based on external measures provides the most effective incentives to the LECs to operate efficiently. (p. 30)

"Clearly, this record would have benefited from more general emphasis on studies which examined the national LEC or telecommunications industry and less emphasis on Pacific's actual performance." (p.35).

"We find that a differential productivity factor representing telecommunications industry productivity in excess of economy-wide productivity continues to be a reasonable method of calculating the productivity factor." (p. 37)

I agree that, if a formula approach is used, the measure of TFP used in the X factor must be independent of company performance to break the efficiency-dampening linkages to rate-of-return regulation. An industry-wide measure of TFP accomplishes this goal because the actions of Pacific Bell have only a small impact on the overall industry measure of TFP.[4]

During its deliberations, the Commission was very interested in the anticipated Bureau of Labor Statistics (BLS) measure of TFP for the LEC industry:

"Clearly, the discussion of what constitutes the most reasonable methodology for calculating the productivity factor four years into NRF and onto the future is more complex than we contemplated it would be. We expected BLS to have published its long-anticipated TFP index for the telecommunications industry by now. During Phase II, it was generally believed that publication of the BLS index was "virtually definite" by the end of 1990. ... we were persuaded to look forward to the BLS figures because of their comparability to BLS's aggregate TFP measure and their potential to be updated over time." (p. 31)

[4] As I discuss in Section 6, Pacific Bell performance is now more likely to be reflective of average industry performance. Therefore, not only does an offset based on industry-wide TFP create desirable efficiency incentives, but it also represents a realistic offset for Pacific Bell.

"While there exist national measures of productivity, no such measure has yet been developed for national telecommunications companies. For that reason, we look forward to analyzing the BLS index and its methodology, because we anticipate that it will best meet our needs for comparability and flexibility in a TFP measure of the telecommunications industry." (p. 32)

The BLS index of TFP for the LEC industry has yet to appear, and its release date has not been announced. Recognizing the uncertain release of the BLS measure, the Commission is very much interested in analyzing alternatives that capture the essence of the BLS index:

"The Commission still intends to determine the efficacy of utilizing the BLS index in the price cap mechanism: when and if the index is issued by the time of the next review. If the BLS index is not available, we look forward to evaluating studies that capture the essential parameters of the methodology that we have held to be reasonable." (p. 37)

I have recently performed a TFP study of the LEC industry over the post-divestiture period on behalf of the United States Telephone Association (USTA).[5] Based on my experience analyzing other BLS productivity studies, my LEC industry study is a close approximation to the anticipated BLS study. The BLS study will be using the same data as I used in my LEC study, and the methods of computing TFP are very similar. Below, I outline the similarity in methods.[6]

BLS and Christensen Associates compute total factor productivity as the ratio of total output to total input.

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[5] Christensen, Schoech, and Meitzen,

[6] BLS methods are described in: U.S. Department Bulletin of Labor, Bureau of Labor Statistics, Trends in Multifactor Productivity, 1948-81, Bulletin 2178, September 1983; U.S. Department of Labor, Bureau of Labor Statistics, "Multifactor Productivity Measures, 1991 and 1992," USDL 94-327, July 11, 1994; and U.S. Department of Labor, Bureau of Labor Statistics, Labor Composition and U.S. Productivity Growth, 1948-90, Bulletin 2426, December 1993.

Total output includes all services provided by the telephone local exchange carriers: local service, long distance service, intrastate access service, interstate access service, and miscellaneous services. Total input includes all inputs used by the local exchange carriers: capital (plant and equipment), labor, and materials, rents, and services.

BLS and Christensen Associates compute total output using economic indexing techniques.
The economic indexing technique involves computing quantity indexes for each of the services provided by the local exchange carriers. The quantity index for each of the services is computed by dividing revenue by a price index for that service. The economic indexing technique then "aggregates" these quantity indexes to an index of total output. The total output index is obtained by computing a weighted average of the growth rates for each service, where the weights are based on revenue shares.

BLS and Christensen Associates compute total input using economic indexing techniques.
Quantity indexes are computed for capital, labor, and materials, rents, and services. The economic indexing technique then aggregates these quantity indexes to an index of total input. The total input index is obtained by computing a weighted average of the growth rates for capital, labor, and materials, rents, and services, where weights are based on cost shares.

BLS and Christensen Associates compute the quantity index of capital and capital cost in similar ways.
Both BLS and Christensen Associates compute the quantity of capital using the "perpetual inventory method." The perpetual inventory method bases the quantity of capital on the cost of plant and equipment added in previous years, adjusted for changes in the prices paid for plant and equipment over time and declines in efficiency of plant and equipment as it ages. BLS and Christensen Associates compute capital cost using a "rental price equation." The rental price equation bases capital cost on taxes, depreciation, capital gains, and return to investors.

BLS and Christensen Associates compute the quantity index of labor and labor cost in similar ways.
Both BLS and Christensen Associates base the quantity index of labor on employee hours worked. Labor cost is based on wages, salaries, and benefits paid to employees.

BLS and Christensen Associates compute the quantity index of materials, rents, and services and materials, rents, and services cost in similar ways.
Both BLS and Christensen Associates base materials, rents, and services costs on company expenditures for these items. The materials, rents, and services quantity index is calculated by dividing cost by a price index for those services.

BLS and Christensen Associates use publicly available data sources, wherever possible, in computing total factor productivity.
Most of the data used in the Christensen Associates total factor productivity study are published in the FCC Statistics of Communications Common Carriers. Data not publicly available are obtained directly from the Local Exchange Carriers. BLS is taking the same approach to data collection in their preliminary efforts to compute total factor productivity for the Local Exchange Carriers.

In summary, because we use similar methodology, I expect my LEC study is a close approximation to the anticipated BLS productivity study. Furthermore, given that BLS will be using essentially the same data, I expect the results of the BLS study will be very similar to the results of my LEC study.

