measuring the performance of firms in the non-farm sector are key to constructing both the input-price and total factor productivity differentials in the X-Factor model and, of course, the GDPPI in the PCI formula. These principles collectively guide the formulation of two empirical tests.

The Non-Farm Business Sector as an External Standard. The FCC in 1997 selected the U.S. non-farm business sector as the external metric for LEC performance. The LECs were to be permitted output price increases equal to input price increases recorded in the non-farm sector. However, the LECs also were expected to meet non-farm productivity gains as measured by the Bureau of Labor Statistics.

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[1] See page 20 and Attachment A to AT&T's October 29, 1999 Comment filed with the Commission.

It therefore makes good sense to evaluate LEC performance against benchmarks for the non-farm sector. Table 2 presents revenue, operating expense, net income, and production (output) data for 1990 and 1998 for the LECs and the 875 largest Value Line U.S. industrials.[2] (The Value Line U.S. industrials, with approximately $4 trillion in 1998 sales, is a large segment of the non-farm sector and thereby serve as a reasonable proxy.) BOC data are taken directly from charts for the FCC's X-factor model (Appendix C).

Examination of Table 2 makes clear that the LECs have experienced no windfall gain compared to the benchmark population selected by the Commission. The top half of Table 2 reveals that total earnings for the LECs increased at less than half the rate of earnings growth for the industrials. This is especially noteworthy for two reasons. First, the LECs' output growth is larger than that of the industrials. Other things equal, one would have expected the higher growth LECs to have exhibited higher earnings growth. Second, overall productivity and input price performance was far superior for the LECs. Their output growth (46.4%) was more than twice their growth in operating expense (22.2%) while the opposite was true for the largest industrials. Output growth for the industrials (39.3%) was more than 10 percentage points below their growth in operating expense (49.9%). With higher output growth and more than double the overall productivity performance, one would have expected the LECs to have enjoyed higher earnings growth. In contrast, LEC earnings growth is less than half that for the industrials. There is no evidence of a windfall gain for the LECs.

The lower half of Table 2 reinforces this conclusion. Per unit LEC earnings declined over the 1990-98 period by 6.1% while per unit earnings for the industrials increased by 33.6%. This is striking given that unit operating expenses for the LECs

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[2] Value Line, Value Line Selection & Opinion, (July 23, 1999), pp. 5445-46. The output index for the Value Line industrials is formed by use of an output deflator. That deflator is formed as the ratio of current to constant dollar output for the GDP nonfinancial corporate business sector as reported in the Survey of Current Business.

Table 2

Comparable Financial Data for BOCs and 875 Major U.S. Industrials

(Charts referenced in table correspond to FCC X-Factor model, Appendix C)

	1990	1998	Growth Rate
BOCs:			
Revenue (Chart D3)	$ 61,197.8	$ 76,869.9	25.6 %
Operating Expense (Chart D8)	35,613.0	43,529.0	22.2 %
Depreciation (Chart D8)	13,931.5	17,306.9	24.2 %
Pre-Tax Earnings (Rev-Exp-Dep)	11,653.3	16,034.0	37.6 %
Output Index (Chart D5)	1.256797	1.841166	46.4 %
Industrials:			
Revenue	$ 2,540,000	$ 3,907,800	53.9 %
Operating Expense	2,181,860	3,269,800	49.9 %
Depreciation	119,000	193,000	62.2 %
Pre-Tax Earnings	239,140	445,000	86.1 %
Output Index	1.000	1.393	39.3 %
PER UNIT OF OUTPUT (Dollars/output index)			
BOCs:			
Revenue	$ 48,693.5	$ 41,751.7	-14.3 %
Operating Expense	28,336.3	23,642.1	-16.6 %
Depreciation	11,084.9	9,400.0	-15.2 %
Pre-Tax Earnings	9,272.2	8,707.6	-6.1 %
Industrials:			
Revenue	$ 2,540,000.0	$ 2,805,712.5	10.5 %
Operating Expense	2,181,860.0	2,347,642.3	7.6 %
Depreciation	119,000.0	138,569.7	16.4 %
Pre-Tax Earnings	239,140.0	319,500.0	33.6 %

declined by 16.6% during this time period while unit operating expenses for the industrials increased by 7.6%. Superior productivity performance was not sufficient to generate unit earnings growth for the LECs at rates experienced by the largest industrials. In fact, LEC unit earnings declined during the period.

