I. INTRODUCTION

On February 20, 2003, the Federal Communications Commission ("FCC" or "Commission") voted to approve new unbundled network element ("UNE") rules modifying the terms under which incumbent telephone companies must resell their network facilities to competitors. The previous UNE rules were widely criticized—and had been invalidated by the courts—for being too broad...
and for requiring that facilities be made available at rates far below cost, even in the absence of evidence that they were necessary for competitive entry. The previous UNE rules were criticized for two significant reasons. First, the rules were criticized for allowing competitors to bundle together and resell a complete platform of services—the so-called UNE-Platform (“UNE-P”)—without ever making a significant investment in facilities. Second, the rules were criticized for applying the resale requirements to broadband facilities, even though it was clear that phone companies had no market power for broadband services. The net effect of the UNE rules was to diminish incentives of both incumbents and their competitors to invest in new facilities.

Three of the FCC’s five members at the time, Chairman Michael Powell and Commissioners Kathleen Abernathy and Kevin Martin, had long been critical of the existing rules. For many months prior to the modification of the UNE-P rules, observers expected the majority to approve proposals to exempt broadband from the resale requirement and effectively abolish the UNE-P. In the days leading up to the vote, however, news began to leak out that one of the three, Commissioner Martin, was negotiating with state public utility commissioners over their proposal to retain the UNE-P. In the end, Martin voted with

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5 See Hazlett, Rivalrous Telecommunications Networks, supra note 3, at 492–94.


Abernathy and Powell to exempt broadband facilities from unbundling, but joined with Commissioners Jonathan Adelstein and Michael Copps—over the dissents of Abernathy and Powell—to give states the authority to retain the UNE-P.9

The combined market capitalization of the incumbent telephone companies declined by $15 billion on the day of the vote,10 a fact that leads to the conclusion that the Commission's ruling was, on the whole, a disincentive to investment in and by those companies. This result should serve as a lesson for policymakers considering imposing UNE-P-like rules on current broadband providers. The UNE-P regime is a direct corollary to current debate about the appropriate governmental response to possible discriminatory behavior by broadband network operators.11 Rules requiring broadband network operators to open their networks to allow non-network operators to offer competing services arguably would have a negative impact on network operators similar to that of the UNE-P regime.12 Thus, the impact of retaining UNE-P, even in light of an otherwise deregulatory action, provides a useful backdrop on which to examine potential Commission decisions mandating the resale of broadband facilities to non-facilities based providers especially on an end-to-end basis.

While economists generally agree that changes in market capitalization can be a valid measure of the economic impact of events such as the UNE decision, they also recognize, as do investors, that stock price fluctuations may result from many factors, including random variations and underlying market trends.13 To isolate the impact of a particular event, ceteris paribus, it is necessary to apply statistical analysis to filter out such factors. The statistical technique used to do so is known as event analysis.14

In this study, we apply the event analysis methodology to examine the im-

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9 Triennial Review Remand Order, supra note 1, at 16,978, 17,504, 17,512.
13 See infra Appendix A.
pact of the FCC’s UNE decision on the two telecommunication industry sectors most directly affected by the FCC’s decision: the Regional Bell Operating Companies (“RBOCs”) and the competitive local exchange carriers that rely on the UNE platform (“UNE-P CLECs”). We also examine the impact of the decision on facilities-based CLECs and telecommunications equipment manufacturers. We find that the FCC UNE decision did indeed have a significant negative impact on RBOC market capitalization, reducing their going-forward value by approximately $19 billion compared to what it would have been had the FCC repealed the UNE-P rules. The results of the study have important implications in the current regulatory and policy debate regarding the appropriate intervention to prevent any potential discriminatory behavior by broadband service providers. Should the Commission adopt a prophylactic rule requiring some level of network sharing between facilities-based providers and non-facilities based competitors, this study shows that the immediate negative impact could be significant.

Our model and empirical results are presented and discussed in Parts IV and V, and in Appendix A. First, in Parts II and III, we place the FCC’s decision in context. Part II draws an analogy to the UNE-P regime and proposed nondiscrimination rules requiring network owners to resell broadband network elements to non-facilities based providers. Part III describes the role of the telecommunications sector in the U.S. economy before 2003, and explains why the FCC’s decision was important from the perspective of overall economic performance. Part IV turns to the specifics of the UNE issue, and places in context some of the events leading up to the decision. After presenting our analysis and discussing its implications in Parts V, VI, and VII, we conclude that the economic impact of retaining UNE-P should serve as a lesson for policy makers about the effects of imposing network sharing arrangements on network operators.

II. THE UNE-P REGIME AND ITS RELATION TO PROPOSED NET NEUTRALITY RULES

In an effort to increase competition in local telecommunications markets—a primary goal of the 1996 Telecommunications Act (“1996 Act”)—the FCC promulgated regulations that required both the RBOCs and local telephone

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15 For discussion of the firms included in the sample, see infra Appendix A.
16 See infra Part III.
17 See infra Part V.
companies to lease their networks to competitive providers. The UNE rules were adopted to provide competitive telecommunications operators access to network infrastructure that they could not afford to build out themselves. This regime closely parallels the current debate regarding rules to prevent possible discriminatory behavior by broadband service providers.

Some groups, primarily Internet application providers, advocate for rules that would require broadband network owners to provide non-network owners free, non-discriminatory access to their networks. These services would compete with the network owners' services.

Some argue that broadband providers currently are discriminating or have the capacity to discriminate against competing services by denying equal and open access to their networks. Proponents of open access rules argue that competition can be inhibited by this alleged discriminatory behavior, which would result in higher consumer prices, less innovation, and possible restraints on free speech and the dissemination of information.

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19 Id., sec. 101(a), § 251(c)(2); 47 U.S.C. § 251(c) (2000); see infra, Part IV.
20 See infra, Part IV.
21 See Open Internet Coalition, Who We Are, http://www.openinternetcoalition.com/index.cfm?objectid=0016502C-F1F6-6035-B1264D29499E9D0 (last visited Nov. 18, 2008). The Open Internet Coalition states that it "represents consumers, grassroots organizations, and businesses working in pursuit of a shared goal: keeping the Internet fast, open and accessible to all Americans." Id. The group lists Amazon, eBay, Google, and their respective subsidiaries, Paypal, Skype, YouTube, among its members. Id.
22 See Open Internet Coalition, Why an Open Internet, http://www.openinternetcoalition.com/index.cfm?objectid=0016BFA0-F1F6-6035-BC6DFC8A0E03C0D7 (last visited Nov. 18, 2008).
Simply, net neutrality guarantees that broadband networks cannot use their networks to give preferential fast lane access to any content provider, nor can they slow down content or services that are unable to pay. The Open Internet Coalition seeks to ensure that the transmission of internet traffic remains open, accessible and fast, and does not favor one particular brand or type of content over another.
Id.
24 See Nicholas Economides, "Net Neutrality," Non-Discrimination and Digital Distribution of Content Through the Internet, 4 J/S: J.L. & POL'Y FOR INFO. SOCIETY 209, 216 (2008) (discussing price discrimination by broadband network owners); Frischmann & van Schewick, supra note 23, at 387–88 ("[Net neutrality advocates] contend that the threat of discrimination will reduce unaffiliated application and content developers' incentives to innovate; and that the resulting reduction in application-level innovation will be bad for society." (citations omitted)).
25 See Frischmann & van Schewick, supra note 23, at 387–88; Savethelnternet.com, Statement of Principles, http://www.savetheinternet.com=/principles (last visited Nov. 18, 2008) ("Network neutrality is the Internet's First Amendment. Without it, the Internet is at risk of losing the openness and accessibility that has revolutionized democratic participation, economic innovation and free speech.").
In 2005, the FCC adopted its Policy Statement on open access, which laid out four principles relating to broadband network openness, affordability, and accessibility:

1. To encourage broadband deployment and preserve and promote the open and interconnected nature of the public Internet, consumers are entitled to access the lawful Internet content of their choice.
2. To encourage broadband deployment and preserve and promote the open and interconnected nature of the public Internet, consumers are entitled to run applications and use services of their choice, subject to the needs of law enforcement.
3. To encourage broadband deployment and preserve and promote the open and interconnected nature of the public Internet, consumers are entitled to connect their choice of legal devices that do not harm the network.
4. To encourage broadband deployment and preserve and promote the open and interconnected nature of the public Internet, consumers are entitled to competition among network providers, application and service providers, and content providers.