4. Telephone Industry TFP Studies Indicate that the Long-Term TFP Growth Differential Between the Telephone Industry and the U.S. Economy is 2 Percent

Christensen LEC TFP Study. I have attached my post-divestiture LEC industry study as Appendix 1. The companies included in the study are Ameritech, Bell Atlantic, BellSouth, GTE, NYNEX, Pacific Telesis, Southern New England Telephone, Southwestern Bell, and U S West. These carriers account for over 90 percent of the revenues of those local exchange carriers reporting to the FCC. This is the only direct TFP study, to my knowledge,

currently available with data and results for the local exchange industry beyond 1988.

Table 1 summarizes the results of my post-divestiture LEC industry TFP study. My study finds that, over the 1984-1993 period, LEC total output grew at an average annual rate of 3.4 percent, total input grew at an average annual rate of 1.0 percent, and LEC TFP grew at an average annual rate of 2.4 percent.[7] Over this same period, the average annual growth of TFP for the private business sector was 0.3 percent. Thus, the TFP growth differential between the LECs and the private business sector was 2.1 percent over the 1984-1993 period.

Table 1
Christensen LEC TFP Study

Year	Output Growth	Input Growth	LEC TFP Growth	U.S. TFP Growth	TFP Growth Differential
1985	2.4%	1.3%	1.1%	0.5%	0.6%
1986	3.0%	0.2%	2.8%	1.0%	1.8%
1986	3.7%	1.9%	1.8%	0.2%	1.6%
1988	5.2%	3.1%	2.1%	0.5%	1.6%
1989	4.8%	2.7%	2.0%	-0.2%	2.2%
1990	3.7%	-0.9%	4.6%	-0.3%	4.9%
1991	2.3%	1.1%	1.2%	-1.0%	2.2%
1992	1.9%	-1.6%	3.5%	1.5%	2.0%
1993	3.6%	1.0%	2.6%	0.6%	2.0%
Average	3.4%	1.0%	2.4%	0.3%	2.1%

[7] Note that tables and charts showing annual growth rates over the 1984-1993 period begin with a 1985 data point. This represents the growth rate of 1985 over 1984. Also note that all growth rates are computed using natural logarithms.

Review of Other Telephone Industry TFP Studies. The results of my LEC industry study are very similar to those of my earlier Bell System TFP study, as well as the results of studies conducted by other researchers. A list of several other TFP studies is presented in Table 2 below. All of these TFP studies have found that the difference between telephone industry TFP growth and economy-wide TFP growth has been between 1.85 percent and 2.2 percent.

Table 2
Summary of Telecommunications Productivity Studies[8]

Study	TFP	TFP Differential	Period
1. American Productivity & Quality Ctr. Communications Industry	3.9	2.2	1948-85
2. Christensen Bell System	3.2	2.1	1947-78
3. Crandall and Galst Total Industry	3.3	2.1	1960-88

[8] Sources for Table 2:

1. American Productivity and Quality Center, Multiple Input Productivity Indices, cited in FCC Docket 87-313, Second Notice of Proposed Rulemaking, May 12, 1988, page 208.
2. Testimony of L. R. Christensen filed in United States v AT&T, Civ. Action No. 74-1698 (D.D.C. filed Nov. 20, 1974), cited in FCC CC Docket 87-313, Second Notice of Proposed Rulemaking, May 12, 1988, page 206.
3. R. W. Crandall and J. Galst, "Productivity Growth in the U.S. Telecommunications Sector: The Impact of the AT&T Divestiture," The Brookings Institution, February, 1991, and United States Department of Labor, Bureau of Labor Statistics, Multifactor Productivity: Private Business Sector, July 1994.
4. D. W. Jorgenson, F. M. Gollop, and B. M. Fraumeni, Productivity and U.S. Economic Growth, Cambridge: Harvard University Press, 1987.
5. T. C. Spavins, "The Long-Term View of the Appropriate Productivity Factor for Interstate Exchange Access," FCC CC Docket 87-313, Second Report and Order, September 19, 1990, Appendix D.

4. Jorgenson, Gollop and Fraumeni Telephone, Telegraph & Misc. Comm.	2.9	2.1	1948-79
5. Spavins Total Industry (indirect)		1.85	1930-89

My Bell System study (1981) focused on the pre-divestiture Bell System. Over the 1948-1979 period, I found Bell System TFP growth to average 3.2 percent per year and U.S. economy TFP growth to average 1.1 percent per year, producing a TFP growth differential of 2.1 percent.

The study by the American Productivity and Quality Center (1988), looked at the larger communications sector of the U.S. economy, which includes radio and television broadcasting in addition to telecommunications. The study also employed a different methodology than mine, but produced similar results with a TFP growth differential of 2.2 percent over the 1948-1985 period.

Crandall and Galst (1991) computed alternative TFP growth estimates. For the entire 1960-1988 period of their study, TFP growth was 3.3 percent for the telecommunications industry with a TFP growth differential of 2.1 percent.[9]

Jorgenson, Gollop, and Fraumeni (1987) computed TFP growth for the telephone, telegraph, and miscellaneous communications industry over the 1948-1979 period. During this time period, most of this industry was composed of telephone companies. Jorgenson, Gollop, and Fraumeni found

[9] These results are for the standard revenue-weighted output measure of TFP.

that the average rate of TFP growth for the industry was 2.9 percent, while the average rate of TFP growth for the U.S. economy was 0.8 percent over this same time period (for a productivity growth differential of 2.1 percent).

