An Accurate Scorecard of the Telecommunications Act of 1996: Rejoinder to the Phoenix Center Study No. 7

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New empirical research by the Phoenix Center purports to show that the Telecommunications Act was responsible for creating 92,000 new jobs in the telecommunications industry. A closer examination of the data reveals that most of those new jobs were fleeting and did not contribute to higher output. Indeed, nearly 89 percent of the 158,000 new wireline jobs that were created between February 1996 and April 2001 have been subsequently eliminated. If we apply the Phoenix Center's flawed methodology to telecommunications equipment, the Telecommunications Act would be "responsible" for eliminating 36,000 equipment-related jobs.

In this Article, we review the methodology of the Phoenix Center and explain how their analysis is flawed. If anything, by decreasing the incentive for CLECs and incumbent local exchange carriers (ILECs) to invest in their own networks, the Telecommunications Act likely was a net job destroyer. Permanent jobs that contribute to output are a byproduct of facilities-based investment and the new services that such investment makes possible. We demonstrate that every million ILEC lines lost to a CLEC via the UNE Platform translates into roughly 1,300 lost jobs through the macroeconomic multiplier effect. Because CLECs have sold roughly 10 million UNE-P lines as of December 2002, we estimate that the unbundling provisions of the Act have destroyed roughly 13,000 jobs throughout the economy through reductions in ILEC capital investment. Finally, because CLECs are projected to gain an additional 20 million lines through UNE-P by 2005, we estimate that an additional 26,000 jobs will be eliminated, which would bring the cumulative effect of the unbundling provisions to 39,000 job losses. As CLECs continue to lease the ILECs' facilities at large mandated discounts, they exploit a regulatory environment that forces the ILECs to reduce capital expenditures, thereby clouding the job outlook in the entire telecommunications industry.

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I. INTRODUCTION AND SUMMARY

This paper provides a critique of the Phoenix Center Policy Bulletin Number 7, which argues that the unbundling regime of the Telecommunications Act of 1996 "has allowed current employment levels in the wireline telecoms sector to remain 17% above historical trend, presently adding about 92,000 jobs to the wireline telecommunications segment of the economy."[1] We will show that Policy Bulletin Number 7 gives too much credit to the Act for job creation in the telecommunications industry through April 2001 and too little blame to the Act for its detrimental effects on output and job creation in the long run.

In Part II, we review the Phoenix Center's methodology and expose its flaws. First, although it purports to have incorporated a causal model, the Phoenix study does not correctly account for the overall effect of economic growth, nor does it begin to control for other causal factors, such as the rise of the Internet, which surely influenced employment in the telecommunications industry. Second, even though the Telecommunications Act was not fully implemented until 1999 and was not adopted by many states until the millennium, the Phoenix Center credits the Act for *all* job creation in the wireline telecommunications segment since February 1996. Third, applying the Phoenix Center's methodology to the telecommunications equipment sector, one must conclude that the Telecommunications Act destroyed half of all U.S. telecommunications equipment industry jobs.

In Part III, we explain why focusing on the short-term increases in employment in the telecommunications industry that followed on the heels of the

1. The Positive Effects of Competition on Employment in the Telecommunications Industry, Phoenix Center Policy Bulletin No. 7, Oct. 15, 2003 [hereinafter *Phoenix Study*].

1996 Act is misguided. Employment growth is important if it is associated with increasing domestic output. Because the mandatory unbundling provisions of the Act discouraged the new competitive local exchange carriers (CLECs) from building their own facilities, these new carriers added little to domestic output in the telecommunications industry. Therefore, it necessarily follows that productivity growth in the telecommunications industry—defined as the growth in industry output per additional unit of labor—has been reduced by the Act. Unfortunately, the principal contribution of the CLECs to jobs creation has been through increasing telemarketing jobs.

In Part IV, we review the additional social costs imposed by the unbundling provisions of the Telecommunications Act. The availability of the ILECs' lines unbundled at low regulated prices has encouraged CLECs to embrace non-sustainable business plans, which resulted in ephemeral job creation. Mandatory unbundling has also reduced the ILECs' incentive to invest in new services and facilities because it has reduced their operating cash flow. The resulting decrease in ILEC investment leads to less innovation in new services, fewer productive jobs, and less choice for consumers of telecommunications services.

II. THE PHOENIX CENTER'S FLAWED METHODOLOGY FOR ESTIMATING THE MARGINAL EFFECT OF THE TELECOMMUNICATIONS ACT ON JOBS

The Phoenix Center Report's methodology in estimating the employment effects of the 1996 Act is severely flawed, resulting in misleading conclusions concerning the impact of CLECs on long-term output and employment growth. Isolating the marginal effect of the Telecommunications Act on jobs is a sophisticated undertaking. Because the Phoenix Center did not make any attempt to perform standard forecasting procedures, its results are not reliable.

A. A Review of the Phoenix Center's Methodology

The Phoenix Center has attempted to estimate the marginal effect of the Telecommunications Act on employment in the wireline telecommunications services sector through two econometric equations. The first equation relates the number of jobs in a given month to the number of jobs in the previous month ("time-series model").[2] The second equation relates the number of jobs in a given month to personal consumption expenditures in the *same* month and non-farm employment in the *same* month ("causal model").[3] The predictions of the two models are averaged to create the forecast the number of jobs but for the Telecommunications Act. To obtain the number of jobs attributable to the Act, the Phoenix Center subtracts the forecast number of jobs in the sector from the trend-adjusted number of jobs that would have existed without the Act.

B. The Methodology Is Fatally Flawed

The Phoenix Center's methodology is flawed for a variety of reasons. The most obvious is that it ignores the myriad of other influences that contributed to employment growth in the late 1990s.

2. *Id*. at 5 n. 13.
3. *Id*.

1. The Phoenix Study Does Not Adequately Control For Other Causal Factors That Influence Employment

There are a large number of forces that influence employment in the economy. Like any other private firm, a wireline telecommunications carrier will not make permanent hires until it perceives a long-term increase in the demand for wireline telecommunications services. The growth of the Internet in the mid-to-late nineties clearly spurred wireline telecommunications carriers to expand capacity and output and thus to hire more workers. Because consumers wanted to surf the web and speak on the telephone at the same time, the demand for second telephone lines increased, thereby increasing the demand for all telecommunications inputs including labor. Subsequently, as the demand for higher-speed Internet connections developed, the carriers increased employment to enhance their networks and connect their subscribers to broadband services. The 1996 Act did nothing to induce this demand, but the Phoenix Center ignores the Internet as a potential source for labor demand.

The gross domestic product (GDP) exploded in the mid-to-late nineties, which also contributed to additional jobs in all sectors of the economy, including the telecommunications industry. Figure 1 shows the relationship between GDP growth and employment by wireline telecommunications carriers from 1990 through 2003.

Figure 1: Annualized GDP Growth Is a Leading Indicator of Employment by Wired Telecommunications Carriers

Source: Bureau of Labor Statistics (available at http://data.bls.gov/labjava/outside.jsp?survey=ce).

As Figure 1 shows, GDP growth is a leading indicator of employment in the wireline telecommunications industry. It took almost four years of economic expansion to induce wireline carriers to hire additional workers beginning in January 1996. Likewise, it took almost two years of economic contraction before wireline carriers realized that demand for telecommunications services would not sustain the new employees added from 1996 through 2001. Despite these lags between GDP growth and increases in employment, the Phoenix Center's causal model includes only *current period* measures of economic activity to explain wireline employment. The result is to attribute too little to cyclical forces and too much to the Act. In layman's terms, an employer in the third quarter of 2003 could not have incorporated news of 9 percent annualized growth in that quarter into his hiring decision during the third quarter. It is therefore no surprise that the Phoenix Center could not predict employment in the telecommunications sector in its causal model.

To correct this obvious flaw in the Phoenix Center model, we estimate a regression of quarterly wireline employment on its level during the same quarter in the previous year, GDP growth lagged 12 months (a sufficient period of time for a firm to incorporate news into its current hiring decision), and a "dummy" variable for the 1996 Act that has a value of one in the regression after the passage of the Act and zero before passage.[4] The model is estimated over the period beginning with March 1991 and ending with June 2003. This straightforward correction of the Phoenix Center's methodology results in an estimated average effect of the Act of 21,000 jobs, or about 3 percent of total wireline employment. When we estimate the model by substituting an *unlagged* measure of GDP growth for GDP growth, the explanatory power of the model declines sharply,[5] confirming our view that the appropriate model should contain a lagged measure of economic activity.

