

IN RESPONSE...

29 January 2004

A RESPONSE TO DRS. CRANDALL AND SINGER

I. Introduction

In October 2003, the Phoenix Center released its POLICY BULLETIN NO. 7 entitled *The Positive Effects of Competition on Employment in the Telecommunications Industry*.¹ This Bulletin included an analysis of employment trends in the telecommunications industry before and after the 1996 Telecommunications Act. A number of figures and statistical tests revealed that employment in the wireline telecommunications sector grew substantially, and almost immediately, after the 1996 Act. In the six-years prior to 1996, employment in the wireline telecommunications sector was falling at an annual rate of 2.3%. In 1996, this trend changed dramatically, with employment growth soaring by 25% over the next five years. This tremendous growth in employment paralleled the surge of new companies that entered the local exchange business following the passage of the important legislation. The sharp decline in sector employment, beginning in 2001, paralleled the failure of over 80% of these new entrants, caused by: (a) the inability to service multi-million (or multi-billion) dollar debt loads; (b) an overly optimistic expectations regarding incumbent cooperation with pro-competitive policies; (c) the collapse of the “internet bubble”; and (d) the recession that started in April of that year.

BellSouth recently hired Robert W. Crandall and Hal J. Singer (Criterion Economics) to respond to POLICY BULLETIN NO. 7 in their paper *An Accurate Scorecard of the Telecommunications Act of 1996: Rejoinder to the Phoenix Center Study No. 7* (January 2004) (hereinafter the “Rejoinder”).² The authors claim that the analysis presented in Figure 1 of POLICY BULLETIN NO. 7 was “flawed (at 1).” In an effort to ensure the accuracy and legitimacy of all analysis performed and released by the Phoenix Center, we have evaluated carefully the *Rejoinder* to see

¹ Available at <http://www.phoenix-center.org/PolicyBulletin/PolicyBulletin7Final.pdf>.

² Robert Crandall is also a fellow at the Brookings Institute, but was not operating in that capacity as author of this paper (*Rejoinder*, p. 1).

if the document contains any legitimate criticisms or offers any material improvements to the analysis in POLICY BULLETIN NO. 7. At the Phoenix Center, we appreciate criticism and comment, since such review can be used to either affirm or improve our analysis, thereby making our work more useful for policy decisions. In some cases, comments on our work provide direction for future research.

Curiously, however, the majority of the *Rejoinder* does not go to the merits of POLICY BULLETIN No. 7, but is instead a polemic against the Federal Communications Commission's unbundling policies of the last eight years. As the Phoenix Center is a non-profit 501(c)(3) educational and research organization and not an advocacy organization,³ we believe it inappropriate to respond to arguments that are better suited to be resolved in the course of administrative litigation before regulatory agencies.⁴ This being said, in the interest of academic debate, we do believe it appropriate to respond to some factual inaccuracies in their *Rejoinder*.

³ Indeed, the Phoenix Center as a matter of institutional policy does not act as a party in any regulatory proceeding nor attempts to lobby legislators for particular policy positions.

⁴ For example, much of the discussion in the *Rejoinder* presumes that UNE rates are below costs and that unbundling has reduced CLEC and ILEC investment. Not only has the Supreme Court rejected this argument in its entirety (going so far as to describe this argument as "founder[ing] on fact"), *Verizon v. FCC*, 122 S.Ct. 1646 (2002), but this position has no empirical support in the literature, although there are many econometric studies suggesting the opposite is true. See, e.g., PHOENIX CENTER POLICY BULLETIN NO. 4: *The Truth About Telecommunications Investment after the Telecommunications Act of 1996* (24 JUNE 2003) (<http://www.phoenix-center.org/PolicyBulletin/PolicyBulletin4Final.pdf>) shows, using government data on telecommunications investment, that the Act generated an extra \$267 billion in sector investment. POLICY BULLETIN NO. 5: *Competition and Bell Company Investment in Telecommunications Plant: The Effects of UNE-P*. (Originally released 9 July 2003 and updated 17 September 2003) (<http://www.phoenix-center.org/PolicyBulletin/PolicyBulletin5.pdf>) and POLICY BULLETIN No. 6, *UNE-P Drives Bell Investment - A Synthesis Model* (17 September 2003) (<http://www.phoenix-center.org/PolicyBulletin/PolicyBulletin6Final.pdf>) show that UNE-P competition has led to increases in investment by the Bell Companies, with an extra \$750 investment per UNE-P line (at the margin). [Ford and Pelcovits](#) (2002) (*Unbundling and Facilities-Based Entry by CLECs: Two Empirical Tests*; www.telepolicy.com) show, using two separate econometric tests motivated by the economic theory of entry, that facilities-based entry is higher in states with lower unbundled element prices. This finding suggests a complementary relationship between UNE and facilities-based entry. [Beard, Ford and Koutsky](#) (2002) (*Mandated Access and the Make-or-Buy Decision: The Case of Local Telecommunications Competition*; www.telepolicy.com) provide an empirical test of how unbundling affects CLEC switch deployment and their results indicate that CLEC deploy more switches in states with lower unbundled switching prices. A recent paper by [Beard, Ford and Ekelund](#) (2002) (*Pursuing Competition in Local Telephony: The Law and Economics of Unbundling and Impairment*, forthcoming in the JOURNAL OF LAW, TECHNOLOGY, AND POLICY, Spring 2004; www.telepolicy.com), in addition to providing an insightful economic definition of the impairment standard of the 1996 Act's section 251(d)(2)(B), present econometric evidence showing that self-supplied and unbundled switching are not effective substitutes, implying the two forms of switching are used to serve different markets. [Beard and Ford](#) (2002) (PHOENIX CENTER POLICY PAPER NO. 14, *Make-or-Buy? Unbundled Elements as Substitutes for Competitive Facilities in the Local Exchange Network* (September 2002)) provide supporting evidence of the same proposition. Other papers such as R. D. Willig, W. H. Lehr, J. P. Bigelow, (Footnote Continued...)