The studies cited above measure TFP growth "directly"--i.e., they measure growth in outputs and inputs directly. Another method is an "indirect" approach where the rate of TFP growth is not computed directly, but is inferred from changes in output price trends. Spavins (1990) began with the Spavins and Lande study (1990) that inferred the rate of TFP growth from changes in prices. Spavins was an FCC staff member and the study was sponsored by the FCC in the LEC price cap deliberations in CC Docket 87-313. Spavins' indirect study of the total telecommunications industry found that over the 1930-1989 period, the TFP growth differential was 1.85 percent. This result is of interest because it shows that direct and indirect approaches produce similar results. The Spavins and Lande study found no evidence that the rate of productivity growth either accelerated or decelerated after divestiture.[10]

Technical Change and Telephone Industry TFP Growth. The results of the telecommunications productivity studies surveyed above indicate a remarkable stability in the differential between telecommunications industry and economy-wide productivity growth. This stability in the productivity

[10] T.C. Spavins and J.M. Lande, "Total Telephone Productivity in the Pre and Post-Divestiture Period," FCC CC Docket 87-313, Supplemental Notice of Proposed Rulemaking, 1990, Appendix D.

growth differential has occurred as the telecommunications industry has gone through some dramatic changes in technology over the decades. For example, more recent innovations such as digital switching, stored program control, and fiber optics are now basic components of the network. The industry's record of technological innovation has allowed it to maintain its TFP growth differential relative to the rest of the economy, but this differential has not widened.[11]

Based on the historical record, there is no evidence that recent and prospective technical developments portend an acceleration of productivity growth in the telephone industry relative to the U.S. economy. For the past forty years there has been more rapid technical change in the telephone industry than in other industries, and this has been manifested in a higher rate of growth of TFP for the telephone industry than for the rest of the economy.

[11] In addition to the evidence on the stability of the TFP differential provided by the studies cited above, I have also estimated a simple least-squares regression model of the difference in telephone industry TFP growth versus U.S. economy TFP growth from 1949 through 1993. The dependent variable is telephone industry TFP growth minus U.S. TFP growth. The explanatory variables are a linear time trend and a dummy variable to represent the divestiture period (=1, 1984-1993). The results of the model indicate that the differential has not changed over the 1949-1993 period or over the 1984-1993 subperiod:

Variable	Coefficient	Standard Error	T-Statistic
Intercept	.011954	.007916	1.5102
Time Trend	-.006631	.012091	-0.5485
Divestiture Dummy	.000382	.000372	1.0269

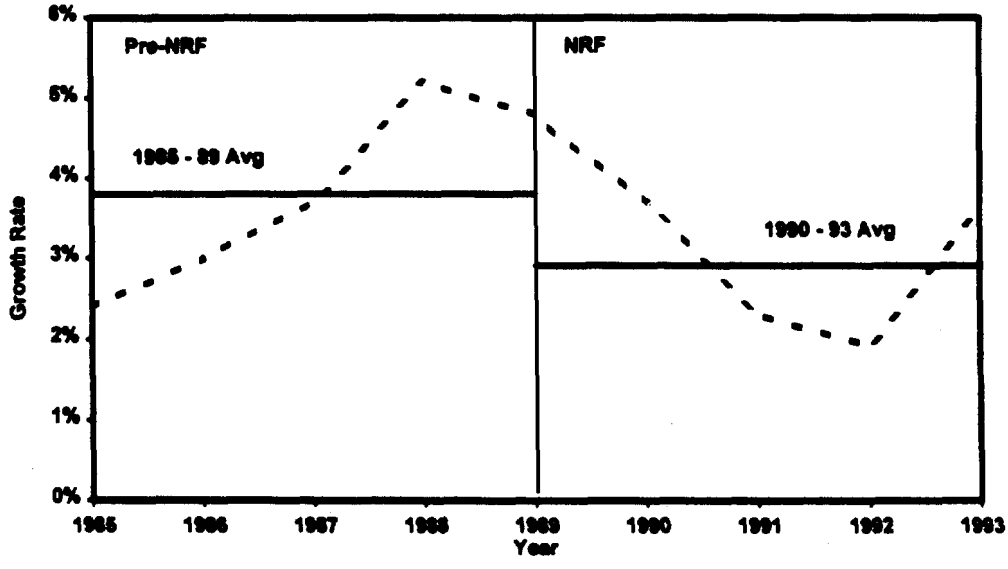
R-squared	.02565
Mean value of dependent variable	.01942
Durbin-Watson statistic	1.6699
Number of observations	45

Data Sources: see Appendix 3

The long-term TFP growth differential has remained stable in the 2 percent range and, in particular, has not widened with divestiture. I know of no evidence to support a belief that TFP growth for the telephone industry will surpass TFP growth for the entire U.S. economy by more than it has in the past.

On the contrary, the telephone industry may have difficulty in sustaining its average post-divestiture rate of productivity growth over the near-term future. In recent years, the growth of telephone industry output has declined. Chart 1 presents the data on output growth from Table 1 of my LEC study.

Chart 1
Local Exchange Carrier Output Growth



The data indicate a slowdown in LEC output growth over the 1990-1993 period. Between 1990 and 1993, LEC average annual output growth was 2.9 percent. This compares to an average annual output growth of 3.8 percent

over the 1984-1989 period. If the telephone industry is unable to flexibly respond to competitive entry into its markets, it may continue to see relatively low output growth. As I discuss below in Section 6, reductions in output growth will, in all likelihood, lead to reductions in TFP growth.

5. The Expected Input Price Differential is Zero and, Therefore, Should Not Be Included in the X Factor

As I have stated above, the X factor in a price cap formula conceptually incorporates: (1) the expected difference between the rate of telephone industry total factor productivity growth and the rate of economy-wide total factor productivity growth; and (2) the expected difference between the rate of telephone industry input price growth and the rate of economy-wide input price growth. The expected TFP growth differential is 2 percent, based on my LEC industry study and previous studies of the telephone industry. I demonstrate here that the expected input price differential, or "W" factor, here is zero.[12]

The Expected Input Price Differential is Zero. I have extensively researched this topic and have recently submitted an Input Price Affidavit on behalf of the United States Telephone Association in the current FCC price cap