Even our smaller estimate of an average increase of 21,000 jobs since the first quarter of 1996 should not be taken to mean that the *network unbundling* provisions of the Act are responsible for this growth. Before 1996, there was no mass-market broadband in the United States; today, there are about 7 million ILEC DSL lines. In 1996, long distance carriers spent $13.5 billion on new facilities; by 2000, their capital expenditures exceeded $41 billion.[6] These expansions were not induced by unbundling, but their effects are included in the coefficient of our post-1996 dummy variable. Therefore, it is unlikely that the new local competitors have added even an average of 21, 000 new jobs over the post-1996 period.

The Phoenix Center's study admits that the "bankruptcy frenzy" in telecommunications—that is, the market's recognition of the CLECs' and long distance carriers' unsound business plans—has reduced wired telecommunications jobs.[7] By September 2003, the number of jobs in this sector was less than 12,000 above its February 1996 level. Thus, whatever the average effect of the Act over

4. The adjusted R Square of the regression is 0.736. The estimated coefficient (t-statistics in parenthesis) for lagged employment is 0.78 (9.72); the estimated coefficient for *lagged* GDP growth is 1443.81 (5.80); and the estimated coefficient for the Telecommunications Act dummy is 21.17 (3.27).

5. The adjusted R Square of the second regression is 0.598. The estimated coefficient (t-statistics in parenthesis) for lagged employment is 0.88 (6.50); the estimated coefficient for GDP growth in the same period is 1056.63 (2.52); and the estimated coefficient for the Telecommunications Act dummy is 18.21 (2.21).

6. Data from Credit Suisse/First Boston.

7. *Phoenix Center Study* at 6.

the past seven and one-half years, it surely has not induced much permanent job creation.

2. Even Though the Telecommunications Act Was Not Fully Implemented Until 1999, the Phoenix Center Credits the Act for All Job Creation in the Wireline Telecommunications Segment since February 1996

The Phoenix Center credits jobs created since February 1996 in the wireline segment to the Act: "From February-96 through April-01, employment skyrocketed by 159,000 jobs as firms scrambled to enter the wireline telecommunications business."[8] But the Act was only signed into law in February 1996.[9] The interconnection provisions of the Act were not implemented by the FCC until August 1996,[10] and the agency did not implement the non-accounting safeguards of the Act until December 1996.[11] Indeed, the FCC did not clarify which elements of the ILECs' networks should be made available at forward-looking, long-run average incremental costs (LRAIC) to competitors until November 1999.[12] More importantly, the state public utility commissions (PUCs) did not begin to establish wholesale prices until 1998,[13] and some states had not established the wholesale prices as late as July 2001.[14] Because the full force of the Act could not have been felt until the millennium or later, it is not reasonable to credit (or blame) the unbundling provisions of the Act for all of the job creation in the telecommunications industry in the intervening three-year period.

3. Applying the Phoenix Center's Methodology to the Equipment Sector, One Must Conclude That the Telecommunications Act Destroyed Half of All Equipment-Related Jobs

Finally, we applied the Phoenix Center's auto-regressive time-series methodology to predict the marginal effect of the Telecommunications Act on the number of jobs in the telecommunications equipment sector. The BLS tracks the number of jobs in the "telecommunications equipment apparatus" sector by month. We began by forecasting the number of jobs in equipment sector but for the passage of the Act according to the Phoenix Center's methodology. In particular, we estimated a time-series (autoregressive-one month) model for the 73 months from February 1990 through February 1996. Figure 2 shows actual number of jobs

8. *Id.* at 5.

9. 47 U.S.C. § 271.

10. Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, First Report and Order, CC Dkt. Nos. 96-98, 95-185, 11 F.C.C Rcd. 15,499 (1996).

11. Implementation of the Non-Accounting Safeguards of Sections 271 and 272 of the Communications Act of 1934, as Amended, First Report and Order and NPRM, CC Dkt. No. 96-149, 11 F.C.C Rcd. 18,877 (1996).

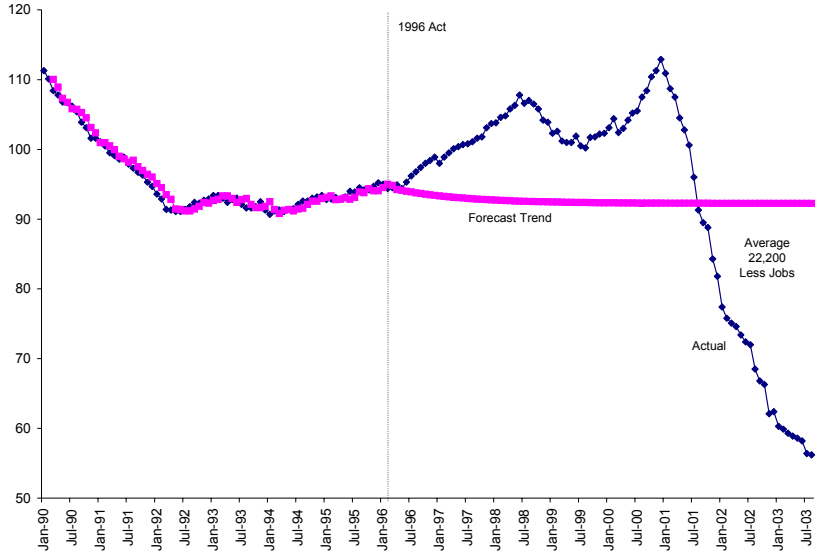
12. Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Third Report and Order and NPRM, CC Dkt. No. 96-149, 16 F.C.C. Rcd. 1724 (1999).

13. DALE E. LEHMAN & DENNIS L. WEISMAN, THE TELECOMMUNICATIONS ACT OF 1996: THE "COSTS" OF MANAGED COMPETITION (Kluwer Academic 2000).

14. *See* Billy Jack Gregg, *A Survey of Unbundled Network Element Prices in the United States* (Spring 2001), *available at* www.nrri.ohio-state.edu/programs/telcom/pdf/UNEMatrix50701.pdf. We exclude from the analysis states that do not publish their average UNE rates. These states are Alaska, Arkansas, California, Colorado, Florida, Hawaii, Louisiana, Missouri, North Dakota, New Mexico, Ohio, Rhode Island, South Carolina, and South Dakota.

in the sector from January 1990 through September 2003 and the predicted number of jobs since the passage of the Telecommunications Act.

FIGURE 2: TELECOMMUNICATIONS EQUIPMENT APPARATUS EMPLOYMENT 1990 THROUGH AUGUST 2003



Source: Bureau of Labor Statistics (available at http://data.bls.gov/labjava/outside.jsp?survey=ce).

As Figure 2 shows, employment in the equipment sector peaked at 112,900 in December 2000. Since that date, however, the equipment sector has shed some 56,700 jobs. Applying the Phoenix Center flawed methodology, one would forecast that, but for the passage of the Telecommunications Act, employment in the equipment sector would have been 92,200 in August 2003. Because actual employment as of August 2003 was only 56,200, one would conclude that the Telecommunications Act was "responsible" for eliminating 36,000 equipment-related jobs.

Although we do not believe that the results of this autoregressive model can be used to predict telecommunications equipment employment, we should note that the unbundling provisions of the Act may have contributed substantially to the problems of the equipment sector. The large equipment companies, such as Lucent and Nortel, financed a large share of the CLECs' expenditures on equipment. When it became clear that these companies' business plans, based heavily on use of unbundled elements, were faulty, most of these CLECs filed for bankruptcy. As a result, the equipment companies were devastated and forced to reduce employment substantially. Therefore, the Act surely was an important factor in the steep decline in the number of equipment jobs shown in Figure 2.

III. INCREASING EMPLOYMENT IN TELECOMMUNICATIONS SHOULD BE PART OF A LARGER OBJECTIVE TO INCREASE DOMESTIC OUTPUT

Job creation should not be an objective by itself. Increases in employment that do not produce corresponding increases in output do not contribute meaningfully

to economic welfare. The mandatory unbundling provisions of the Act, and their extension to include the entire UNE Platform, discourage CLECs from investing in their own facilities. As a result, a large share of CLEC services is simply resale of ILEC services and adds little or nothing to social output.