Proponents of open access view the Policy Statement as a positive, but ineffective step, and continue to push the Commission to take a stronger stance on discriminatory behavior by broadband providers. They worry that the Policy Statement may not be enforceable; therefore they are seeking a formal rule that would require open access for providers of competitive services and applications.

Opponents to open access rules argue that broadband providers need the

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28 See Jerry Brito & Jerry Ellig, A Tale of Two Commissions: Net Neutrality and Regulatory Analysis, 16 COMMLAW CONSPECTUS 1, 2–4 (2007) (“In short . . . the Commission cannot enforce the Policy Statement because it is not a legally binding legislative or interpretative rule.”).

29 See Savethelnterent.com, supra note 25 (“We urge Congress to take steps now to preserve network neutrality, a guiding principle of the Internet, and to ensure that the Internet remains open to innovation and progress.”).
ability to manage their networks to ensure high quality service to the end user. Therefore, broadband providers should have the ability to exercise some level of management that would favor or disfavor some services or applications that does not rise to the level of discriminatory behavior. Furthermore, they argue that while the Commission has not yet adopted a formal rule, its policy statement is an effective remedy for discriminatory behavior. For instance, the Commission recently relied in part on the Policy Statement to punish discriminatory behavior by at least one broadband provider.

In August, 2008, the Commission adopted a Memorandum Opinion and Order, finding that Comcast Corp. ("Comcast") used "unreasonable network management practices" when it degraded the service of its customers utilizing peer-to-peer file sharing program BitTorrent. As a result, the Commission required Comcast to submit disclosures to ensure that it was practicing "protocol-agnostic network management technique[s]." If Comcast did not comply within thirty days, the Commission reserved the right to impose injunctive relief forbidding Comcast from practicing any network management techniques. Comcast has appealed the decision.

The action taken by the Commission to remedy Comcast’s behavior falls short of structural rules imposing open access on all broadband network owners. Required open access, either through a physical unbundling regime or a type of structural separation of the broadband transmission component is analogous to the former UNE-P regime. As the following economic event

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32 Id. ¶ 54.

33 Id. ¶ 4. (“BitTorrent is an open-source, peer-to-peer networking protocol that has become increasingly popular among Internet users in recent years.” (citation omitted)).

34 Id. ¶ 54.

35 Id. ¶ 55.

analysis shows, such rules could have significant and immediate adverse effects on network owners’ market capitalization. This in turn acts as a disincentive to expand or maintain current infrastructure as well as to build next generation network infrastructures.

III. THE TELECOMMUNICATIONS SECTOR, INVESTMENT AND ECONOMIC GROWTH

In the late 1990s, real Gross Domestic Product ("GDP") growth in the United States averaged nearly 5% annually, and labor productivity grew at an annual rate of 2.5%, nearly twice the rate of the previous two decades.\(^\text{37}\) Economists generally agree that improvements in information and communications technology ("ICT") associated with the rise of the Internet were responsible for a significant portion of these positive economic results, with investment in the telecommunications sector playing an especially important role.\(^\text{38}\) As shown in Table 1 infra, ICT sector investment—investment in information processing equipment and software as measured by the Bureau of Economic Analysis ("BEA")—grew by nearly 156%, from $182.7 billion in 1995 to $467.6 billion in 2000.\(^\text{39}\) By the end of the decade, the ICT sector accounted for nearly fifty cents of every dollar of private equipment investment in the United States.\(^\text{40}\)


\(^{39}\) U.S. DEP’T OF COM., BUREAU OF ECON. ANALYSIS, NATIONAL INCOME AND PRODUCT ACCOUNTS Table 5.5.6 Real Private Fixed Investment in Equipment and Software by Type, Chained Dollars (2008), available at http://bea.gov/national/nipaweb/Index.asp (select “list of All NIPA Tables,” follow link for “Table 5.3.6. Real Private Fixed Investment by Type, Chained Dollars (A) (Q),” and select dates).

\(^{40}\) Id. In 2000, total fixed, private investment in equipment and software was $926.2 billion of which $467.6 billion was information processing equipment and software. Id.
Table 1. Private, Nonresidential Fixed Investment in Equipment and Software ($ Billions, 1995–2002)\textsuperscript{41}

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<tbody>
<tr>
<td>Information Processing Equipment &amp; Software</td>
<td>182.7</td>
<td>218.9</td>
<td>269.9</td>
<td>328.9</td>
<td>398.5</td>
<td>467.6</td>
<td>459.0</td>
<td>437.4</td>
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<tr>
<td>Industrial Equipment</td>
<td>134.9</td>
<td>139.9</td>
<td>143.0</td>
<td>148.1</td>
<td>159.2</td>
<td>145.7</td>
<td>126.0</td>
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<tr>
<td>Transportation Equipment</td>
<td>120.6</td>
<td>125.4</td>
<td>135.9</td>
<td>145.4</td>
<td>160.8</td>
<td>142.8</td>
<td>125.8</td>
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<tr>
<td>Other Equipment</td>
<td>105.9</td>
<td>110.0</td>
<td>119.9</td>
<td>129.7</td>
<td>134.6</td>
<td>129.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>544.1</td>
<td>594.2</td>
<td>668.7</td>
<td>752.1</td>
<td>844.4</td>
<td>922.2</td>
<td>877.1</td>
<td>823.7</td>
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Conversely, the meltdown in the ICT sector contributed significantly to the economic slowdown between 2000 and 2002.\textsuperscript{42} In the same time period, the telecommunications and computer sectors experienced more layoffs than any other sector of the economy, and losses in ICT sector market capitalization contributed disproportionately to the drop in equity values and associated declines in net worth and retirement savings.\textsuperscript{43} For instance, the telecommunications and computer sectors laid off more employees (946,000) between the beginning of 2000 and the end of 2002 than the automotive, electronics, and industrial goods sectors combined (862,000).\textsuperscript{44}

Furthermore, while total private employment in the United States declined by 1.7% between January 2001 and December 2002,\textsuperscript{45} employment in the high-tech sector of the economy fell by 9.8%, representing a net loss of 559,900

\textsuperscript{41} See id. (in chained 2000 dollars).


\textsuperscript{44} See EISENACH ET AL., THE DIGITAL ECONOMY FACT BOOK, supra note 37, at 7 (citing data from Challenger, Gray and Christmas Inc.).

The NASDAQ composite index fell 42% between the beginning of 2001 and the end of 2002. However, the computer and telecommunications indices fell even more sharply, by 47% and 75%, respectively. According to the Federal Reserve Board, the overall net worth of American households declined in 2000 for the first time since 1945, and continued falling in 2001 and 2002.

Between 2000 and 2003, the net worth of American households declined by $1.53 trillion. Contributing to this decrease in household net worth were losses in the stock market valuation of the telecommunications sector of nearly $2 trillion, with telecommunications equipment alone accounting for $1.4 trillion of the total. According to BEA, ICT sector investment declined by over 6% between 2000 and 2002. In fact, investment in communications equipment declined by 21% in 2002 alone.

Economists credit much of the rapid economic growth of the late 1990s to technological progress in the ICT sector. However, prior to repeal of the UNE requirements for broadband providers, ICT sector experts agreed that further progress depended on the rapid development of broadband communications services. In 2001, economists Robert Crandall and Charles Jackson estimated

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46 Press Release, American Electronics Association, High-Tech Workforce Shrinks by 560,000 Jobs over Two Years (Mar. 19, 2003) (providing data that demonstrates a decline in the U.S. high-tech employment industry between January of 2001 and December of 2002).

47 ^IXIC, the NASDAQ Composite Index, decreased from 2291.86 on January 2, 2001 to 1335.51 on December 31, 2002. See Yahoo! Finance, http://finance.yahoo.com (Search "^IXIC" and follow “Historical Prices” hyperlink).


49 ^IXUT, the NASDAQ Telecommunications Index, decreased from 429.08 on January 2, 2001 to 107.5 on December 31, 2002. See Yahoo! Finance, http://finance.yahoo.com (search "^IXUT" and follow “Historical Prices” hyperlink).