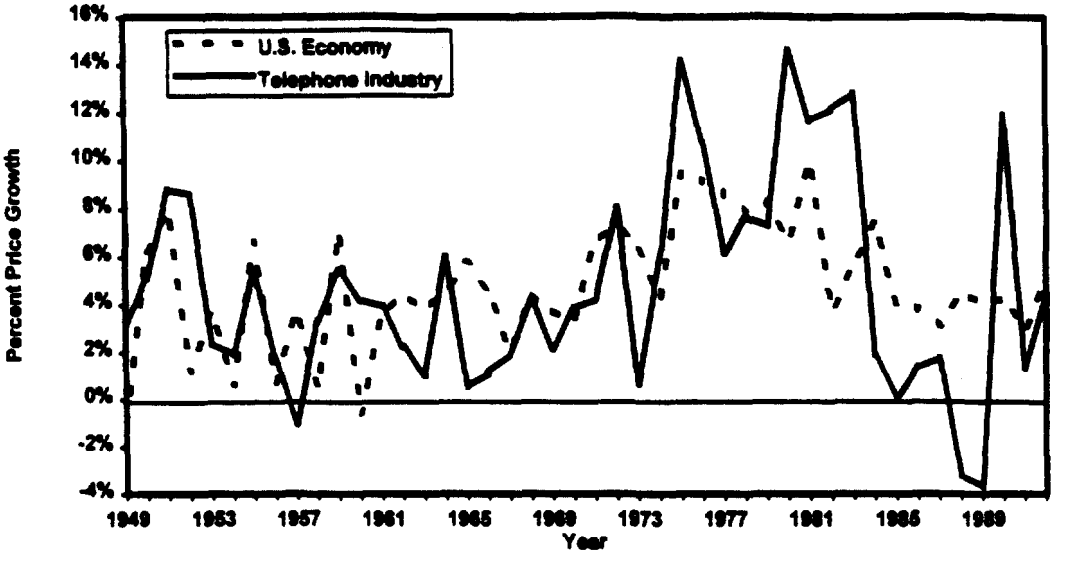
[12] In D.94-06-011, the Commission concluded that, as with TFP, industry measures of input prices are preferred in a price cap formula over company-specific measures since company-specific measures effectively create a rate-of-return type mechanism that dampens efficiency incentives (pp. 13-14). I agree that a company-specific input price measure would reconnect the link with rate-of-return regulation and dampen the Company's efficiency incentives.

proceeding (CC Docket 94-1). That affidavit is available upon request. I have concluded that, on a going-forward basis, there is no conceptual or empirical basis for believing that LEC input prices will increase significantly more slowly than input prices for the entire U.S. economy.

Telephone companies compete for labor, capital, and other inputs with all other sectors of the U.S. economy. Therefore, one would expect input prices for telephone companies to have the same long-term trend as other sectors of the economy, and hence, the same as the entire U.S. economy. This expectation is validated by long-term historical evidence.

Chart 2 presents the data on input price growth for the telephone industry and the overall economy from my Input Price Affidavit. Over the period 1949 to 1992, input prices for U.S. telephone companies grew at virtually the same rate as for the rest of the economy. For the full 44-year period, input price growth averaged 4.8% per year for the U.S. economy and 4.7% per year for telephone companies. In spite of the pronounced short-term volatility in both series, the rates of growth are virtually the same in the long-term.

Chart 2
Comparison of U.S. Economy Input Price Growth with Telephone Industry Input Price Growth



It is straightforward to conduct a formal statistical test of the hypothesis that the trend in input price growth for the telephone industry equals the trend in input price growth for the entire U.S. economy. I have performed this test in my affidavit and found that there is no evidence that the input price trends differ. The result holds for the full 1949-1992 period, as well as for the 1949-1984 and 1985-1992 sub-periods. This means that any observed short-term differences in input price growth cannot be properly construed as representing a difference in the underlying trends of input prices for the LECs and the entire U.S. economy.

Furthermore, to my knowledge, no one has provided evidence to support the proposition that LEC input prices will rise slower than U.S. economy input prices in the near future. U.S. economy input price growth

reflects changes in prices for labor input and prices for capital input. Current evidence on LEC labor and capital input price trends supports an expectation that they will not differ significantly from their economy-wide counterparts.

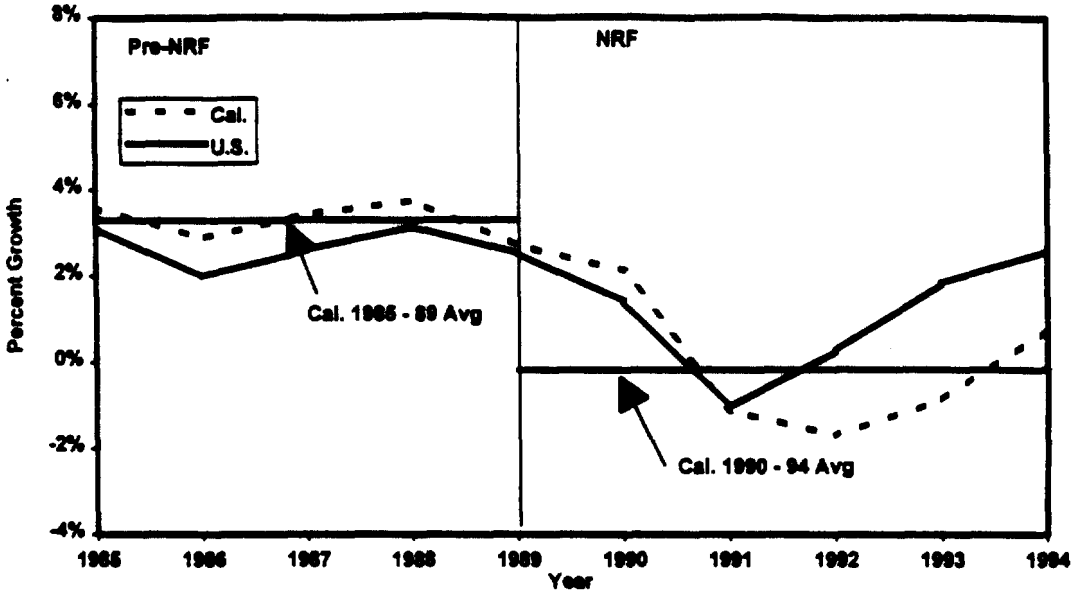
6. If a Price Cap Formula is Retained, a 2 Percent X Factor, Based on the Nation-Wide Telephone Industry TFP Differential, is a Realistic X Factor for Pacific Bell.

