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Irrational Expectations: Can a Regulator Credibly Commit to Removing an Unbundling Obligation?

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Executive Summary

There is a large empirical literature that investigates the effects of unbundling requirements on broadband operators' incentives to invest in infrastructure. To date, that literature has generally relied on industry-wide data as an indicator of how the representative operator reacts to the imposition of mandatory unbundling. In this paper, we present original findings on how specific firms reacted to the removal of an unbundling obligation—that is, an act of "regulatory forbearance"—either for an existing access technology or for a new access technology. We rely on three case studies to evaluate the impact of regulatory forbearance on specific incumbents and entrants that were directly affected by the regulator's decision. Our findings from the first case study appear to undermine the so-called "stepping stone" justification for unbundling an existing access technology (for example, the copper loop). In particular, there is a large discontinuity in the investment by entrants around the date of forbearance, in contrast to the steady movement up the "ladder of investment" predicted by the stepping stone hypothesis. Such a discontinuity suggests that either (1) the regulator failed to signal its deregulatory intentions to entrants, or (2) that the signal was clear but the entrant did not react according to the theory. We also find that incumbent investment increases significantly in response to forbearance from regulating a new access technology (for example, fiber loops). When forbearing from regulating an existing access technology, regulators can signal their future intentions to entrants by slowly increasing the regulated wholesale rate. In the case of forbearing from regulating a new technology, however, there is no equivalent mechanism by which regulators can signal their deregulatory intentions to incumbents. Because a regulator cannot credibly signal its commitment to industry participants, and because such a commitment is critical to the practical success of the stepping stone theory, the best policy for maximizing investment is to accelerate the date of forbearance for existing and new access technologies.

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I. INTRODUCTION 2
II. CASE STUDY SELECTION 11
III. FIRST CASE STUDY: FORBEARANCE FROM REGULATING EXISTING COPPER LOOPS IN ANCHORAGE, ALASKA 11
A. Mandatory Unbundling, Forbearance, and the 1996 Telecommunications Act 13
B. ACS's Petition for Forbearance 14

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C. GCI Repeatedly Indicated that Unbundling Requirements Decreased Its Incentive to Deploy Its Own Facilities *14*
1. GCI Comments Before the FCC's Forbearance Proceeding *15*
2. GCI Comments Following the FCC Decision *16*
D. GCI Significantly Increased Investment Following the Anchorage UNE Forbearance Decision *17*
IV. SECOND CASE STUDY: FORBEARANCE FROM REGULATING NEW FIBER NETWORKS IN THE UNITED STATES 18
A. Background of Fiber and DSL Regulation in the United States *18*
1. The FCC's Report and Order and Order on Remand *19*
2. USTA II and the FCC's Order on Remand *20*
B. Unbundling Deregulation Spurred Investment *22*
V. THIRD CASE STUDY: FORBEARANCE FROM REGULATING NEW WIRELESS NETWORKS IN AUSTRALIA 25
A. ACCC Forbearance from Australian Domestic Mobile Roaming Declaration . *26*
B. ACCC Forbearance from International Mobile Roaming Declaration *28*
C. ACCC Forbearance from 3G Declaration *28*
D. Incumbent Responded to Regulatory Forbearance by Increasing Capital Investment *29*
VI. CONCLUSION 31

I. INTRODUCTION

The central premise behind regulatory policies that require incumbent network owners to share their facilities at regulated rates is the so-called "stepping stone hypothesis," which suggests that mandated sharing can create a set of "stepping stones"—or "rungs" on a "ladder of investment"—that allow entrants to invest gradually in their own facilities. According to the stepping stone hypothesis, unbundling allows entrants to gain a foothold at the lower rungs of the investment ladder using (for example) bitstream access, and then climb gradually up the ladder by investing in their own DSLAMs and ATM switches, ultimately replicating the incumbent's entire access network.[1]

The success of the stepping stone approach depends on the regulator's ability to determine which portions of the incumbent's network should be subject to mandatory unbundling and to set access prices at economically correct levels. If elements that cannot economically be replicated are excluded from sharing, or if access prices are set too high, entrants may never get past the first stone (or up the first rung)—that is, they may not enter at all. Alternatively, if sharing is applied to elements that entrants could economically replicate, or if access prices are set too low, both entrants and incumbents will have insufficient incentives to invest in new infrastructure.

Striking the right balance is a difficult task. First, the regulator must identify the correct "rung" on the ladder at which to implement unbundling requirements—that is, the regulator must mandate access for those elements (and only those elements) that cannot yet economically be replicated by entrants, but could in the reasonably near future. Second, the regulator must set access prices for those elements based on their forward-looking costs, taking into account the

1. Martin Cave, *Encouraging Infrastructure via the Ladder of Investment*, 30 TELECOM. POL'Y 223-37 (2006).

options value entrants receive for avoiding the risks of making the investment themselves. Third, and crucially, the regulator must adjust access prices upwards at a pace that reflects the entrant's increasing ability to rely on its own facilities (and provides the correct incentives for it to do so);[2] and, once entrants have climbed a rung, the regulator must remove the unbundling requirement for that element altogether.[3] All of these decisions are complicated by the facts that entrants enter the market at different times and use different technologies, and thus are likely to have different cost structures.

To successfully induce the entrant to invest in its own facilities, the regulator must understand precisely the entrant's investment calculus—that is, the economics of its "make or buy" decision. If one ignores the sunk cost nature of investments in telecommunications networks, the entrant's investment decision turns purely on whether it can self-supply at a lower cost than the regulated access rate. But sunk costs introduce another factor, namely the entrant's ability to avoid risk by avoiding making a sunk cost investment. As Martin Cave, an architect of the "ladder of investment theory," explains, the value of this reduced risk, or "options value," depends not only on the size of the sunk cost component of the investment, but also future events, such as the degree of demand uncertainty, and the expected change in input and output prices.[4] If the wholesale rate fails to account for the options value of avoiding a sunk cost investment, both entrants' and incumbents' incentives will be biased against investment.