The reason for the significantly different patterns in LEC and industrial unit earnings is clearly the disparate pattern in unit revenue. This increased by 10.5% for the industrials but declined by 14.3% for the LECs. This, of course, is the direct consequence of the Commission's aggressive application of its X-Factor. As an illustration, to have achieved the same 33.6% unit earnings growth experienced by the industrials, LEC revenue per unit would have had to have increased by an additional 7.6 percentage points between 1990 and 1998. (Interestingly, unit revenue would still have decreased by 6.7% over the period, but the lower rate of price decline would have generated earnings growth comparable to large industrials.) This, of course, is just another way of demonstrating that the Commission's current 6.5% X-Factor is holding LEC prices and therefore earnings lower than would be expected if the LECs were pricing as are member firms in the FCC's own selected group of comparables.

In any case, the important conclusion for the Commission's present purposes is that, when compared to a broad composite of large U.S. industrials, there is no empirical evidence supporting AT&T's position that the LECs have somehow enjoyed a windfall gain under current PCI/X regulation. If anything, just the opposite is demonstrated. PCI/X regulation has provided very favorable payoffs to telecommunications ratepayers.

Inference from the Commission's X-Factor Model. The overall return to LEC capital in the Commission's X-Factor model is calculated as a residual formed as the difference between total LEC revenues and the sum of LEC payments to labor and material inputs (Appendix C, Chart D9, column G). The "rental price" of capital is measured as the ratio of property income (including depreciation) to what the Commission itself constructed and

identified as its economically meaningful measure of capital input (column E). This rental price (column H) has increased at only a 0.6% annual rate since the initiation of price caps at the end of 1990. Not only is this inconsistent with a windfall gain in any absolute sense but the growth rates of other input prices in the X-Factor model confirm that there is no windfall when returns to capital are evaluated against payments to other inputs. Capital input's 0.6% annual growth for its return compares to 3.7% and 2.5% annual growth rates for labor and material input prices, respectively (Chart D12). In addition, it is important to note that the rental price in the 1991-98 period, averaging .197, is 12.4% below the average .225 rental price that existed in the 1985-90 period (Chart D9, Appendix C). The Commission's own data belie the AT&T premise that the LECs have enjoyed a windfall gain.

The result is really no different if the property income residual is measured net of depreciation. Net operating income per unit of capital input increased at less than a 1.3% rate between 1990 and 1998. (See Charts D8 and D9.) But even this is not indicative of a windfall gain. While total property income net of depreciation increased at a 4.0% annual rate since 1990, LEC output increased at an annual 4.8% rate (Chart D5). In addition, LEC productivity growth increased at an annual 4.1% rate (Chart D1). It follows that total dollar earnings have increased with demand and productivity growth, not as a result of any windfall gain.

This begs the question: What is the basis for AT&T's allegation that the LECs have experienced a windfall gain? The answer lies in (i) AT&T's use of a capital rate base inconsistent with what the Commission has identified as a more economically meaningful measure of capital input and (ii) AT&T's reliance on an inferior rate-of-return model whose basis is contradicted by principles determined during eight years of price-cap experience during debates occurring before both before the Commission and the Court.

The alleged "windfall" is based on an analysis of "interstate-only" rates of return in a single price-cap service basket. Performing such calculations requires allocations of both

expenses and capital input following historically-adopted separations conventions based not on economic principles but on accounting conventions required under a rate-of-return model retired nearly a decade ago. Moreover, the capital rate base used in that calculation is inconsistent with the measure of LEC capital input adopted by the Commission for its X-Factor analysis, a measure of capital input preferred by the FCC as more economically meaningful than its rate base predecessor.

