ATTACHMENT 2

Economic Benefits of LEC Price Cap Reform

by

Robert G. Harris

ATTACHMENT 3

Price Cap Reform, Financial Incentives and Exchange Carrier Investment

by

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Richard Schmalensee and William Taylor

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Net Effects of Exogenous Cost Adjustments for Price Cap LECs 1991-1993

NET EFFECTS OF EXOGENOUS COST ADJUSTMENTS FOR PRICE CAP LECS 1991-1993

Exogenous Cost Changes	Rule Section	Amount
Reserve Deficiency Amortization	61.45(d)(1)(i)	($455,000,000)
Changes in Accounting Rules	61.45(d)(1)(ii)	$199,000,000
Changes in Separations Rules	61.45(d)(1)(iii)	($651,000,000)
Changes in LTS and TRS	61.45(d)(1)(iv)	$106,000,000
Reallocation of Regulated Investment	61.45(d)(1)(v)	($100,000)
Tax Law Changes	61.45(d)(1)(vi)	$172,000,000
Other Extraordinary Cost Changes	61.45(d)(1)(vi)	$65,000,000
Inside Wire Amortization	61.45(d)(1)(viii)	($166,000,000)
TOTAL EFFECT		($730,100,000)

ATTACHMENT 11

GNP-PI Versus GDP-PI: 1982 to Present

GNP-PI VERSUS GDP-PI: 1982 TO PRESENT

QUARTER	GNP-PI	GDP-PI	DIFFERENCE
1982 Q1	83.5	83.4	-0.1
1982 Q2	84.3	84.3	0
1982 Q3	85.4	85.4	0
1982 Q4	86.3	86.3	0
1983 Q1	87.0	87.0	0
1983 Q2	87.7	87.7	0
1983 Q3	88.5	88.5	0
1983 Q4	89.3	89.3	0
1984 Q1	90.1	90.0	-0.1
1984 Q2	90.7	90.6	-0.1
1984 Q3	91.5	91.4	-0.1
1984 Q4	92.3	92.3	0
1985 Q1	93.2	93.2	0
1985 Q2	93.9	93.9	0
1985 Q3	94.6	94.6	0
1985 Q4	95.5	95.5	0
1986 Q1	96.1	96.0	-0.1
1986 Q2	96.6	96.6	0
1986 Q3	97.3	97.3	0
1986 Q4	98.0	98.0	0
1987 Q1	98.9	98.9	0
1987 Q2	99.5	99.5	0
1987 Q3	100.3	100.4	0.1
1987 Q4	101.3	101.3	0
1988 Q1	102.2	102.2	0
1988 Q2	103.3	103.3	0
1988 Q3	104.7	104.7	0
1988 Q4	105.6	105.6	0
1989 Q1	106.9	106.9	0
1989 Q2	108.2	108.2	0
1989 Q3	109.2	109.2	0
1989 Q4	110.2	110.2	0
1990 Q1	111.7	111.7	0
1990 Q2	112.9	112.9	0
1990 Q3	114.3	114.3	0
1990 Q4	115.3	115.3	0
1991 Q1	116.7	116.8	0.1
1991 Q2	117.7	117.8	0.1
1991 Q3	118.7	118.7	0
1991 Q4	119.5	119.5	0
1992 Q1	120.7	120.8	0.1
1992 Q2	121.7	121.8	0.1
1992 Q3	122.5	122.5	0
1992 Q4	123.4	123.5	0.1
1993 Q1	124.7	124.8	0.1
1993 Q2	125.6	125.6	0
1993 Q3	126.2	126.3	0.1
1993 Q4	126.9	127.0	0.1

Average Annual Growth

1982 Q1 - 1993 Q4	3.63%	3.64%	0.01%
1989 Q4 - 1993 Q4	3.59%	3.61%	0.02%
1992 Q4 - 1993 Q4	2.84%	2.83%	-0.01%

ATTACHMENT 1

Executive Summary of USTA's Expert Reports on
LEC Price Cap Reform

by

Robert G. Harris

EXECUTIVE SUMMARY

Experts' Reports on LEC Price Cap Reforms

United States Telephone Association

by
Professor Robert G. Harris
University of California, Berkeley, and
Law & Economics Consulting Group, Inc.