A. Regulatory Policy Should Not Focus Exclusively on Job Creation

If a principal of a high school can manage a student body of 250 efficiently by herself, society is not better off when the school hires an additional administrator. Likewise, if a Bell Operating Company requires a sales force of one employee for every 500 lines, then society is not better off when a CLEC hires one or more additional telemarketers to resell the same 500 lines. Domestic product is not increased by either new job. Presumably, the additional administrator and telemarketers could be put to better uses that would increase domestic product.

U.S. policymakers have come to appreciate the importance of increasing productivity. The growth rate of U.S. labor productivity (after cyclical adjustment) increased after 1995, from 1.4 percent per year over the period from 1973 to 1995, to 3.0 percent per year between 1995 and 2001.[15] The faster growth in productivity has persisted through the first three years of the new millennium. This persistence in productivity growth is credited for boosting real wages and real hourly compensation.[16] According to R. Glenn Hubbard, former Chairman of the Council of Economic Advisers, "[p]olicy should be oriented around more rapid long-run growth; this effort will benefit from a more sophisticated understanding of the process of productivity growth."[17]

Productivity is an important policy objective for several reasons. Over the long run, productivity contributes to a higher standard of living by increasing economic growth. Over the short run, productivity growth is an important determinant of labor cost and it helps in controlling inflation—that is, productivity growth allows for higher wages and faster economic growth without inflationary consequences. The use of regulation to increase employment without adding to output is not a contribution to the country's social welfare.

B. Mandatory Unbundling Discourages Competitive Carriers from Building Their Own Facilities

The Commission's unbundling decisions have encouraged the CLECs to defer pro-competitive facilities-based investments. An expanding economics literature has examined the theoretical linkages between unbundling and the incentives to invest in facilities by both incumbent providers and competitive carriers.[18] Much

15. The Executive Office of the President, Council of Economic Advisers, Economic Report of the President 2002, at 61 (available at http://www.access.gpo.gov/usbudget/fy2003/pdf/2002_erp.pdf).

16. Remarks of R. Glenn Hubbard, Chairman, Council of Economic Advisers, Productivity in the 21st Century, American Enterprise Institute, Oct. 23, 2002 (available at http://www.whitehouse.gov/cea/aei_productivity_conference_oct_23-2002.pdf).

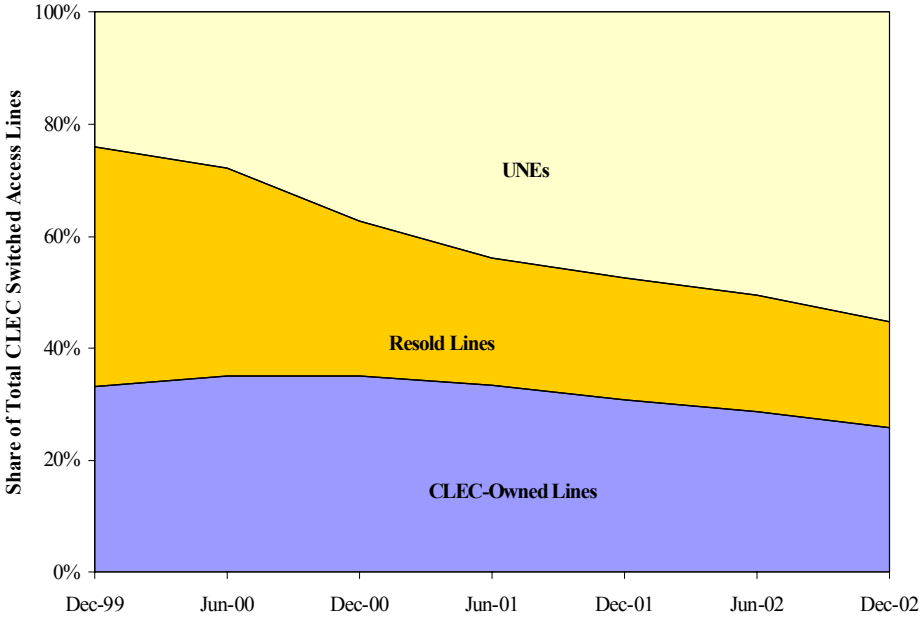
17. *Id*. at 4.

18. *See* Martin Taschdjian, *From Open Networks to Open Markets: How Public Policy Affects Infrastructure Investment Decisions*, Program on Information Program on Information Resources Policy, Harvard University (November 2000) (concluding that mandatory unbundling has "slowed investment in local networks, thereby limiting the spread of facilities-based competition for most local-access telecommunications services."); Marc Bourreau & Pinar Dogan, *Regulation and*

anecdotal evidence suggesting that low UNE prices discourage facilities-based investment also exists. Recently, empirical evidence has emerged to substantiate the theory that regulated rates can distort investment decisions. Using a cross-sectional dataset, James Eisner of the FCC and Professor Dale E. Lehman of Alaska Pacific University find empirically that decreases in UNE rates reduce facilities-based investment by entrants.[19]

One way to measure the effect of mis-priced UNEs on the method of CLEC entry is through time-series analysis. Figure 3 demonstrates that CLECs are increasingly relying on UNE-P as their preferred mode of entry.

FIGURE 3: CLECS ARE INCREASINGLY RELYING ON UNE-P AS THEIR PREFERRED MODE OF ENTRY



Source: FCC, LOCAL TELEPHONE COMPETITION: STATUS AS OF DECEMBER 31, 2002, at 6 (tbl. 3) (rel. June 12, 2003).
Note: UNEs include UNE-loops and UNE-platform.

Whereas CLECs relied on UNEs for 23.9 percent of their lines in December 1999, by December 2002, UNE lines accounted for 55.4 percent of all CLEC lines.[20] Of

Innovation in the Telecommunications Industry, 25 TELECOMM. POL'Y 167-84 (Apr. 2001); Gary Biglaiser & Michael Riordan, *Dynamics of Price Regulation*, 31 RAND J. ECON. 744-67 (2000); Koji Domon & Koshiro Ota, *Access Pricing and Market Structure,* 13 INFO. ECON. & POL'Y 77-93 (Mar. 2001); Thomas M. Jorde, J. Gregory Sidak, & David J. Teece, *Innovation, Investment, and Unbundling*, 17 YALE J. ON REG. 1 (2000) (concluding that mandatory unbundling will "diminish the incentives of both incumbent local exchange carriers (ILECs) and competitive local exchange carriers (CLECs) to invest in existing and new technologies").

19. *See*, *e.g.*, James Eisner & Dale E. Lehman, Regulatory Behavior and Competitive Entry, Presented at the 14th Annual Western Conference Center for Research in Regulated Industries, June 28, 2001 ("We find states with low UNE prices have less facilities-based entry, with more ambiguous effects on the other two forms of entry.").

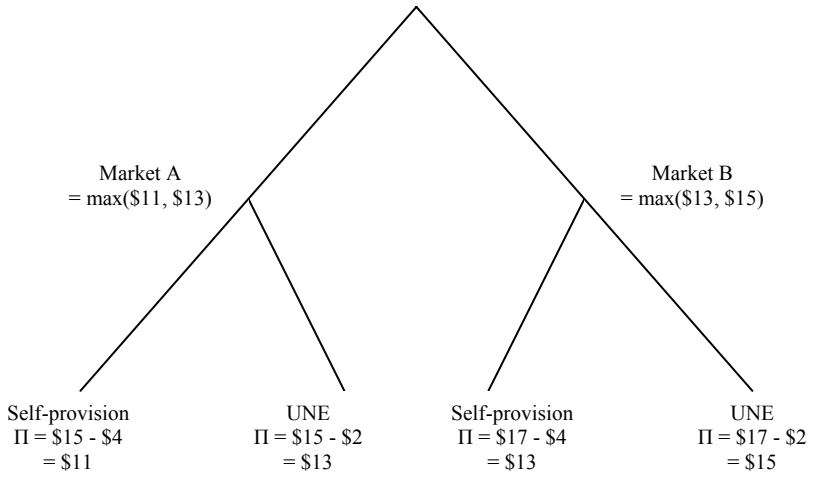
20. FCC, LOCAL TELEPHONE COMPETITION: STATUS AS OF DECEMBER 31, 2002, at 6 (tbl. 3) (rel. June 12, 2003) (available at http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/lcom0603.pdf) [hereinafter *Local Telephone Competition*].

all UNE lines in December 2002, 70.5 percent were acquired in combination with the ILEC's switch—that is they were in the form of the UNE Platform.[21] Since December 2000, the number of lines supplied by CLECs other than cable television companies over their own lines has actually declined. Clearly, the availability of mis-priced wholesale access has discouraged CLECs from investing in their own facilities (including switches) over time.