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Accordingly, this response first examines in Section II the *Rejoinder's* discussion of the empirical analysis in POLICY BULLETIN NO. 7. Even though we contend that many of the statistical arguments contained in the *Rejoinder* are unpersuasive, incorrect and/or invalid, we nevertheless attempt to incorporate *plausibly legitimate* suggestions into our empirical analysis in a theoretically appropriate manner. Doing so – just as we did in the case of our response in POLICY BULLETIN NO. 7 to the critiques of Drs. Hazlett, *et al.*'s critiques⁵ of POLICY BULLETIN NO. 5⁶ – does not materially alter the estimated employment effects summarized in POLICY BULLETIN NO. 7.⁷ We also find that the methods used in BULLETIN NO. 7 are preferred, in a statistical sense, to those proposed in the *Rejoinder*.

Second, we were somewhat surprised the number of factual inaccuracies and logical inconsistencies in the *Rejoinder*, and some of these are listed in Section III.

and S. B. Levinson, *Stimulating Investment and the Telecommunications Act of 1996*, Unpublished Manuscript (October 2002); K A. Hassett and L. J. Kotlikoff, *The Role of Competition in Stimulating Telecom Investment*, AEI PUBLICATION (October 2, 2002) (www.aei.org/publications/pubID.14873/pub_detail.asp) use a panel dataset to evaluate the relationship between unbundling and investment, and find a positive link between the two. Indeed, the *Rejoinder* cites two studies support their arguments, but neither employs plausibly legitimate economic or econometric techniques. For a review of these studies, see the reviews of [Do Unbundling Policies Discourage CLEC Facilities-Based Investment?](#) by Robert W. Crandall, Allan T. Ingraham, And Hal J. Singer and [Regulatory Behavior and Competitive Entry](#), by James Eisner and Dale Lehman (available at www.telepolicy.com/review.htm). In the former paper, the authors contend that a unit of telecommunications service is produced by combining a self-supplied and unbundled loop in some optimal way. No other inputs (*e.g.*, labor, switching, transport, capital, etc...) are required. These assumptions are untenable. The latter paper, which Crandall and Singer offer as empirical evidence on investment incentives, claims that the demand curve for unbundled elements slopes upward ("The effect of UNE rates on CLEC entry is positive, and in some specifications statistically significant if states with 271 approval are excluded. Further research is needed to investigate this puzzling result (at B24)"). Obviously, the results from this paper cannot be taken seriously. PHOENIX CENTER POLICY PAPER NO. 17 (T. Randolph Beard and Christopher C. Klein, *Bell Companies as Profitable Wholesale Firms: The Financial Implications of UNE-P*, PHOENIX CENTER POLICY PAPER NO. 17 (November 2002) (<http://www.phoenix-center.org/pcpp/PCPP17Final.pdf>) and [Beard, Ford, and Klein \(2004\)](#) (T. R. Beard, G. S. Ford, and C. Klein, *The Financial Implications of the UNE-Platform: A Review of the Evidence*, (Forthcoming in COMMLAW CONSPECTUS, Winter 2004)) are the only attempts to assess the relationship between UNE rates and "actual" wholesale costs in a systematic manner. Both papers, using different techniques to compute wholesale costs, find that the rates for UNE-P are (on average) not below "actual" costs and provide a generous return for the Bell Companies. The validity of the analysis contained in these papers has not been challenged. Since there is already a mountain of evidence against the Bells' favorite policy positions that are repeated in the *Rejoinder*, we do not devote further effort to that task here.

⁵ <http://www.phoenix-center.org/PolicyBulletin/HazlettetalComments.pdf>.

⁶ PHOENIX CENTER POLICY BULLETIN NO. 6: *UNE-P Drives Bell Investment - A Synthesis Model* (17 September 2003) (<http://www.phoenix-center.org/PolicyBulletin/PolicyBulletin6Final.pdf>).

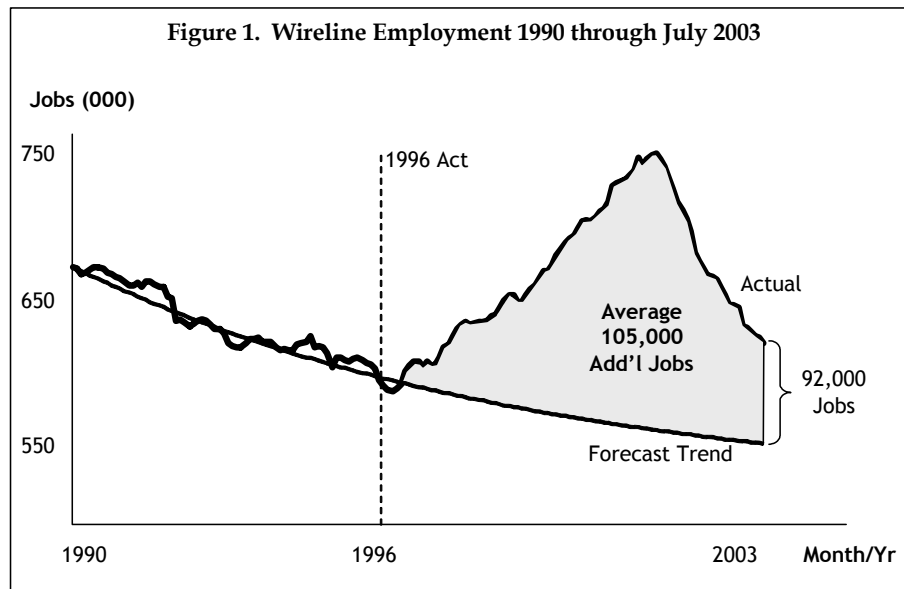
⁷ The recommended changes of R. Carter Hill (Z-Tel's advocate) TO POLICY BULLETIN NO. 5 were also helpful, but his suggestions required no modifications for consistency with economic or econometric theory. (<http://www.phoenix-center.org/PolicyBulletin/HillComments.pdf>)

Finally in Section IV, although completely unrelated to anything contained in POLICY BULLETIN No. 7, we discuss Crandall's and Singer's contention that a UNE-Loop entry strategy is a "non sustainable business plan (at 13)." We do so because based on the arguments in the *Rejoinder* related to investment and cash flow, Crandall's and Singer's analysis appears to call for policies aimed at increasing the availability of UNE-P while reducing the opportunities for UNE-L and facilities-based entry (the latter, according to Crandall and Singer, includes only entry that replicates the local loop in some way).