All of these factors suggest that setting the correct access price at a point in time is difficult. As noted above, however, regulators need to do more: They must gradually adjust access prices upwards until they converge to the voluntary price—that is, the point at which entrants are expected to have replicated the facilities subject to sharing and no longer require mandated access at rates below the voluntary exchange price. The need for such ongoing adjustments, combined with the existence of lags between investment decisions and infrastructure deployment, forces both incumbents and entrants to make decisions on the basis of their *expectations* about *future* regulatory policy. For example, if entrants believe that regulators will adjust wholesale prices "too slowly," they will be reluctant to move to the higher rungs of the investment ladder—even if prices have been set at the economically correct levels to begin with.

Thus, the decisions of both entrants and incumbents about the level of infrastructure investment in each period depend on their expectations regarding

2. Ultimately, these adjustments should cause the mandated price to converge with the voluntary exchange price, at which point the price constraint is no longer binding. The access price, A, at which the incumbent will voluntarily serve as a wholesaler solves the equality $A - C_W = P_R - C_R - C_W$, where C_W is equal to the wholesale cost per line per month, P_R is the retail price per line per month, and C_R is the retail cost per line per month.

3. *See* Cave at 233-34 (describing each of these steps).

4. *Id*. at 234. Before accounting for the option value, the entrant will invest whenever $P > (r + \alpha + \delta)\ I$, where P is the price (minus variable cost) of the service, r is the risk-adjusted discount rate, α is the economic depreciation rate, δ is the decreasing price of capital goods, and I is the cost of the investment. Intuitively, the price must exceed the cost of capital, which includes the change in the price of the capital good. After accounting for the option value, the entrant will invest whenever $P > m\ (r + \alpha + \delta)\ I$, where m is a term that accounts for the sunk cost nature of the investment coupled with inherent economic uncertainty relating to (1) demand uncertainty, (2) price uncertainty, (3) technological progress uncertainty, and (4) interest rate uncertainty. *See* Jerry Hausman, *The Effect of Sunk Costs in Telecommunications Regulation*, in REAL OPTIONS: THE NEW INVESTMENT THEORY AND ITS IMPLICATIONS FOR TELECOMMUNICATIONS 197-98 (James Alleman & Eli Noam eds., Kluwer 1999).

(1) the actual path of dynamically efficient access prices in future periods, (2) the regulator's ability accurately to estimate and impose dynamically efficient access prices within its current policy framework, and (3) the probability of a change in policy framework that may cause the regulator to alter its approach altogether. For example, an incumbent administration might commit to phasing out the lower tiers of the investment ladder over a fixed time horizon, only to be reversed by a successor administration in a subsequent period that restores bitstream access at the original low prices. Uncertainty about each of these elements adds to the "regulatory risk" factor applied by both incumbents and entrants in evaluating potential investments. To avoid such uncertainty, regulators must make a "credible commitment" to raise prices and remove sharing requirements, because

> entrants must believe that mandated access will be temporary or that its price will rise if they are to factor this into their investment decisions. Otherwise 'moral hazard' problem will arise, with entrants knowing that, if they do not invest, the regulator will not remove their benefits.[5]

Expectations about future regulatory behavior are also critical with respect to decisions about whether to regulate new access technologies. For example, with advances in technology, incumbents seek to upgrade their broadband networks (both wireline and wireless) to support new services, including video. But incumbents fear the prospect that such investments could be appropriated by the regulator and shared with entrants.

Recognizing this incentive problem, German regulators moved quickly to commit to not regulating fiber networks. In early 2005, German incumbent Deutsche Telekom (DT) asked regulators to forbear from unbundling regulations if it constructed a new fiber optic network. A DT spokesman noted at the time that the company "cannot possibly invest 3 billion euros in setting up a network without receiving adequate protection for [the] investment in return."[6] In response, German lawmakers passed legislation granting DT sole use of its VDSL last-mile copper networks, which are used to connect to DT's fiber-optic network.[7] This unique form of regulatory forbearance appears to have provided adequate regulatory certainty and incentive for DT to build the system as planned,[8] even in the face of the European Union's decision to mount a court challenge to the German forbearance decision.[9] Nevertheless, the EU's action

5. *See* Cave at 235.

6. As quoted in Tom Jowitt, *Deutsche Telekom Fiber-Optic Monopoly Row Continues*, COMPUTERWIRE, Feb. 22, 2006, *available at* http://www.computerwire.com/industries/research/?pid=B8D172E2-34D2-4139-8284-F509C2E9A7DB.

7. Kevin J. O'Brien, *German Parliament Approves Rules Banning Rivals from Deutsche Telekom's New Network*, INTERNATIONAL HERALD TRIBUNE, Dec. 15, 2006, *available at* http://www.iht.com/articles/2006/12/15/business/telekom.php ("The German Parliament voted Friday to ban rival telecommunications companies from selling services on Deutsche Telekom's new, super-high-speed broadband network, setting up a potentially embarrassing legal clash with European lawmakers.").

8. Deutsche Telekom plans to connect 50 German cities with VDSL technology by 2008. *Interim Group Report: January 1 to June 30, 2007*, DEUTSCHE TELEKOM, AG, at 17 ("[DT] plans to equip 50 cities with VDSL and connect them to the platform by 2008.").

9. Eric Pfanner, *EU Starts Court Case Against Germany Over Law Favoring Deutsche Telekom*, INTERNATIONAL HERALD TRIBUNE, Feb 27, 2007, *available at* http://www.iht.com/articles/2007/02/27/business/telekom.php ("European regulators have started

means that both the incumbent and its competitors face the prospect that Germany's policies with respect to mandatory unbundling will be decided in a court of law, with both the outcome and its timing highly uncertain. As experience in the United States has shown, both incumbents and entrants have large stakes in the outcomes of such battles, and as a result are fully prepared to engage in both political lobbying and litigation to achieve their desired outcomes—with delay and uncertainty a seemingly inevitable consequence.[10]

Similar situations can be found in many other countries. In Australia, the regulator's inability credibly to commit to forbear from broadband unbundling requirements has delayed if not altogether scuttled a major nationwide broadband deployment plan. Telstra, the incumbent LEC, called off its previously planned fiber deployment after more than a year of negotiations with the Australian Competition and Consumer Commission (ACCC) finally announcing in 2006 that "[o]ur fiber to the node (FTTN) project is on hold…[u]ntil our actual costs are recognized and the ACCC's regulatory practices change, we will not invest in a FTTN broadband network."[11] Although a consortium of competitors has threatened to step in with its own plan,[12] there has been no next generation broadband access deployment in Australia to match the deployment currently underway in the United States.