52 Id.


54 See EISENACH ET AL., THE DIGITAL ECONOMY FACT BOOK, supra note 37, at 6.

55 See U.S. DEP’T OF COM., supra note 39 (noting $467.6 billion in investment at the end of 2000 as compared to $437.4 billion at the end of 2002).

56 See id. (noting $114.7 billion in investment at the end of 2001 as compared to $90.5 billion at the end of 2002).

57 EISENACH & LENARD, IMPACT OF UNE-P, supra note 42, at 3.

58 In re Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers; Implementation of the Local Competition Provisions of the Telecommuni-
the benefits of widespread broadband for the economy at over $500 billion.59

As telecommunications stock values collapsed in the early 2000s, telecommunications investment experienced a sharp decline: telecom capital expenditures declined by 18% in 2001.60 As the FCC considered changes in its UNE rules, the economic distress of the telecommunications sector contributed to the sense of significance and urgency surrounding what many people believed would be one of its most important decisions since passage of the 1996 Telecommunications Act.61

IV. THE UNE RULES AND THE FCC’S FEBRUARY 20, 2003 DECISION

The FCC’s UNE rules, first issued in August 1996,62 require ILECs, including both the RBOCs and the then existing 1400 or so smaller local telephone companies, to lease their networks to competitors at prices set by state public utility commissions under a formula devised by the FCC.63 The rules have been controversial from the outset and have twice been overturned by the courts.64

The UNE regime was a central element of the FCC’s efforts to facilitate

61 See EISENACH & LENARD, IMPACT OF UNE-P, supra note 42, at 8.
63 See id. ¶¶ 268, 625. States, however, had authority to exempt smaller companies. See id. ¶ 38.
competition in the local telecommunications marketplace, a major goal of the 1996 Act. The intent of lawmakers in creating the UNE regime was to speed entry and enhance competition in the local telephone market by allowing competitors access to facilities that cannot economically be duplicated. The central economic question raised by the policy is its impact on investment. If the mandated price of access to existing facilities is set below the risk-adjusted cost of investing in new ones along with an adequate return on investment, then neither incumbents nor entrants have an incentive to build new facilities. UNE prices set below costs may also have the effect of encouraging excessive entry by inefficient firms. When the resale requirement is applied to network elements that economically can be duplicated by competitors, the economic effects are especially perverse. The effect is to deter investment that is not only economically efficient, but which would contribute to the development of sustainable, facilities-based competition.

The impact of the rules on investment was a major issue in the FCC’s review of the UNE regime, which the Commission voted to initiate in December 2001. The Commission voted specifically to “seek comment on whether [it] should modify or limit incumbents’ unbundling obligations going forward so as to encourage incumbents and others to invest in new construction.” More specifically, the Commission considered that “requiring incumbents to unbundle new or upgraded facilities may discourage them from investing in those facilities in the first place. Moreover, the availability of incumbent facilities at cost-based rates may discourage competitive carriers and others from investing in or using alternatives to the incumbent’s network.”

The Commission’s concern appears to have been driven by both legal and economic issues. The Supreme Court vacated the Commission’s earlier rules on the grounds that the Commission failed to justify the rules as “rationally related to the goals of the Act.” Specifically, the Court pointed to the Com-
mission's determination of which network elements would be subject to the UNE resale requirements.\footnote{\citename{Id.} at 387–89. The Commission responded by issuing the UNE Remand Order. \textit{First Report and Order}, supra note 62, \textsection 1, 8. At the time of the Triennial Review notice in December 2001, the UNE Remand Order was under appeal in the DC Circuit. U.S. Telecom Ass'n v. FCC, 290 F.3d 415, 417 (D.C. Cir. 2002).} Economic concerns were also at the forefront of the Commission's deliberations. By 2001, a substantial body of economic research had been conducted on the impact of the UNE rules on investment.\footnote{\citename{See \textit{Eisenach} & \textit{Lenard}, \textit{Impact of UNE-P}, supra note 42, at 11, 18 (examining multiple economic studies on the effects of the UNE rules on investment).} For the most part, the economic evidence suggested that the UNE regime had discouraged investment by incumbents and CLECs alike.\footnote{\citename{This assessment of the evidence is based upon our careful review of the literature on these issues. Of course, researchers are not unanimous; a few studies come to different conclusions. For a review of different conclusions, see \textit{Eisenach} & \textit{Lenard}, \textit{Impact of UNE-P}, supra note 42, at 11–16.} UNE prices, which the states initially set at levels approximately 25% below levels they previously had determined were necessary to recover costs, were further reduced over time—often as a condition of granting approval for the RBOCs to offer long distance service.\footnote{\citename{Id.} at 10.} One study found that by 2001, UNE rates were covering between 39% and 52% of revenue the RBOCs would have received had the lines not been leased and between 49% and 66% of operating costs.\footnote{\citename{Id.} at 10.} There was growing evidence that the markets for some UNE elements—most notably switches—had become competitive and that multiple providers were deploying these elements.\footnote{\citename{UNE Third Report and Order, supra note 64, \textsection 35.} Furthermore, evidence suggested that competition was uniquely robust in certain markets, such as in urban areas and with business customers, although competition elsewhere, in rural areas for example, still lagged.\footnote{\citename{See \textit{Florida Public Service Comm'n}, \textit{Broadband Services in the United States: An Analysis of Availability and Demand} 20–22 (2002), available at \url{http://www.psc.state.fl.us/publications/pdf/telecomm/tele-takeratestudyfinal.pdf}.} Finally, in the market for residential broadband services, telephone companies served less than one-third of all broadband customers, compared with over two-thirds served by cable companies.\footnote{\citename{High-Speed Services for Internet Access: Status as of December 31, 2002 tbls.3, 4 (2003) (reporting high-speed services based on data from December 2001). The FCC found, based on mandatory reports from service providers, that there were approximately 4.9 million business and residential broadband customers (advanced service and high-speed) who received ADSL or fiber optics as of December 2001. \textit{Id.} The FCC also found that there were approximately 11.4 million business and residential broadband customers (advanced service and high-speed) who received service via coaxial cable. \textit{Id.} As of December 2001, approximately 16.8 million consumers subscribed to broadband. \textit{Id.}}}
specific substantive reforms. First, the Commission asked whether it should examine markets at a more “granular” level in determining whether there was sufficient market power to justify continued application of the UNE regime.\(^\text{82}\) Second, the Commission asked whether the list of network elements to which the UNE regime should be applied should be narrowed, including specifically whether switching services should be removed.\(^\text{83}\) Finally, the Commission sought comment on whether broadband services offered by incumbent telephone companies should be reclassified as “information services,” thereby removing them from the UNE regime.\(^\text{84}\) In addition, the Commission sought comment on the role state public utility commissions should play in implementing the UNE regime—an issue that turned out to be central to the final outcome.\(^\text{85}\)

As discussed further in Part V infra, many believed at the time the Notice of Proposed Rulemaking was issued, and throughout most of the fourteen-month period it was under consideration, that three of the commissioners, Chairman Powell and Commissioners Abernathy and Martin, were broadly in agreement with the deregulatory agenda it implied.\(^\text{86}\) The other two, Michael Copps and Jonathan Adelstein, were assumed to be skeptical or opposed.\(^\text{87}\) Thus, observers expected that a 3-2 FCC majority would issue new UNE rules that would lighten the regulatory burden on the RBOCs.

First, the Commission was expected to adopt rules to exempt new investments in broadband facilities from resale obligations and pare back the list of UNE elements subject to unbundling. In particular, switching would be removed from the list, thus effectively eliminating the UNE-Platform.\(^\text{88}\) Next, the Commission was expected to establish a formula or set of benchmarks upon which to judge the competitiveness of markets for other UNE elements.\(^\text{89}\) As these markets became more competitive, the Commission would create a process by which the elements would be removed from the list.\(^\text{90}\) Finally, the rules were expected to allow states to retain an advisory role and a role in implement-

\(^{82}\) Triennial Review NPRM, supra note 70, ¶ 35.

\(^{83}\) Id. ¶ 47.

\(^{84}\) Id.

\(^{85}\) Id. ¶ 75.

\(^{86}\) Krim, supra note 6.

\(^{87}\) Id.

