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Economic Assessment of the 1999 X-Factor Model Proposed by the FCC Staff

By

Frank M. Gollop

Professor of Economics

Boston College

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EXECUTIVE SUMMARY

Changes should be made to the Commission's 1997 model only when clear and unambiguous errors have been detected. As the staff acknowledges in the current FNPRM in a section discussing incentive regulation: "The simple fact that the **X-factor is fixed** and independent of the actual costs incurred creates an incentive for the firm to be efficient." (p. 42, FNPRM, Nov. 15, 1999; emphasis added) In short, properly designed incentive regulation not only rejects a cost-plus paradigm but also requires that, once established, the "rules of the game" not be changed. Ex post "adjustments" designed to reduce earnings run the risk of diminishing incentives and therefore the efficiency payoffs to be shared between firms and consumers.

Having adopted a formal structure for the X-Factor in its May 1997 order, the Commission now finds its staff proposing a totally restructured model. It is presented as the "1999 Staff TFP Study" in the FNPRM released November 15, 1999. There is hardly a variable left unaffected. Revenue, output, total labor expense, compensation per employee, the rental price of capital, capital expense, material expense, operating expense, taxes, and even the BLS input price series for the U.S. nonfarm sector are changed. Interestingly, the incremental effect of each and every proposed "adjustment" leads to an increase in the X-Factor otherwise found in the Commission's 1997 model.

This report examines each of the proposed methodological changes. Since the Commission has transitioned itself away from accounting-based rate-of-return regulation to incentive regulation based on economic concepts and accounts, economic principles become the appropriate yardstick by which to evaluate each staff proposed "adjustment." Economic analysis indicates that, in theory and/or form of implementation, the staff's substantively important recommendations violate both basic economic principles and well-accepted productivity accounting rules. Staff errors, to list only a few, include

- the inappropriate selection of the Baa rate as the measure of LEC opportunity costs,
- a procedure for adjusting the LECs' cost of capital that violates both elementary economic principles as well as the productivity accounting rules found in the very source document cited as authority by the staff,
- the ad hoc disallowance of labor severance payments while the economic model underlying the X-Factor requires their inclusion in labor expense,
- the substitution of local DEMs for calls without any analysis of how output variables must be measured in an X-Factor/price-cap framework,
- adoption of 1998 LEC data that are inconsistent with the staff's own 1985-97 series,
- the inexplicable introduction of an input-price differential based on U.S. nonfarm input prices that do not exist in the cited BLS accounts, and
- failure to symmetrically convert both LEC and BLS nonfarm productivity accounts to consistently defined external rate-of-return bases.

This said, if clear and unambiguous errors are found in the May 1997 model, modifications should be made. The analysis developed in this report suggests that two of the conceptual changes proposed in the FNPRM should receive serious consideration. One tends to raise X, the other to lower it. First, the staff proposes that the measure of local output be changed from calls to local DEMs to account for the effects of increased Internet use. In principle, Internet use is certainly an exogenous event that may require modifying the measure of local output. However, DEMs is not the appropriate metric. Since X is used to cap prices, each output variable in the X-Factor calculation must be defined as closely as possible to the unit measure on which market price and revenue are based. Driving 80% of local revenues, access lines become the appropriate candidate to replace calls. Access lines are adopted in this report and, other things equal, lead to a higher X-Factor. Second, the staff now recommends that the internal rate of return in its 1997 model be replaced with an external rate of return. This recommendation is consistent with economic principles and, in making it, the staff now embraces a position recommended long ago by USTA. The staff's implementation procedure, however, violates both economic principles and long-established productivity accounting rules. The external rate of return must be (i) an economically meaningful proxy for the LECs' opportunity costs and (ii) implemented so as to adjust only that portion of capital expense corresponding to

LEC opportunity costs. The staff's recommended adjustment to the LECs' cost of capital violates both precepts. Proper adjustments are made in this report and, other things equal, are found to lead to a lower X.

Both the FCC's 1997 model as well as a properly designed 1999 staff model lead to the same policy conclusion: the present 6.5% X-Factor is not justified by any meaningful measure of LEC performance.