II. Reply to Comments on the Empirical Analysis Contained in POLICY BULLETIN No. 7

A. Employment in Wireline Telecommunications

Crandall's and Singer's attention to POLICY BULLETIN NO. 7 is, for the most part, limited to our discussion of Figure 1 in the BULLETIN. The figure, which illustrates temporal employment levels in the wireline telecommunications, is reproduced as Figure 1 below. The remaining statistical analyses in the BULLETIN are ignored in the *Rejoinder*, so we do not discuss those here.



The analysis illustrated by Figure 1 is relatively straightforward. Using regression analysis, the functional relationship between wireline employment and other economic factors prior to the Act (signed February 1996) was established. This functional relationship was then used to forecast employment after the Act under the assumption that the pre-Act relationship would be valid during the post-Act period (if the Act did not exist). Changes in any of the explanatory factors from the regression (aggregate personal consumption and total non-farm employment)

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would be reflected in the *Forecast Trend*. Additional jobs created by the Act would then be measured by the difference between actual employment during the period and the *Forecast Trend*.⁸ As illustrated in the figure, our analysis estimated an additional 105,000 jobs on average resulting from the Act, with employment in July 2003 remaining about 92,000 jobs above trend despite declines in employment beginning in the second quarter of 2001.

Crandall and Singer claim that an “obvious flaw” in our approach was that it “attribute[ed] too little to cyclical forces (at 5),” implying our forecast equation failed to properly account for the *dynamics* of employment. Their proposed solution was to base the forecast on one-year lagged values of economic growth and employment. To address this issue, we add to our model lagged values of economic growth and employment in an effort to assess the impact to our estimates of including such dynamics.⁹ The results are nearly identical to those reported in POLICY BULLETIN NO. 7. The average above-trend employment in the post-Act period was 105,700 jobs, with 106,000 above-trend jobs in July 2003. Note, however, that our original forecast method performed better statistically than this dynamic approach.¹⁰ So, we see no reason to alter our original methodology.

Crandall and Singer also contend that the rise in wireline employment *immediately* following the 1996 Act could be explained, in part, by the introduction and diffusion of broadband services. But, this claim requires the contention that the 1996 Act had nothing to do with the deployment of DSL (and Crandall and Singer make such a claim at 5.). As in other cases (discussed below), Crandall and Singer appear to be unaware of the history of DSL as a consumer product and of the facts, generally, of the competitive local exchange market. That history is described by former Chief Economist of the FCC Howard Shelanski as follows:

In the case of DSL, the technology was not deployed at all to provide retail, high-speed data services when local exchange companies had regional monopolies. ... Carriers did not offer DSL service as a consumer product on its own until late in 1996. That year, the Telecommunications Act of 1996 (“the Act”)

⁸ We expressed additional jobs in annual terms.

⁹ Thus, our new model includes current period personal consumption and non-farm employment as well as one-year lagged values of personal consumption growth and non-farm employment. Following Crandall and Singer, we use annual lags in both cases. Rather than using GDP, we continue to use personal consumption since consumption data is available on a monthly basis. Personal consumption and GDP have a correlation coefficient of 0.998, so the two are near perfect substitutes in regression analysis.

¹⁰ Performance is measured using the mean absolute percent error computed from a forecast of year 1995 values. If only the dynamic variables are used as regressors, the forecast model performs poorly (MAPE = 0.025, versus 0.005 for the regression in POLICY BULLETIN NO. 7), but still has little effect on our findings (an additional 81,000 jobs in the post-Act period).

opened the local telephone market to competition. The Act required incumbent telephone companies to lease out elements of their systems for competitors to use to provide service. New entrants were then able to lease copper “loops” that link central offices to customers, install their own DSL equipment and connections to the internet, and offer high-speed data service to customers that was cheaper and easier to obtain than T1 service.¹¹

Therefore, even if the growth in wireline employment was entirely the result of DSL, it is legitimate to conclude that this employment growth was a consequence of the unbundling provisions of the Act.

The influence of the Internet on wireline employment is perhaps a legitimate consideration.¹² Incorporating the influence of the growth of the Internet is accomplished by including a measure of employment for Internet-related jobs (we use Internet Service Provider (ISP), Search Portal, and Data Processing) in the forecast regression. (This assumes that the Act had nothing to do with the rise in Internet jobs, which is a stretch of logic.) We find that including this measure of Internet-related employment actually leads to an increase in the employment effect, with an average annual job increase of 133,000 jobs. Statistically, this regression performs worse than that used in the BULLETIN.¹³ Thus, Crandall’s and Singer’s proposal to incorporate Internet growth as a determining factor for wireline employment offers nothing in the way of improving our estimation method; if anything, the more expansive model suggests the conclusions in POLICY BULLETIN NO. 7 were conservative.

Crandall and Singer also report results from a regression model that attempts to measure the employment effect using a dummy variable approach, claiming that the coefficient on the Act dummy variable indicates that the Act added only 21,000 jobs. The problem with this approach is that Crandall’s and Singer’s model specification prohibits the ability of a dummy variable to measure the effects of the Act. Specifically, *because Crandall and Singer use post-Act wireline employment to explain post-Act wireline employment*, the effects of the Act are, to a large degree, already accounted for, thereby leaving little or nothing for an Act-indicator variable to detect. Even ignoring this error, the temporal trend in employment after the Act means it would be impossible to measure the employment effect using a dummy variable. The dummy

¹¹ See Harold A. Shelanski, *Competition and Deployment of New Technology in U.S. Telecommunications*, 2000 UNIVERSITY OF CHICAGO LEGAL FORUM (2000).