A simple growth rate comparison of capital input under the Commission's X-Factor model with the Commission's rate base under its rate-of-return paradigm illustrates the source of the disputed windfall. Column 1 of Table 3 reflects an annual 2.7% growth rate for capital input based on the definition of capital input adopted by the FCC in its X-Factor model. Column 2 suggests an annual 1% decline in total company rate base as defined under the prior rate-of-return paradigm. (Note, significantly different growth rates arise even without entering the contentious debate of separating expenses into interstate and intrastate categories.) Clearly, rates of return calculated using column 2 will exceed those derived under column 1. The Commission has embraced the measure

Table 3

Total Company Capital Input (BOC)

	FCC X-Factor Model Chart D9, Column D (Appendix C)	Rate-of-Return Rate Base Total Company
1990	$ 130,912,833	$ 98,036,888
1991	134,489,094	99,151,014
1992	137,807,183	99,568,078
1993	141,057,540	99,158,623
1994	143,878,628	98,219,551
1995	147,115,146	95,417,704
1996	152,437,614	97,647,458
1997	157,586,899	94,906,267
1998	162,626,701	91,823,310

of capital in its X- Factor model as the economically meaningful measure of capital input. On the basis of that measure, the rental price has been essentially flat over the entire price-cap era. (See column H, Chart D9, Appendix C.) By substituting a declining rate base for the economically meaningful series now used by the Commission, AT&T creates the appearance of a windfall gain. However, that mirage is based on a methodology of capital measurement now rejected by the Commission.

The record throughout FCC price-cap proceedings is replete with cautions about any attempt to separate total LEC operations into distinct interstate and intrastate accounts. Because the LECs produce interstate and intrastate services with common and joint inputs, there is no economically meaningful way to construct unique, defensible sets of intrastate and interstate input and cost accounts. Consequently, measuring "interstate earnings" is an endeavor not guided by economic principles but by arbitrary assumptions. However, it is interesting to note that even if one adopts the Commission's separations conventions to "build" a set of interstate accounts, there still is no evidence of any windfall gain.

Consider the 1991-98 time series of LEC interstate "accounts" displayed in Table 4. Interstate output and revenue are taken directly from the FCC X-Factor charts found in Appendix C. "Interstate-only" operating expense is not found in the X-Factor accounts because it is not considered an economically meaningful variable. However, it can be found in the ARMIS reports where it is constructed using the rate-of-return era separations formula. The implications are wholly consistent with the total company analysis presented in Table 2. The trend in unit operating expense demonstrates the LECs' considerable productivity performance. TFP growth and input price movements combined to reduce unit operating expense by more than 40% between 1990 and 1998. This, however, did not translate into increased unit operating income. The return per unit of output decreased by nearly 29% over the eight-year period. The reason is exactly the

Table 4

Evidence from X-Factor Model: Interstate Analysis

	Total Revenue (Chart D3) (million $)	Total Op. Expense (ARMIS) (million $)	Output Index (Chart D4)	Unit Revenue (million $)	Unit Op. Expense (million $)	Unit Op. Income (million $)
1990	$ 15,484	$ 11,604	1.5319	$ 10,108	$ 7,575	$ 2,533
1991	15,462	11,616	1.6901	9,148	6,873	2,275
1992	15,768	11,480	1.7939	8,790	6,400	2,390
1993	16,341	11,646	2.0078	8,138	5,801	2,338
1994	17,101	12,349	2.1904	7,807	5,638	2,169
1995	17,633	12,663	2.4108	7,314	5,253	2,062
1996	18,411	12,960	2.6544	6,936	4,882	2,054
1997	18,883	13,382	2.8678	6,584	4,666	1,918
1998	19,898	14,230	3.1407	6,336	4,531	1,805

same as it was for total company performance described in Table 2. Average price per unit of LEC service (i.e. revenue per unit of output) declined by more than 37% in the period. This price decline is all the more remarkable given that it is stated in nominal terms. While the rest of the economy was experiencing inflation with the CPI increasing by 25% and industrial prices increasing by 10.5% (Table 2), interstate prices declined by 37%. (Note, this measured rate of decline in interstate prices is not a function of the separations formula. Separations affect only the allocation of inputs and input expenses.) Moreover, this 37% decline in interstate prices is nearly three times the 14.3% decline recorded for average LEC unit prices calculated at the total company level (Table 2). The interstate price decline, of course, is the direct result of the Commission's application of price caps based on an aggressive X-Factor. There certainly is no empirical evidence that the LECs enjoyed any windfall gain.