	1997 Staff Model	1999 Staff Model	
		Corrected	Uncorrected
1991-98	4.12	3.29	6.33
1994-98	4.06	3.76	6.02

INTRODUCTION

The current X-Factor is set at 6.5%, a rate determined in 1997 primarily on the basis of what the Commission then believed was a rising three-year trend in the 1993-95 period. The U.S. Court of Appeals for the District of Columbia Circuit rejected, among other things, the appropriateness of interpreting a three-year movement as a trend rather than a cycle. Subsequent updates of the Commission's model indicate conclusively that the Court's common sense skepticism was well founded. X-Factors for 1996, 1997, and 1998 were found to be 1.98, 3.62, and 3.03, respectively—factors that not only are well below the 6.5% policy standard but also clearly refute the "trend."

The Commission staff now proposes a totally restructured X-Factor model. It is presented as the "1999 staff TFP Study" in the FNPRM released November 15, 1999. There is hardly a variable left unaffected. Revenue, output, total labor expense, compensation per employee, the rental price of capital, capital expense, material expense, operating expense, taxes, and even the BLS input price series for the U.S. nonfarm sector are changed. The staff argues that each change is required to address "errors" in the 1997 model adopted by the Commission. Interestingly, the incremental effect of each and every proposed "adjustment" leads to an increase in the X-Factor otherwise found in the Commission's 1997 model.

This report examines each of the proposed methodological changes. Economic principles become the appropriate arbiter and suggest that, with two exceptions, the 1999 staff model errs against both economic theory and productivity accounting rules. The two exceptions are the staff's call for adoption of an external rate of return and a new measure for local output. A simulation of the 1999 staff model is developed which properly implements these recommendations while correcting for other modeling and data errors. The 1991-98 and 1994-98 average X-Factors in the Commission's 1997 model were 4.12 and 4.06, respectively. The corresponding averages in the corrected 1999 staff model are 3.29 and 3.76, respectively.

1. OPPORTUNITY COST OF CAPITAL

The most significant difference between the 1997 and 1999 staff models involves the treatment of the cost of capital. The 1997 model begins from the premise that total revenue equals total cost. Consistent with this framework, property income (total expense associated with capital input) is calculated as a residual formed as the difference between total revenue and the sum of labor and material expenses. Actual earnings are assumed to reflect LEC opportunity costs and therefore are considered part of the required return to capital. In contrast, the 1999 staff model is premised on the belief that total revenue does not equal total cost. As a result, property income is not defined as a residual as in the 1997 staff model but is formed from an independent calculation based on an external rate of return.

The 1999 staff model adopts the following position. If profits are above LEC opportunity costs, the total required dollar return to capital and the resulting rental price of capital would be upward biased in the 1997 model. Symmetrically, if the LECs earned less than their true opportunity costs, required property income and the derived rental price would be downward biased via the 1997 residual method. The 1999 staff model proposes calculating the rental price directly and multiplying it by capital input to derive a stand-alone measure of property income. In short, the 1997 model adopts an "internal rate of return" framework in defining property income while the 1999 model embraces an "external rate of return" model to define property income.

There are strong a priori arguments in the economics literature supporting the use of either internal or external rates of return. AT&T and its expert Dr. John Norsworthy argued that the Commission should adopt an internal rate of return. USTA recommended the use of an external rate of return. In fact, USTA's own TFPRP model still uses an external rate of return. Book-length reports could be written on the relative merits of each approach in alternative applications and each could draw support from economic theory.

However, once the decision is made to adopt an external rate-of-return framework, economic theory is uncompromising regarding how external rates of return are to be calculated and applied. The critical present task then is to determine (a) whether the staff correctly applies sound accounting and economic principles in calculating a proper external rate of return appropriate to the LECs and (b) whether that rate has been correctly incorporated into the 1999 staff model. There are a number of important distinct issues underlying these two main themes. They are addressed in the following subsections.

1.a. Moody's Baa Rate is Not the Appropriate Measure of LEC Opportunity Costs.

The 1999 staff model takes the quite defensible position that LEC opportunity costs should be measured by an external rate of return but then immediately embraces Moody's Baa bond rate as the appropriate metric. No justification is offered explaining why time series movements in the Baa rate are the appropriate proxy for changes in LEC opportunity costs. At most, the author states that changes in the Baa rate are highly correlated with changes in other financial instruments. (Fn. 35, p. 47, FNPRM, Nov. 15, 1999) Economic principles, however, require far more than that.