¹² *Rejoinder* at 4.

¹³ The mean absolute percent error is 0.01 with the additional variable, but only 0.005 for the regression used in POLICY BULLETIN NO. 7.

variable test assumes the slope coefficients are equal over time (figure 1 shows that this assumption is probably unreasonable).¹⁴

Crandall and Singer also assert that the Act could not be responsible for the tremendous surge in wireline employment immediately following the Act because the provisions of the Act were not established until months (and in some case years) later. (Strangely, Crandall and Singer offer no other explanation for the obvious surge in employment immediately following the 1996 Act.) Their position cannot be squared with the reality of competitive entry following the 1996 Act. For example, Intermedia Communications installed 15 switches by the end of 1997, in addition to an ATM network connecting 22 cities.¹⁵ Intermedia had installed a fiber optic network over 17,000 route miles by July 1996.¹⁶ Hyperion sought \$150 Million in financing as early as April 1996.¹⁷ And while Crandall and Singer would have you believe that competitive entry could not explain employment increases prior to November 1999 (“the FCC did not clarify which elements of the ILEC’s networks should be made available at forward-looking, long-run average increment cost to competitors until November 1999”), Bell Atlantic received approval of its Section 271 application in December 1999 based on the claim there was sufficient competitive entry. Clearly, there was substantial competitive activity prior to November 1999.

B. Telephone Apparatus Employment

Crandall and Singer attempt (but fail) to apply our analysis (from Figure 1 in BULLETIN NO. 7) to Equipment Apparatus employment. Their analysis is summarized in Figure 2 of the *Rejoinder*. There are a number of significant problems with this analysis. First, it is immediately obvious from their Figure 2 (see *Rejoinder*) that Crandall’s and Singer’s *Forecast Trend* is not a meaningful extrapolation of the pre-Act employment levels. No effort, it appears, is made by Crandall and Singer to produce a quality *Forecast Trend* that may render some useful insight into employment effects.

Second, telephone apparatus is a manufacturing industry and such industries can re-locate jobs to other countries. The decline in domestic apparatus employment could be replaced by as much or more employment in other countries (say China), but Crandall and Singer do not

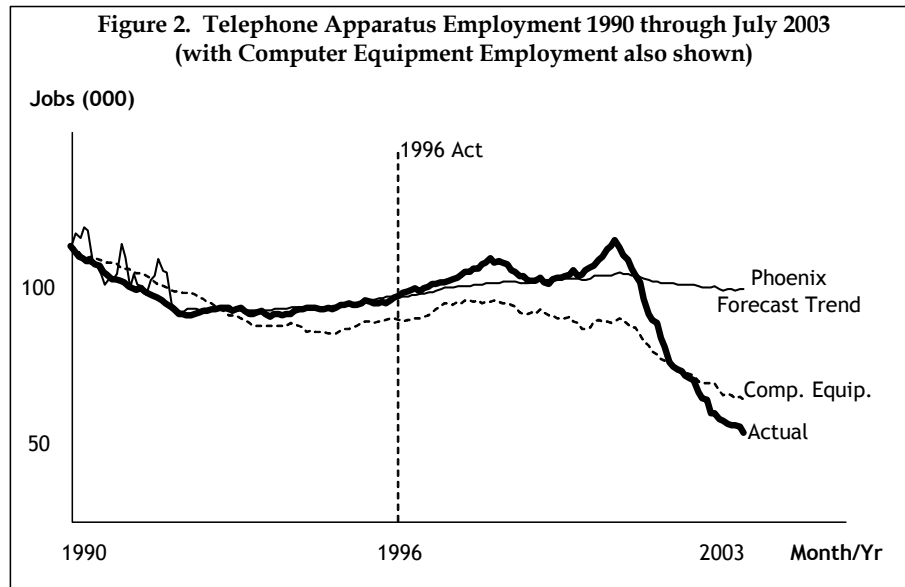
¹⁴ See, e.g., E. S. Phelps, *A Statistical Theory of Sexism*, 62 AMERICAN ECONOMIC REVIEW 659-91; J. D. Jackson and D. J. Smyth, *Specifying Differential Cyclical Response in Economic Time Series: Capacity Utilization and Demand for Imports*, 2 ECONOMIC MODELLING 149-161.

¹⁵ Intermedia Acquires Network and Switches, Intermedia Press Release (June 26, 1997).

¹⁶ CLEC Intermedia Has Installed Base Of 17,128 Fiber Miles, FIBER OPTICS NEWS, POTOMAC: Jun 3, 1996. p. 1.

¹⁷ CLEC Hyperion Files For \$150 Million In Financing, FIBER OPTICS NEWS, POTOMAC: Apr 1, 1996. p. 1.

consider this fact. Increases in productivity could also lead to job declines. Further, domestic manufacturing of electronics has, over the past few years, seen dramatic declines in overall employment, due to productivity gains and the export of jobs. Between February-96 to July-03, Computer Equipment jobs fell by 27% and Semiconductor employment fell by 20%. Between July-98 and July-03, Computer Equipment and Telephone Apparatus jobs fell by a near identical amount (44% and 47%, respectively).



As shown in Figure 2, if we include in our forecast equation a measure of electronics employment, the *Forecast Trend* is much more plausible than that illustrated in the *Rejoinder*.¹⁸ Based on this trend, we conclude the Act had very little effect on telephone apparatus employment, with employment being very close to trend for a few years following the Act. Apparatus employment did not begin its precipitous fall until 2001, coinciding with the recession and consistent with the trend in other electronic manufacturing sectors (Computer Equipment). On average, apparatus employment is down about 5,000 jobs on average, and is substantially below its pre-Act level as of July 2003 just as Computer Equipment jobs are down

¹⁸ Our forecast equation is estimated in log form and includes Computer Equipment employment and Personal Consumption. We also allow the slopes and intercept to vary prior to September 1992 to account for the obvious difference in the employment trend before and after that date. We also performed the analysis by excluding observations prior to September 1992 and the results were not much affected (depending on the explanatory variables, small positive or negative numbers could be obtained).

substantially subsequent to the Act (as shown in Figure 2). A review of Figure 2 suggests that the reduction in telephone apparatus jobs appears to be consistent with general trends in computer manufacturing.