The Commission has found, and I concur, that a TFP growth differential based on industry-wide TFP is preferable to a company-specific TFP measure to be included in the X factor when a price cap formula approach is used. Moreover, as I have demonstrated, a non-zero input price differential, or "W" factor should not be included in the X factor. Therefore, I believe that a productivity offset of 2 percent, based on the long term TFP growth differential between the U.S. telephone industry and the U.S. economy, represents an appropriate offset for Pacific Bell, if the Commission decides to continue a formula-based approach. This is consistent with the 2.1 percent TFP growth differential between the post-divestiture LEC industry and the U.S. economy measured in my LEC study and reflects a realistic assessment of Pacific Bell's likely performance over the near-term future. Furthermore, given that this offset is based on industry-wide TFP, the efficiency-dampening linkages to rate-of-return regulation that are inherent in offsets based on company-specific performance are severed.

As I describe below, Pacific Bell's performance of the 1980's will not continue into the future. This is due to the impact on the Company of the California economy, which is relatively weaker now than it was during the late 1980's, and the effects of competition for Pacific Bell's "high margin" services, such as access and toll. These factors indicate that achieving industry average performance will be a challenging goal for Pacific Bell. Therefore, the industry-based 2 percent offset is realistic if Pacific Bell is subject to a price cap formula.

California Economic Growth has Slowed. The general economic climate has an effect on telephone company performance. The tremendous growth experienced by the California economy during the late 1980's has slowed in recent years and, as a consequence, Pacific Bell's performance has been affected. The slowdown in the California economy is reflected in the state's employment growth. Chart 3 compares California and U.S. nonfarm employment growth over the 1984-1994 period.

Chart 3
California and U.S. Non-Farm Employment Growth

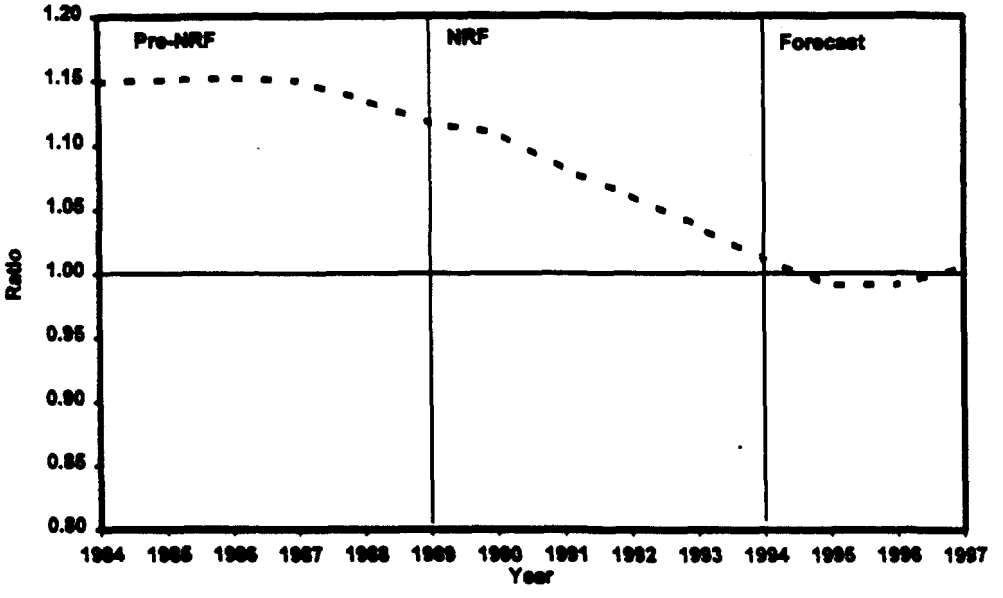


It can be seen that California employment growth has slowed considerably since 1989 and has fallen below national growth rates. From 1984 to 1989 average annual employment growth was 3.3 percent in California and 2.7 percent for the national economy. From 1990 to 1994, California experienced negative employment growth, averaging -0.2 percent annually, while U.S. employment growth averaged 1.0 percent annually.

The slowdown in the California economy is also evident in the comparison of per capita income for California and the nation. As is evident from Chart 4, California started the post-divestiture period with per capita income 15 percent above that of the nation. However, the weakening California economy has resulted in the state's per capita income falling to the

national average. In fact, annual California per capita income growth averaged only 1.6 percent between 1990 and 1994, compared to the average national growth rate of 3.9 percent over this period. Chart 4 also indicates that California is expected to perform at or below the national average through 1997.[13]

Chart 4
Per Capita Income Ratio of California To U.S.