Opportunity costs are defined as the return an investor can expect in the next best use of its funds. While this definition applies to all "investors," the appropriate empirical proxy for opportunity costs varies across investors. An eighty-year old individual with sparse funds would be well advised to look to very safe government securities as an appropriate yardstick for his opportunity costs. A young, highly educated and motivated woman in the early phase of her earnings cycle in a lucrative job should define the opportunity costs of her employment not with reference to any bond rate but with respect to her potential earnings with some other employer. Similarly, if the LECs (or their investors) "cashed

out" and exited the telecommunications industry, would their rational next-best use of investment funds be a Baa bond? Prudent advisors would more likely suggest investing available funds in some alternative industrial activity. The LECs and their investors would not be passive bondholders, but proactive owners of some industrial (product or service) enterprise.

For purposes of illustration, I propose that the rate of return series reported by Value Line for its sample of 875 large industrials better represents expected movements in LEC opportunity costs than does the Baa or any other bond rate. The Value Line time series, appropriately incorporating both debt and equity returns to capital, is reported in column 2 of Table 1.[1] Moody's Baa rate is reproduced in column 1. (Table B-8, p. 60, Appendix B, FNPRM, Nov. 15, 1999)

The disparate trends after 1991 are of considerable importance. While the economy has been enjoying record-setting growth since 1991, inflation and interest rates have been under control. As a result, bond rates have trended downward while earnings have increased. For investors in large corporations like the LECs, which series better reflects opportunity costs of investment funds? The answer is obvious.

It is important to emphasize that one cannot rebut the use of the Value Line series by arguing that the 875 industrials may include some firms that are not members of perfectly competitive industries. The definition of opportunity costs imposes no conditions on the source of funds but simply inquires as to their "next-best use." For those who invest in companies like the LECs, their investment alternatives are better represented by returns in like-sized firms than by the return on bonds. The investment options available to the LECs are a function of the magnitude of funds available to the LECs, rather than being predetermined by bond options available to individual households.

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[1] Value Line, Value Line Selection & Opinion, (July 23, 1999), pp. 5445-46.

Table 1

LEC Opportunity Costs of Capital

Year	Moody's Baa Rate	Value Line 875 Industrial Rate of Return
1987	10.6 %	11.0 %
1988	10.8	12.5
1989	10.8	11.7
1990	10.4	10.5
1991	9.8	8.5
1992	9.0	9.6
1993	7.9	10.9
1994	8.6	11.9
1995	8.2	12.9
1996	8.1	12.7
1997	7.9	13.2
1998	7.2	11.9

1.b. The 1999 Staff Model Applies Its Baa Adjustment to the Entire Rental Price of Capital but Opportunity Cost Is Only One Component of the Rental Price.

Appendix B to the Commission's FNPRM provides the basis for the staff's proposed change to its treatment of the cost of capital.

> Conceptually, the difference (residual) between revenue and the required returns to all non-capital inputs...consists of two parts. The first part is the required return to capital. The second part is the excess profit earned by the firm. Instead of attempting to separate this difference into two parts, however, the Commission in the *1997 Price Cap Review Order* simply assumed that all of this residual was the required return to capital, *i.e.*, that no excess profit was earned....
>
> In order to correct the miscalculation of the LECs' cost of capital in the 1997 Staff TFP study, it is necessary to replace the TFP study's cost of capital with a competitive cost for the inputs during the historical years. (pp. 45-6, FNPRM, Nov. 15, 1999)

To implement this strategy, the staff takes the unit cost of capital for 1991 as calculated in the original 1997 staff study and moves it forward and backward in time by applying the full basis point changes observed in Baa rates over those years. The author's assumption, now made explicit, is that the entire cost of capital ("rental price of capital" in the FCC's 1997 model) should move in sync with movements in opportunity costs. It is here that the author commits a serious violation of both accounting and economic principles, quite apart from its selection of the Baa rate.