\(^{88}\) See Yochi J. Dreazen & Shawn Young, FCC Plans to Erase a Key Rule Aiding Local Phone Competition, WALL ST. J., Jan. 6, 2003, at A1 [hereinafter Dreazen & Young, Erase a Key Rule]. The removal of switching was seen as especially important because of the key role it plays in the UNE-Platform, allowing competitors to operate as pure resellers, without making any substantial investment in their own facilities. Removing switching from the list would effectively end UNE-P. Id.

\(^{89}\) Triennial Review NPRM, supra note 70, ¶ 67.

\(^{90}\) Id.
tation and enforcement, but not authority to decide which elements would be subject to the UNE resale requirements. 91

On February 20, 2003, after a fourteen-month rulemaking that generated thousands of comments, the Commission voted as expected to exempt broadband from the resale requirements. 92 To the surprise of many observers, however, the Commission did not exclude switches from the list of UNEs, nor did it limit the role of states. 93 Instead, the Commission’s decision increased the authority of states to determine which elements, including switches, would be subject to resale. 94 Since most state commissions appeared to favor retaining the UNE requirement (and hence the UNE-P), the decision was seen widely as a defeat for the RBOCs and for the deregulatory agenda of Chairman Powell. 95

V. THE ECONOMIC IMPACT OF THE FCC’S UNE DECISION: AN EVENT ANALYSIS STUDY

Our main purpose in this study is to measure the impact of the FCC’s UNE decision on the going-forward value of companies in the telecommunications sector. Due to the similarities between the UNE-P regime and currently debated broadband network open access and potential resale arrangements, the result of the event study analysis is relevant to the debate. We measure the impact of the FCC’s UNE decision by using a widely-accepted methodology in economics known as an event analysis. 96 Simply put, an event study utilizes movements in stock prices on the date or dates when an event becomes known to investors as a measure of the impact of the event on the firm’s value: 97

Using financial market data, an event study measures the impact of a specific event on the value of a firm. The usefulness of such a study comes from the fact that, given rationality in the marketplace, the effects of an event will be reflected immediately in security prices. Thus a measure of the event’s economic impact can be constructed using security prices observed over a relatively short time period. In contrast, direct productivity related measures may require many months or even years of observation. 98

An event study begins by identifying dates when market participants became aware of key events. Here the relevant dates are when the market became aware of the parameters of the FCC’s decision and, in particular, when the

91 Id. ¶¶ 78–79.
93 Triennial Review Remand Order, supra note 1, ¶¶ 170–96, 419; see also Labaton, supra note 92.
94 Triennial Review Remand Order, supra note 1, ¶¶ 186–96.
95 See Labaton, supra note 92 (describing the decision as a “stinging defeat”).
97 See id. at 13.
98 Id.
market became aware of the ways in which the decision would deviate from prior market expectations.

To evaluate market expectations throughout the period, we canvassed several sources of information, including LexisNexis,99 the Bureau of National Affairs' Daily Report for Executives,100 and Telecommunications Reports.101 From these sources, we identified news articles that reflected market expectations prior to the decision and news articles that most likely informed investors of the nature of the final decision.

News stories published from December 2001—when the FCC initiated the UNE rulemaking—through early January 2003 reflected the widely held expectation that the Commission would vote in favor of deregulation on both the broadband and UNE issues.102 In December 2002 and January 2003, as the date of the decision approached, these expectations formed more clearly. For example on December 12, 2002, the Wall Street Journal reported that “Chairman Michael Powell seems poised to alter the rules in coming months by removing certain pieces of network equipment from the bundle that the Bells are required to lease . . . .”103 While some reports during this period suggested that Commissioner Kevin Martin might favor giving some authority over UNE regulation to the states,104 Investors Business Daily reported on December 19, 2002 that “[w]hile [Commissioner Kevin] Martin might not agree with Powell on some issues, that doesn’t mean he’ll break ranks with the FCC’s Republican majority on a deregulatory agenda . . . .”105 These expectations persisted into January. On January 3, Washington Post reporter Jonathan Krim wrote that “analysts are increasingly convinced that, for the most part, the deregulatory agenda of Chairman Michael K. Powell will prevail . . . .”106 On January 6, 2003, the Wall

99 LexisNexis, About LexisNexis, http://global.lexisnexis.com/about.aspx (last visited Oct. 22, 2008) (“We provide customers access to 5 billion searchable documents from more than 32,00 legal, news and business sources.”).
102 See, e.g., Dreazen, Bell Companies Lose Customers, supra note 7 (noting industry experts belief that the UNE rules would be repealed).
103 Id.
104 See Labaton, supra note 92.
106 Krim, supra note 6.
Street Journal agreed, reporting “[f]ederal regulators are preparing to stop making local phone companies rent their networks to rivals at cheap rates . . .”

Furthermore, expectations of a deregulatory decision may have risen on January 29, 2003 when Chairman Powell told a group of reporters that the vote on the decision would take place a week ahead of the court-imposed February 20 deadline. As the BNA’s Daily Report for Executives reported on January 30, “Chairman Michael Powell told reporters . . . that he expects new rules on the Bell companies’ unbundled network elements to be ready by the Commission’s next scheduled meeting on [February] 13 . . . Most observers expect the new rules to give the Bell companies relief from the unbundled network element platform (UNE-P).” By calling the vote early, Powell seemed to be signaling that he had the votes for his proposal, a development that could well have had a significant impact on market expectations.

When did these expectations change? That is, when did the market come to understand that Powell’s agenda would be defeated by a more regulatory alternative? A review of the stories suggests there were two “windows” during which news of Chairman Powell’s defeat likely reached investors. On February 10, 2003, the Commission announced that the vote would not be held on February 13 after all, but would instead be delayed until February 20. USA Today was first to report the story, printing on February 10 that “[a]n 11th-hour deal struck late last week by a majority of the five Federal Communications Commission members would derail the plans of Republican Chairman Michael Powell to deregulate the regional Bell companies.” Then, on February 11, 2003, Telecommunications Reports wrote that “[m]any Wall Street analysts and money managers had been betting that the FCC’s imminent ruling on unbundled network elements (UNEs) and other competition rules would be ‘Bell friendly.’ But some financial odds makers are rethinking that position now that the [FCC] has delayed its decision.” Thus, we conclude that the announcement of a delay in the vote may have significantly impacted market expectations.

While the delay was an important signal, negotiations between Chairman

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107 Dreazen & Young, Erase a Key Rule, supra note 88.
109 Id.
111 FCC Delays Decision on Local Phone Rules, USA TODAY, Feb. 11, 2003, at 1B.
113 FCC Delay Prompts Some on Wall Street to Change About Bell Company Prospects, TELECOMM. REP. DAILY, Feb. 11, 2003 [hereinafter FCC Delay].
Powell and the other commissioners continued through the ensuing week, and the outcome remained in doubt. Thus, for example, on February 16, 2003, the Denver Post wrote that the FCC “is expected Thursday to relax rules that force [the Bell companies] to help their rivals break into local markets.”

By Wednesday, February 19, 2003, however, both USA Today and the Los Angeles Times were reporting that the negotiations had broken down and that Powell would indeed be defeated. USA Today reported that “[d]espite a flurry of talks,” Powell had “failed to sway a majority of commissioners.” The Los Angeles Times’s headline was more blunt: “Powell Gives Up on Rule Revamp.”

Based on this chronology, we identified three event dates. Event dates are the dates when the relevant news about the rulemaking reached the market. In keeping with standard practice, we then identified three event windows, defined as the three-day period encompassing the day before the event, the day of the event and the day subsequent to the event. Our event windows were:

**January 29–31:** The point at which market expectations of a deregulatory outcome peaked was on the date when Chairman Powell announced his intention to hold the vote on February 13, 2003. The announcement came in a meeting with reporters on January 29, 2003 and reached the market on January 30, 2003.

**February 10–12:** Chairman Powell first demonstrated difficulty mustering a majority when the FCC announced on February 10, 2003 that the vote would be delayed. This news reached the market on February 11, 2003.

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114 See id.


117 Davidson, Powell Likely to Fail, supra note 116.

118 Granelli & Shiver, supra note 116.


120 Id. at 14–15.

121 The purpose of using multi-day event windows is to capture the possibility that news of the event may “leak” and reach the market prior to the actual publication date of the article itself, or that news may not reach all investors simultaneously, so that the full market effect may not be felt until a day after the event itself. See id. at 35; see also discussion infra Appendix A (describing event studies in finance).