Importantly, given that manufacturing jobs can be relocated to different countries, it is impossible to assign, without further analysis, any effect of the Act on Apparatus employment.¹⁹ It is also clear from Figure 2 that the post-Act change in Apparatus employment is not nearly as large as that seen in wireline telecommunications. We conclude from this analysis that the Act had no immediate influence on Apparatus employment, so attempts to blame the sector's demise on the Act is probably misguided.

At bottom, Crandall's and Singer's argument that (1) failed unbundling policies (2) created failed business plans which in turn (3) created losses of equipment manufacturing jobs is simply circular reasoning. That is to say, Crandall and Singer argue that the jobs created by CLECs who "embraced non-sustainable business plans" based upon mandatory unbundling were "fleeting and did not contribute to higher output." (*Rejoinder* at 1). If this logic is followed through, however, then all of the new equipment manufacturing jobs created to serve these failed business using non-sustainable business plans must also be "fleeting" as well and, as such, these jobs also "did not contribute to higher output" either.

Finally, but perhaps more significantly, Crandall's and Singer's cries of regulatory harm to the equipment manufacturing industry discounts the causative effects of the vendor community's own conduct that contributed significantly to the telecoms bubble of the 1990's. Indeed, one of the less publicized yet major factors contributing to burst of the telecom bubble of the Nineties lies with the equipment vendor community, when they flooded the market with what appeared to be "free" money in the form of vendor financing to would-be entrepreneurs and cash-starved telecoms operators. However, as the old saying goes, there is no such thing as a free lunch, and vendor financing was no exception.

Indeed, while it appeared on the surface that many vendors appeared to be saviors by providing an easy source of debt for both equipment and working capital for new entrants, the reality is that many of these vendor loans required CLECs to: (a) borrow at relatively high floating rates; (b) purchase equipment at a substantial mark-up over retail (even though a volume discount was clearly warranted in such a situation); (c) purchase more equipment than needed; and (d) purchase consulting services from the vendors (again at a mark-up). Adding to

¹⁹ It is also worth observing that even if Crandall's and Singer's claim that the Act led to a reduction of 22,000 jobs in apparatus manufacturing (p. 7), the gains in wireline employment were more than sufficient to offset these losses thereby resulting in a positive net gain in jobs.

this Faustian deal is that the vendors required CLECs to pledge everything related to their business down to the paperclips as collateral to ensure that they were further protected.

The big flaw in this arrangement is that because vendors are *not* operators with an intimate knowledge of the nuances of the industry, but rather manufacturers looking to increase equipment sales, the vendors' greed got in the way of making sound business judgments based upon thorough due diligence. Thus, when these vendor loans inevitably defaulted due to unrealistic expectations and *arguendo* – using Crandall's and Singer's own words – “non-sustainable business plans” *which they, as lenders, should have investigated before extending credit in the first instance*, the revenues and stock price of such major vendors as Alcatel, Lucent, Nortel, Corning, Intel, Cisco, *etc.* correspondingly went into the tank as well.²⁰

III. Factual Inaccuracies and Logical Inconsistencies

As noted above, the majority of the *Rejoinder* curiously does not go to the merits of POLICY BULLETIN NO. 7, but is instead a polemic against the Federal Communications Commission's unbundling policies of the last eight years. As the Phoenix Center is a non-profit 501(c)(3) educational and research organization and not an advocacy organization, we believe it inappropriate to respond to arguments that are better suited to be resolved in the course of administrative litigation before regulatory agencies. This being said, for the sake of those less familiar with the facts of the industry, we do believe it appropriate to respond to some factual inaccuracies in their polemic in this Section.

Crandall and Singer claim that labor productivity “declined slightly after passage of the Telecommunications Act (p. 11).” They are wrong. The productivity index for wireline telecommunications has increased every year from 1990 to 2001, never once declining.²¹

²⁰ What is particularly dismaying is the fact that rather than work towards rebuilding the competitive industry the burned equipment vendors are running from the CLEC community and are instead throwing themselves like lemmings to the sea upon the mercy of the incumbent local monopolists, reasoning (incorrectly) that if they support the incumbent monopolists', then the strong incumbent monopolists will reward them with lucrative equipment contracts. Indeed, many vendors have recently tacitly – if not outright overtly – supported the Bells in their policy positions before regulators under the guise of “broadband” de-regulation (perhaps under duress), and a clandestine meeting between the CEOs of the major Bell companies and equipment manufactures was recently exposed where they were plotting a joint lobbying campaign. *See, e.g.,* Brody Mullins, *Baby Bells Plan \$40M K St. Blitz*, ROLL CALL (28 Oct. 2003). The only problem is that in buttering up to the local monopolists, the equipment vendors are just exacerbating, perhaps irreparably, the structural problems to the market they themselves have created, further limiting their long-term financial prospects. The incumbent monopolists, as the sole purchasers of equipment, will require only one or two vendors and have shown themselves to be reluctant investors in new technologies. In contrast, the empirical data is overwhelming that competition spurs investment – even from the local incumbents. (*See supra* n. 4).

²¹ Data can be downloaded at: <http://ftp.bls.gov/pub/special.requests/opt/dipts/oaehin.txt>.

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Crandall and Singer also contend that output in the sector has not risen, but this is impossible. Productivity is simply the ratio of output to employees (or hours). Given that employment rose substantially following the 1996 Act and productivity continued to rise, output must have risen at least as much as employment. Government statistics show this to be true.