In contrast to Australia's ambivalent regulation or Germany's forbearance, British fiber deployment has been hampered by uncertainty over the impact of unbundling requirements that are currently in effect. For example, British Telecom (BT) officer Matt Beal has said that current British unbundling regulations make fiber deployment "not worth the expense."[13] BT chairman Sir Christopher Bland has also hinted that regulatory disincentives may play a role in Britain's limited fiber deployment, noting that any fiber investment would need "to make sense for our shareholders if [BT is] going to invest lots of money in it."[14] Because Ofcom, the British regulator, appears to be moving in the opposite

legal proceedings against Germany over a new law that allows Deutsche Telekom to keep rivals off a high-speed network it is building to deliver on-demand movies and other services to German living rooms."). *See also EU Takes Germany to Court over Telecom Law*, INTERNATIONAL HERALD TRIBUNE, June 27, 2007, *available at* http://www.iht.com/articles/2007/06/27/business/telekom.php. ("Deutsche Telekom aims to roll out a high-speed fiber-optic network that will transmit data up to 20 times faster than current offerings. The plan is to provide the 50 largest German cities with high-speed broadband lines by the end of 2007.").

10. Such "rent-seeking activity" is an apparently unavoidable by product of government regulation and can lead to welfare losses well in excess of those traditionally associated with the "welfare loss triangle." *See*, *e.g.*, Gordon Tullock, *The Welfare Costs of Tariffs, Monopolies and Theft*, WESTERN ECON. J. 224-232 (1967); George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. MGMT. SCI. 3-21 (1971) (proving a theory of demand for and supply of regulation); Sam Peltzman, *Toward a More General Theory of Regulation*, 19 J. L. & ECON. 211-40 (1976) (formalizing Stigler's model); Richard Posner, *Theories of Economic Regulation*, 5 BELL J. ECON. MGMT. SCI. 335-58 (1974).

11. Telstra Corp. Ltd., *Annual Report 2006*, *Full Year Results and Operations Review*, at 74, *available at* http://www.telstra.com.au/abouttelstra/investor/docs/fyresultsoverview.pdf.

12. Renai LeMay, *G9 Lodges Fiber Proposal with ACCC*, ZDNET AUSTRALIA, Apr. 20, 2007, *available at* http://www.zdnet.com.au/news/communications/soa/G9-lodges-fibre-proposal-with-ACCC/0,130061791,339275000,00.htm.

13. David Meyer, *Fiber Access Essential Says Industry Group*, ZDNET UK, Apr. 16, 2007, *available at* http://news.zdnet.co.uk/communications/0,1000000085,39286709,00.htm ("BT currently has no plans to upgrade the copper to high-speed fiber because it says regulation would force it to open those connections up to rival providers, thus making it not worth the expense.")

14. David Meyer, *Outgoing BT Chief Hints at Fibre Rollout*, ZD NET UK, July 19, 2007, *available at* http://news.zdnet.co.uk/communications/ 0,1000000085,39288121,00.htm.

direction, significant fiber optic system investment seems unlikely in the near future.[15]

The empirical literature on the investment effects of mandatory unbundling typically does not account explicitly for the role of such regulatory uncertainty, focusing instead on whether access rates are set at the efficient level at a point in time. Most such studies rely on cross-sectional or time-series data of a broad array of firms shortly after unbundling has been introduced. For example, Robert Crandall, Allan Ingraham, and Hal Singer used cross-state variation in the price of constructing local phone lines (adding capacity) relative to leasing unbundled loops (LLUs) to identify the sensitivity of CLEC investment in local lines to the LLU rate.[16] They showed that mandatory unbundling encourages a CLEC to delay facilities-based investment by altering its relative net present value of investment between time periods.[17] They also found that facilities-based lines growth relative to LLU growth was faster in states where regulated LLU rates were higher relative to the cost of facilities-based investment.[18]

Professor Leonard Waverman, Professor Meloria Meschi, Benoit Reillier, and Kalyan Dasgupta employed the Crandall-Ingraham-Singer methodology to examine the effect of unbundling requirements on infrastructure investment in Europe.[19] Using data from 2002-2006, the authors sought to determine the net effect that lower LLU prices—resulting from increased access regulation—had on broadband deployment, European economic output, and European employment.[20] They found that lower LLU rates steeply reduced the number of broadband consumers over that period.[21] Furthermore, using an approach developed by Crandall, Jackson, and Singer,[22] the authors suggest that lower LLU prices may, by reducing broadband investment over the next decade, forgo over 30 billion Euros of additional output and "thousands" of additional jobs.[23]

Jerry Hausman and J. Gregory Sidak evaluated the investment effects of mandatory unbundling in the United States, the United Kingdom, Canada, and Germany.[24] Their analysis demonstrated that, contrary to the prediction of the stepping stone hypothesis, U.S. competitive local exchange carriers (CLECs) were increasingly relying on unbundling as their preferred mode of entry.[25]

15. For example, Ofcom moved in 2004 to introduce copper and, possibly, fiber unbundling. *See* Graeme Wearden, *Ofcom Forces Action on Broadband Unbundling*, ZD NET UK, May 13, 2004, *available at* http://news.zdnet.co.uk/communications/ 0,1000000085,39154558,00.htm.

16. Robert W. Crandall, Allan T. Ingraham & Hal J. Singer, *Do Unbundling Policies Discourage CLEC Facilities-Based Investment?* 4 TOPICS IN ECON. ANALYSIS 3 (2004).

17. *Id*. at 4-5.

18. *Id*.

19. Leonard Waverman, Meloria Meschi, Benoit Reillier, & Kalyan Dasgupta, *Access Regulation and Infrastructure Investment in the Telecommunications Sector: An Empirical Investigation*, Working Paper, LECG Ltd. (Sept. 2007) [hereinafter *European LLU Study*].

20. *Id.* at 2-3.

21. *Id.* at 3-4.