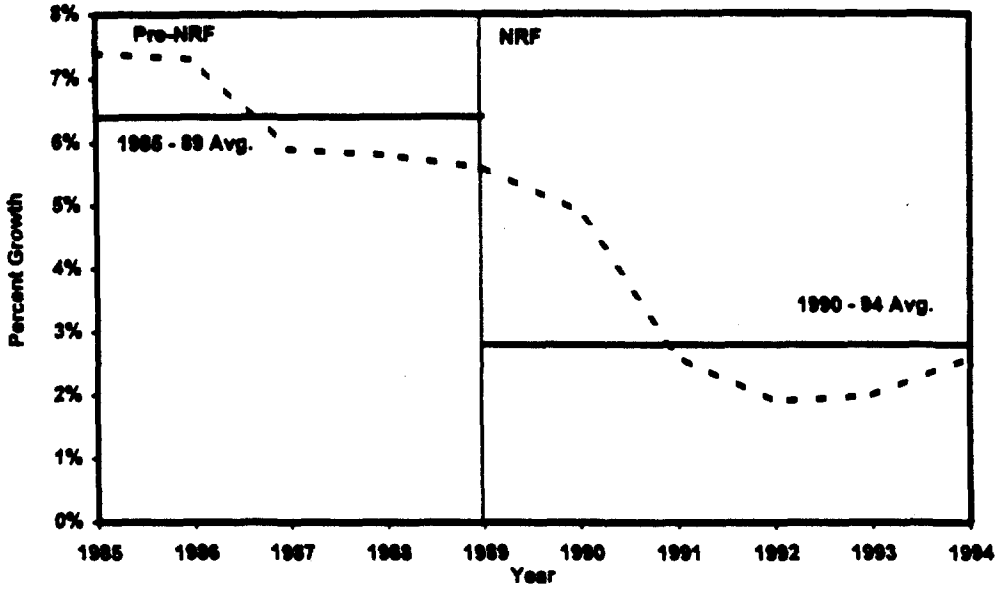


As I demonstrate below, Pacific Bell's performance is related to California's economic performance. Therefore, to the extent California continues to experience relatively weak economic performance, Pacific Bell's performance will be negatively affected and will be more in line with industry averages.

[13] The UCLA Business Forecast for the Nation and California , Conference Edition, June 1995.

Pacific Bell's Strong Performance of the 1980's is Weakening in the 1990's. Pacific Bell output growth (Chart 5) has declined as the California economy has declined.

Chart 5
Pacific Bell Total Output Growth



Average annual total output growth for Pacific Bell was 6.4 percent over the 1984 to 1989 period. This had fallen to 2.8 percent for the 1990-1994 period.

The strong California economy allowed Pacific Bell to begin the post-divestiture era with strong output and revenue growth. The fact that Company performance is influenced by the state's economic condition is apparent from the similar trends exhibited in Charts 3, 4, and 5 discussed above. In addition, Pacific Bell's performance on restraining input growth during the 1980's was among the best in the industry. In 1984, Pacific Bell

Chart 6
Pacific Bell Expenses per Average Access Line

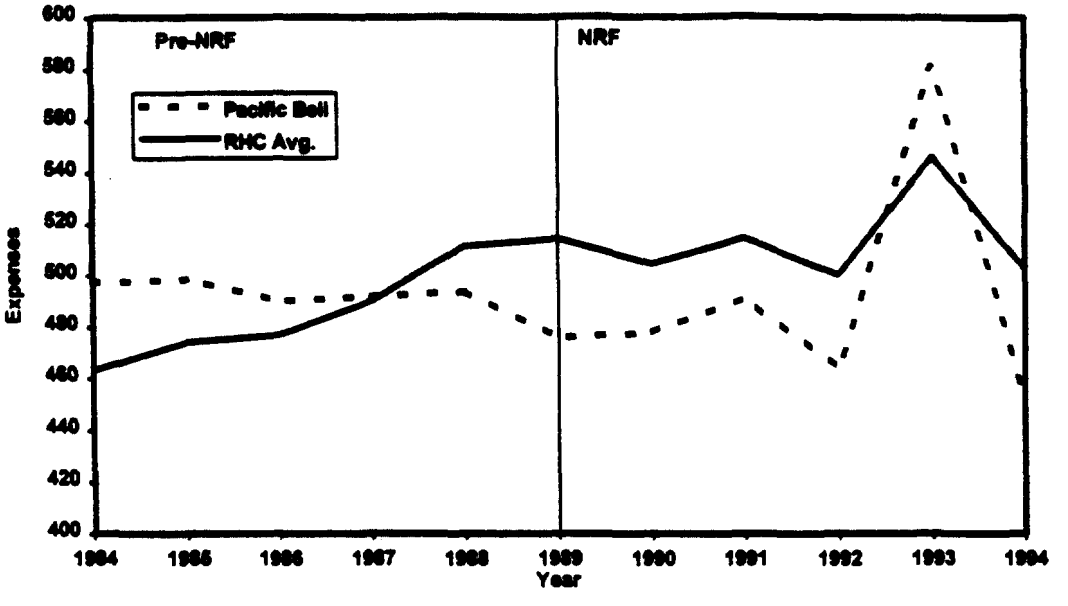
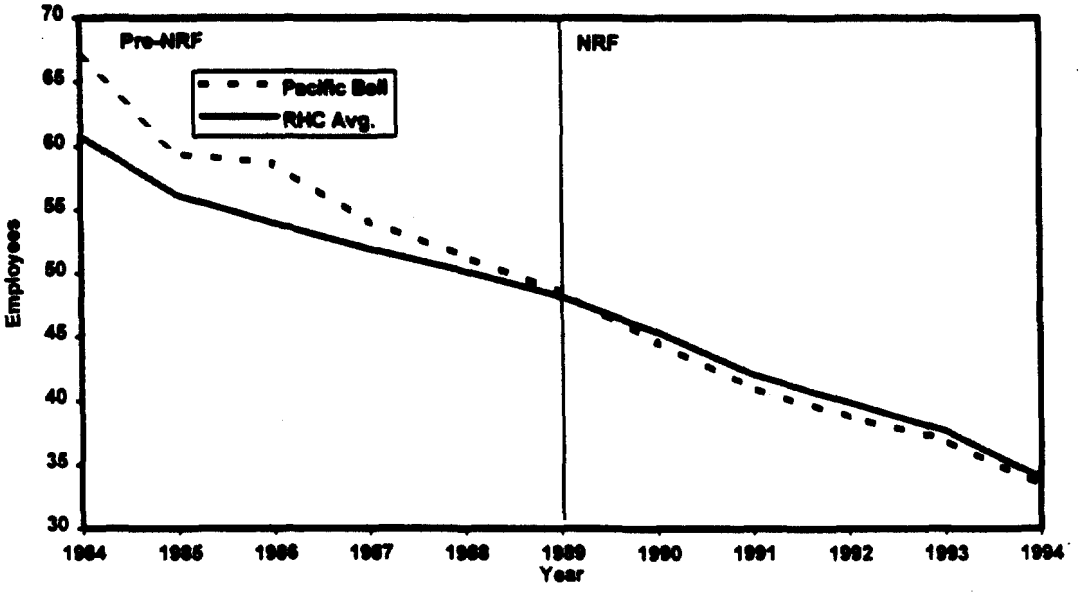