An October 2003 report by the Consumer Federation of America (CFA) purports to demonstrate that "[t]here is no evidence that reduced UNE availability leads to higher CLEC investment rates."[22] To test this hypothesis, the CFA plotted the UNE share of total CLEC residential lines in a state against the ratio of the UNE rate to the residential basic rate in that state. The exercise was repeated for business lines.[23] The CFA could not detect a pattern in the data and therefore concluded incorrectly that the pricing of UNEs does not influence the mode of CLEC entry:

Because the CFA mis-specified its model, however, the intuitive result that lower wholesale rates encourage greater UNE activity could not be gleamed from the data. In particular, the CFA erred in constructing its explanatory variable (the ratio of the UNE rate to the basic rate). As Figure 4 demonstrates below, economic theory predicts that while the basic rate influences the *degree* of entry in a market, the cost of self-provisioning influences the *mode* of entry.

FIGURE 4: CLEC DECISION TREE



In this example, a CLEC decides between market *A* and market *B* in the first stage, and then between self-provisioning and leasing in stage two. The decision tree can be solved backwards as follows: if it enters market *A*, the CLEC will earn $11 per line from self-provisioning or $13 per line from leasing a loop from the ILEC; if it enters market *B*, the CLEC will earn $13 per line from self-provisioning or $15 per line from leasing a loop from the ILEC. Because $15 (the best outcome in market B) exceeds $13 (the best outcome in market *A*), the CLEC chooses market *B*.

21. *Id*. (tbl. 4).

22. Consumer Federation of America, Competition at the Crossroads: Can Public Utility Commissions Save Local Phone Competition?, Oct. 7, 2003, at 3 (available at http://www.consumerfed.org/unep_200310.pdf).

23. *Id*. at 21 (exhibit 8).

Two important lessons can be drawn from this exercise. First, the CLEC's expected revenue per line does not depend on the how the CLEC obtains the customer. When the CLEC compares the profitability of the two entry strategies in a given market, the revenue per line cancels, which explains the CFA's failure to find the desired relationship. Second, revenue per line can affect the CLEC's decision on which market to enter. In this stylized example, the only variable that changes across markets *A* and *B* is the revenue per line. The appropriate variable to explain variation in a CLEC's mode of entry across U.S. states is the ratio of the UNE rate to the cost of self-provisioning in a state. These two factors—and not the revenue per line—determine whether a CLEC decides to invest in its own facilities.

In a paper co-authored with Dr. Allan Ingraham, we found that the mis-pricing of UNE elements by the state public utility commission (at the FCC's direction) discouraged hundreds of millions of dollars from facilities-based investment.[24] By examining the variation in facilities-based investment in loops across U.S. states and across states over time, we found that an increase in the UNE loop rate increases CLEC facilities based lines for any reasonable own-price elasticity of demand for CLEC service. We also found that facilities-based lines growth relative to UNE growth was faster in states where the cost of UNEs was higher relative to the cost of facilities-based investment. Hence, the best argument for maintaining the current unbundling regime—namely, that low UNE rates encourage CLECs to rent at first, and then build facilities once they have some market experience—is not supported by the data.

C. There Is No Evidence That the New Carriers Have Added to Domestic Telecom Output or Reduced the Price of Local Telephone Service

The new entrants have not developed innovative new services. For the most part, they have used unbundled facilities, the UNE platform (a form of carrier resale), and total service resale to bid subscribers away from the ILECs while offering virtually the same service. These new carriers hired thousands of telemarketers and billing clerks simply to place a new label on the established carriers' local services. This activity could not have contributed to telecom output. As a result, their entry could be expected to reduce labor productivity growth.

An analysis of BLS data for wired telecommunications service confirms this deduction. The BLS data reveal that productivity *declined* slightly after passage of the Telecommunications Act. Output per hour in the wired telecommunications industry grew on average by 5.5 percent per year between 1990 and 1996, and grew on average by 4.9 percent per year from 1996 to 2001.[25] The failure of the wired telecommunications sector to realize an acceleration in productivity growth is surprising given the enormous surge in productivity growth in other information technology industries. For example, productivity in computers and peripheral equipment grew on average by 29.8 percent from 1996 through 2001, and productivity in wireless telecommunications grew on average by 10.1 percent over

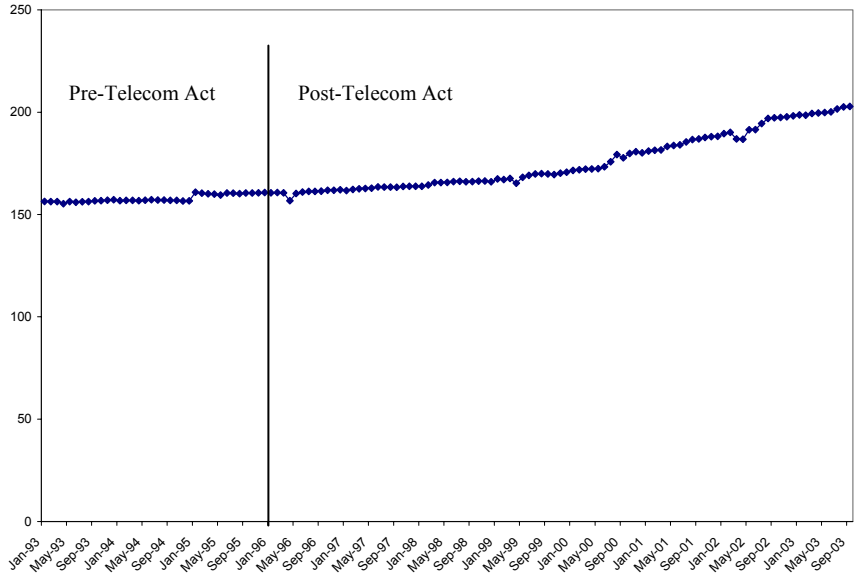
24. Robert W. Crandall, Allan T. Ingraham & Hal J. Singer, *Do Unbundling Policies Discourage Facilities-Based Investment by CLECs*, Criterion Working Paper (Nov. 2002).

25. Output per Hour, Annual Rates of Change, All Published Industries, available at BLS web site (www.bls.gov/bls/productivity.htm).

the same time period.[26] Wireline telecommunications was ideally positioned to exploit this technological revolution of the late 1990s, but despite the regulators' best intentions of regulators, productivity growth fell. Much of this decline is due to the entry of new local firms who added to employment while not contributing measurably to telecommunications output.

Moreover, CLECs have not even succeeded in driving down local service prices measurably—despite the fact that they now have more than 13 percent of the nation's access lines—as the Bureau of Labor Statistics' Consumer Price Index shows.

FIGURE 5: CONSUMER PRICE INDEX OF LOCAL TELEPHONE SERVICES, 1993-2003



Source: Bureau of Labor Statistics, Consumer Price Index, All Urban Consumers, Telephone Services, Local Charges (available at http://data.bls.gov/labjava/outside.jsp?survey=cu).
Note: Prices normalized to 1984 dollars.

As Figure 5 shows, prices of local telephone services offered by *all carriers* in urban areas grew at a slower annual rate on average before passage of the Act (1.21 percent versus 2.96 percent). According to the FCC, the average residential rate for local service provided *by ILECs* in urban areas before taxes, fees, and miscellaneous charges increased from $13.71 in 1996 to $14.55 in 2002.[27] Hence, entry by CLECs does not appear to have disciplined the pricing of ILECs. It appears, therefore, that the CLECs simply added costs to a market without adding value, a result that can only be produced by favorable government regulation.