22. *See* Robert W. Crandall, Charles L. Jackson, and Hal J. Singer, *The Effect of Ubiquitous Broadband Adoption on Investment, Jobs, and the U.S. Economy*, Working Paper, Criterion Economics (Sept. 2003).

23. *European LLU Study, supra* note 19, at 5.

24. Jerry A. Hausman & J. Gregory Sidak, *Did Mandatory Unbundling Achieve Its Purpose? Empirical Evidence from Five Countries*, 1 J. COMPETITION L. & ECON. 173 (2005).

25. *Id*. at 200-04.

Canadian CLECs also were shown to become increasingly dependent on unbundled loops for narrowband services between 1999 and 2002.[26]

Thomas W. Hazlett found that the pattern of CLEC entry in the United States suggests that competition achieved through mandatory unbundling does not lead to facilities-based entry.[27] Instead, rapid growth in the use of unbundled network facilities by CLECs quickly became the dominant form of CLEC entry.[28] Hazlett also found that capital expenditures in the network actually declined dramatically for both incumbents and entrants. He estimated that the simple correlation between unbundled network element (UNE) lines and non-cable facilities-based lines is roughly –1, indicating that UNE line growth crowded out new investments in the network.[29]

Most recently, Robert Crandall and J. Gregory Sidak analyzed quarterly data collected by the European Competitive Communications Association (ECTA).[30] For each country in the ECTA database, they examined whether "higher-investment" LLU lines overtake the sum of "lower-investment" bitstream and resale lines at some point in the sample period and, if not, whether LLU lines appear likely to overtake the sum of bitstream and resale lines in the near term. Crandall and Sidak found that LLU lines increased as a percentage of total CLEC lines between July 2002 and September 2006 in nine of the fifteen European countries in the sample. In the other six countries—Denmark, Finland, Germany, Greece, Ireland, and the Netherlands—falling LLU lines as a percentage of total CLEC lines demonstrates that entrants did not move up the ladder of investment. According to Crandall and Sidak, the best support for the ladder-of-investment theory is to be found in France and Italy, two countries with little or no cable modem competition.

The role of expectations is acknowledged, but not quantified, in a study by Larry Darby, Jeffrey Eisenach, and Joseph Kraemer, which analyzes the financial results of 24 publicly traded CLECs in the United States between 1996 and 2001. They found that industry expectations of favorable regulatory treatment (that is, long-term availability of below-cost pricing of network elements) contributed to excessive entry among CLECs, and ultimately to the "meltdown" that resulted in most CLECs going out of business or declaring bankruptcy.[31]

The major contribution of this paper is that it examines in detail the investment reactions of incumbents and entrants over time to specific regulatory decisions regarding unbundling obligations. We consider two forms of regulatory forbearance: (1) the removal an unbundling obligation for an *existing* access technology (for example, a copper loop) or (2) forbearance from imposing an unbundling obligation for a *new* access technology (for example, a fiber loop). As we demonstrate below, the analysis of both types of investment decisions is very similar.

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26. *Id*. at 232-33.

27. Thomas W. Hazlett, *Rivalrous Telecommunications Networks With and Without Mandatory Sharing*, Working Paper, AEI-Brookings: Joint Center for Regulatory Studies 1 (May 2005).

28. *Id*. at 11.

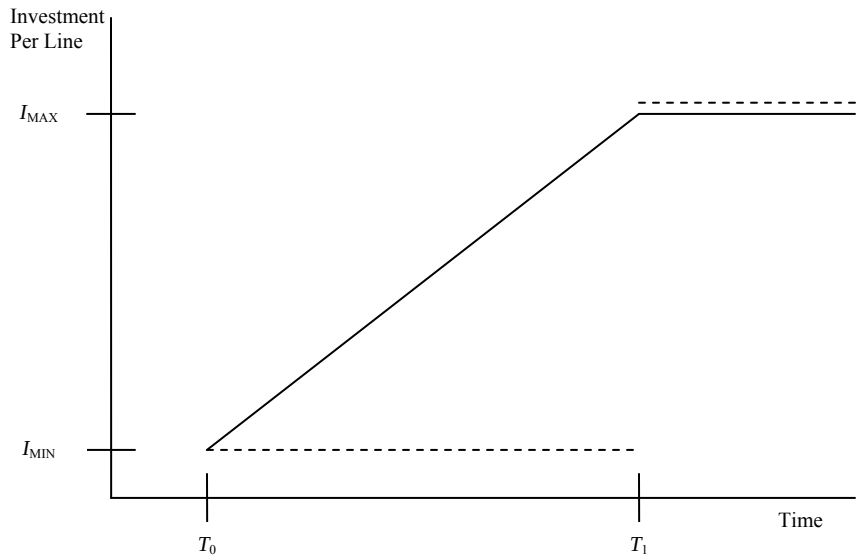
29. *Id*. at 21.

30. Robert W. Crandall & J. Gregory Sidak, *Is Mandatory Unbundling the Key to Increasing Broadband Penetration in Mexico? A Survey of International Evidence*, Working Paper, Criterion Economics (June 2007), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=996065.

31. Larry F. Darby, Jeffrey A. Eisenach, & Joseph S. Kraemer, *The CLEC Experiment: Anatomy of a Meltdown*, Progress on Point 9.23, The Progress & Freedom Foundation, Sept. 2002.

Figure 1 shows the optimal investment schedule for a hypothetical entrant whose expectations are based on a secure commitment by the regulator to slowly increase access prices over time such that by the date of forbearance, T_1, the access price is equal to the voluntarily determined access rate.