The above quotation from Appendix B states that payments to capital input ("property income" in the language of the staff's 1997 model) "consists of two parts." In truth, it consists of far more than two parts. Payments to capital input, in both 1997 and 1999 models, must include some measure of opportunity costs but must also include compensation to capital input for depreciation, amortization, rental payments, business transfers, capital gains and losses on assets, property taxes, and federal, state, and local income taxes. Opportunity costs are only one component of the "required return to capital input."

Even if one believed that opportunity costs in the 1997 staff model are mismeasured and even if one believed that LEC opportunity costs are best proxied by the Baa rate, any adjustment must be applied only to that portion of property income (and therefore only to that portion of capital's rental price) that corresponds to opportunity cost. There is certainly no basis for believing that time series movements in Baa rates are meaningful measures of movements in depreciation rates, amortization rates, property or income tax rates, etc. This, however, is precisely what the 1999 staff model does when applying 100 percent of all basis point changes in the Baa rate to the LECs' rental price of capital. This violates the most fundamental accounting and economic principles.

The staff's position is especially surprising given its own citation to the pioneering work of Jorgenson and Griliches at footnote 32 in Appendix B to the FNPRM. The cited paper has become one of the benchmark references for TFP measurement. At pages 267-68 of that paper and in more detail in its statistical appendix at pages 276-78, Jorgenson and Griliches make clear that the rental price of capital incorporates far more than opportunity cost. The list provided above corresponds to the standard components of property income found both in the U.S. National Accounts and in all credible models of productivity measurement.[2]

This discussion begs the question as to how much of capital's rental price (and therefore its movement over time) is subject to adjustment by any decision to replace the internal rate of return with any external rate-of-return measure. As an illustration, I deduct (i) depreciation and amortization expense as reported in the Commission's 1997 model and (ii) LEC income taxes reported in Accounts 7220 and 7230 from total property income. The results of that investigation are reported in Table 2.[3] Depreciation, amortization, and

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[2] Jorgenson, Dale, Frank Gollop, and Barbara Fraumeni. Productivity and U.S. Economic Growth. Cambridge, MA: Harvard University Press, 1987), pp. 109-48, esp. p. 124.

[3] No calculation needs to be made for years prior to 1991. Under rate-of-return regulation, the LECs allowed rates of returns in those years presumably reflected opportunity costs as defined collectively by state and federal commissions. This issue is discussed in detail in section 1.c.

Table 2

Earnings Share in Property Income
(Dollars in Thousands)

Year	Property Income W/Depreciation (Chart D9, Col G) (A)	Depreciation & Amortization (Chart D8, Col C) (B)	Federal & State Income Tax (Accts 7220 & 7230) (C)
1991	$ 24,641,357	$ 13,499,778	$ 2,965,866
1992	26,477,135	13,822,882	3,078,975
1993	26,914,823	14,244,514	3,619,526
1994	26,366,385	15,068,058	2,862,758
1995	27,166,096	15,556,284	3,865,155
1996	30,414,808	16,377,242	4,854,531
1997	30,679,731	16,758,832	4,612,796
1998	33,340,502	17,306,863	6,696,650

Year	Earnings + Misc. Capital Expenses (A – B – C) (D)	Max. Earnings Share in Property Income (D / A) (E)
1991	$ 8,175,713	33.2%
1992	9,575,278	36.2
1993	9,050,783	33.6
1994	8,435,569	32.0
1995	7,744,657	28.5
1996	9,183,035	30.2
1997	9,308,103	30.3
1998	9,336,989	28.0

income taxes alone account for approximately 70% of property income. Earnings (including interest payments) and miscellaneous capital expenses including property taxes, rent paid, and business transfers together account for the remaining 30%.

The simulation developed later in this report applies an external rate-of-return adjustment to 30% of property income to illustrate the importance of properly applying an external rate of return metric. However, it is important to emphasize that any formal adoption of the staff's proposal will require a far more detailed analysis of LEC capital accounts than provided in Table 2. Further decomposition of these accounts would certainly find that any earnings adjustment should apply to much less than 30% of property income.