Chart 7
Pacific Bell Employees per 10,000 Access Lines



had relatively high operating expenses per average access line (Chart 6--$502 vs RHC average of $468) and relatively high employees per 10,000 access lines (Chart 7--67.0 vs RHC average of 61.2). In fact, Pacific Bell ranked next to last out of the seven RHC's in both measures in 1984. Through the Company's efforts, both of these measures improved dramatically so they were well below industry averages by 1994. Pacific Bell operating expenses per average access line declined to $458 versus the RHC average of $511, and Pacific Bell employees per 10,000 access lines declined to 33.4 versus the RHC average of 34.1. Among the RHC's, Pacific Bell ranked first and fourth, respectively on these measures in 1994. These impressive improvements relative to industry averages will be difficult for Pacific Bell to continue in the future. The Company will have to work hard just to maintain its current margin of superiority relative to industry averages.

Increased Competition for "High Margin" Services will Further Handicap Pacific Bell's TFP Performance. The decline in output growth can have a particularly debilitating effect on TFP performance if the declines are concentrated in "high margin" services, such as access and toll. This is especially important in California, where intraLATA toll markets were opened to competition this year.

Services subject to competition, such as access and toll, typically have high price-to-marginal cost ratios, which is a primary reason why such services attract competitive entry. In Appendix 2, I detail the relationship between

output growth and TFP growth. I demonstrate that when the markup of price relative to marginal cost varies over the services provided, growth in services with high price-to-marginal cost ratios contributes more to TFP growth than growth in low markup services. This is because as output of these services grows, total revenue increases more rapidly than total cost. In "real" terms, total output also increases faster than total input. Conversely, reductions in the growth of high markup services lead to disproportionate reductions in TFP growth. Using industry data, I conclude that for every 1 percentage point decline in access and toll output growth, industry TFP growth will decline by 0.2 percent.

Therefore, Pacific Bell faces the prospect of lower TFP growth as competition and bypass lead to reductions in toll and access output growth. This is in addition to the dampening effect of the California economy's slowdown on Pacific Bell's performance. The declining growth trend in these series is already apparent. As shown in Chart 8, between 1984 and 1989, Pacific's intrastate toll output grew at an average annual rate of 7.8 percent and had fallen to an annual average of 0.3 percent for the 1990-1994 period.

Chart 8
Pacific Bell Intrastate Toll Growth

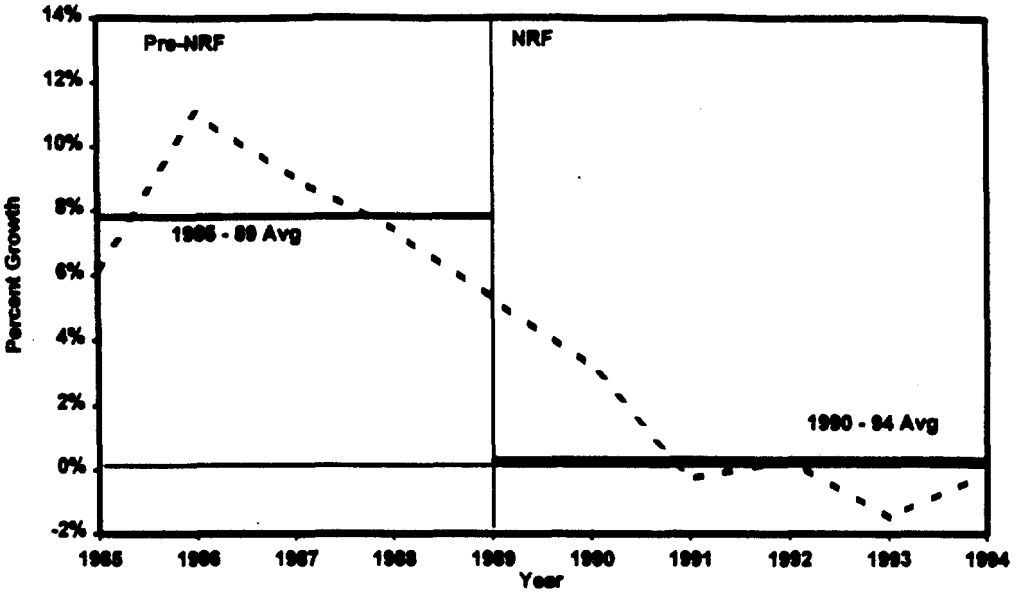
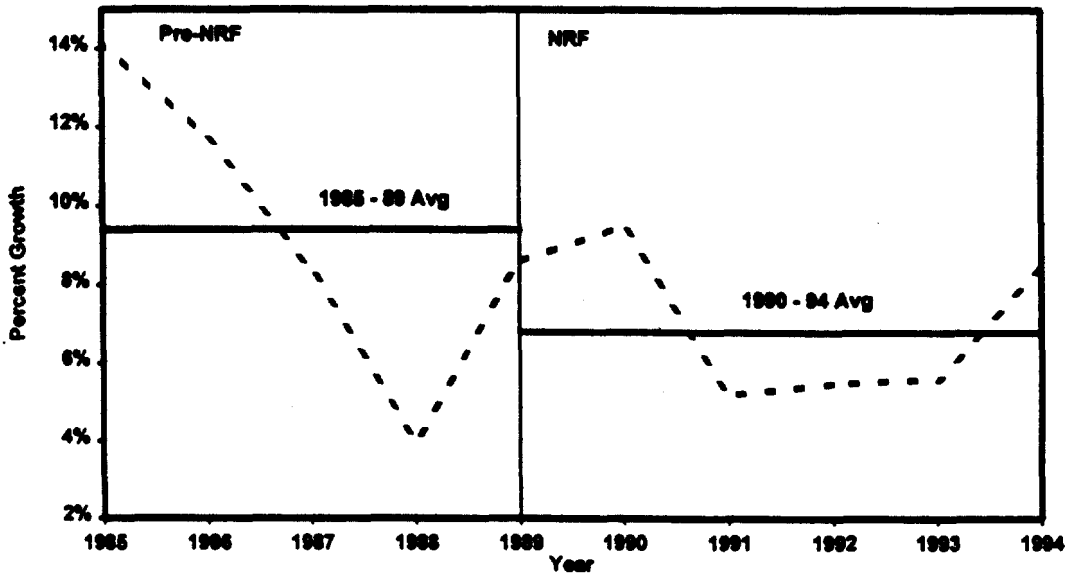
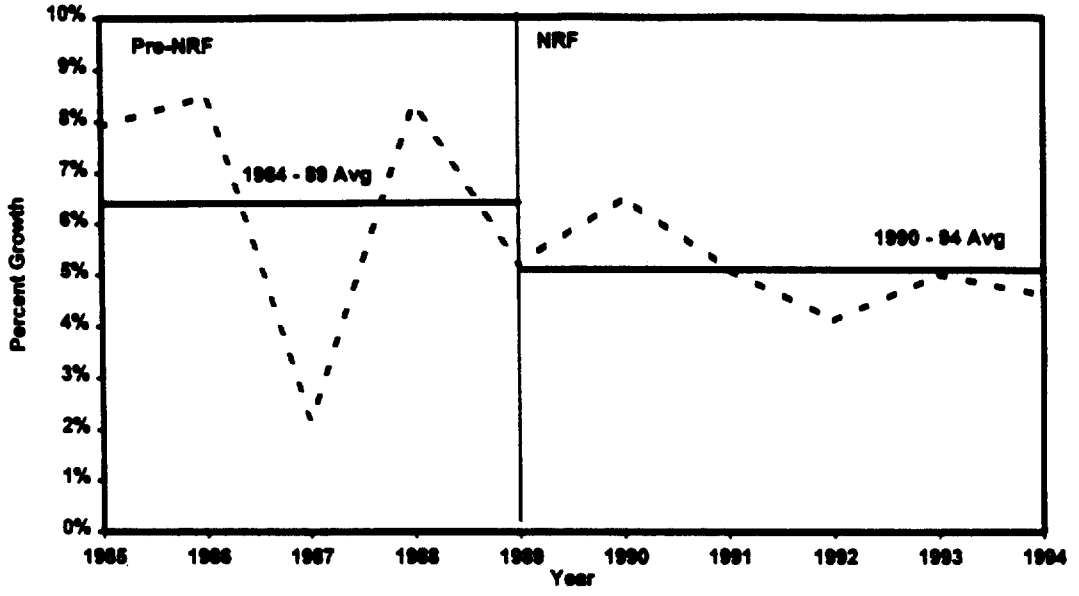