FIGURE 1: ENTRANT INVESTMENT SCHEDULE, REMOVAL OF UNBUNDLING OBLIGATION FOR AN EXISTING ACCESS TECHNOLOGY



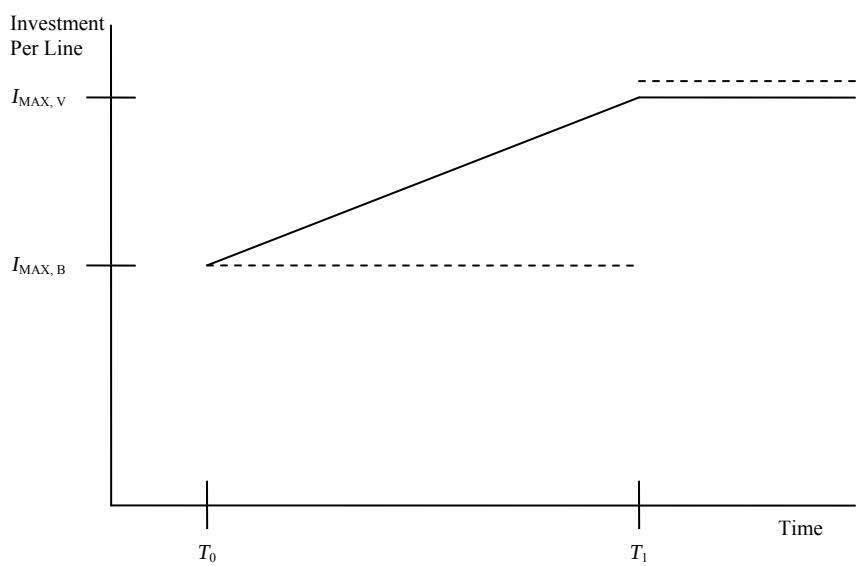
The entrant's investment schedule (on a per line basis) under the stepping stone hypothesis is the non-dashed line. T_0 is the date on which the unbundling obligation is imposed and wholesale prices are set at long-run incremental cost. I_{MAX} is the investment per line that would enable the entrant to completely bypass the incumbent's network, and I_{MIN} is the minimum investment per line to offer service at the lowest rung on the ladder. If the entrant is convinced that wholesale prices will increase over this period, and if the entrant is committed to serving as a facilities-based operator over the long term—two key assumptions underlying the stepping stone hypothesis—then the entrant should slowly increase its investment in its own facilities towards I_{MAX} for two reasons. First, as the wholesale price increases, it is more profitable at the margin for the entrant to serve certain customers over its own facilities—that is, it is more profitable to move to a higher rung on the investment ladder over all or part of its network. Second, given the lag between investment and the ability to serve a customer over its own facilities, the entrant would prefer to be ready to serve 100 percent of its customers using its own facilities on T_1.

For the transition to facilities-based investment to occur, it is critical that the entrant believes that the regulator will not deviate from its commitment ultimately to raise access prices to the voluntary (i.e., market) access rate. Otherwise the entrant will withhold its investment until T_1 to exploit fully the arbitrage opportunity made possible by the low wholesale rate. Such investment-discouraging expectations can be formed during several scenarios. For example, the regulator could fail to increase wholesale rates in the early years of the

unbundling experiment. Or the regulator could begin to increase wholesale rates, but then reverse itself, decreasing rates in midcourse. At the time of the reversal, the entrant would no longer find the regulator's commitment to raise wholesale rates credible. Alternatively, even if the regulator is truly committed to increase wholesale rates and can calculate the actual going-forward costs of infrastructure, it may err in its calculation of the option value conferred on entrants. Any one of these errors would cause the entrants to remain on the bottom of the investment ladder, resulting in suboptimal investment relative to the welfare-maximizing path. The regulator's best choice in this circumstance is to accelerate the date of forbearance—that is, move T_1 closer to T_0.

The previous discussion concerned the regulator's decision to remove an unbundling obligation on an *existing* access technology. The regulator's decision to forbear from regulating a *new* access technology has a similar effect on the investment schedule of the incumbent. It is a non-controversial proposition that unbundling has the effect of truncating the high end of the distribution of returns for incumbents, thereby decreasing their incentive to invest.[32] As was the case for the entrant, the regulator's problem is exacerbated by its inability to commit to a particular policy in future periods. Figure 2 shows the incumbent's investment schedule under two beliefs: (1) the regulator can be trusted to exclude new access technologies such as fiber from unbundling requirements at some future date and (2) the regulator cannot be trusted until it actually grants forbearance.

FIGURE 2: INCUMBENT INVESTMENT SCHEDULE,
FORBEARANCE OF UNBUNDLING OBLIGATION FOR A NEW ACCESS TECHNOLOGY



At T_0, the incumbent is investing at the maximum level, $I_{MAX,B}$, to sustain the existing access technology. At some point after T_0, the incumbent has the potential to invest in a new access technology, which requires investment $I_{MAX,V}$.

32. The expected value of return on a new telecommunications service with mean μ and standard deviation σ when it is truncated at long run incremental cost c is $E(y \mid y < c) = \mu - \sigma M(c)$, where M(c) is the inverse Mills ratio evaluated at c. *See* Hausman, *supra*, at 195.

Until the regulator can credibly commit to forbearing from applying unbundling requirement to the new access technology, however, the incumbent is reluctant to invest in those upgrades. Graphically, investment remains constant at $I_{MAX,B}$ between T_0 and T_1. Moreover, in contrast to the case of forbearing from regulating existing access technologies, the regulator does not have a simple way to signal its commitment to follow through on a promise of forbearance for a *new* access technology at some future date. Recall that the regulator could signal its commitment to forbear from regulating an *existing* access technology by slowly increasing the regulated wholesale price. Unfortunately, there is no similar policy instrument in the case of forbearing from regulating a new technology.[33]

Assuming the regulator's is unable to credibly signal its forbearance intentions, we would again expect investment to lag behind the economically optimal path during the period of uncertainty, and then to observe a discontinuity in incumbent investment around the time T_1. In contrast, if the regulator can commit to forbearing from regulating the new access technology at some future date, then the incumbent will slowly increase its investment to $I_{MAX,V}$, and the incumbent's investment per line should increase gradually between T_0 and T_1. This hypothesis is the analog of the "stepping stone hypothesis" in the case of removing an unbundling obligation for an existing access technology. Thus, if the goal of the regulator is to achieve the economically efficient investment path, and if it cannot convince incumbents of its intention to shield new services from unbundling requirements at some point in the future, then the regulator should accelerate the date of forbearance—that is, move T_1 closer to T_0.

Table 1 summarizes the results of this discussion. It bears emphasis that although the stepping stone hypothesis, as its name suggests, makes predictions about the behavior of entrants only, forbearance from regulating an existing access technology also affects an incumbent's incentive to invest. Similarly, although the analog of the stepping stone hypothesis implicates the behavior of incumbents only, forbearance from regulating new services also affects an entrant's incentive to invest.