The important conclusion is that the staff's application of full basis point changes in the Baa or any other bond index to the LEC rental price is wholly unjustified. In fact, it is fair to say that the staff's proposed adjustment method may introduce far more bias than does the 1997 staff assumption that actual returns proxy opportunity costs. Without question, implementing any meaningful "adjustment" will require considerable data effort, well beyond the requirements of the staff's 1997 model, and that is even before considering what independent metric should be used to measure an external rate of return appropriate to the LECs. Given the "simplicity" standard adopted long ago by the Commission in its X-Factor proceedings, perhaps this is one reason it opted for an internal rate of return model.

An amended version of the staff model is developed later in this report. It adopts the procedures proposed by the 1999 staff model to adjust the rental price of capital to reflect an external opportunity cost standard. The only two differences are that the adjustment is applied only to that portion of property income that corresponds (conservatively) to LEC earnings and is based on the rate of return experienced by the Value Line industrials.

1.c. Its Own Model Should Have Warned the Staff that Its Application of the Baa Rate Was Inappropriate.

The 1999 staff model adopts the assumption that LEC returns in 1991 equaled the companies' true opportunity costs.

> The base year is 1991. This is the first full year of LEC price cap. The implicit assumption is that the cost of capital for this year was at a competitive level. That is, it is assumed that LECs earned a normal return in that year. (Footnote 36, p. 47, Appendix B, FNPRM, Nov. 15, 1999)

The staff then adjusts that 1991 cost of capital forward and backward in time using the Baa rate as described above.

The forward adjustments are consistent with the staff's concern about possible differences between internal rates of return and LEC opportunity costs, but the backward adjustments are totally perplexing. Why would the staff ever consider adjusting LEC rental prices for years 1985-90 when the LECs were under rate-of-return regulation? If the staff believes that state and federal regulators appropriately set LEC rates in 1991 to reflect true opportunity costs, what was it about regulatory behavior between 1985 and 1990 that made regulators fail to meet their responsibility in each and every year? The author of Appendix B offers no justification for the asymmetric treatment of the rental price of capital in 1985-90, on the one hand, and 1991, on the other hand. Without comment, he "adjusts" the reported rental price of capital in years 1985-90 though these arguably were years in which regulators set rates that generated no excess profits.

If the staff author does not want us to interpret his methodology as an indictment of regulators during the rate-of-return era, then he leaves us with no choice but to indict his methodology. Table 3 presents the rental prices of capital produced under the 1997 and 1999 staff models. The former, reported in column 1, are based on the internal rate of return methodology and are taken directly from USTA's 1999 update of the Commission's

Table 3

Rental Price of Capital

Year	1997 Staff Model (Column H, Chart D9)	1999 Staff Model (Column 2, Table B-8)
1985	23 %	22 %
1986	24	19
1987	24	20
1988	23	20
1989	21	19
1990	20	19
1991	19	19
1992	20	18
1993	20	17
1994	19	18
1995	19	18
1996	21	17
1997	20	17
1998	21	16

1997 model.[4] (This update was filed September 10, 1999.) The latter adopts the Baa adjusted rental prices taken from Table B-8 of Appendix B to the November 1999 FNPRM. If the staff believes rate-of-return regulators fulfilled their responsibilities prior to 1991, how do they explain the differences in the two series over the 1985-90 period? Did rate of return regulators overestimate LEC opportunity costs of capital by nearly five full percentage points in both 1986 and 1987 or is the staff's Baa adjustment process flawed? In any case, the substantial disagreement between the opportunity cost judgment of regulators in 1985-90 and the 1999 staff model proxies for the same period should have at least raised a red flag for those who designed the 1999 staff model. Curiously, no comment is found in the text of Appendix B.

1.d. The 1999 Staff Model Errs By Modifying LEC Revenues, Taxes, and Operating Expenses When Converting to an External Rate of Return Framework.

The authors of the 1999 staff model believe that their adjustments to property income and the rental price of capital require corresponding adjustments to LEC revenues, taxes, and operating expenses. "Recalculating the LECs' historical cost of capital changes the level of the LECs' revenues, taxes, and operating expenses for the historical years." (p. 47, Appendix B, FNPRM, Nov. 15, 1999) This not only is incorrect but makes absolutely no sense.