May 9, 1994

Federal Communications Commission

Notice of Proposed Rulemaking

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

1. Introduction and Purpose

Since the adoption of the current price cap regulation of the interstate access prices of Local Exchange Carriers (LECs) four years ago, the growth of competition in access services has been truly astonishing. Competitive access providers, interexchange carriers, cable television operators, satellite systems providers and customers themselves have rapidly expanded their access facilities and capabilities. It is time for the Commission to reap the harvest of competition by freeing local exchange carriers from regulations that are no longer necessary and increasingly counter-productive.

Yet, as powerful and compelling as these competitive developments are, the Commission addresses the reform of access price regulation in an even broader context: the development of the National Information Infrastructure (NII). Much to its credit, the Clinton Administration has committed to adopting policies that will accelerate the development, deployment and diffusion of advanced telecommunications services and regain global leadership for the United States in these critically important industries. This proceeding, as much as any pending before the Commission, presents a test of that commitment. Private investors — including LEC shareholders — will not risk their savings unless they are assured that the potential rewards are worth the risk: the government should not expect that wishing for private investment will make it happen. What is needed are adaptive and flexible policies that facilitate balanced competition, promote efficiency and innovation, and provide appropriate economic incentives for investment. As articulated by Vice President Gore:

> "...for the private sector to invest and for initiatives opening a market to competition to be successful, it is necessary to create a regulatory environment that fosters and promotes competition and private sector investments, while at the same time protecting consumers' interests." (International Telecommunications Union, Buenos Aires, March 21, 1994.)

In this proceeding, the Commission has an historic opportunity to make a substantial contribution toward these ends. The Commission should seize this opportunity to:

- ***Increase incentives for LEC investment in the NII by ending earnings regulation (sharing, low-end adjustment and depreciation prescription) and removing obstacles to new service offerings;***

- ***Increase incentives for LECs' to be more efficient and innovative by adopting a realistic productivity offset;***

- ***ensure that all customers benefit from growing competition in access services by using forward-looking measures of competition, granting LECs increased pricing flexibility and reducing regulatory disparities between LECs and their competitors.***

As the association of the nation's local exchange telephone carriers, the USTA has marshaled its efforts to support the Commission in that endeavor. In developing and proposing a balanced set of price cap and related access service reforms, USTA commissioned a series of economic studies for use in designing, evaluating and assessing the benefits of price cap reforms. The resulting expert reports have been submitted to the Commission in this and related proceedings. This Executive Summary will provide brief synopses of the following reports submitted with the USTA's Comments:

- The Economic Benefits of LEC Price Cap Reform, by Robert G. Harris: explains why growing competition in access service dictates changes in price caps; identifies the goals of and principles for reforming price caps; and provides the economic rationale for USTA's proposed reforms and describes the benefits of those reforms to users of access services.

- Economic Performance of the LEC Price Cap Plan, by National Economic Research Associates, Inc. (NERA): analyzes how the major components of the price cap index formula — inflation and productivity offset — have worked and explains why a reduction in the current offset is supported by long-term TFP results and would improve the incentives of price cap regulation.

- Productivity of the Local Operating Telephone Companies Subject to Price Cap Regulation, by Lauritis R. Christensen, Philip Schoeth and Mark E. Meitzen: reports the results of a Total Factor Productivity (TFP) study of price cap LECs, which found that the average annual difference between the productivity growth of the LECs and the US economy has been 1.7%.

- Comments on the USTA Pricing Flexibility Proposal, by Richard Schmalensee and William Taylor: explains why increased pricing flexibility for LECs would promote balanced competition in access services and enable LECs to better respond to customers' individual needs by charging prices that more accurately reflect the costs of providing services.

- Price Cap Reform, Financial Incentives and LEC Investment, by Larry Darby: focuses on the impact that regulation has to the level of LEC investment in the public network; concludes that the price cap reforms proposed by USTA would likely stimulate LEC investment in the public network by five percent in the first year, rising to a fifteen percent increase over the next ten years.

- Accelerating Investment in the Telecommunications Network: Impacts on Technology Adoption and Service Quality, by Lawrence K. Vanston, Technology Futures, Inc.: focuses on the acceleration of technology due to increased investment in the telecommunications infrastructure; concludes that the increased investment predicted by Darby will cause new digital services to be adopted one to two years earlier than they otherwise would be, resulting in annual increases of one percent in the quality of telecommunications services, rising to a three percent annual increase by 2004.