Crandall and Singer also contend that CLEC entry has not led to lower prices (at 11-12). However, they rebut their own claim by concluding “[a]s CLECs entered ..., ILECS apparently responded by lowering their prices (p. 13).” Furthermore, it was UNE-P CLECs that introduced the “all you can eat”/unlimited/all-distance calling plans, ensuring that no customer ever need spend more than about \$60-70 per month for local and long distance services including a full array of vertical features (voicemail, callerID, etc.). This pricing plan is without question the most innovative, welfare improving pricing innovation the telecommunications industry has seen for many decades. The analysis summarized in PHOENIX CENTER POLICY BULLETIN NO. 8, *The \$10 Billion Benefit of Unbundling: Consumer Surplus Gains from Competitive Pricing Innovations* (January 2004) estimates that this pricing innovation has the potential to provide consumers over \$10 billion annually in increased consumer surplus. Other studies also show substantial consumer benefits from price reductions resulting from competitive entry.²²

In their abstract, Crandall and Singer contend “permanent jobs that contribute to output are a byproduct of facilities-based investment and the new services that such investment makes possible (at 1).” Crandall and Singer contend, therefore, that capital expenditures are per se desirable because they render “new services.” But then, in a twist of logic, Crandall and Singer assert that “publicly traded CLECs [reported] more than \$60 billion of capital spending on capital facilities between 1996 and 2001 (at 13-14)” yet “these new entrants developed no new services (at 13).” It is not possible to reconcile these two positions. Further, it is difficult to reconcile the claim that “unbundling decisions have encouraged the CLECs to defer pro-competitive facilities-based investment (p. 8)” while also observing that “capital spending by the new local carriers increased from virtually nothing to nearly \$20 billion in 2000 alone (p. 13),” with publicly-traded CLECs “reporting more than \$60 billion of spending on capital facilities between 1996 and 2001) (p. 13-14).” As noted by the Supreme Court in *Verizon v. FCC*,²³ “actual investment in competing facilities since the effective date of the Act simply belies

²² *Telephone Competition Reports: Projected Savings Estimates by State* (Various state studies 2001, 2002), www.trac.org (“In Maryland’s local market, TRAC predicts that over 753,000 customers could switch from the incumbent to a competitive local telephone service and potentially save \$82 million annually (Maryland Study, at 3).”). By extrapolating TRAC’s estimates, Comptel estimates that consumers could save over \$9 billion annually in lower telephone costs. *Competition Could Save Consumers Up To \$9.24 Billion in Local Phone Bills, CompTel Says*, Comptel Press Release (Jan. 7, 2003): http://www.comptel.org/press/jan7_2003.html.

²³ *Supra* n. 4. 1669

the no-stimulation argument's conclusion" and is "contrary to fact".²⁴ Likewise, the investment statistics reported by Crandall and Singer bely their claim that unbundling has reduced investment by CLECs.

Crandall and Singer also claim that "new entrants have not developed innovative new services (at 11)." Nothing could be further from the truth. Covad Communications, *not the Bell Companies*, developed the DSL product for the mass market.²⁵ Z-Tel Communications, a UNE-P CLEC, has won many innovation awards and used its advanced communications technologies to provide free communications for U.S. soldiers operating in Iraq.²⁶ Top retailers, including CompUSA, Circuit City, Staples, Officemax and others, recently awarded Z-Tel's Personal Voice Assistant (PVA) "Best New Technology."²⁷ Crandall and Singer's research on the industry leaves much to be desired.

Crandall's and Singer's Table 1 contains numerous errors. For example, CoreComm/ATX is listed by the authors as having a "resale" strategy, but the company actually owns and operates six Class-V switches.²⁸ Similarly, McLeod is listed as having a "Resale" entry strategy, but the company describes itself as follows: "We are a facilities-based telecommunications provider with, as of December 31, 2002, 38 Asynchronous Transfer Mode switches, 50 voice switches, 562 collocations, 430 Digital Subscriber Line Access Multiplexers, [and] over 31,000 route miles of fiber optic cable."²⁹ Over half of McLeod's customers are serviced using UNE-L. Z-Tel was also listed UNE strategy, but in fact relies solely on UNE-P to provide the local exchange portion of its services. GCI is also a UNE-P CLEC (and cable operator).³⁰ XO Communications connects over 96% of its buildings to its network using unbundled loops purchased from the incumbents

²⁴ *Id.* at 1669.

²⁵ See Harold A. Shelanski, *Competition and Deployment of New Technology in U.S. Telecommunications*, 2000 UNIVERSITY OF CHICAGO LEGAL FORUM (2000).

²⁶ Z-Tel Wins 'Best of Innovations' Award for Design and Engineering at 2004 International Consumer Electronics Show, December 22, 2003 (Comtex; Z-Tel Press Release); *Industry Call to Action: "Operation Connect" from Z-Tel Makes Communications for Military and Their Loved Ones Free, Simple and Reliable*, BUSINESS WIRE (Apr 14, 2003).

²⁷ PVA was recently named "Best New Technology" by top US retailers. Award winners were chosen by hand-selected, top U.S. retailers, such as CompUSA, Circuit City, HSN, Staples, Best Buy, Radio Shack, Costco, Buy.com, OfficeMax.com, AOL, Office Depot and Amazon.com., at the Fall 2003 RetailVision event. See *Top U.S. Retailers Name Z-Tel's Personal Voice Assistant(TM) 'Best New Technology'* (Sep 15, 2003) PRNewswire-FirstCall via COMTEX.

²⁸ CoreComm/ATX Form 10-K (2001, 2002).

²⁹ McLeod Form 10-K (2002).

³⁰ GCI Form 10-K (2002).

(i.e., UNE-L), yet Crandall and Singer list XO as a facilities-based entrant.³¹ XO is no doubt a facilities-based carrier, but the company relies almost as heavily on unbundled loops as, say, Allegiance Telecom (listed as UNE) or Talk America (listed as UNE--P).