What Tables 2 and 4 do show is that the substantial productivity gains by the LECs in the 1990-98 period were passed through to ratepayers. This is true whether LEC

performance is measured at the total company or interstate level, and whether LEC results are viewed standing alone or relative to the non-farm business sector, the criterion sector selected by the FCC as the benchmark for LEC performance. There simply is no empirical evidence supporting AT&T's position that the LECs have experienced a windfall gain during the period of price-cap regulation.

4. Policy Inferences Flowing from AT&T's Comment

A number of important inferences for public policy follow from AT&T's response to the Commission's recent NPRM. They already have been summarized in the introductory section of this report. The most important inference, however, is that neither AT&T nor the Commission can ignore the consequences for X of implementing AT&T's "q" factor. A pure "productivity" issue, the proper identification of the outputs that drive LEC costs, motivates the Commission's NPRM and AT&T's response. This, of course, is a central concern in the proper measurement of the X-Factor. If the Commission is concerned with productivity measurement issues, it should be willing to set X at an appropriate level. That level is not the current 6.5% policy standard. As submitted by USTA in its recent ex parte (September 10, 1999), the update of the FCC's model suggests that the average X-Factor over the most recent five-year period is 4.06 (Appendix C). Given its concern with proper productivity measurement, the Commission should reduce X to this level. If, in addition, the Commission decides to implement AT&T's "q" adjustment on a going-forward basis, that decision would necessitate reducing the X-Factor further, by an additional average 0.83 percentage points per year according to a 1991-98 simulation. In short, the Commission and the IXCs cannot finesse X-Factor issues nor the need to reduce X to at least the level calibrated by the FCC's own model.

APPENDIX A

USTA SIMULATION ADJUSTMENTS IN FCC'S X-FACTOR MODEL

	AT&T Proposed 'q' **PCI adjustment** Based on MOU Growth	Local Switching Revenue reductions based on AT&T 'q'
1990		
1991	0.94895	$ (144,011,044)
1992	0.89982	$ (300,917,345)
1993	0.84872	$ (494,412,611)
1994	0.78724	$ (669,265,913)
1995	0.70270	$ (983,846,109)
1996	0.64162	$ (1,295,564,659)
1997	0.59970	$ (1,737,229,861)
1998	**0.55786**	**$ (1,237,229,000)**
	PCI Result per ^^ AT&T Attachment A	AT&T's 'q' Priceout ^^ Attachmt A, pg 2 of 2

	BOC Local Switches per AT&T Attachment A	BOC Local Switches Growth Rate
1990	9739	
1991	9829	0.92%
1992	9905	0.77%
1993	9912	0.07%
1994	9861	-0.51%
1995	9883	0.22%
1996	9768	-1.16%
1997	9733	-0.36%
1998	9579	-1.58%

APPENDIX B

X-FACTOR SIMULATION OF

AT&T'S PROPOSED "Q" ADJUSTMENT

Chart D1: Components of FCC LEC Price Cap X-Factor [Excluding CPD]