- The Economic Impact of Revising the Interstate Price Cap Formula for the LECs, by The WEFA Group: reports the results of macroeconomic modeling of the benefits of the USTA proposal for revising the interstate price cap formula over the next ten years: an additional 510,000 jobs; $47.9 billion increase in Gross Domestic Product in 2004; consumers save $65 billion in real terms through lower inflation; and disposable income $23 billion higher in real terms in 2004. (change numbers)

Because there was considerable collaboration among the authors in conducting their analyses and because several of these studies relied upon the work of the other authors, this Executive Summary will also describe the collaboration and explain the linkages.

2. Telecommunications and the Information Economy

In Appendix A to his report, Professor Harris examines the mounting evidence of the critical importance of telecommunications to the nation's economic welfare. Spending on communications constituted 6.1% of GNP by 1989; the combined output of the information industries will rise from 16% of GNP in 1991 to 20% in the year 2000. LECs play a critically important role in the industry, providing a major share of total investment: $21 billion, or 76% of the $28 billion total invested by all carriers in 1992. The intensity of telecommunications usage has been growing at an annual rate of 3%, with the eight most intensive user industries producing nearly half of total US output of goods and services. Increased use of telecommunications services has had an enormous impact on aggregate productivity growth, contributing 25% of the total realized in the US economy from 1975 to 1991.

Recent studies have found very strong linkages between telecommunications investment and economic growth and development at the national, state and local levels. In recognition of these impacts, many of the United States' leading global competitors have targeted telecommunications as a "strategic industry," adopting progressive public policies to accelerate more rapid development and deployment of telecommunications technologies. As a consequence, the US can no longer merely presume it will continue its international leadership in telecommunications. Affirmative policy changes are needed to unleash the full power of market forces and realize all of the potential of new telecommunications technologies.

3. The Need for Price Cap Reforms

In Section II of his report, Harris describes the dramatic changes in telecommunications in general and access services in particular, with detailed support presented in Appendix B. Demand for services has become much more diverse and more advanced, as customers have grown more sophisticated in their use of communications. Demand has also become very highly concentrated, so that entrants with geographically limited networks can reach a very substantial share of access revenues. Business customers located in just 1% of the total land

area served by LECs in ten large states constitute 30% of total LEC revenues; 75% of total revenues are located in just 8% of the land area.

The fact that revenues are so highly concentrated has attracted extraordinarily rapid entry into access services, with Competitive Access Providers growing at phenomenal rates. CAPs initially targeted special access services in the densest urban cores, but are now offering switched access; exchange services and expanding into surrounding areas and smaller cities. LECs have already proven highly vulnerable to these entrants: MFS grew a cumulative 919% over the past three years, while Teleport grew by 50% last year alone. Moreover, these are but two of the 77 CAPs serving 125 urban areas, with both numbers growing faster than one can count. Interexchange carriers have also entered the access services businesses, with MCI declaring a $2 billion commitment to build local networks, with financial backing from British Telecom.

Even as targeted competition intensifies, wholesale competition in access and local exchange services lies immediately ahead. As continuing technological improvements increase the capabilities of alternative modes of communications, intermodal competition will surely increase in the near future. IXCs, especially MCI and AT&T, are entering access and exchange services by adding access facilities to their extensive switching capabilities. Cable systems operators are deploying new digital technologies, including two-way communications. Further, market penetration by cellular carriers and the introduction of Personal Communications Services (PCS) will greatly increase competition from wireless carriers.

The emergence of these powerful competitors and market forces has swept away the "natural monopoly" of local exchange carriers. Unfortunately, the myth of the monopoly remains, perhaps because it serves so well the interests of those would prefer to compete with local exchange carriers constrained by regulatory restrictions and obligations, while they are not. In this proceeding, the Commission should reap the harvest of competition, by freeing LECs from regulations that are no longer necessary and increasingly counter-productive.