122 See Bolen, supra note 108 (noting in a January 30, 2003 publication that the announcement occurred January 29, 2003).


February 18–20: While the FCC’s vote took place on February 20, 2003, news of the final outcome was widely reported on February 19, 2003.125 We chose February 19, 2003 as our event date, but included February 20, 2003 within the event window.

Next, the companies likely to be impacted by the decision were identified. In our case, two groups of companies were affected directly by the FCC’s decision. The first group consists of the four RBOCs.126 We theorize that by forcing below-cost resale of their lines, the UNE rules deprived these companies of income and, on a going forward basis, of the cash flow and access to capital needed to invest in new facilities. Thus, we expected that news of the FCC’s intention to repeal the rules—the first event in our study—should have increased their market valuations, other things equal, while news of a decision to leave the rules in place—events two and three—should have decreased their market valuations.

The second group of companies we examined consists of three competitive local exchange carriers whose business models relied heavily on resale (i.e., the UNE-P).127 With respect to these companies, we theorized that they benefited from the arbitrage opportunity inherent in the UNE regime—that is, the opportunity to lease lines from the RBOCs at state-mandated wholesale prices while selling at much-higher, generally unregulated retail prices. Thus, we expected information indicating the FCC was likely to repeal the UNE rules—the first event window—would reduce these firms’ valuations, other things equal, while news of a decision to leave the rules in place—event windows two and three—should have increased their market valuations.

We tested these hypotheses using multiple regression analysis, as described in detail in Appendix A. Each regression incorporated the Standard & Poor’s (“S&P”) 500 market index, intended to screen out trends affecting the broader

125 See, e.g., Granelli & Shiver, supra note 116 (“[FCC] Chairman Michael K. Powell has abandoned his push to deregulate the telephone industry quickly as the agency prepares to revise key rules . . . .”); Davidson, Powell Likely to Fail, supra note 116 (“[FCC] Chairman Michael Powell has failed to sway a majority of commissioners who oppose his plan to deregulate the regional Bells . . . .”).

126 The four RBOCs at the time of the Triennial Review Remand Order were BellSouth Corp., Qwest Communications Inc., SBC Communications Inc., and Verizon Communications Inc. Mulkern, supra note 115. The three remaining RBOCs are AT&T Corp., Qwest Communications International Inc., and Verizon Communications, Inc. In re AT&T Inc. and BellSouth Corporation Application Pursuant to Section 214 of the Communications Act of 1934 and Section 63.04 of the Commission’s Rules for Consent to the Transfer of Control of BellSouth Corporation to AT&T Inc., Comments of the National Association of State Utility Consumer Advocates, WC Docket No. 06-74, at 3 (June 5, 2006) (accessible via FCC Electronic Comment Filing System).

market, plus dummy variables that were set equal to one of the dates included in the event windows, and equal to zero on all other dates. For each group of companies, we estimated the abnormal return ("AR") for each date individually, and calculated a cumulative abnormal return ("CAR") for the three days that comprise each event window. The ARs and CARs, which represent the estimated impact of the event on the going-forward value of the companies in each sample, are expressed in both percentage terms (i.e., as a percentage of the total market capitalization of the firms in the sample) and in absolute (dollar) terms. In addition, we performed tests of statistical significance that allowed us to determine the probability that the estimated ARs and CARs were truly related to the events at issue, and not generated by random movements in stock prices. The results of our analysis are reported in Tables 2 and 3.

Table 2. Daily Abnormal Returns

<table>
<thead>
<tr>
<th>Sector</th>
<th>EVENT ONE (Vote Announced)</th>
<th>EVENT TWO (Vote Delayed)</th>
<th>EVENT THREE (Outcome Announced)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/29 1/30 1/31</td>
<td>2/10 2/11 2/12</td>
<td>2/18 2/19 2/20</td>
</tr>
<tr>
<td>RBOCS</td>
<td>1.19% 1.15% 0.04% (0.39)</td>
<td>-2.00% -1.04% -1.65% (0.65)</td>
<td>-0.93% -3.68% -7.73% (0.30) (1.20) (2.52*)</td>
</tr>
<tr>
<td>UNE-P</td>
<td>0.42% -1.20% 3.41% (0.09)</td>
<td>2.05% -1.54% -0.28% (0.45)</td>
<td>3.55% 14.48% 14.68% (0.78) (3.20*) (3.24*)</td>
</tr>
<tr>
<td>CLECs</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Figures in parentheses are t-statistics. Asterisk (*) indicates significance at the 99% confidence level.
Table 3. Cumulative Abnormal Returns

<table>
<thead>
<tr>
<th>Sector</th>
<th>EVENT ONE (Vote Announced)</th>
<th>EVENT TWO (Vote Delayed)</th>
<th>EVENT THREE (Outcome Announced)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAR Value</td>
<td>CAR Value</td>
<td>CAR Value</td>
</tr>
<tr>
<td>RBOCS</td>
<td>2.40% $7,329 (0.20)</td>
<td>-4.62% -$13,164 (0.80)</td>
<td>-11.95% -$19,182 (5.93*)</td>
</tr>
<tr>
<td>UNE-P Carriers</td>
<td>2.60% $437 (0.11)</td>
<td>0.20% $317 (0.00)</td>
<td>35.95% $361 (13.77*)</td>
</tr>
</tbody>
</table>

Notes: Figures in parentheses are F-statistics. Asterisk (*) indicates significance at the 99% confidence level. Changes in market values are in millions of dollars.

As indicated in the tables, the first two events we examined, Chairman Powell’s announcement of the date for the vote and the subsequent announcement that the vote would be delayed, did not produce a statistically significant impact on the market valuations of either set of companies. Measures of statistical significance for estimates of both the daily ARs (t-statistics) and the event-window CARs (F-statistics) are far below the levels that would allow us to reject the null hypothesis of no effect.  

However, results for the third event window, representing the release of the FCC’s final decision, are strongly significant. The direction of the indicated effect is consistent with the predictions of our theory. Daily ARs for the RBOCs were negative on all three days of the window and were statistically significant on February 20, 2003 at a 98% confidence level; daily ARs for the UNE-P CLECs were positive on all three days and statistically significant on both February 19 and February 20, 2003 at a 99% confidence level. The CARs for the three-day window, viewed as a whole, were statistically significant at a 98% level for the RBOCs and a 99% level for the UNE-P CLECs.

As shown in the far-right column of Table 3, the CARs for both groups were of significant magnitude. The market value of the four RBOCs decreased nearly 12%, or more than $19 billion, from what it would have been had the

128 A null hypothesis “implies that there is no difference between the true value of a population parameter and that which is being hypothesized.” JAN KMENTA, ELEMENTS OF ECONOMETRICS 111 (2d ed., 1986) A null hypothesis is considered true, unless it is proved beyond a reasonable doubt that the hypothesis is not true. Id. at 112. Thus, by demonstrating an effect, the null hypothesis of no effect may be rejected.
FCC acted in accordance with prior market expectations. As an additional result, the market value of UNE-P CLECs increased by a substantially larger percentage: nearly 36%. Because their market capitalizations are much smaller, however, the absolute gain was a relatively small $361 million. The combined net loss for the two sectors was approximately $18.9 billion.

VI. INTERPRETATION OF RESULTS AND THEIR IMPLICATIONS

Our results demonstrate the FCC’s decision substantially reduced the RBOCs’ market value. As discussed infra, the implications of this result bear on any future mandatory broadband resale rules adopted by the Commission.