	Input Price Growth Rates			Total Factor Productivity Growth Rates			LEC
	Total RBOCs	U.S. Nonfarm Business Sector	Differential	Total RBOCs	U.S. Nonfarm Business Sector	Differential	Price/Productivity Differential
	A	B	C=B-A	D	E	F=D-E	G=C+F
Year							
1984							
1985							
1986	5.20%	2.33%	-2.87%	2.84%	1.10%	1.74%	-1.13%
1987	0.72%	3.45%	2.73%	3.13%	-0.50%	3.63%	6.36%
1988	-1.39%	5.02%	6.41%	0.32%	0.30%	0.02%	6.42%
1989	-2.40%	2.42%	4.82%	1.90%	0.20%	1.70%	6.52%
1990	1.86%	3.31%	1.45%	6.83%	-0.70%	7.53%	8.99%
1991	-0.92%	1.77%	2.69%	1.47%	-1.41%	2.88%	5.57%
1992	2.56%	3.15%	0.59%	3.72%	1.71%	2.01%	2.60%
1993	2.20%	2.18%	-0.02%	3.25%	0.20%	3.05%	3.02%
1994	-0.30%	3.37%	3.67%	1.35%	0.30%	1.05%	4.72%
1995	0.80%	2.61%	1.81%	3.62%	0.30%	3.32%	5.14%
1996	5.62%	3.00%	-2.62%	5.29%	1.48%	3.82%	1.19%
1997	0.37%	2.30%	1.93%	1.88%	0.39%	1.49%	3.42%
1998	4.67%	2.69%	-1.98%	4.19%	0.53%	3.65%	1.67%
Averages							
[1986-94]	0.84%	3.00%	2.16%	2.76%	0.13%	2.62%	4.79%
[1986-95]	0.83%	2.96%	2.13%	2.84%	0.15%	2.69%	4.82%
[1987-95]	0.35%	3.03%	2.68%	2.84%	0.04%	2.80%	5.48%
[1988-95]	0.30%	2.98%	2.68%	2.81%	0.11%	2.70%	5.37%
[1989-95]	0.54%	2.69%	2.15%	3.16%	0.09%	3.08%	5.22%
[1990-95]	1.03%	2.73%	1.70%	3.37%	0.07%	3.31%	5.01%
[1991-95]	0.87%	2.62%	1.75%	2.68%	0.22%	2.46%	4.21%
[1986-98]	1.46%	2.89%	1.43%	3.06%	0.30%	2.76%	4.19%
[1987-98]	1.15%	2.94%	1.79%	3.08%	0.23%	2.85%	4.64%
[1988-98]	1.19%	2.89%	1.70%	3.07%	0.30%	2.77%	4.48%
[1989-98]	1.44%	2.68%	1.23%	3.35%	0.30%	3.05%	4.28%
[1990-98]	1.87%	2.71%	0.84%	3.51%	0.31%	3.20%	4.04%
[1991-98]	1.87%	2.63%	0.76%	3.10%	0.44%	2.66%	3.42%
[1992-98]	2.27%	2.76%	0.48%	3.33%	0.70%	2.63%	3.11%
[1993-98]	2.23%	2.69%	0.46%	3.26%	0.53%	2.73%	3.19%
[1994-98]	2.23%	2.79%	0.56%	3.27%	0.60%	2.67%	3.23%

Chart D2: RBOC Interstate Revenues

Year	End User A	Interstate Switched Access B	Special Access C	Total Interstate D = A + B + C
1984				
1985	$1,499,413,893	$10,906,203,190	$1,960,688,644	$14,366,305,727
1986	$2,400,475,814	$10,484,265,170	$2,574,800,716	$15,459,541,700
1987	$3,090,639,929	$9,611,996,187	$2,657,677,439	$15,360,313,555
1988	$3,604,221,000	$9,662,529,000	$2,539,698,000	$15,806,448,000
1989	$4,398,692,000	$9,092,575,000	$2,253,922,000	$15,745,189,000
1990	$4,679,142,000	$8,595,750,000	$2,209,064,000	$15,483,956,000
1991	$4,828,177,000	$8,370,118,956	$2,119,037,000	$15,317,332,956
1992	$4,963,262,000	$8,349,962,655	$2,153,565,000	$15,466,789,655
1993	$5,244,094,000	$8,504,652,389	$2,097,997,000	$15,846,743,389
1994	$5,589,662,000	$8,624,517,087	$2,217,125,000	$16,431,304,087
1995	$5,770,285,000	$8,349,022,891	$2,529,667,000	$16,648,974,891
1996	$5,930,960,000	$8,114,074,341	$3,070,598,000	$17,115,632,341
1997	$6,268,026,000	$7,026,585,139	$3,851,028,000	$17,145,639,139
1998	$7,807,872,000	$6,038,012,000	$4,815,249,000	$18,661,133,000