The text accompanying the 1999 staff model does not argue that LEC profits have been mismeasured. The author only argues that, in his opinion, part of booked profits should be categorized as opportunity cost ("normal" profit) and part as "excess" profit. As a result, LEC capital expenses and therefore total LEC costs are adjusted downward to meet what the staff author claims are economic costs. However, this does not affect booked revenue. It is

[4] See column H of Chart D-9 in Appendix C of USTA's September 10, 1999 filing.

not affected at all either by the author's interpretation of profit or by his ultimate adjustment method. The only difference is that costs in the staff's 1999 model now are assumed to be below booked revenue rather than set equal to booked revenue as in its 1997 model.

The response to the author's statement that taxes and operating expenses require adjustments is equally straightforward. The downward adjustment to capital expense in the 1999 staff model changes neither labor nor material expenses. Therefore, there can be no change to operating expense as defined in the FCC model. Similarly, I feel confident in asserting that the author's reassignment of some fraction of dollar earnings from the "normal" (opportunity cost) to "excess" categories will have absolutely no impact on the Internal Revenue Service's view of the LECs' income tax liability. In any case, income taxes are not part of operating expenses in the ARMIS accounting system. Even if the staff believed it should adjust income taxes, that decision would have no effect on measured operating expense.

The staff's rewriting of LEC revenue and expense history introduces modeling bias. Moreover, the staff's decision to force revenue to equal cost is most curious. Creating the scenario where revenue exceeds cost would appear to have been the whole intent of the staff model. The simulation developed below removes this source of bias from the 1999 staff model.

1.e. Converting LEC Capital Accounts from Internal to External Rate of Return Frameworks Requires Symmetric Adjustments to the Capital Accounts for the Nonfarm Business Sector.

Both 1997 and 1999 staff models quantify X by establishing TFP and input price differentials comparing the performance of the LECs with firms in the U.S. nonfarm

business sector. In both models, the staff relies on BLS data for the nonfarm sector. BLS measures nonfarm TFP and input price growth using a model based on an internally calculated rate of return, i.e., total revenue equals total cost and all measured profits are assumed to reflect opportunity costs. One nice feature of the 1997 staff model is that its adoption of an internal rate of return framework for the LEC capital accounts guarantees symmetry with the BLS accounts so that the computation of the TFP and input price differentials are computed on like concepts. The 1999 staff model introduces an asymmetry.

The authors of the FNPRM introduce two bases for their recommended conversion to an external rate of return standard: (i) the LECs may not be in a perfectly competitive industry and (ii) they may not be in long run equilibrium. It is true that imperfect competition may lead to excess profits and, even if perfectly competitive, firms may earn excess profits in the short run.[5] The differential nature of the staff's model, however, begs the question: What insures that the firms in the nonfarm business sector, to which BLS applies an internal rate of return framework, are perfectly competitive firms in long run equilibrium? If the staff chooses to measure the performance of the LECs using an external rate of return structure, symmetry requires that the staff make similar adjustments to the BLS series. Doing so would reduce the resulting X-Factor.

If the Commission adopts the staff's 1999 model as presently proposed, it ultimately will have to confront its asymmetric treatment of both TPF and input price differentials. The proposed asymmetry is indefensible and is perhaps one reason that compelled the Commission to adopt an internal rate of return model in May 1997.

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[5] The FNPRM elaborates on the importance of the long run equilibrium assumption at p. 40 of the Nov. 12, 1999 document. "The measure of TFP growth obtained by conventional means (an internal rate of return model) is not, however, appropriate whenever firms are not in a long run cost minimizing equilibrium. A firm is not in long run equilibrium whenever the firm's input-output bundle is other than

2. ECONOMIC PRINCIPLES UNDERLYING TFP MODELING REQUIRE THAT SEVERANCE PAYMENTS BE INLCUDED IN LEC LABOR EXPENSE

The authors of the 1999 staff model adjust reported labor expense downward for years 1991-98 by amounts estimated to reflect the LECs' severance payments. The staff does not argue that the incentive payments were not incurred, nor does the staff take the position that these separation payments are not legitimate business expenses. The staff's rationale and modeling decision are described in the following two sentences.