4. Policy Goals and Principles in LEC Price Cap Reforms

These changes in industry conditions have two crucial implications for public policy objectives. First, the goals and objectives — the ends — of regulatory policy should reflect the growing importance of telecommunications to the economic welfare of households, businesses and public agencies. This requires that policy makers give added weight to economic efficiency, competition and economic development effects in considering policy alternatives. Second, in developing and implementing a regulatory framework — the means to achieve those policy objectives — policy makers should take full account of the dynamics of change in telecommunications, on both the supply and demand sides. In light of these policy objectives, Professor Harris offers, in Section III of his report, a set of principles which should guide the design, evaluation and adoption of price cap reforms: substitute competition for regulation; promote competitive neutrality; facilitate market responsiveness;

synchronize regulatory and competition policies; make price cap regulation more adaptive and flexible; and shift the risks of network investments from basic ratepayers to shareholders.

5. Rationale for USTA's Price Cap Reforms: Baseline Issues

In Section IV of his report, Professor Harris explains how the USTA proposals are consistent with the policy principles he advocates and would achieve the policy goals of LEC price cap reform. He deals with five major policy changes:

1. End Rate of Return Regulation (Earnings Sharing and Low-end Adjustment): There are four main flaws in the Commission's current price cap plan for LECs. First, the low-end adjustment leaves customers at risk, since they "share" in any under-earnings. Second, sharing limits the incentives for efficiency, innovation and good performance: in competitive industries, firms that perform above industry averages earn above the industry average profit; firms that perform below average earn less. Third, sharing plans are more costly and complex to administer, because they require both an apparatus for price indexing and for regulating the rate of return. Fourth, the regulator can no longer honor its half of the rate of return contract: given the degree to which competition will develop, the Commission cannot realistically commit itself to assuring LECs the opportunity to earn a given rate of return over the life of their current investments.

There are four corresponding advantages of pure price regulation, as proposed by the USTA: First, it imposes the risk of unrecovered capital investment or unsuccessful product offerings on shareholders. Second, it does not limit the incentives for efficiency, innovation and good performance — it uses both the potential of above average returns and the threat of below average returns. Third, under the USTA plan, there is no incentive to cross-subsidize competitive services, or to price those services below incremental costs, since the carrier would be "giving away" some of the profits of its shareholders. Fourth, it would be much simpler to administer, since much of the measurement, reporting and monitoring of rate of return regulation are no longer required.

2. End Rate Base Regulation (Depreciation Prescription): The Commission should not continue to prescribe depreciation rates. The need to regulate depreciation is driven by sharing, as the argument goes: so long as the rate of return is regulated — which sharing requires — you should also regulate the rate base, i.e., prescribe depreciation rates. By regulating depreciation rates now, the Commission is also effectively regulating them into the future. By preventing LECs from depreciating their investments at rates that anticipate more rapid technological change and potential loss of market share to competition, the Commission would be denying them an opportunity to earn a reasonable rate of return, because the regulated rate of return will overstate their actual economic rate of return. Given the rates of technological change, increasing competition and the potential for quantum shifts in competition, it is imperative that LECs be able to make their own business judgments about the rate at which their amortizes their investments.

3. Streamline Regulations for New Services: The regulatory process for the introduction of new services should be streamlined, since many new services typically will be launched in a competitive environment, or will, at minimum, extend the range of options from which customers can choose. Thus, new services should be subjected to price regulation only when there is a compelling public interest reason for doing so. Delaying the revenues streams derived from the provision of new services may prevent LEC investors from realizing sufficient benefits to compensate for the substantial risk inherent in the investments needed to offer those services..

4. Exogenous Cost Changes: The ability to recover exogenous costs should be retained. In its efforts to "mirror" the workings of competitive markets, the Commission should recognize that exogenous cost changes are reflected in the prices charged by firms in competitive industries. An increase (decrease) in the costs incurred by firms in an industry effectively shifts the industry supply curve up (down), thereby increasing (decreasing) the market-clearing price. Moreover, changes in the accounting treatment of LECs may have real economic effects, given that current price cap rates were initially based on accounting costs.

5. Regulatory Parity for LECs, CAPs, IXCs and other Service Providers: Unless accompanied by appropriate reform of price caps and access charges, the Commission's promotion of local exchange competition will increase the problems of imbalanced competition and targeted entry. In light of the rapid entry by cable companies into access services and the portent of their entry into local exchange services with network that pass more than 90% of American homes, it is especially important that the Commission policies establishes a level playing field between cable companies and local exchange carriers.