1991	($144,011,044)	$8,370,118,956
1992	($300,917,345)	$8,349,962,655
1993	($494,412,611)	$8,504,652,389
1994	($669,265,913)	$8,624,517,087
1995	($983,846,109)	$8,349,022,891
1996	($1,295,564,659)	$8,114,074,341
1997	($1,737,229,861)	$7,026,585,139
1998	($1,237,229,000)	$6,038,012,000

Chart D3: RBOC REVENUES (Excluding Miscellaneous Services)

Year	Local Service A	Intrastate Toll and Intrastate Access B	Interstate C	Total D = A + B + C
1984				
1985	$26,960,554,164	$13,047,095,682	$14,366,305,727	$54,373,955,573
1986	$28,626,174,049	$13,538,946,795	$15,459,541,700	$57,624,662,544
1987	$29,150,842,991	$14,166,723,124	$15,360,313,555	$58,677,879,670
1988	$29,226,988,000	$14,994,975,000	$15,806,448,000	$60,028,411,000
1989	$29,973,157,000	$14,868,219,000	$15,745,189,000	$60,586,565,000
1990	$30,699,085,000	$15,014,729,000	$15,483,956,000	$61,197,770,000
1991	$32,059,008,000	$14,522,276,000	$15,317,332,956	$61,898,616,956
1992	$33,359,990,000	$14,225,181,000	$15,466,789,655	$63,051,960,655
1993	$34,598,957,000	$14,496,831,000	$15,846,743,389	$64,942,531,389
1994	$35,758,637,000	$14,355,983,000	$16,431,304,087	$66,545,924,087
1995	$37,684,860,000	$13,123,225,000	$16,648,974,891	$67,457,059,891
1996	$40,523,387,000	$12,987,476,000	$17,115,632,341	$70,626,495,341
1997	$42,460,592,000	$12,308,613,000	$17,145,639,139	$71,914,844,139
1998	$44,993,354,000	$11,978,176,000	$18,661,133,000	$75,632,663,000

Chart D4: Calculation of Fisher Ideal Index for Interstate Output

	Revenue Shares			Quantities			Output Indices			Interstate	
	End User	Interstate Switched Access	Special Access	Access Lines	Switched Access Minutes*	Special Access Lines	Laspeyres A	Paasche B	Fisher Relative C=(A*B)^0.5	Output Quantity Index	Growth
Year											
1984											
1985	10.44%	75.92%	13.65%	92,671,959	156,853,820,000	1,230,590	1.000000	1.000000	1.000000	1.000000	
1986	15.53%	67.82%	16.66%	95,333,884	157,302,701,000	1,664,101	1.053249	1.052253	1.052751	1.052751	5.14%
1987	20.12%	62.58%	17.30%	98,228,585	173,154,171,000	1,764,445	1.083098	1.078813	1.080953	1.137975	7.78%
1988	22.80%	61.13%	16.07%	98,270,787	187,663,836,000	2,701,817	1.144443	1.114960	1.129605	1.285462	12.19%
1989	27.94%	57.75%	14.31%	101,190,050	210,406,134,000	2,448,090	1.065766	1.058920	1.062338	1.365595	6.05%
1990	30.22%	55.51%	14.27%	103,857,988	231,960,296,000	3,518,005	1.129086	1.114500	1.121769	1.531882	11.49%
1991	31.52%	54.64%	13.83%	107,383,807	234,103,886,400	5,151,699	1.081641	1.062952	1.072256	1.642570	6.98%
1992	32.09%	53.99%	13.92%	108,938,065	235,914,029,400	6,033,139	1.032458	1.029933	1.031195	1.693809	3.07%
1993	33.09%	53.67%	13.24%	112,196,681	236,080,753,000	10,153,615	1.105076	1.068053	1.086407	1.840167	8.29%
1994	34.02%	52.49%	13.49%	115,264,861	234,866,051,800	13,824,365	1.054151	1.044025	1.049076	1.930475	4.79%
1995	34.66%	50.15%	15.19%	119,887,506	235,390,040,600	16,107,677	1.037100	1.037364	1.037232	2.002350	3.66%
1996	34.65%	47.41%	17.94%	125,333,996	232,651,008,500	20,775,150	1.053938	1.052391	1.053164	2.108803	5.18%
1997	36.56%	40.98%	22.46%	131,458,355	231,817,390,000	24,479,958	1.047227	1.052133	1.049677	2.213562	4.85%
1998	41.84%	32.36%	25.80%	136,170,133	228,149,468,700	31,620,187	1.072131	1.072436	1.072284	2.373567	6.98%
										Average[1986-95]	6.94%
										Average[1986-97]	6.62%
										Average[1986-98]	6.65%