Before exploring the broader ramifications of the FCC’s action, however, a comparison of our results with those of a study released in 2003 by the Phoenix Center for Advanced Legal & Economic Policy Studies (“Phoenix Center”) is useful.¹²⁹ Like our study, the Phoenix Center study used an event analysis to isolate the impact of the FCC’s decision on the market value of RBOCs and UNE-P CLECs.¹³⁰ However, it reached a remarkably different result, concluding that despite the fact that the capitalized value of the RBOCs actually declined by $15 billion the day of the vote—“the data suggests that BOC market capitalization may have actually increased by $5.8 billion as a consequence of the Triennial Review.”¹³¹

How is this possible? Like our study, the Phoenix Center study postulated that news relevant to the FCC’s ultimate decision may have reached the market during more than one event window.¹³² Specifically, their study identified two event windows: first, January 6, 2003 when the Wall Street Journal published a story¹³³ reporting the then-common wisdom that the FCC was likely to scale back substantially the UNE regime; and second, February 20, 2003, the date of the decision.¹³⁴ The study found that RBOC stocks gained value on the first date and lost it on the second, but that the January 6, 2003 gains were larger (by $5.8 billion) than the February 20, 2003 losses.¹³⁵ Arguing that “judgments regarding the impact of the FCC’s decision . . . must account for both events,”¹³⁶ the Phoenix Center concluded that “the net impact of the two critical events in the final stages of the Triennial Review process reveal that Bell mar-

¹²⁹ See TELECOMMUNICATIONS STOCKS, supra note 10, at 1.
¹³⁰ Id. at 4–6.
¹³¹ Id. at 4 (emphasis in original).
¹³² Id. at 6–7.
¹³³ See Dreazen & Young, Erase a Key Rule, supra note 88.
¹³⁴ TELECOMMUNICATIONS STOCKS, supra note 10, at 5.
¹³⁵ Id. at 1, 5.
¹³⁶ Id. at 5.
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ket cap increased by $5.8 billion.”

The main problem with the Phoenix Center study lies in its choices of event dates, each of which represents a significant error. The first event day, January 6, 2003, was chosen on the basis of what the Phoenix Center referred to as a seminal event—the January 6, 2003 Wall Street Journal article. The choice was inapt for two reasons: the article reported no new news, and other events on that day—namely the announcement of President Bush’s plan to eliminate taxation of corporate dividends—had a significant effect on RBOC stock prices.

The expectation that the FCC would follow Chairman Powell’s lead on the Triennial Review Remand Order did not suddenly emerge in the marketplace on January 6, 2003. To the contrary, most stories written about the rulemaking during 2002 reflected the same set of expectations as those contained in the January 6, 2003 Wall Street Journal article. As noted above, the Wall Street Journal itself carried very much the same news a month earlier, when it reported that “Chairman Michael Powell seems poised to alter the [UNE] rules in coming months by removing certain pieces of network equipment from the bundle that the Bells are required to lease, people familiar with the matter say.” Indeed, later in the day on January 6, TR Daily, an authoritative industry newsletter, ran a story in which an industry insider described the Wall Street Journal’s report as “nothing new.”

The real news in early February 2003 was not about the Commission’s rulemaking, but rather about President Bush’s proposal to eliminate taxation of corporate dividends. While the President formally announced the plan in a speech on February 7, 2003, the details of the plan were reported prominently

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137 Id. at 10 (emphasis in original).
138 Id. at 4–5.
139 Compare Dreazen & Young, Erase a Key Rule, supra note 88 (reporting in January 2003 that the FCC was poised to repeal the UNE rules), with Dreazen, Bell Companies Lose Customers, supra note 7 (reporting in December 2002 that the FCC likely would repeal the UNE rules) and Krim, supra note 6 (reporting the same).
141 Compare Dreazen & Young, Erase a Key Rule, supra note 88, with Yochi J. Dreazen, Appeals Court Sides with Bells in Dispute over Network Sharing, WALL ST. J., May 28, 2002, at B4; Dreazen, Bell Companies Lose Customers, supra note 7; and Rienhardt Krause, FCC Commissioner Martin Gets Spotlight; Looks Like Swing Vote, INVESTOR’S BUS. DAILY, Dec. 19, 2002, at A6.
142 See Dreazen, Bell Companies Lose Customers, supra note 7.
143 UNE-P Order Remains a Work in Progress with Commissioners Still in Dark, TELECOMM. REP. DAILY, Jan. 6, 2003.
144 See, e.g., Shares Rise on Expectations, supra note 140 (discussing the positive effects of the expectation of the Bush tax cuts on the market).
in the *Wall Street Journal* earlier on January 3, 2003\textsuperscript{145} (the first date in the Phoenix Center event window) and covered heavily by the financial media on January 6, 2003.\textsuperscript{146} Not surprisingly, coverage of the announcement sparked a major stock market rally, especially among companies that pay high dividends, including three of the four RBOCs.\textsuperscript{147} As the *New York Times* reported in its market wrap-up on January 7, 2003, “[a]nticipation of a tax cut yesterday reignited the New Year’s rally on Wall Street, sending shares sharply higher . . . . Stocks that pay dividends, particularly big-name blue chips, were among yesterday’s winners.”\textsuperscript{148}

As shown in Table 4, RBOC stock prices increased slightly more than stocks with comparable dividend yields during the January 3–7 window, and we cannot conclusively prove that the *Wall Street Journal’s* FCC story had no effect.\textsuperscript{149} What this demonstrates, however, is that the January 6 window is heavily polluted by the President Bush’s tax cut announcement and that much, if not all, of the RBOC stock price movements that took place during that period had nothing to do with the FCC’s Triennial Review.


\textsuperscript{147} *Shares Rise on Expectations*, supra note 140.

\textsuperscript{148} *Id.*

\textsuperscript{149} However, analysis at the time suggested that telecommunications stocks would rise more than those of other companies with similar dividend yields under the proposed dividend tax cuts. The impact of eliminating the tax on dividends is a function of several factors, which vary across sectors. Based on a sophisticated analysis, one study concluded that telecommunications stocks would benefit the most of any major sector, with stock prices rising by an average of 33.4%, compared with 23.3% for the next biggest winner, the materials sector. See John Rutledge, Rutledge Capital, How the Dividend Tax Cut Will Work, (Jan. 4, 2003), http://www.rutledgecapital.com/Articles/20030104 how the dividend taxcut work. htm.
Table 4. Stock Price Movements for High Dividend Stocks, Selected Indices (January 3–7, 2003)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Current Dividend Yield</th>
<th>Average Change in Stock Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Jan. 3–7</td>
</tr>
<tr>
<td>RBOC#</td>
<td>3.33</td>
<td>7.86%</td>
</tr>
<tr>
<td>Electric Utility###</td>
<td>4.63</td>
<td>2.01%</td>
</tr>
<tr>
<td>Automobile Manufacturers###</td>
<td>5.62</td>
<td>2.38%</td>
</tr>
<tr>
<td>S&amp;P 500 Index</td>
<td>-</td>
<td>1.53%</td>
</tr>
<tr>
<td>Dow Jones Industrial Index</td>
<td>-</td>
<td>1.55%</td>
</tr>
<tr>
<td>NASDAQ Composite Index</td>
<td>-</td>
<td>3.56%</td>
</tr>
</tbody>
</table>

Notes: #BellSouth, Qwest, SBC, Verizon. ###Dominion Resources, DTE Energy, First Energy, Florida Power & Light, PPL, Southern Company. ###Ford, General Motors, Daimler-Chrysler.

The Phoenix Center’s choice for its second event window was also flawed, because the window both begins (on February 19, 2003) and ends (on February 21, 2003) a day late. As noted above, the result of the FCC rulemaking was widely reported in the media the morning of February 19, 2003, suggesting that the news was available to at least some insiders a day earlier, on February 18, 2003. By the same token, the FCC’s vote took place the morning of February 20, 2003 and was widely and immediately reported, there is no reason to believe that the effects of the news were still rippling through the markets on February 21, 2003. By omitting February 18, 2003 and including February 21, a date on which three of the four RBOC stocks actually went up, the Phoenix Center study likely missed at least part of the effect of the FCC’s actual decision. The Phoenix Center study also could have captured a “bounce back” effect on February 21, 2003 that partially offset the downward stock price movement of the previous two days.

Through its incorrect choice of event windows, the Phoenix Center study produced a result that missed the mark by as much as $25 billion—the $19.2 billion the RBOCs actually lost, plus the $5.8 billion the Phoenix study mis-

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150 See, e.g., Wigfield, supra note 8 (announcing even before the vote occurred, “[FCC] Chairman Michael Powell has apparently fallen short in his drive to further deregulate the telephone industry . . . .”).

151 On February 21, BellSouth closed up $0.90, Qwest closed up $0.03, and Verizon closed up $0.88, while SBC closed down $0.57. New York Stock Exchange Composite Transactions, WALL ST. J., Feb. 24, 2003, at C2.
takenly concluded the RBOCs gained. RBOC stocks fell sharply as a result of FCC's decision; they certainly did not rise.