TABLE 1: PREDICTIONS OF STEPPING STONE HYPOTHESIS AND ITS ANALOG FOR NEW ACCESS TECHNOLOGIES

	Forbear from Regulating an Existing Access Technology	*Forbear from Regulating a New Access Technology*
Entrant	Stepping Stone Prediction: No discontinuity in investment around the time of forbearance	
Incumbent		Regulator Can Be Trusted Prediction: No discontinuity in investment around the time of forbearance

As Table 1 shows, the stepping stone hypothesis and its analog for incumbent investment in new services generate concrete predictions of the investment behavior of entrants and incumbents around the time of forbearance on existing and new services, respectively. In this paper, we test those predictions

33. The ultimate form of commitment, of course, is to issue a binding forbearance order, which precludes future unbundling for the new access technology.

empirically by examining the investment behavior of entrants and incumbents (collectively, "operators") around the time of a forbearance order, and find significant discontinuities in investment. It should be noted that our findings do not necessarily refute the stepping stone hypothesis as a matter or theory. They do suggest, however, that in practice, regulators have not successfully met the challenge of managing expectations described above. Our paper is organized as follows.

In Part II, we describe how we chose the cases studied. In Part III, we examine the deregulation of existing UNE service obligations in the Anchorage, Alaska area. In Part IV, we analyze the effect of regulatory forbearance on the deployment of U.S. fiber optic networks. Part V examines regulatory forbearance internationally, examining how regulatory forbearance affected the deployment of new 3G mobile telephony in Australia. Finally, Part VI offers policy implications from our findings.

II. CASE STUDY SELECTION

To select our case studies, we focused on significant decisions that would allow us to test the hypotheses presented in Table 1. In addition, selections were made so that we could examine ILEC and CLEC investment responses to forbearance decisions. Selections were also made to ensure that the review considered both cases that granted the removal of obligations on existing access technologies and cases that granted forbearance from the regulation of new access technologies. Finally, two of our three cases are drawn from the United States (the other is from Australia); this is in large part because the United States has a relatively lengthy and varied history of unbundling and forbearance, and thus offers a variety of "natural experiments."

Our paper examines three specific regulatory events as case studies: (1) the FCC's limited forbearance from regulation of the copper loop in the Anchorage, Alaska area (2) the series of Federal Communications Commission (FCC) decisions forbearing from the imposition of unbundling obligations on fiber optic networks in the United States; and (3) the Australian Competition and Consumer Commission's decision to refrain from the "declaration" (imposition of unbundling requirements) of Third-Generation (3G) wireless networks in Australia. The first case examines forbearance from unbundling requirements on an *existing* access technology (the copper loop), whereas cases (2) and (3) address examples of forbearance from the imposition of unbundling requirements on *new* access technologies (fiber loop and wireless 3G).

These cases, collectively, allow for an analysis of incumbent and entrant reactions to several watershed regulatory decisions. Each case had a large direct or indirect effect on investment calculations. Although this selection is by no means exhaustive, it touches on the crucial copper, fiber, and wireless components of modern telecommunications networks.

III. FIRST CASE STUDY: FORBEARANCE FROM REGULATING EXISTING COPPER LOOPS IN ANCHORAGE, ALASKA

In September 2005, immediately following the FCC's preliminary ruling granting Qwest regulatory forbearance in Omaha, Nebraska,[34] Alaska Communications Systems Group, Inc. (ACS) filed a similar petition for forbearance in Anchorage, Alaska.[35] Following Qwest's example, ACS petitioned for forbearance from mandatory unbundling requirements to provide (existing) voice services in their Anchorage wire centers, which it contended were subject to fierce competition from the local cable operator. The Commission granted, in part, ACS's petition in December 2006.[36]

There are several reasons why ACS's petition is an ideal opportunity to examine entrant and incumbent investment decisions in the face of regulatory forbearance. First, there was only one facilities-based competitive local exchange carrier, GCI, Inc. (GCI), operating in the Anchorage market. As a result, it was the only competitive local carrier directly affected by the FCC's forbearance order. Second, ACS and GCI are both well-capitalized, profitable, facilities-based carriers, ensuring that changes in investment decisions likely represent rational responses to changes in expected long-run rates of return (such as those caused by changes in the regulatory regime) than reactions to budget constraints associated (for example) with bankruptcy or cash-flow problems. Third, because ACS and GCI are both local Alaska companies with limited operations, Anchorage represents a substantial segment of their market, and thus also represents a substantial segment of their capital expenditures. Because of this limited scope of operations, we have greater confidence that changes in company-wide investment are caused by forbearance decisions in the Anchorage MSA.

As noted above, the stepping stone hypothesis implies that investment should occur on a smooth path over the period of deregulation. Thus, a smooth GCI investment schedule will provide some validation of the stepping stone hypothesis. Under the alternative hypothesis, one would expect to observe a discontinuity in GCI's investment following regulatory forbearance. As such, discontinuity in GCI investment around the time of the Anchorage forbearance decision would provide some evidence that either (1) regulators were not successful in fully and accurately signaling their intentions with respect to the forbearance, or (2) that the deregulatory signal from the regulator was clear but GCI did not react according to the stepping stone theory, or some combination of the two.

To test the hypothesis, we examined quarterly GCI line extension investments. Line extension investments account for the cost of extending last-mile service to its customers. Because last-mile telecommunications service can also be provided over ACS's unbundled UNE loops, line extension spending

34. *In the Matter of Qwest Corporation Petition for Forbearance Pursuant to 47 U.S.C. §160(c) in the Omaha Metropolitan Statistical Area, FCC Memorandum and Order,* WC Dkt. No. 04-223 (rel. Dec. 2, 2005) [hereinafter *Quest Petition*].

35. *In the Matter of Petition of ACS of Anchorage, Inc. Pursuant to Section 10 of the Communications Act of 1934, as Amended, for Forbearance from Sections 251(c)(3) and 252(d)(1) in the Anchorage LEC Study Area*, *Petition of ACS of Anchorage, Inc. for Forbearance from Sections 251(C)(3) and 252(D)(1)*, WC Dkt. No. 05-281 (filed Sept. 30, 2005) [hereinafter *ACS Petition*].