* The Switched Access Minutes series for 1991-1998 is based upon the growth rates for local switches found in Attachment A, AT&T Comment, dated Oct. 29, 1999.

Chart D5: Calculation of Fisher Ideal Index for Total Company Output

	Revenue Shares			Quantities			Output Indices				
Year	Local Service A	Intrastate Toll and Instratate Access B	Interstate C	Number of Local Calls	Intrastate DEMs	Interstate Quantity Index	Laspeyres A	Paasche B	Fisher Relative C=(A*B)^0.5	Total Company Output Index	Growth
1984											
1985	49.58%	24.00%	26.42%	310,696,999,600	164,191,177,000	1.000000	1.000000	1.000000	1.000000	1.000000	
1986	49.68%	23.50%	26.83%	315,839,746,231	173,173,536,000	1.052751	1.035272	1.034895	1.035083	1.035083	3.45%
1987	49.68%	24.14%	26.18%	320,735,770,416	183,597,411,000	1.137975	1.043561	1.042639	1.043100	1.079696	4.22%
1988	48.69%	24.98%	26.33%	318,724,184,964	191,904,837,000	1.285462	1.041736	1.039449	1.040592	1.123522	3.98%
1989	49.47%	24.54%	25.99%	330,212,044,704	207,298,177,000	1.365595	1.054001	1.053389	1.053695	1.183850	5.23%
1990	50.16%	24.53%	25.30%	342,403,840,684	217,913,904,000	1.531882	1.062478	1.060759	1.061618	1.256797	5.98%
1991	51.79%	23.46%	24.75%	353,219,571,000	219,713,721,000	1.642570	1.036154	1.035686	1.035920	1.301941	3.53%
1992	52.91%	22.56%	24.53%	365,468,629,000	224,278,538,000	1.693809	1.030555	1.030657	1.030606	1.341788	3.01%
1993	53.28%	22.32%	24.40%	376,995,406,000	227,540,869,000	1.840167	1.041165	1.040472	1.040818	1.396557	4.00%
1994	53.74%	21.57%	24.69%	392,601,075,000	235,362,364,000	1.930475	1.041702	1.041753	1.041727	1.454832	4.09%
1995	55.86%	19.45%	24.68%	409,383,799,000	246,926,539,000	2.002350	1.042763	1.042614	1.042689	1.516936	4.18%
1996	57.38%	18.39%	24.23%	422,262,867,000	263,719,641,000	2.108803	1.043927	1.043235	1.043581	1.583046	4.27%
1997	59.04%	17.12%	23.84%	433,316,755,000	273,526,580,000	2.213562	1.033897	1.033572	1.033735	1.636449	3.32%
1998	59.49%	15.84%	24.67%	444,538,659,000	296,776,339,000	2.373567	1.047073	1.046088	1.046580	1.712675	4.55%
										Average[1986-95]	4.17%
										Average[1986-97]	4.10%
										Average[1986-98]	4.14%