Chart 9
Pacific Bell Intrastate Access Growth



Intrastate access grew at an average annual rate of 9.4 percent during the 1984-1989 period and had fallen to 6.8 percent for 1990-1994 (Chart 9).

Chart 10
Pacific Bell Interstate Access Growth



Interstate access grew at an average annual rate of 6.4 percent over the 1984-1989 period and had fallen to 5.1 percent over the 1990-1994 period (Chart 10).

In summary, the weaker California economy has had a negative impact on Pacific Bell as recent Company performance indicates. Given that a major economic rebound is not expected in California in the near future, the state's economy will continue to restrain Pacific Bell's performance to well below that needed to achieve the 5 percent productivity growth currently embodied in price cap formula. Furthermore, competition is also having a negative impact on Pacific Bell's performance. Competition has resulted in declining output

growth in "high margin" services that contribute disproportionately to productivity growth. Therefore, not only does the overall decline in Pacific Bell's output growth portend lower performance in the future, but the fact that high-margin services are exhibiting output growth declines will have a disproportionately negative impact on Pacific Bell performance. Adding to these negative impacts on output growth is the likelihood that Pacific Bell's input growth will be more similar to industry trends instead of surpassing those trends. Therefore, if Pacific continues to be regulated by a price cap formula, an offset, based on the TFP growth differential between the U.S. LEC industry and the overall economy, is appropriate.

7. Conclusion

Pacific Bell has recommended that the current price cap mechanism for intrastate rates be eliminated. However, the first issue in D.95-07-049 also asks if the price cap formula should be modified. If modified, Pacific Bell has recommended that the offset be no more than 2 percent, based on the long run differential in productivity growth between the national telephone local exchange industry and the U.S. economy.

As the Commission recognized in its decision, D.94-06-011, an industry-wide measure of TFP is the preferred measure of TFP to use as the offset because it breaks the efficiency-dampening linkages to rate-of-return regulation that are inherent in using a company-specific measure of TFP. The

Commission also indicated that the long-awaited Bureau of Labor Statistics (BLS) measure of LEC industry TFP would be the ideal measure. However, the BLS study has been delayed, and its release date is uncertain. The study I have performed for the LEC industry in the FCC price cap proceeding is a close approximation to the anticipated BLS study. The results of my study and other studies of the telephone industry indicate a stable TFP growth differential between the telecommunications industry and the overall economy.

I believe that a productivity offset of 2 percent, based on the long term TFP growth differential between the telephone industry and the U.S. economy, would represent a challenging offset for Pacific Bell. This is consistent with the 2.1 percent TFP growth differential between the post-divestiture LEC industry and the U.S. economy measured in my LEC study and the results of the other industry studies. Furthermore, because it is based on industry-wide and not company-specific performance, it has the desirable properties recognized by the Commission in D.94-06-011. It also reflects a realistic assessment of Pacific Bell's likely performance over the near-term future. Pacific Bell's productivity performance of the 1980's will not continue into the future because of impact on the Company of the weaker California economy and the effect of competition for Pacific Bell's "high margin" services, such as access and toll. As a consequence, Pacific Bell's near-term future is likely to be one of lower output growth relative to the 1980's, at or below industry averages and input growth more like industry averages.