Crandall's and Singer's notion of a facilities-based entrant is also askew. The only CLECs classified as facilities-based entrants in Crandall and Singer's table are those that have in some sense deployed their own loop plant (whether wireline or wireless). Thus, facilities-based entry apparently requires a CLEC to deploy its own loops. Verizon CEO Ivan Seidenberg recently stated that such a strategy "doesn't make any sense," and the only CLEC that really attempted to deploy its own loop plant to any significant degree (RCN Communications) is on the verge of bankruptcy.³²

The foolishness of this definition of facilities-based entry is easily illustrated. Network Plus, listed as having a "UNE" strategy and not a "facilities-based entry strategy", owns and operates 9,000 fiber miles in addition to Lucent 5ESS switches.³³ US LEC, similarly having a "UNE" strategy, owns and operates 26 circuit switches.³⁴ PacWest, another "UNE" firm according to the authors, operates 10 circuit switches.³⁵ Intermedia operated more than 17,000 miles of fiber in addition to about 30 voice and 164 data switches; but, according to Crandall-Ingram, the company did not have a facilities-based entry strategy.³⁶ Another alleged "UNE" firm, ITC^Deltacom, owns/operates over 10,000 fiber miles in addition to 185 collocations, 12 circuit switches, 44 Frame Relay/ATM switches, and 42 "next generation" switches.³⁷ Other examples were provided above (Allegiance Telecom, for example, with over \$1B invested in telecom plant). All of these firms, not facilities-based in the eyes of Crandall and Singer, have investment billions in telecommunications infrastructure and are, consequently, plainly facilities-based entrants.

³¹ XO Form 10-K (2000) at 41.

³² James S. Granelli, *Verizon Targets High Speed, Wired or Not; CEO Ivan Seidenberg criticizes his rivals that are leasing land lines. He sees mobile and cable firms as more viable*, LOS ANGELES TIMES (Jan. 12, 2004) and *RCN Debt Restructuring Talks Heat Up*, TR DAILY (Jan. 15, 2004).

³³ *Network Plus Expands its Fiber Reach in Southeastern US*, CONVERGE NETWORK DIGEST (Oct. 22, 1999); *Network Plus Set To Open 80,000 Square Foot Facility; Additional Location in Randolph, Massachusetts Will Add Up to 250 New Staff*, BUSINESS WIRE (Dec 9, 1999).

³⁴ US LEC Form 10-K 2002).

³⁵ PacWest Form 10-K (2001, 2002).

³⁶ *Worldcom And Intermedia Complete Merger*, CONVERGE NETWORK DIGEST (July 2, 2001); *Clec Intermedia Has Installed Base Of 17,128 Fiber Miles*, *Fiber Optic News* (June 3, 1996); Interview with Byron Neil, a former switch engineer for Intermedia (Jan. 10, 2004).

³⁷ ITC^Deltacom Form 10-K (2001, 2002).

Overall, Crandall's and Singer's description of CLEC business plans (in Table 1) is so exceedingly inaccurate that it provides no information of use, except maybe the recognition that the only entry strategy listed without a single bankruptcy is UNE-P (GCI, Talk America, and Z-Tel).

IV. Crandall's and Singer's Argument that UNE-Loop is an Unviable Entry Strategy and Reduces Telecom Investment

Bell Companies consistently argue that they should not be required to unbundled local switching because CLECs can successfully self provide the switching element in conjunction with Bell-supplied loop plant.³⁸ The combination of CLE-supplied switching and unbundled loops is called UNE-L or UNE-Loop. UNE-P or UNE-Platform is the combination of unbundled loops and unbundled switching. UNE-P is the most successful form of entry into the local exchange mass market.³⁹

Oddly, Crandall and Singer contest the Bell assertion by describing UNE-L entry as a "non sustainable business plan[]" that has "resulted in an incredible waste of resources (at 13)." They observe that "CLECs accounting for nearly 40 percent of the 24.8 million CLEC switched-access lines were either in bankruptcy or emerging from bankruptcy (at 14)." All but two (Adelphia and Teligent) of the listed bankrupt firms in Crandall's and Singer's list (at Table 1) were carriers using primarily a UNE-L entry strategy.⁴⁰ Crandall and Singer also assert that as a result of the widespread failure of UNE-L entry strategies that the "equipment companies were devastated and forced to reduce employment substantially (at 7)." Thus, the carriers leaving the vendors holding the bag were UNE-L providers, not UNE-P providers.

In addition, Crandall's and Singer's investment analysis indicates that UNE-P is a more desirable entry strategy than UNE-L or facilities-based entry.⁴¹ Specifically, Crandall's and Singer's suggestion that capital expenditures are positively related to operating cash flow, and they provide empirical support for this proposition.⁴² For Bell investment, they conclude from

³⁸ See generally, Comments and Reply Comments of BellSouth, Verizon, SBC, and Qwest in CC Docket No. 01-338 (April 5, 2002 and July 17, 2002).

³⁹ See UNE-P Fact Report (Jan. 2003; available at www.telpolicy.com) and *Rejoinder* at Table 1.

⁴⁰ As discussed later, Crandall's and Singer's description of CLEC entry strategies is exceedingly inaccurate. We have reviewed the financial filings of all CLECs on the list and assigned them to an appropriate entry strategy.

⁴¹ The Phoenix Center is ambivalent about the alternative modes of entry, except to say that all forms of entry that can reasonably be expected to benefit consumers should be encouraged.

⁴² Crandall and Singer present a simple regression analysis of this point, but the legitimacy of their regression specification is challenged by the citations they provide for the alleged relationship between cash flow and investment (*Rejoinder*, at ft. 39). The economic literature weighs capital expenditures and cash flow by net plant (or
(Footnote Continued....)

their theory and empirics that any policy that reduces cash flow must be bad because it, in turn, will reduce Bell investment. Unbundling, according to the authors, is bad because it reduces revenue, which in turn reduces cash flow, which in turn reduces investment.⁴³

Before turning to the issue of entry modes, it is worth noting that cash flows can rise and fall for many reasons. For example, we would expect that competition would reduce cash flows and the deregulation of a monopoly would increase cash flows. So, it is legitimate to interpret Crandall's and Singer's theory to imply that eliminating competition and deregulating the prices of the monopoly firms is desirable. While Crandall and Singer would probably agree (as would their clients), we do not believe prohibiting competition and deregulating monopolists is sound public policy.