> To have a labor price series meaningful for TFP analysis, it is necessary to adjust for the impact of the exogenous changes in labor compensation and accounting rules. This is accomplished by adjusting the labor compensation series to net out one-time charges for such things as buyouts and accounting rule changes. (FNPRM, p. 50)

The first sentence is totally in error. First, incentive payments made by the LECs to their employees are not exogenous events imposed on the companies by some external force. They reflect endogenous decisions presumably made by rational firms. Second, exogenous factors should not automatically be excluded from the measure of labor expense entering the TFP calculation. For example, a government-mandated change in Social Security tax rates is an exogenous event but, because it affects compensation payments, it necessarily enters the calculation of labor expense. Third, by netting out severance payments without allocating them either to labor expense in other years or to capital expense in the same year as a charge against earnings, the staff is effectively "disallowing" severance expenses. In short, the staff's disallowance is consistent only with the premise that it believes that the LECs, if rational, cost-minimizing firms, should simply have fired the excess laborers. Because severance payments (in the staff's opinion) are unnecessary "gifts" to exiting employees, they should not be recognized as legitimate labor expenses.

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corresponding to a point on the long run unit cost curve. If the firm is not in long run equilibrium, then profit is not zero."

Regardless of how this issue might have been adjudicated under the old rate-of-return paradigm, disallowing severance payments makes absolutely no economic sense under price-cap regulation. Facing a predetermined X, with the threat of having to cover all costs and the promise of retaining earnings achieved in excess of X, the LECs have absolutely no incentive to needlessly pay laborers any more than is required by market forces. And this brings me to my last point.

Fourth, those staff members who designed this "adjustment" to labor expense appear to misunderstand the economic principles underlying input price measurement in proper TFP modeling. Derived either from production or cost functions, the TFP model requires that the measured input price for labor reflect the incremental cost that a cost-minimizing firm would incur to hire additional labor and/or retain its existing labor force. The last phrase is critical and explains why the LECs willingly incurred (and incur) real severance payments instead of simply firing sizable numbers of laborers. Absent these payments, two effects would result. First, morale among retained workers would decline. Second, it would become increasingly difficult (i.e. expensive) to hire quality laborers. The first translates to lower marginal productivity; the second results in higher wages and salaries to compensate workers for the risk they would now bear through uncompensated separation. In short, the LECs rationally incur severance payments just as do so many companies throughout the economy.

The 1999 staff model assumes labor force reductions during the 1991-98 period without incentive payments would have had no impact on labor productivity or future wage levels. That makes no economic sense and flies in the face of firm behavior observed in the U.S. labor market. Market forces require that the LECs make severance payments. Proper TFP modeling requires that this real, market-driven phenomenon be recognized in labor expense.

TFP accounting principles require that severance payments be recognized as labor expense—as they are in the 1997 staff model. Though less defensible, the staff's only

alternative would be to remove severance payments from the labor expense category and reassign them to capital expense, as charges against earnings. Such a reallocation of expense would reduce the cost-share weight on slowing growing labor input and increase the weight on faster growing capital input. This would result in a lower measured TFP growth rate for the LECs and therefore a lower X. Short of this alternative, economic principles require that the staff retain its treatment of labor expense as defined in its 1997 model. This is the position adopted in the simulation presented later in this study.

3. ACCESS LINES ARE A MORE APPROPRIATE MEASURE OF LOCAL OUTPUT THAN IS THE NUMBER OF LOCAL CALLS

The staff proposes that the measure of local output be changed from the number of local calls used in the staff 1997 model to dial equipment minutes (DEMs). The staff believes this is necessary to account for rising minutes per call resulting from increased Internet use by local subscribers. (p. 23, FNPRM, Nov. 15, 1999) Internet use is certainly an exogenous event that may require modifying the measure of local output. However, careful analysis suggests that, under the Internet hypothesis, access lines rather than DEMs become the appropriate measure of output for calculating the X-Factor in the price-cap formula.

The choice of an appropriate output measure must follow from the very purpose of the X-Factor as a public policy tool. Since X is used to cap prices and therefore revenue, output in the X-Factor calculation must be defined as closely as possible to the unit measure on which market price is based. It is the specific source of local revenue that forms the proper external standard defining the measure of local output. MCI acknowledged as much in its November 1998 filing with the Commission: "Since local revenue is a combination of per line and per minute charges for local service, and of charges for CLASS services, the

most accurate estimator of demand for local services would be based on some weighted average of all of these types of outputs."[6] The Commission, however, long ago decided that it would adopt a single measure of local output for the sake of simplicity. As of May 1997, that measure was call volume. The staff now proposes DEMs as the alternative single measure.