6. Design of the Price Cap Mechanism

One purpose of the Commission's inquiry is to assess the economic performance of the LEC price cap plan. The NERA report focuses on how the major components of the price cap index formula, the measures of inflation and the productivity offset, have worked. Based on their analysis of the available data, NERA concludes that these two components are working within the anticipated range of outcomes and that an increase in the productivity offset would significantly dilute the very incentives that plan is intended to achieve.

The NERA report first examines the relationship between economic efficiency and the incentives facing the regulated firm under price cap regulation. They conclude that the current price cap plan fosters efficient behavior by establishing incentives comparable to those facing unregulated firms in competitive markets to provide access services at the lowest possible cost and to set prices so as to send appropriate signals to customers and competitors of the firm's access services.

NERA derives the annual adjustment formula for price caps from first principles and demonstrates its reliance upon appropriate measures of US. inflation, a productivity

offset and adjustments for exogenous cost changes. Though they find negligible numerical differences, there may be slight theoretical advantages and significant practical advantages to using the GDP-PI in place of the GNP-PI.

NERA then derives the theoretical relationship between the total factor productivity (TFP) growth of the regulated firm and the productivity offset in the annual price adjustment formula. From their analysis they conclude that an appropriate productivity offset is the historical differential between the annual TFP growth of the regulated LEC industry and that of the US economy. Measured in this way, the productivity offset includes the effect of any growth in minutes of use per line because the LECs' measured TFP growth uses actual growth of both minutes and lines as the measure of output. Also, measured directly, LEC TFP uses an estimate of capital input which more accurately reflects economic asset lives rather than the artificial accounting asset lives. Most importantly, NERA notes that the productivity offset should be stable over a long period of time, and the price cap review should not be used to modify the productivity offset because of the successes or failures of LECs regulated under the plan.

NERA also examines whether the Commission should adopt a mechanism which would adjust the plan to reflect changes in interest rates, finding that the plan as originally articulated properly adjusts prices to reflect changes in interest rates. No special adjustment for changes in interest rates is required because changes in interest rates represent changes in the input prices that affect every industry in the US. While changes in capital, labor or raw materials prices may affect the costs of different industries differently, depending on the mix of inputs used, NERA shows that differences in input price growth rates are implicitly part of the productivity offset in the plan. Thus interest rate changes — as well as changes in other input prices — are accounted for through the measure of US inflation (GNP-PI) and through the productivity offset, which accounts for any differences between US and industry input prices. The price cap-regulated firm thus does not automatically benefit when input prices fall; rather, it benefits only to the extent that it can adapt its inputs to the change in prices so that its costs fall relative to costs of other firms in the economy.

7. Productivity Adjustment Factor

The incentive effects of price cap regulation depend critically on the productivity offset. If set too high, the expected returns on LEC investments will lie below the levels needed to attract risk capital. The report by Laurits R. Christensen, Philip E. Schoech, and Mark E. Meitzen of Christensen Associates summarizes their study of the Total Factor Productivity (TFP) of the price cap LECs. TFP is the ratio of total output to total input, where total output includes all services provided by the LEC and total input includes the capital, labor, and materials used to provide those services. In addition, their report establishes a theoretical framework for analyzing sources of TFP growth, summarizes empirical studies of TFP growth in the telecommunications industry, and provides an analysis of TFP implications for LEC services subject to emerging competition.

The productivity offset in the price cap formula is related to the differential in productivity growth between the LECs and the US economy. Since 1984, Christensen, Schoech and Meitzen estimate that the productivity growth differential between the LECs and the overall economy has been 1.7%.

The Christensen report also provides a theoretical framework for analyzing sources of TFP growth and reviews empirical studies of TFP growth in the telephone industry. A primary source of TFP growth in the telephone industry is output growth. Furthermore, services that have relatively high levels of contribution to joint and common costs (i.e., low marginal costs relative to price) have relatively greater contributions to TFP growth. Two service groups with relatively high contribution margins are also areas that will be facing increased competition in the future — intraLATA toll and switched access. As competition increases in these services, LECs are faced with the prospect that future output growth in these areas will be less than historical growth, leading to downward pressure on TFP growth.