Ironically, CLEC entry was largely an exercise in arbitrage that reduced the source of telecommunications subsidies, thereby placing upward pressure on prices for most local residential customers. Before entry, ILECs were encouraged by the

26. *Id*.

27. Trends in Telephone Service, FCC Industry Analysis Division, 2003 Report, at 13-1 (rel. Aug. 2003) (available at http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/trend803.pdf).

regulatory process to subsidize rural customers with rents from urban customers, and to subsidize residential customers with rents from business customers. Because wholesale (UNE) prices were based on incremental costs, the largest margins for CLECs were available from businesses in urban areas. As CLECs entered those high-margin areas, ILECs apparently responded by lowering their prices to businesses in those areas and eliminating subsidies—that is, increasing prices—to rural customers and residential customers. The net effect of this process was undoubtedly an increase in the price of local services for most residential customers. Hence, the largest beneficiaries of CLEC entry were business customers. But the "savings" enjoyed by businesses are properly characterized as a transfer from ILECs to business customers, not all of which is necessarily passed on to consumers.

In conclusion, because CLECs did not contribute measurably to domestic output, they contributed to a slowing of productivity growth in wired telecommunications. Thus, the Telecommunications Act's local competition provisions may have increased jobs somewhat, but they did so at the expense of productivity. Because CLECs are increasingly relying on UNE-P, their principal contribution to jobs "creation" is telemarketing jobs.

IV. Additional Social Cost Imposed by the Telecommunications Act

In addition to lower productivity, the Telecommunications Act likely reduced social welfare in several other ways. Mandatory unbundling encouraged CLECs to embrace non-sustainable business plans and reduced incumbent carriers' and facilities-based entrants' incentives to invest in new services. The resulting decrease in investment had led to less innovation in new services, fewer productive jobs, lower growth rates, and less choice for consumers of telecommunications services. In this section, we present a model that attempts to estimate the marginal effect of the unbundling provisions of the Act on jobs.

A. Mandatory Unbundling Encouraged CLECs to Embrace Non-Sustainable Business Plans

The FCC's attempt to induce competition artificially by creating a wholesale market in network facilities with prices often below actual costs has resulted in an incredible waste of resources. Given the subsidized access to their larger, incumbent rivals' facilities, the new CLECs found ready access to capital in the United States from 1996 to 2001. Capital spending by the new local carriers increased from virtually nothing to nearly $20 billion in 2000 alone.[28]

Unfortunately, these new entrants developed no new services, and now the few survivors are largely hanging on by reselling incumbent services. Very few of the survivors are likely to be able to stay the course. Once the repository of more than $100 billion in market capitalization, the publicly traded CLECs now have a scant $2.9 billion in total market capitalization after reporting more than $60 billion of

28. It is unclear how much of this reported capital spending was devoted to productive capacity. Much of it may have been spent on office facilities, collocation cages, marketing-related equipment, etc. For a discussion of this issue, see Larry F. Darby, Jeffrey A. Eisenach & Joseph S. Kraemer, The CLEC Experiment: Anatomy of a Meltdown, Progress and Freedom Foundation, Sept. 2002, at 10 *et seq*.

spending on capital facilities between 1996 and 2001.[29] As was the case in the U.S. airlines and trucking industries two decades ago, a large number of new entrants have foundered on bad business plans and a disappointing market.

TABLE 1: THE SURVIVORS—U.S. COMPETITIVE LOCAL EXCHANGE CARRIERS, JUNE 2003

Company	Estimated Lines (12/2001)	Network Strategy	Market Cap ($M) (6/30/03)	Current Status
McLeod	1,200,000	Resale	406	Emerged from Bankruptcy: Operating
Allegiance	1,005,900	UNE	6	Bankrupt
Winstar	1,000,000	Facilities (Wireless)	0	Sold in Bankruptcy; Operating
XO	800,000	Facilities (Wireless)	689	Emerged from Bankruptcy; Operating
RCN	800,000	Facilities (Cable)	218	Solvent
ICG	800,000	Facilities and UNE	0	Emerged from Bankruptcy; Operating
Intermedia	750,000	UNE	--	Sold to WorldCom
Adelphia	700,000	Resale	0	In Bankruptcy; Operating
Focal	593,000	UNE	--	Bankrupt
CTC	566,000	Resale	--	In Bankruptcy; Operating
Time Warner Telecom	348,000	Facilities	706	Solvent
Mpower	338,000	UNE	--	Bankrupt; Closed
Convergent	335,000	Resale	--	Bankrupt; Closed
ChoiceOne	300,000		13	Solvent
Ztel	297,000	UNE	9	Solvent
Network Plus	295,000	UNE	--	Bankrupt; Acquired by Broadview
CoreComm (now ATX)	295,000	Resale	11	Solvent
ITC DeltaComm	287,300	UNE	132	Emerged from Bankruptcy; Operating
e.spire	255,000	Facilities; Resale	--	Bankrupt; Sold to Xspedius
Global Crossing	250,000	Facilities	--	Bankrupt; Sold to Citizens Comm.
US LEC	249,000	UNE	102	Solvent
Pac West	247,000	UNE	27	Solvent
Net 2000	89,000	UNE	--	Bankrupt; Closed
GCI	73,000	UNE; Facilities	489	Solvent
Teligent	70,000	Facilities	--	Bankrupt
Talk America	NA	UNE-P	202	Solvent
Total in Bankruptcy or Emerging from Bankruptcy	9,334,200			
Share of CLEC Lines in Bankruptcy or Emerging from Bankruptcy	37.7%			

Table 1 shows the status of these publicly traded CLECs as of June 2003. Few have any appreciable market capitalization left, and most are in danger of closing altogether. As of June 2003, CLECs accounting for nearly 40 percent of the 24.8 million CLEC switched-access lines were either in bankruptcy or emerging from bankruptcy.[30] The failure of the CLECs was magnified because of the subsidies

29. Information on capital spending by the CLECs may be found in the ALTS Annual Report, *The State of Local Competition 2002,* available at http://www.alts.org/ resources.html.

30. Industry Analysis and Technology Division Wireline Competition Bureau, Local Telephone Competition: Status as of December 31, 2002 (tbl. 1) (rel. June 12, 2003) (available at http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/lcom0603.pdf).

that lured so many new carriers into the marketplace, a feature lacking in the earlier exercises of airline and trucking deregulation.

B. By Reducing Operating Cash Flow, Mandatory Unbundling Has Reduced Incumbent Carriers Incentive to Invest in New Services

The states have seized upon the FCC's liberal unbundling rules to allow entrants to lease the incumbents' entire complement of local facilities, now misleadingly called the "UNE Platform."[31] The principal effect of the Commission's failure to restrict entrants' access to this UNE platform is to reduce the incumbent LECs' operating cash flows, which are already under pressure because of the growth in UNE-Ps and the loss of second lines to broadband. The RBOCs' operating cash flow historically has served as a good predictor of RBOC investment in plant and equipment. Because unbundling decreases an ILEC's cash flows, and because cash flows are used to finance ILEC investment, unbundling generally lowers ILEC investment in a proportionate manner.

In this section, we use a four-step procedure to translate lines lost by the ILECs to a CLEC via UNE-P into reduced capital expenditures by the ILECs. Because of the lack of analyst forecasts for ILECs other than the RBOCs, we consider only RBOC capital expenditures in this section.[32] We demonstrate that for every line lost to a CLEC via UNE-P at the current regulated rates, the RBOC loses roughly $18.50 in revenue, $15.50 in earnings, and $10 in operating cash flows each month. This reduction in cash flow, in turn, reduces the ILEC's capital spending.

1. An ILEC Line Lost to a UNE-Based CLEC Translates into Less Revenue

When an RBOC loses a line to a CLEC via UNE-P or UNE-L, the RBOC receives less revenue on that line than when the end-user purchases the line directly from the RBOC at the retail rate. Table 2 shows the estimates of average retail and UNE-P revenue per line for each RBOC from two different sources.

31. "UNE Platform" is an artful phrase used by regulators to describe a wholesale facility that requires no unbundling whatsoever.