An analysis of revenue sources reveals that 67% of intrastate revenue is flat rate or line volume related; only 33% of intrastate revenue is related to usage. Focusing more narrowly on the sources of local revenue, more than 80% is generated from lines.[7] Only a very small portion is derived from per-use rates. To have an economically meaningful X-Factor, the measure of output used in the model must correspond to outputs driving revenue growth. With this criterion in mind, the analysis of revenue sources suggests that the number of access lines is clearly a superior candidate to either calls or DEMs. If the Commission is intent on changing the measure of local output but wants a single quantity measure, the number of access lines is the only economically meaningful choice.

Table 4 summaries the growth rates of calls, DEMs, and access lines. Two empirical observations are relevant. First, since local revenue growth is tied mainly to line growth, the erratic movement in DEMs over the past 15 years would introduce a substantial bias in the Commission's X-Factor. The –0.1% and 11.5% growth rates for DEMs in 1990 and 1997, respectively, illustrate the point. Second, the fact that access line growth rates are typically intermediate to those for calls and DEMs suggests that access line growth is a good proxy for any weighted measure of local output growth. For example, as discussed above, a reasonable measure of local output growth would be a weighted average of call, DEM, and line growth rates. Consider access line growth relative to the other growth rates in Table 4. In the 1994-98 period, for example, installed access lines increased at a 3.9% annual rate while calls and DEMs increased at 3.3% and 6.8% annual rates, respectively.

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[6] MCI Reply Comment dated November 9, 1998, CC Docket 94-1, p. 26.
[7] Telcordia survey performed for USTA, Spring 1999.

Table 4

Local Output
(Growth Rates)

Year	Local Calls	Local DEMs	Access Lines
1985	1.7%	1.1%	2.9%
1986	1.6	0.6	3.0
1987	-0.6	4.6	0.0
1988	3.6	1.8	3.0
1989	3.7	1.2	2.6
1990	3.2	-0.1	3.4
1991	3.5	3.0	1.4
1992	3.2	5.3	3.0
1993	3.2	5.3	3.0
1994	4.1	4.8	2.7
1995	4.3	4.8	4.0
1996	3.1	8.5	4.5
1997	2.6	11.5	4.9
1998	2.6	4.4	3.6
1991-98	3.3	6.0	3.4
1994-98	3.3	6.8	3.9

Not only would access line growth receive an 80% weight in any weighted average, but its growth rates relative to those for calls and DEMs suggest that access line growth is likely a reasonable proxy for that weighted average. Without doubt, the weighted average would be closer to the reported rates for access lines than to those for local DEMs. If the Commission maintains its long-standing policy of using a single metric for an output, access lines become the economically meaningful variable for local output. Moreover, access lines already are used elsewhere in the FCC's model, as the measure of output corresponding to end-user interstate revenues. In the simulation developed below, access lines rather than DEMs are substituted for local calls.

4. THE 1999 STAFF MODEL USES AN INCORRECT INPUT PRICE SERIES FOR THE U.S. NONFARM BUSINESS SECTOR

The 1999 staff model introduces an input price series for the U.S. nonfarm business sector that, quite frankly, is not what it purports to be. The text in Appendix B offers the following source description:

> The input price differential...is computed as the percentage change in input prices for the aggregate economy less the percentage change in LECs' input prices. The measure of aggregate input price change used is the Nonfarm Business Sector Input Price Index compiled by the Bureau of Labor Statistics of the U.S. Department of Labor.[54]

[54]The series is quarterly and is taken from Table 2: Private Nonfarm Business: Productivity and Related Indexes, 1948-97. It is available via the Bureau of Labor Statistics Internet site at http://www.bls.gov

I contacted BLS and found that the input price series that corresponds to the nonfarm business sector TFP index produced by BLS (a) is not available quarterly, (b) is not available on the BLS web site, and (c) has not changed since BLS provided the series to me for the USTA update of the staff 1997 model as filed with the Commission on September 10, 1999. I have not been able to determine the source of the staff 1999 series but I am