8. Rationale for USTA's Price Cap Reforms: Transitional Issues

As discussed in Section II and Appendix A of the Harris report, competition in access services is emerging at a phenomenal rate. In other words, we are already in the transition stage, with some market areas and services already highly competitive. Under those conditions, the Commission should not be looking at these transition issues as "futuristic," as issues that should be resolved at some point in the future. The Commission should adopt, in this proceeding, a long-term price cap plan that will naturally adapt to changing market conditions and facilitate the development of healthy, balanced competition in access services. To successfully implement a transition plan, it is imperative that the Commission require, as USTA proposes, that all access providers report regularly on their facilities and access capabilities. Without that requirement, LEC competitors have a strategic interest in not disclosing or understating their capabilities to maintain regulatory restrictions on LEC as long as possible.

In light of these competitive conditions in access services, Schmalensee and Taylor assess the USTA proposal to grant LECs access pricing flexibility depending on the degree of competition present in each market area. To be consistent with economic theory and the Commission's policy objectives, access reforms must achieve the consumer benefits from pricing flexibility without incurring efficiency losses in markets where a LEC has the ability and incentive to price anticompetitively. They conclude that the USTA proposal is sound, and its adoption would serve the public interest: it would benefit customers by enabling them to purchase access services from the LECs, CAPs, or other competitors at the most efficient and lowest price.

The USTA proposes that the current LEC wire centers become the geographic areas that determine the degree of pricing flexibility. Schmalensee & Taylor believe that economic markets are generally larger than wire centers; however, the wire center is the smallest geographic area to which market power analysis can be applied. The

pricing flexibility sought in the USTA proposal will not create incentives for LECs to pursue anticompetitive strategies, and there are sufficient safeguards to address concerns regarding predation and discrimination. They also conclude that the proposed price cap structure ensures that additional LEC pricing flexibility would not facilitate subsidizing access services in competitive wire centers at the expense of access customers in less competitive areas. Instead, the additional pricing flexibility would provide the pro-competitive ability to meet competitors' prices and customers' individual needs by charging prices that more accurately reflect the costs of providing services.

A key element of the USTA proposal is the method for assessing the competitiveness of a local geographic market, which is based on the availability of competitive alternatives to a substantial fraction of the current demand for access services. We feel strongly that availability is superior to share in this context. Economic theory, the Department of Justice Merger Guidelines and the Cable Act of 1992 all suggest that the form of the USTA proposed standard for competitiveness is appropriate and realistic. Given the degree of pricing flexibility requested, the proposed criteria to classify wire centers as Transitional Market Areas (TMA) are probably conservative, and the Competitive Market Area (CMA) criteria are certainly reasonable. The USTA proposal applies these concepts to both large and small LECs, so that the necessary degree of pricing flexibility can be implemented in all relevant geographic areas as competitive conditions warrant.

There appears to be common agreement that regulatory impediments to competition in access services need to be eliminated in order to provide the maximum benefits of competition to consumers. Changes of this magnitude are not uncommon; the FCC has granted AT&T pricing flexibility when it found that circumstances warranted or required such actions. Obviously, the goal of efficient regulation is to open markets so that all potential competitors are given an opportunity to compete, and the FCC is progressing rapidly in that direction. However, much of this effort will be wasted if competition takes place in the shadow of current access regulations, which handicap LECs in their response to changing market conditions by holding a price umbrella over competitive market areas.

Incumbent LECs must be permitted to adjust their prices and products as soon as competitive alternatives are available. Otherwise, competitors will receive false economic signals and will make incorrect calculations about their ability to supply services in particular market areas. Thus the principle benefit from the provision of appropriate pricing flexibility in these markets is that market forces will determine which firms provide what services at what prices. Without increased downward pricing flexibility for the LECs, this benefit of competition will not accrue to customers, and access competition may raise industry costs rather than lower them.

9. Benefits of Price Cap Reforms: LEC Incentives and Investment

Based on his analysis of implications of capital markets and the capital budgeting process for LEC investment incentives, the report by Larry Darby concludes that

adoption of the USTA price cap reforms would increase investment in the public network by five percent initially, growing to fifteen percent over the next ten years. In reaching that conclusion, Dr. Darby consulted with Professor Harris about the incentive implications of the proposed reforms and with Dr. Vanston of TFI about the investment implications of emerging telecommunications technologies. This estimate of additional investment in the public network was then used by WEFA as one of the key inputs in the macroeconomic modeling of the benefits of price cap reform.