32. According to the FCC, RBOCs constituted 85 percent of ILEC retained end-user lines and 98 percent of ILEC lines lost to UNE-P and UNE-L as of December 2002. Therefore, out of all the ILECs, the RBOCs will realize almost all of the gains in ILEC end-user access lines resulting from the elimination of the UNE-P regulations. *See* FEDERAL COMMUNICATIONS COMMISSION, LOCAL TELEPHONE COMPETITION: STATUS AS OF DECEMBER 31, 2002, *available at* http://www.fcc.gov/wcb/iatd/comp.html, Table 4 (June 2003) [hereinafter LOCAL COMPETITION REPORT]; FCC, *Selected RBOC Telephone Data from FCC Form 477 as of 12/31/02* (June 2003), *at* http://www.fcc.gov/wcb/iatd/comp.html.

TABLE 2: MONTHLY LOSSES IN REVENUE PER LINE FROM UNE-P

	Retail Revenue Per Line		UNE-P Revenue Per Line		Lost Revenue Per Line	
RBOC	UBS Warburg	Commerce Capital Markets	UBS Warburg	Commerce Capital Markets	UBS Warburg	Commerce Capital Markets
BellSouth	$36.72	$53.69	$18.43	$23.10	$18.29	$30.59
Qwest	$33.06	$51.10	$18.33	$22.94	$14.73	$28.16
SBC	$34.25	$51.23	$14.50	$16.55	$19.76	$34.68
Verizon	$32.99	$42.49	$15.10	$19.40	$17.89	$23.09
Average					$18.57	

Sources: John Hodulik, UBS Warburg, *The Regional Bells: How Much Pain from UNE-P?* (Aug. 20, 2002); Anna Maria Kovacs, Kristin L. Burns, & Gregory S. Vitale, Commerce Capital Markets, *The Status of 271 and UNE-Platform in the Regional Bells' Territories* (Nov. 8, 2002).

To be conservative, we rely on UBS Warburg's (smaller) estimates of average revenue lost per month per line to UNE-P. We assume that the difference in lost revenue per line when an RBOC loses a line to UNE-L versus a UNE-P at regulated rates is equal to the average regulated switching rate per month.[33] We also assume that the change in lost revenue per line when an RBOC loses a line to UNE-P at regulated rates or voluntary UNE-P is equal to the difference between the regulated switching rate per month and the voluntary switching rate per month. In the next step, we convert the lost revenue per line into lost earnings.

2. Lower Revenues Translate into Lower Cash Flows

Operating earnings are equal to the difference between revenues and costs. UBS Warburg and Commerce Capital Markets estimate per line costs for each RBOC and use these estimates to calculate earnings per line. UBS Warburg assumes that 5 percent of the operating cost per line and 20 percent of selling, general, and administrative (SG&A) expenses per line are avoided when a CLEC acquires the line via UNE-P. Commerce Capital Markets uses estimates of retail per-line costs minus marketing and administrative costs as a proxy for the per-line cost of leasing a UNE-P. With these estimates, the analysts calculate the average earnings per-line listed in Table 3.

33. The current regulated monthly switch rates per line for each RBOC are calculated by multiplying the average of the local originating and local terminating switching rates per minute of use (MOU) by the total dial equipment minutes (DEM) per line for each state. *See* Anna Maria Kovacs, Kristin L. Burns, & Gregory S. Vitale, Commerce Capital Markets, *The Status of 271 and UNE-Platform in the Regional Bells' Territories*, at 11 (Nov. 8, 2002).

TABLE 3: LOSSES IN EARNINGS PER LINE OF UNE-P, 2002

	Retail Earnings Per Line		UNE-P Earnings Per Line		Lost Earnings Per Line	
RBOC	UBS Warburg	Commerce Capital Markets	UBS Warburg	Commerce Capital Markets	UBS Warburg	Commerce Capital Markets
BellSouth	$18.12	$13.91	$2.47	($10.84)	$15.65	$24.75
Qwest	$13.00	$16.65	$1.03	($6.83)	$11.98	$23.48
SBC	$13.53	$14.25	($3.51)	($14.96)	$17.04	$29.21
Verizon	$14.59	$8.22	($0.68)	($11.25)	$15.26	$19.47

Sources: John Hodulik, UBS Warburg, *The Regional Bells: How Much Pain from UNE-P?* (Aug. 20, 2002); Anna Maria Kovacs, Kristin L. Burns, Gregory S. Vitale, Commerce Capital Markets, *The Status of 271 and UNE-Platform in the Regional Bells' Territories* (Nov. 8, 2002).

The estimates of lost earnings per line due to UNE-P at regulated rates shown in Table 3 are before interest, taxes, depreciation, and amortization (EBITDA), but these earnings do not translate directly into after-tax cash flows that are available to the companies for capital expenditures. To obtain operating cash flows (*OpCF*) we must deduct taxes and interest from EBITDA.[34] Using the top marginal corporate tax rate of 35 percent,[35] the lost operating cash flow from leasing a line through UNE-P at regulated switching rates versus retaining the line, leasing the line as a UNE-L, or leasing the line as a voluntary UNE-P is thus equal to 0.65 times lost earnings.

The ILEC margins reported in Table 3 are likely to understate the impact of unbundling in the future, as state regulators appear determined to prevent CLECs from failing. In an October 2003 report that estimates the impact of the FCC's Triennial Review Order, Moody's Investor Service estimates that UNE-P rates declined at an annual rate of 17.3 percent in 2003,[36] and as a result, RBOC revenue will decrease by $1 to $3 billion annually.[37] The continued adjustment of UNE-P rates downward is tantamount to requiring facilities-based ILECs and CLECs to finance the UNE-based CLECs operations. Nevertheless, Moody's demonstrates that, due to high marketing expenses, the UNE-P business model will fail to generate positive earnings unless the CLEC can capture 10 million lines—a breakeven level of customers that is nearly impossible for any one CLEC to satisfy.[38] Burdening the facilities-based carriers this way is a costly way of sustaining competition and is not viable over the long term.

3. Lower Cash Flows Translate into Reduced Capital Expenditures

Economists have established that there is a significant relationship between operating cash flows and capital expenditures.[39] As Figure 6 below shows, this

34. A finance textbook might define operating cash flows as EBITDA less taxes and interest less the change in net working capital. Adoption of this definition would not affect our results.

35. Internal Revenue Service, Publication 542 (2002).

36. Moody's Investor Service, The Far-Reaching Impact Of UNE-P Regulation, at 1 (Oct. 2003).

37. *Id*. at 6.

38. *Id*. at 8.

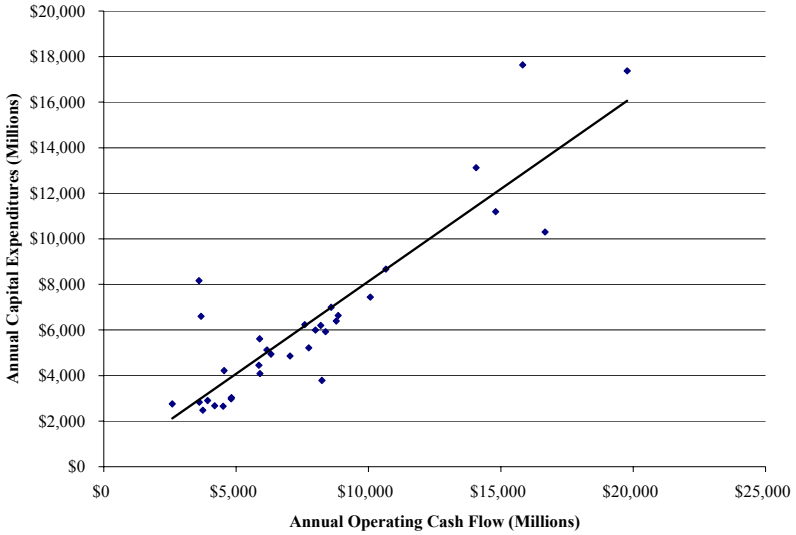
39. *See*, *e.g.*, Steven M. Fazzari, R. Glenn Hubbard & Bruce C. Peterson, *Financing Constraints and Corporate Investment*, BROOKINGS PAPERS ON ECONOMIC ACTIVITY 141-195 (1988) (showing that cash flow, defined as income after interest and taxes, plus depreciation, amortization, and other non-cash deductions from income, has as statistically significant and positive effect on

relationship appears to be linear for the Bell companies and therefore may be written as:

[3] $$Capex_t = \beta_0 + \beta_1 OpCF_t + \varepsilon_t ,$$

where $Capex_t$ is the capital expenditures for an RBOC in year t, $OpCF_t$ is the operating cash flow for the RBOC in year t, and ε_t is the error term. We use regression analysis to estimate the coefficients β_0 and β_1 using a sample of data from SEC filings on RBOC capital expenditures and operating cash flows from 1996 to 2002. The results of our regression analysis are shown in Table 4.