It is also worth observing that Crandall and Singer's empirical analysis is inconsistent with the literature to which they cite in support of their analysis. Specifically, the empirical relationship between capital expenditures and cash flow arises out of the q -theory of investment that implies investment is determined by a firm's q -ratio (the ratio of the market value to the replacement value of the firm).⁴⁴ In an effort to evaluate whether financial constraints or transactions costs lead to more self-financing of investment, some researchers began adding to the q -theory empirical model an *additional* variable measuring operating cash flow, which was intended to proxy the ability of a firm to internally fund capital expenditures. (There is no formal theoretical analysis to support including these additional variables in the regression.)⁴⁵ If capital markets are perfect (or transactions costs low), then cash flow should not affect investment and the q -ratio should explain all variations in investment. While some research finds a positive relationship between cash flow and investment, some research suggests this finding is merely the coincidence of a mis-measured q -ratio.⁴⁶ In any case, Crandall and Singer

sales) and includes additional regressors including the firm's q -ratio and potentially other variables. Further discussion is provided in the text, *infra*.

⁴³ Crandall's and Singer's analysis employs the revenue and cost estimates of financial analysts, which have been shown convincingly to be exceedingly inaccurate. See, e.g., T. Randolph Beard and Christopher C. Klein, *Bell Companies as Profitable Wholesale Firms: The Financial Implications of UNE-P*, PHOENIX CENTER POLICY PAPER NO. 17 (November 2002) (<http://www.phoenix-center.org/pcpp/PCPP17Final.pdf>).

⁴⁴ See, e.g., F. Hayashi, *Tobin's Marginal q and Average Q : A Neoclassical Interpretation*, 50 *ECONOMETRICA*:213-224 (1982); A. B. Abel and O. J. Blanchard, *The Present Value of Profits and Cyclical Movements in Investment*, 54 *ECONOMETRICA* 249-273 (1986); F. Schiantarelli and D. Georgoutsos, *Monopolistic Competition and the q theory of Investment*, 34 *EUROPEAN ECONOMIC REVIEW* 1061-1078 (1990).

⁴⁵ T. Erickson and T. Whited, *Measurement Error and the Relationship between Investment and " q "*, 108 *JOURNAL OF POLITICAL ECONOMY* 1027-1057 (2000) ("we find no evidence that that cash flow belongs in the investment- q regression, whether or not firms are deemed financially constrained (at 1050)").

⁴⁶ *Id.*

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exclude the q -ratio from their regression, thereby separating their empirical model from the very theory (and literature) they rely upon.⁴⁷

Returning to the implications of their cash flow-investment logic, consider the unavoidable conclusions of their hypothesis for the alternative CLEC entry modes (UNE-P, UNE-L, and facilities-based entry). Of the three entry modes, the revenues obtained by a Bell Company is highest for UNE-P (loop, switching, and transport) and lowest for facilities-based entry (no elements sold). UNE-L (loop only) is in the middle. Tracing the logic of Crandall and Singer through, it follows that UNE-P reduces Bell Company capital expenditures less than UNE-L, which reduces Bell investment less than facilities-based entry.⁴⁸ Thus, since pure facilities-based entry will reduce Bell revenues the most, it is therefore the least desirable form of entry, *ergo*: UNE-P is preferred to both UNE-L and facilities-based entry.

Furthermore, the relationship between capital expenditures and cash flow is general in the sense that it is not restricted only to Bell Companies or to telecommunications.⁴⁹ The academic research finds this relationship holds across many industries and firm-types. Therefore, if one wished to promote increased levels of CLEC capital expenditures, then one would tend to favor entry modes that produced higher cash flows. Table 1 summarizes the cash flow positions of three alternate entry modes (facilities-based, UNE-L, and UNE-P) based on the financials of flagship CLECs. From the table, it is plain to see that only a UNE-P entry strategy generates positive cash flows. Facilities-based entry (including loops, which is the only form of facilities-based entry Crandall and Singer deem legitimate), has the smallest operating cash flow. The natural conclusion of the Crandall and Singer logic is that UNE-P is the preferred form of entry, allowing CLECs to accumulate cash flow that can then be used to fund capital expenditures.

⁴⁷ It is not clear what effect correct specification would have on the estimated coefficient, but that is not the point. The point is that if one appeals to a particular literature to support their empirical model, one should at least read that literature and adhere to and the most important elements of the empirical framework. A review of another study by Drs. Crandall and Singer (and A. Ingraham) pointing out serious errors of both a theoretical and empirical nature is available at www.telepolicy.com/review.htm.

⁴⁸ See George S. Ford, *A Fox in the Hen House: An Evaluation of Bell Company Proposals to Eliminate their Monopoly Position in Local Telecommunications Markets*, PHOENIX CENTER POLICY PAPER NO. 15 (September 2002) (<http://www.phoenix-center.org/pcpp/PCPP15%20Final.pdf>).

⁴⁹ 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 1. Cash Flow and Entry Strategy			
Entry Strategy/CLEC	Operating Cash Flow (2002)	Total Revenues	Cash Flow ÷ Revenues
UNE-L			
US LEC	(5,645)	250,363	(0.02)
Allegiance	(68,288)	770,982	(0.09)
McLeod	(57,700)	992,100	(0.06)
FACILITIES			
RCN Corp.	(202,814)	457,351	(0.44)
UNE-P			
Talk-America	51,898	317,507	0.16
Z-Tel	18,399	235,255	0.08

V. Conclusion and Further Thoughts

Thomas Jefferson is famous for observing that “Difference of opinion leads to enquiry, and enquiry to truth.” For this reason, we want to thank Drs. Crandall and Singer for taking the time to author a lengthy critique of our work and, moreover, for submitting this critique to the Phoenix Center for posting on the web and further discussion. In so doing, we have all contributed much to the public dialectic. After a review of Crandall and Singer’s suggestions and criticisms, however, we find no reason to alter the analysis or conclusions in POLICY BULLETIN NO. 7.

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