Darby begins by showing that, directly and indirectly though mutual funds and pension funds, a substantial share of the American people are LEC shareholders. In making investment decisions, LEC managers are subject to the discipline imposed by the financial objectives and alternative investment opportunities of their shareholders and creditors. The rate of return required to attract investment in the equity of a company is a determined by the risk free rate of interest, an inflation premium, the corporate risk premium, an equity premium, the company specific risk and the company specific regulatory risk. Company specific risk embodies investors perceptions of company's competitive conditions, threats of technological obsolescence, vulnerability to new entrants and other risks of doing business. Regulatory risk incorporates investors views of how regulations will impact revenue streams, expenses and potential returns. Investors base their expectations on real economic values, not regulatory accounting practices. So, while regulators may set depreciation rates at artificially low levels, capital markets will discount reported rates of return because they are upward-biased measures of economic profits.

Share prices reflect a forward-looking view of a company's prospects. Hence, decisions by regulators that increase market risk (e.g., by reducing entry barriers) or regulatory risk (e.g., by imposing restrictions on new service offerings) will signal managers to invest less where risk has increased relative to prospective returns, and invest more in lines of business or geographic areas where the risk-reward factor is superior. Conversely, by reducing risk (e.g., by granting pricing flexibility to meet competition or removing caps on earnings), regulators send positive signals to capital markets, which then reward managers for investing in the those lines of business in which the risk-reward tradeoff has been improved.

In this environment, Darby identifies the necessary ingredients for improving the investment climate and the sufficient conditions for increasing LEC investment in the public network. In its reform of LEC price caps, the Commission should (1) eliminate caps on earnings and depreciation prescription, both of which distort the risk-reward factor; (2) allow greater pricing flexibility to meet competition, to reduce market risk; (3) eliminate impediments to new service offerings, to accelerate the flow of revenues which justify the investment in the technologies needed to produce those services; and (4) reduce market risk by striving for regulatory parity across competitors and not handicapping LECs to protect entrants from competition.

Darby cautions the Commission that a major shift has occurred in investors' perceptions of LECs as an investment option because (1) the Commission has greatly increased market risk by actively promoting competition in local exchange

services; and (2) the demand for digital, broadband and other advanced services is unpredictable, compared to the steady, assured growth of telephone service in days past. Given these changed conditions, Darby concludes:

> "It is no longer safe to assume that investment in the public network will grow, or even be maintained at historic rates, without regard to the nature of regulatory restraints and incentives... While much has been written and said about the promise of new technologies and the array of new services that will be made available, the fact is that such developments depend on the willingness of individual investors to risk their savings... That is why price caps matter. Price cap reform is necessary to induce individuals to make available the risk capital necessary for LECs to help build the information superhighway."

10. Benefits of LEC Price Cap Reforms: Adoption of New Technologies and Service Quality Improvements

Dr. Vanston of Technology Futures, Inc. analyzes the effects of increased investment in the public telecommunications network, using the estimate of 5% growing to 15% developed in collaboration with Professor Harris and Dr. Darby. His analysis finds that the increased investment generates substantial benefits to users of the public network, through earlier deployment and adoption of new technologies that greatly improve the quality of services and offer a wide range of new services. Using standard technology forecasting methods, he quantifies the cumulative quality improvement to be 19% greater with the additional investment over the next ten years. This equates to annual quality gains of 13%, which becomes a key input in the WEFA Group's estimates of the macroeconomic benefits of price cap reforms.

Dr. Vanston first demonstrates the potential for creating mass markets in advanced telecommunications services, as has already occurred for fax machines, Local Area Networks, cellular telephone service, personal computers with modems and on-line information services. Just as data communications has replaced voice as the leading application of public networks for large business customers, the affordability, convenience and productivity gains from digital devices is creating explosive growth in the demand for data communications among small business and many residential users. As microelectronics and digitization have produced dramatic price decreases and even more dramatic quality improvements in communications equipment, the existing analog local distribution facilities of the public network — "local loops" — have become an obstacle to further advance.

For that reason, the potential benefits of converting the current public network to provide integrated digital services and broadband services to end users are enormous. Dr. Vanston illustrates the potential for mass market applications that rely on digital narrowband or broadband connectivity: Group 4 fax (much faster transmission speed and laser printer quality resolution); storage, manipulation and retrieval of electronic imaging; desktop video conferencing; interactive multimedia; and video dialtone. To cite just one rapidly growing source of demand: 6.6 million Americans called themselves "telecommuters" in 1992; the number is forecast to