FIGURE 6: THE RELATIONSHIP BETWEEN RBOC OPERATING CASH FLOWS AND CAPITAL EXPENDITURES: 1996 – 2002



Sources: RBOC 10-K SEC filings; Qwest Restated Financial Results, *available at* http://www4.qwest.com/ireye/ir_site.zhtml?ticker=q&script=700.

The trendline in Figure 6 is based on a least-squares regression analysis. Table 6 shows the regression statistics.

investment, when both cash flow and investment are deflated by beginning-of-period capital); Takeo Hoshi, Anil Kashyap & David Scharfstein, *Corporate Structure, Liquidity, and Investment: Evidence from Japanese Industrial Groupings*, 56 Q. J. ECON. 33-60 (1991) (showing that cash flow, defined as after-tax income plus depreciation less dividend payments, has a statistically significant and positive effect on investment); Steven N. Kaplan & Luigi Zingales, *Do Investment Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?* 112 Q. J. ECON. 169-215 (1997) (showing that cash flow, defined as earnings before extraordinary items and depreciation, has a statistically significant and positive effect on capital expenditures when both cash flow and capital expenditures are deflated by beginning-of-period capital); Owen Lamont, *Cash Flow and Investment: Evidence from Internal Capital Markets*, 52 J. FIN. 83-111 (1997).

TABLE 4: REGRESSION STATISTICS
DEPENDENT VARIABLE IS CAPITAL EXPENDITURES

Variable	Coefficient	t-Statistic
Operating Cash Flow	0.811266	10.91
Constant	18.28659	0.03
Observations		33
R^2		0.793
Adjusted R^2		0.787

As Table 4 shows, capital expenditures increase by $0.811 for every incremental dollar of operating cash flow. Moreover, information on operating cash flows explains nearly 80 percent of the variation in capital expenditures ($R^2 = 0.793$).

C. The Resulting Decrease in Investment Leads to Fewer Jobs

As a result of these regulatory policies, U.S. telecommunications firms have instituted sharp cuts in their capital expenditures. In response, U.S. communication equipment manufacturers have decreased their spending on research and development by 23.4 percent in 2002.[40] Obviously, the result will be less innovation in telecom equipment and services.

ILEC returns on invested capital (ROIC) have been consistently declining over the past three years to the point that three of four ILECs may now have a ROIC below their weighted average cost of capital (WACC).[41] (See Table 5) According to Booz Allen Hamilton, one strategy available to ILECs to address this profit squeeze is to eliminate jobs: "Areas in which cost-reduction best practices have been applied most effectively, so far, include IT outsourcing and re-engineering of outside plant operations, as well as strategic sourcing and elimination of G&A duplications."[42]

40. CBS Marketwatch & Compustat. Reductions are relative to R&D spending in 2001.

41. Booz Allen Hamilton, Managerial Strategies and the Future of ROIC in Telecommunications, Working Paper prepared for the Second Workshop of the Managerial Strategies Module, Mar. 15, 2003, at 3.

42. *Id*. at 16.

TABLE 5: ILEC RETURNS ON INVESTMENT AND WEIGHTED AVERAGE COST OF CAPITAL 2002

RBOC	ROIC	WACC	ROIC-WACC
Verizon	7.0%	7.7%	(0.7%)
SBC	8.4%	8.5%	(0.1%)
BellSouth	10.9%	6.5%	4.4%
Qwest	0.8%	6.8%	(6.0%)

Source: Booz Allen Hamilton, Managerial Strategies and the Future of ROIC in Telecommunications, Working Paper prepared for the Second Workshop of the Managerial Strategies Module, Mar. 15, 2003, at 3 (ex. 2).

If the Act's unbundling requirements and their extension to the UNE-P were not available to entrants, the RBOCs would have invested far more in their networks. The increase in capital expenditures resulting from the elimination of these UNE-P regulations would have had a multiplicative effect on the economy if the economy were at less than full employment.[43] The multiplier specific to the telecommunications equipment manufacturers helps determine to what extent the elimination of UNE-P regulations will increase U.S. employment and gross domestic product (GDP). The multiplicative effect occurs because higher expenditures on telecommunications equipment—equivalent to higher demand for the products of equipment manufacturers—cause the equipment manufacturers to hire more employees to meet the increased demand. The equipment manufacturers' incomes increase as well due to the increased expenditures, which will increase their consumption as well. The increased consumption of the employees and owners of equipment manufacturers will in turn increase the income and employment of their suppliers. The income and employment of those suppliers will then increase, and so on. The Bureau of Economic Analysis (BEA) estimates that the employment multiplier effect for telephone and telegraph apparatus is 17.2278.[44] Hence, a one million-dollar increase in the final demand for communications equipment would create roughly 17.2 new jobs nationally. The employment multiplier for "telephone and telegraph communications, and communications services" is 16.6 for every one million-dollar increase in demand. The timeframe over which employment would increase is debatable. In most cases, the BEA considers one year to be the appropriate time horizon for its multipliers to

43. The multiplier is a standard principle in the macroeconomics literature. *See, e.g.,* RUDIGER DORNBUSCH & STANLEY FISCHER, MACROECONOMICS 66 (McGraw Hill 6th ed. 1994). Richard Kahn first introduced the multiplier concept as an "employment multiplier." *See* Richard F. Kahn, *The Relation of Home Investment To Employment,* 41 ECON. J. 173, 173-98 (1931). John Maynard Keynes expanded upon this concept by introducing the "investment multiplier," which is the multiplier used in my analysis. *See* JOHN MAYNARD KEYNES, A GENERAL THEORY OF EMPLOYMENT, INTEREST, AND MONEY 115 (Harcourt Brace & Co. 1964) (1936).

44. BUREAU OF ECONOMIC ANALYSIS, U.S. DEPARTMENT OF COMMERCE, Regional Input-Output Modeling System (RIMS II), Table 1.4 (2002). Multipliers are based on the 1997 Benchmark Input-Output Table for the Nation and 1999 regional data. We use the multiplier for telephone and telegraph apparatus (I-O code 56.0300, or SIC 3661) because it matches the products purchased by telephone service operators through their increased capital expenditures more closely than any other multiplier category. According to the 1987 SIC Manual, the industry consists of "[e]stablishments primarily engaged in manufacturing wire telephone and telegraph equipment. Included are establishments manufacturing modems and other telephone and telegraph communications interface equipment." *See* U.S. DEPT. OF LABOR, OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION, STANDARD INDUSTRIAL CLASSIFICATION MANUAL (1987), *available at* http://www.osha.gov/oshstats/sicser.html.

have achieved full effect.[45] Other economists have estimated that at least two years may be required for incremental investment to achieve its full impact on the economy.[46]

The multiplier effect is most fully realized when there is substantial excess capacity, during economic recessions or sharp declines in specific sectors. Because the economy is still recovering from the recent recession,[47] excess capacity exists, particularly in telecom equipment, but not to the extent it would during a depression. According to our previous estimates, every million ILEC lines lost to a CLEC via UNE-P translates into roughly 1,300 lost jobs through the multiplier effect. It bears emphasis that this job loss estimate is net of any jobs created by CLECs who avail themselves of UNE-P, as those CLECs make little to no capital expenditures. Imposition of unbundling thus *reduces* jobs substantially as the result of the multiplier's effect on the reduction of telecommunications investment. Because CLECs have sold roughly 10 million UNE-P lines as of December 2002,[48] and because 1,300 jobs are eliminated from the economy for every 1 million lines lost to UNE-P, we estimate that the unbundling provisions of the Act have eliminated roughly 13 million jobs throughout the economy.