With this conclusion firmly established, we turn finally to discuss the implications of future Commission decisions imposing UNE-P type rules on broadband network owners.

VII. PARALLELS BETWEEN THE UNE-P REGIME AND PROPOSALS TO FORCE NETWORK SHARING BY BROADBAND NETWORK OPERATORS

The results of this study generally show that the market had an immediate and negative initial response to the Triennial Review and Remand Order. The FCC's UNE decision was expected to reduce substantially investment in the telecommunications sector relative to what it would have been had the UNE rules been substantially reformed. Two main consequences of the network sharing rules generally are responsible for this result: (1) weakened incentives to invest in facilities still covered by the rules; and (2) reduced cash flow from operations available to fund investments. Because the D.C. Circuit remanded the UNE-P Order, and the Commission ultimately repealed the UNE-P regime, the possible negative consequences were largely mitigated. Nonetheless, the immediate market effect of simply leaving the UNE-P regime in place in the Triennial Review Remand Order is a strong lesson on investors' expectations that such rules limit investment and growth in the near and long terms.

One approach to estimating the immediate short-term impact of the decision on capital expenditures subsequent to the Triennial Review Remand Order is to examine the proportion of RBOC cash from operations that the companies traditionally have used for capital investments prior to the change in the regulation. Over certain three-year periods, the four companies reported total net

152 TELECOMMUNICATIONS STOCKS, supra note 10, at 4.
154 In re Unbundled Access to Network Elements; Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Order on Remand, 20 F.C.C.R. 2533, ¶ 199 (Dec. 15, 2004).
155 Hazlett, Rivalrous Telecommunications Networks, supra note 3, at 494.
156 See id. Hazlett provides an example of this analysis:
Analysts further noted that decreasing investment was rational for RBOCs, and hence positive for carrier shareholders. One “bright spot” identified by the investment community during the first quarter of 2003—the height of the UNE-P line growth boom—was that “practically every telco reported capex well below our expectations.” One firm noted that with SBC's capital expenditure to revenue ratio at 9%, there was little room for further cuts, while Bell South and Qwest “still have some room to cut” at 11–12% respectively, and Verizon at 15% “is likely best positioned to cut.”
Id. (quoting MERRILL LYNCH, ILEC SCORECARD 2 (May 15, 2003)). Corporations use cash earned from operations for one of two main purposes: (a) to finance new investment in plant
cash flows from operating activities of $126 billion.\textsuperscript{157} During the same periods, they paid dividends totaling $29 billion and invested $114 billion in new capital.\textsuperscript{158} If the net present value of their future cash flow was reduced by $19 billion, as our results suggest, it is reasonable to estimate that the net present value of their future capital expenditures (absent the subsequent repeal of the rule) would have declined by as much as 85% of this amount, or $16 billion.\textsuperscript{159}

Of course, corporations may also finance capital expenditures through debt, or by reducing the amount of earnings paid out in dividends. Faced with a profitable investment opportunity, a profit-maximizing firm often does both. The FCC majority may have had this thought in mind when they eliminated broadband services from UNE regulation—thereby arguably creating an incentive for the RBOCs to invest in new broadband facilities—even as it deprived them of cash flow and incentives to invest in traditional facilities by leaving UNEs in place on switching and other key network elements. A Goldman Sachs report issued the day after the decision examined this theory, and found it unpersuasive:

The FCC majority’s stated goal in the Broadband ruling was to try to incent upgraded investment from the RBOCs, with the logic that the Bells will simply upgrade faster and more broadly in order to maximize the number of DSL lines that are not subject to unbundling. We don’t believe that this will have the intended effect . . . . We think that it is naïve to think that the Bells, facing such a negative UNE-P decision, will turn around and step up spending on a part of their business that only produces long-run incremental returns. In the short term, they need to respond to the damage that the FCC has imposed on their existing business.\textsuperscript{160}

Industry analysts echoed the Goldman Sachs report. For example, Fitch Rat-

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\textsuperscript{158} See BellSouth Corp., supra note 157, at 50–51; Qwest Communications Int’l Inc., supra note 157, at 85; SBC Communications Inc., supra note 157, exhibit 13; Verizon Communications Inc., supra note 157, at 64–65.

\textsuperscript{159} This estimate is broadly consistent with previous estimates, calculated by very different methodologies, of the impact of UNE-P on telecom capital expenditures. See supra, notes 129–31 and accompanying text. If anything, the effect may be larger, as the continuation of the UNE rules may cause companies to decrease capital expenditures as a proportion of their operating earnings.

\textsuperscript{160} FRANK J. GOVERNALI ET AL., TELECOM SERVICES: FCC DECISION PROVIDES BRIGHTER OUTLOOK FOR T, DIMMER FOR BELLS, GOLDMAN SACHS (2003).
ings concluded that "[t]he relief from unbundling on broadband facilities provides some incentive to invest . . . , but the continuation of UNE-P in the residential market will impede the cash flow growth that the carriers, could in turn, reinvest in broadband facilities." Similarly, Anna-Marie Kovacs, a respected telecommunication analyst from Commerce Capital Markets, wrote that "the rules make investment in fiber closer to the home much more appealing that it has been, but they do not make cash available for investment . . . the funds for broadband are not likely to become available quickly." Ultimately, the Commission's action revoking the UNE-P regime hedged these negative effects; however, there is no reason that network operators will respond differently with respect to network investments subsequent to future network sharing rules.

Some argue that to prevent discriminatory behavior by network operators, rules need to be adopted that would force broadband network providers to allow access to firms offering competing services. As noted above, substantial evidence shows that network sharing reduces incentives to invest in new facilities, since the discounted cash flow from such investments cannot be expected to cover the costs of the investment. Economic theory predicts, and the evidence suggests, that this effect reduces capital investment by all market participants.

By reducing the network owners' expected future cash flows, the FCC decision deprived them of internal sources of funds for new investment, and a similar decision would likely have the same effect. Our $19.2 billion estimate of the drop in market capitalization can be interpreted as an estimate of the discounted present value of the expected reduction in future cash flows. As a consequence, all other things equal, capital expenditures by the firms would

165 Crandall, supra note 164, at 20-21 ("Mandating network sharing . . . invites disputes over network design and is likely to undercompensate network owners for the risk of the premature obsolescence of their sunk facilities. Both of these problems are likely to reduce capital spending and the development of new technologies . . . ").
166 Id. at 19-21.
decline relative to what they would have been had the FCC acted according to expectations. Similarly, announcement of a Commission rule against perceived discriminatory behavior by broadband network owners will cause a significant reduction in capital investment by the network owners, ultimately threatening infrastructure and technology deployment.\textsuperscript{167}

VIII. CONCLUSION

The FCC's UNE regime was intended to increase competition in the market for local wireline telephone services. Rather than focusing on facilities-based entry, however, the UNE rules sought to make it profitable for new entrants to resell the services of incumbents.

Net neutrality regulation, though perhaps motivated by non-economic goals—such as First Amendment concerns—ultimately would affect investment incentives in much the same way as UNE-P: Like the UNE-P rules considered here, they would prevent network owners from capturing the full returns on their investments. This study provides a stark reminder to policymakers of the potential harms caused by forced sharing of network facilities, suggesting that whatever concerns policymakers may have about net neutrality should be addressed, if at all, through a more targeted approach.

APPENDIX A: THE EMPIRICAL MODEL

Event Studies In Finance

An event study is an empirical investigation into the impact of a particular type of event on a publicly traded firm. The underlying hypothesis is that the event affects the firm's market value because it affects the future profitability and the residual value of the firm. The event may be within the firm's control, such as an earnings announcement, or outside the firm's control, such as a legislative act being passed or a regulatory ruling being announced.