36. *In the Matter of Petition of ACS of Anchorage, Inc. Pursuant to Section 10 of the Communications Act of 1934, as Amended, for Forbearance from Sections 251(c)(3) and 252(d)(1) in the Anchorage LEC Study Area*, *FCC Memorandum and Order*, WC Dkt. No. 05-281 (rel. Jan. 30, 2007) [hereinafter *Anchorage Memorandum and Order*].

represents direct substitution between these two alternatives. Examining line extension capital expenditures per access line in use, we observe a significant discontinuity in GCI's line extension investment expenditures. This finding is consistent with the hypothesis that GCI did not find the regulator's pronouncements of gradual de-regulation credible. Indeed, after initially increasing UNE loop rates in Anchorage from $14.92 to $19.15 in June 2004,[37] the regulator *decreased* access price to $18.64 in November 2004.[38] The effect of this reversal in UNE rates may have undermined GCI's belief that the regulator was committed to forbearing from regulation at some future date.

A. Mandatory Unbundling, Forbearance, and the 1996 Telecommunications Act

The statutory obligation to for incumbents to unbundle network elements, and the regulator's statutory authority to forbear from that requirement both reside in the 1996 Telecommunications Act.[39] The 1996 Act specifically imposes on each incumbent:

> The duty to provide, to any requesting telecommunications carrier for the provision of a telecommunications service, nondiscriminatory access to network elements on an unbundled basis at any technically feasible point on rates, terms, and conditions that are just, reasonable, and nondiscriminatory…An incumbent local exchange carrier shall provide such unbundled network elements in a manner that allows requesting carriers to combine such elements in order to provide such telecommunications service.[40]

In addition, however, the 1996 Act gives the FCC the power to forbear from the unbundling regulations if such action is deemed by the Commission to be in the public interest. Specifically, the 1996 Act states:

> …the Commission shall forbear from applying any regulation or any provision of this chapter to a telecommunications carrier or telecommunications service, or class of telecommunications carriers or telecommunications services, in any or some of its or their geographic markets if the Commission determines that—
>
> …
>
> (3) forbearance from applying such provision or regulation is consistent with the public interest.[41]

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37. *RCA Anchorage Decision, supra* note 57, at 76.

38. *In the Matter of the Petition by GCI Communications Corp. d/b/a General Communication, Inc., and d/b/a GCI for Arbitration under Section 252 of the Telecommunications Act of 1996 with the Municipality of Anchorage d/b/a Anchorage Telephone Utility a/k/a ATU Telecommunications for the purpose of Instituting Local Exchange Competition, Order Approving Interconnection and Resale Agreement between ACS-AN and GCI,* RCA Dkt. No. U-96-89, Order No. 51 (filed Dec. 7, 2004) at 76. Order came in response to arbitration. *See In the Matter of the Petition by GCI Communications Corp. d/b/a General Communication, Inc., and d/b/a GCI for Arbitration under Section 252 of the Telecommunications Act of 1996 with the Municipality of Anchorage d/b/a Anchorage Telephone Utility a/k/a ATU Telecommunications for the purpose of Instituting Local Exchange Competition, Joint Compliance Filing of ACS of Anchorage, Inc./GCI Interconnection Agreement Pursuant to Order No. 49*, RCA Dkt. No. U-96-89 (filed Oct. 27, 2004), at 23 Part C Attachment I.

39. Telecommunications Act of 1996, 47 U.S.C. § 251.

40. S. 652, Telecommunications Act of 1996, 104th Cong. I § 101(a) (1996); incorporated as 47 U.S.C. § 251(c)(3).

41. 47 U.S.C. § 160(a).

The 1996 Act also instructed the Commission to "consider whether forbearance from enforcing the provision or regulation will promote competitive market conditions…."[42] The FCC's decision to forbear from UNE regulation in Anchorage, as we discuss below, was predicated on the promotion of the public interest *and* on competition in local telephony.

B. ACS's Petition for Forbearance

At the time of its forbearance petition, the incumbent local exchange carrier, ACS, was required to provide entrants access to its network at regulated rates. Its sole facilities-based competitor, GCI, utilized ACS' network (specifically, its last-mile loops) to serve a small portion of its customers, while serving the remainder of its customers entirely over its own facilities.

GCI considers itself to be "the leading integrated, facilities-based communications provider in Alaska, offering local and long-distance voice, cable video, Internet and wireless communications services to consumer and commercial customers."[43] Before ACS's petition, GCI offered telephone service through either its own access lines or ACS access lines that were provided at a regulated rate, which at the time of ACS's petition (September 2005) was $18.64 per access line.[44] At that time, GCI relied on ACS' UNEs to provide telephone service to approximately 7 percent of GCI's total customers.[45] GCI had been successful in winning a growing proportion of market share. In its petition, ACS claimed that, "ACS's local exchange market share in Anchorage has fallen from nearly 100 percent to less than 50 percent."[46] GCI was the only competitor in Anchorage that relied on UNE loops.[47]

C. GCI Repeatedly Indicated that Unbundling Requirements Decreased Its Incentive to Deploy Its Own Facilities

GCI's comments both before and during the forbearance proceeding indicate that its decisions to invest in its own loop and switching equipment were based in part on the regulatory environment.[48] In July 2004, for example, GCI Chief Financial Officer John Lowber stated, "[i]n part because we're limited in our

42. 47 U.S.C. § 160(b).

43. GCI, Inc, SEC FORM 10-K (filed Mar. 26, 2007) at 8.

44. *In the Matter of Petition of ACS of Anchorage, Inc. Pursuant to Section 10 of the Communications Act of 1934, as Amended, for Forbearance from Sections 251(c)(3) and 252(d)(1) in the Anchorage LEC Study Area*, *Statement of David C. Blessing,* WC Dkt. No. 05-281 (filed Sept. 30, 2005), at 3.

45. GCI, Inc., 2006 SEC FORM 10-Q (filed Nov. 14, 2006), at 26.

46. *ACS Petition*, *supra* note 35, at 1.