The only way to resolve this negative effect with our earlier positive effect is as follows: Since 1996, the Telecommunications Act is associated with an average increase of 21,000 wireline jobs. However, implementation of the unbundling provisions of the 1996 Act has decreased capital expenditures by the ILECs and destroyed roughly 13,000 jobs throughout the economy. Most of this latter loss of jobs has occurred outside the wireline telecommunications sector.[49] Hence, the net effect of the unbundling provisions on jobs across all sectors of the economy is approximately equal to the difference between 21,000 and 13,000 jobs lost outside the telecom sector due to reduced ILEC capital expenditures.

Finally, UNE-P lines are projected to grow to nearly 30 million by 2005.[50] Assuming that ILECs will incur the same losses per line when the line is lost to a CLEC through UNE-P, we project that this expansion of UNE-P lines will result in the reduction of an additional 26,000 jobs throughout the economy. Thus, it is likely that the continuation of the Telecommunications Act's unbundling policies will offset any positive post-1996 effects on employment.

CONCLUSION

Our empirical findings demonstrate that the Telecommunications Act of 1996 has not increased productive employment in the sector because:

45. BUREAU OF ECONOMIC ANALYSIS, U.S. DEPARTMENT OF COMMERCE, REGIONAL MULTIPLIERS: A USER HANDBOOK FOR THE REGIONAL INPUT-OUTPUT MODELING SYSTEM (RIMS II), at 8 (Mar. 1997).

46. *See, e.g.,* OLIVIER BLANCHARD, MACROECONOMICS 72-73 (Prentice Hall 1997).

47. As of March 19, 2003, the National Bureau of Economic Research had not declared an end to the recession that began in March 2001. It noted that in March 2003, the U.S. economy continued "to experience growth in output and income, without growth in employment." *See* National Bureau of Economic Research, *The NBER's Business Cycle Dating Procedure* at 1, *available at* http://www.nber.org/cycles/recessions.html (Mar. 7, 2003).

48. *Local Telephone Competition*, at tbl. 4.

49. To the extent that some of the jobs eliminated through less ILEC investment were wireline jobs, then our estimate of 13,000 might be biased upward.

50. John Hodulik, UBS Warburg, *Wireline Services Model Book 2.0* (Mar. 3, 2003).

- Virtually all of the jobs "created" by the Act have subsequently been lost as investors discovered that the expansion of new entrants and long distance companies was based on unsound business plans
- The Telecommunications Act encouraged CLECs to hire superfluous personnel who did not contribute to greater industry output. Output per hour in the wired telecommunications industry grew on average by 5.5 percent between 1990 and 1996, declining to an average of 4.9 percent from 1996 to 2001, a period in which productivity in other IT-related sectors soared.
- Employment in the telecom equipment industry has plummeted since 2001 when the equipment suppliers were forced to contract by the collapse and widespread bankruptcies among CLECs and long distance companies. Much of this decline is due to the unsound CLEC business plans encouraged by regulators eager to allow widespread unbundling at artificially low prices.
- As of June 2003, CLECs accounting for nearly 40 percent of the 24.8 million CLEC switched-access lines were either in bankruptcy or emerging from bankruptcy.
- Lines lost to UNE-P decrease ILEC cash flow and capital expenditures, thereby leading to substantial declines in employment throughout the economy. These losses could be as great as 39,000 jobs by 2005.
- Every million ILEC lines lost to a CLEC via UNE-P translates into roughly 1,300 lost jobs through the multiplier effect.

By discouraging capital formation for both ILECs and CLECs, the Telecommunications Act of 1996 has destroyed more jobs than it has created. The loss in capital expenditures resulting from the FCC's unbundling policies has been especially damaging for telecommunications equipment manufacturers. These firms, including ADC Telecommunications, Ciena, Lucent, and Nortel, bear the brunt of this policy through decreased demand for their products, which are used to build and maintain facilities-based local networks. In addition to equipment manufacturers, other sectors of the economy will suffer because general economic activity is positively linked to telecommunications investment.

A proper assessment of the welfare effects of the Act must focus more on economic output in the telecommunications industry and less on the number of telemarketing jobs. The purported savings to consumers who have switched to a CLEC do not constitute an increase in economic welfare—these dollars are merely a transfer of income from the ILEC to the customers. If the goal of the Act is to facilitate such transfers, some form of tightened price regulation on the ILECs' offerings would have been a less costly approach despite all of the well-known problems of such regulation. Despite evidence to the contrary, even if were to assume that the Act had transferred income from ILEC shareholders to consumers, one would have to weigh any such "benefits" against the social costs associated with the financial havoc that the FCC and state PUCs have wreaked on investors. Much of the $60 billion invested by CLECs since 1996 has simply been wasted.

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Dr. Crandall has written widely on telecommunications policy, the economics of broadcasting, and the economics of cable television. He is the author or co-author of five books on communications policy published by the Brookings Institution since 1989. With Leonard Waverman, he is co-author of *Who Pays for Universal Service? When Telephone Subsidies Become Transparent* (Brookings Institution 2000) and *Talk Is Cheap: The Promise of Regulatory Reform in North American Telecommunications* (Brookings Institution 1996). With Harold Furchtgott-Roth, he is co-author of *Cable TV: Regulation or Competition?* (Brookings Institution 1996). He is also the author of *After the Breakup: U.S. Telecommunications in a More Competitive Era* (Brookings Institution 1991). With Kenneth Flamm, he is co-author of *Changing the Rules: Technological Change, International Competition, and Regulation in Communications (Brookings Institution 1989)*. In addition, he has published four other books on regulation and industrial organization with the Brookings Institution. With Pietro S. Nivola, he is co-author of *The Extra Mile: Rethinking Energy Policy for Automotive Transportation* (Brookings Institution 1995). He is the author of *Manufacturing on the Move* (Brookings Institution 1993). With Donald F. Barnett, he is co-author of *Up From Ashes: The U.S. Minimill Steel Industry* (Brookings Institution 1986). He is also co-author with Howard K. Gruenspecht, Theodore E. Keeler, and Lester B. Lave of *Regulating the Automobile* (Brookings Institution 1986). Dr. Crandall's work has been cited on numerous occasions by the federal judiciary and the Federal Communications Commission (FCC).

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B. Hal J. Singer

Hal J. Singer is Senior Vice President of Criterion Economics. His areas of expertise are antitrust, telecommunications and the Internet, spectrum policy, auction design and strategy, and information economics.

Dr. Singer has prepared economic expert testimony in support of, or in opposition to, many major telecommunications mergers, including AT&T-Comcast, EchoStar-DIRECTV, AOL-Time Warner, AT&T-MediaOne, Bell Atlantic-GTE, Deutsche Telekom-VoiceStream Wireless, and WorldCom-Sprint. He has made merger presentations to staff economists and lawyers at the Antitrust Division of the Department of Justice, Federal Communications Commission, and Federal Trade Commission. He has worked on pricing and takings matters concerning mandatory access to telecommunications networks, as well as on empirical estimations of demand for broadband telecommunications services.

Dr. Singer is also an expert in the area of auctions. He has advised wireless firms in the U.S. FCC C re-auction, the Australian UMTS auction, the German 3G auction, and the U.S. FCC C & F re-auction. He has testified on behalf of Allegheny Communications in the United States Court of Appeals for the District of Columbia Circuit. He has authored several economic reports for communications firms, including the Disney Corporation, Verizon, and the Brussels Roundtable, a consortium of European telecommunications carriers.

Dr. Singer has published scholarly articles on telecommunications regulation and spectrum auctions in several economics and legal journals, including the *American Economic Review Papers and Proceedings, Berkeley Technology Law Review, Hastings Law Journal*, *Journal of Business and Finance*, *Journal of Industrial Economics*, *Journal of Network Industries*, *Journal of Regulatory Economics*, *Real Property, Probate and Trusts Journal*, and *Yale Journal on Regulation*.

Before joining Criterion Economics, Dr. Singer managed the telecommunications practice at an internationally recognized consulting firm. In addition, he has worked as an economist for the Securities and Exchange Commission and has taught microeconomics and international trade at the undergraduate level.

He earned M.A. and Ph.D. degrees in economics from the Johns Hopkins University and a B.S. *magna cum laude* in economics from Tulane University.