The impact of the event on a firm's stock price, or market value, reveals the effects of the event on the firm's going forward value (i.e. the discounted pre-

\textsuperscript{167} See, e.g., John Eggerton, \textit{Analyst: Downturn Could Work Against Net Neutrality Legislation}, \textsc{Broad. & Cable}, Oct. 13, 2008, http://www.broadcastingcable.com/article/CA6604885.html?rssid=193 Eggerton uses the cable industry as an example: [The] economic argument cable has made all along...[is] that network neutrality legislation, or even the threat of it, can discourage the kind of investment in infrastructure necessary to roll out broadband to underserved communities and expand the pipes for all those band-width heavy applications, like video, that are becoming the currency of online entertainment and community (YouTube, Hulu).\textit{Id.}

sent value of its earnings), if the following four conditions are present: (1) the event is a well-defined news item; (2) the time that the news reaches the market is known; (3) there is no reason to believe that the market anticipated the news; and, (4) it is possible to isolate the effect of the news from market, industry, and other specific factors simultaneously affecting the firm’s stock price.

A properly executed event study consists of the following three steps:

1. A statistical model is used to predict a stock’s return (percentage change in price) for a period beginning the day before news of the event reaches the market to the day the news is assimilated into the stock price. The model predicts stock returns based on market and industry events, but not the event being investigated. As such, the model provides a benchmark stock return against which actual returns can be measured.

2. Predicted returns are subtracted from actual returns to calculate what are known as abnormal returns (“ARs”). ARs for short periods (usually individual trading days) typically are summed to give cumulative abnormal returns (“CARs”) for a longer period. Because a statistical model is used to generate predicted returns, they typically do not match actual returns, even when there is no event, due to random statistical errors. Measures of statistical significance have to be used to determine whether any differences between predicted and actual returns are due to random chance or an event not captured by the model. That is, ARs have to be statistically significant in order for one to conclude they are a result of the event being investigated.

3. Lastly, the magnitude of the event’s impact is evaluated. Of the three generally accepted methods for doing so (the market model, the factor model, and the dummy variable model), we chose the dummy variable model.68

Generalized Model

The model used is a modified version of the dummy variable event study model.69 This model provides equivalent, and more convenient, results com-

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pared to other types of event models because it provides both “prediction errors and correct test statistics in one step,” using any statistical package. The model is as follows:

\[
\tilde{r}_{jt} = \alpha_j + \beta_j \tilde{r}_{mt} + \sum_{n=1}^{2} \gamma_{jn} d_{nt} + \tilde{\varepsilon}_{jt}
\]

Where \( \tilde{r}_{jt} \) is the continuously compounded return to security \( j \) over day \( t \); \( \tilde{r}_{mt} \) is the continuously compounded return to the value weighted market portfolio over day \( t \); \( d_{nt} \) is a dummy variable which takes on a value of one if \( t \) is day \(-1\), \( 0 \) or \( 1 \) relative to event in question.

\( \varepsilon_{it} \) is assumed to be a mean zero, normally distributed error term that is independent to both \( \tilde{r}_{mt} \) and \( d_{nt} \). The AR parameter gamma indirectly isolates the component of the security’s daily return that is due to the event itself. The CAR is measured as the cumulative sum of the gamma coefficients.

Statistical significance for the one-day event is measured by the t-statistics on the \( \gamma \) coefficients. The significance of CARs is measured by a test of significance of cumulative sum of the \( \gamma \)'s. The F-statistic for the CARs is determined by using a Wald Test (restricted least squares).

Data

The data used to estimate the stock-return model for the event study are daily closing prices for publicly traded firms in the telecommunications industry and the S&P 500 market index. To be included in the sample, each firm needed to have daily stock prices for the entire estimation period. The firms are organized into two portfolios: RBOCs (BellSouth, Qwest Communications, SBC Communications and Verizon Communications) and UNE-P CLECs (AT&T, Talk America, and Z-Tel).

The process of choosing firms for the sample was relatively straightforward. The four RBOCs are the firms most directly affected by the UNE rules, as they are required in all instances to make their lines available. While other ILECs may also be required to resell their lines, many operate in rural areas where there has been little competition for access, and many of the ILECs also operate outside their traditional service areas as CLECs.

The choice of the UNE-P CLEC portfolio required us to make several distinctions. First, we omitted Covad (a prominent CLEC) from the portfolio on

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170 Karafiath, supra note 169, at 351.

171 See DAMODAR N. GUJARATI, BASIC ECONOMETRICS 257–58 (3d ed., 1995). The null hypothesis of the test is that the abnormal return equals zero.
the grounds that, uniquely among the CLECs, it relies on "line sharing," a form of mandated access the FCC eliminated as part of its February 20, 2003 decision. Covad's stock fell precipitously as a result, and there is virtually no disagreement that the drop was the result of the FCC action. Next, we distinguished between UNE-P CLECs (i.e., Z-Tel and Talk America, which rely primarily on resale, and have not invested significantly in facilities) and other CLECs on the grounds that the impact of the FCC action on CLECs that have invested significantly in their own facilities is ambiguous: while they may be helped by availability of UNEs in some instances, the value of their equipment is reduced by the below-cost leasing of the same equipment by the RBOCs under the UNE rules. Third, we included AT&T among the UNE-P CLECs because of the firm's heavy reliance on UNE-P to enter the local telephone market for residential customers and small businesses. Finally, we excluded WorldCom (which would otherwise have been included in the portfolio on the same grounds as AT&T) because its stock was not trading on major exchanges due to its Chapter 11 status during the relevant times.

Daily stock returns for each firm are measured as $R_{i,t} = (\ln p_t - \ln p_{t-1})$, where $R_{i,t}$ is firm $i$'s return on day $t$ and $p_t$ and $p_{t-1}$ are the closing prices on day $t$ and $t-1$. Portfolio returns are calculated by averaging stock returns across all firms in the portfolio.

Empirical Model

To estimate the ARs and CARs, and their significance around the January 30th, February 11th, and February 19th event dates, we use the following equation:

$$R_p = \alpha + \beta_1 R_M + \rho_1 J_{AN29} + \rho_2 J_{AN30} + \rho_3 J_{AN31} + \gamma_1 FEB10 + \gamma_2 FEB11 + \gamma_3 FEB12 + \lambda_1 FEB18 + \lambda_2 FEB19 + \lambda_3 FEB20 + \epsilon$$

Where $R_p$ is the average daily return on a the portfolio, $R_M$ is the daily return on a the market index (the S&P 500), $J_{AN29}, J_{AN30}, J_{AN31}, FEB10, FEB11, FEB12, FEB18, FEB19,$ and $FEB20$ are dummy variables that equal 1 on each respective date (year 2003), $\epsilon$ is the econometric disturbance term, and the $\rho, \gamma$ and $\lambda$ are the estimated coefficients of an ordinary least squares regression.172 Variables $J_{AN31}, FEB12,$ and $FEB20$ measure the actual event date, whereas the other dates are either minus-one or two trading days from the actual event. Lagged values of the event date ($J_{AN29}, J_{AN30}, FEB10, FEB11, FEB18$ and $FEB19$) detect anticipation and information leaks.

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172 This approach is similar to the models estimated in George Bittlingmayer & Thomas W. Hazlett, Financial Effects of Broadband Regulation 18 (Oct. 25, 2001); Telecommunications Stocks, supra note 10, at 6; John J. Binder, Measuring the Effects of Regulation with Stock Price Data, 16 RAND J. ECON. 167, 171–72 (1985).
Abnormal returns for the event are measured as both one-day or three-day returns.\textsuperscript{173} One-day abnormal returns are measured by the coefficients $\rho_1, \gamma_1, \lambda_1, \rho_2, \gamma_2, \lambda_2, \rho_3, \gamma_3$, and $\lambda_3$. Three-day CARs are measured as the cumulative sum of the coefficients $p_i, \gamma_i$ and $\lambda_i$.\textsuperscript{174} Statistical significance for the one-day event is measured by the t-statistics on the coefficients $\rho_1, \gamma_1, \lambda_1, \rho_2, \gamma_2, \lambda_2, \rho_3, \gamma_3$, and $\lambda_3$, while the three-day returns are measured by a test of significance of the cumulative sum of the $p$'s, $\gamma$'s and $\lambda$'s. Statistical significance of the CARs is determined by the Wald test, which provides an F-statistic.

\textsuperscript{173} See TELECOMMUNICATIONS STOCKS, supra note 10, at 6; see also Bittlingmayer & Hazlett, supra note 172, at 18 (an example of abnormal returns for the event being measured as a three-day return).

\textsuperscript{174} The cumulative return is measured as $(1 + \rho_1) (1 + \rho_2) (1 + \rho_3) - 1$, and likewise for the $\gamma$'s and $\lambda$'s.