47. *In the Matter of Petition of ACS of Anchorage, Inc. Pursuant to Section 10 of the Communications Act of 1934, as Amended, for Forbearance from Sections 251(c)(3) and 252(d)(1) in the Anchorage LEC Study Area*, *Statement of Thomas Meade,* WC Dkt. No. 05-281 (filed Sept. 30, 2005), at 3. ("GCI is the only CLEC that orders UNE loops from ACS.") Although ACS faced additional competition from the local subsidiary of AT&T and from TelAlaska *Id.* at 2. These carriers relied on reselling ACS' services. *Id.* at 3. ("By ACS's estimates for June 2005, competitors in Anchorage provide service through the following means: approximately 11,000 lines are provisioned via resale under Section 251(c)(4)…").

48. *See*, for example, *In the Matter of Petition of ACS of Anchorage, Inc. Pursuant to Section 10 of the Communications Act of 1934, as Amended, for Forbearance from Sections 251(c)(3) and 252(d)(1) in the Anchorage LEC Study Area*, *Opposition of General Communications, Inc.,* WC Dkt. No. 05-281 (filed Jan. 9, 2006) [hereinafter *Statement of Thomas Meade*], at 35-37.

ability to control loop rental costs, we've been positioning ourselves to deploy [digital local phone service] using our cable plant instead of leased local loops or other means involving the incumbent local exchange provider."[49] However, GCI had also made clear that the extent and pace of last-mile line development hinged on "the opportunity costs of building its own last-mile facilities."[50] In the following section, we review GCI's comments before and after the FCC's forbearance decision.

1. GCI Comments Before the FCC's Forbearance Proceeding

In its petition, ACS noted several examples where GCI appeared to signal that the extent and pace of last-mile development was dependent on the state of unbundling regulation. Predictably, GCI denied ACS's interpretation of these statements.[51] GCI's comments either addressed its last-mile facilities deployment incentives generally or its deployment of cable-based telephony products specifically. Taking these together, there appears to be ample evidence that the regulatory environment plays a crucial role in the rate and extent of last-mile facility construction.

GCI's comments before the Anchorage forbearance proceedings suggest that the price of regulated UNEs is an important consideration in its last-mile investment decisions. For example, GCI's Senior Vice President for Regulatory Affairs, Dana Tindall, testified in an Alaskan state regulatory proceeding that "[r]aising prices dramatically would compel GCI to speed up the investment and deployment of its cable telephony network."[52] Ms. Tindall also noted, in a separate statement, that "[i]f the UNE loop rate goes up GCI will speed up its cable telephony deployment."[53] Although she noted that excessively high rates may force GCI from the marketplace, Ms. Tindall admitted that the price at

49. GCI Q2 2004 Earnings Call Transcript at 4 (July 28, 2004), *as attached to ACS Petition*, Exhibit F.

50. *See Statement of Thomas Meade, supra* note 48, at 36 n. 148. *See also Petition of GCI for Arbitration Under Section 252 of the Communications Act of 1996 with the Municipality of Anchorage a/k/a ATU Telecommunications for the Purpose of Instituting Local Exchange Competition, Testimony of Dana Tindall on Behalf of GCI,* RCA Docket No. U-96-89, Public Hearing (Nov. 6, 2003), Volume X at 851 ("I'm not saying what we would do, but if it gets down to the rate where I believe a TELRIC rate makes a competitive entrance [sic] somewhat indifferent between building versus leasing we would have to look at it [continuing to build out GCI's own facilities]."). *See also Petition of GCI for Arbitration Under Section 252 of the Communications Act of 1996 with the Municipality of Anchorage a/k/a ATU Telecommunications for the Purpose of Instituting Local Exchange Competition, Prefiled Rebuttal Testimony of Dana Tindall on Behalf of General Communications, Inc. (GCI),* RCA Docket No. U-96-89 (Sept. 29, 2003), at 3 ("It is clear at the outset of competition, if UNE rates are set too high, they will act as a barrier to entry, and if they are set too low, they run the risk of discouraging new technologies.").

51. *Id.* at 35-37.

52. *In the Matter of Petition by GCI Communications Carp. d/b/a General Communication Inc. and GCI, for Arbitration Under Section 252 of the Telecommunications Act of 1996 with the Municipality of Anchorage d/b/a ATU Telecommunications a/k/a ATU Telecommunications for the Purpose of Instituting Local Competition, Prefiled Rebuttal Testimony of Dana Tindall on Behalf of General Communication, Inc*., RCA Docket No. U-96-89 (filed Sept. 29, 2003), at 3.

53. TESTIMONY OF DANA TINDALL ON BEHALF OF GCI, BEFORE THE REGULATORY COMMISSION OF ALASKA, Public Hearing (Nov. 6, 2003), Volume X at 850 (cited and included in *In the Matter of Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers, Comments of ACS,* WC Docket No. 03-173 (filed Dec. 16,2003), Exhibit L, at 842.)

which GCI would increase its cable telephony investments was above the existing regulated UNE price.[54]

Subsequent GCI statements similarly suggest that cable-based telephony investments may have been suppressed as a result of low UNE prices. For example, a senior GCI official noted that "[o]riginally we had a thought that DLPS [i.e., cable telephony] would [be] built out through the entirety of our footprint over a five-year base."[55] However, in response to questions from an investment analyst regarding GCI's potential response to a UNE rate increase,[56] the GCI official noted that "in light of the [Regulatory Commission of Alaska's] generous decision, we have a very significant incentive to [move faster with DLPS deployment]."[57] As a result, the GCI official suggested that "the question we're grappling with is could we shrink that to something like a three-year timeframe for full DLPS deployment."[58]

Evidently, GCI was able to increase its investment in last-mile facilities, but would do so only in response to an increase in the rate paid for UNE access. The previous GCI comments, culled from 2004 Alaskan state regulatory proceedings, only set the stage for the FCC's review of the Anchorage UNE regulations. The FCC's decision to forbear from UNE regulation altogether in some Anchorage wire centers proved to be a far greater incentive to GCI's deployment of its own last-mile telecommunications facilities than modest UNE rate increases.

2. GCI Comments Following the FCC Decision

GCI's pronouncements following the Anchorage forbearance decision also suggested that UNE regulation may have impeded infrastructure investments. Issuing a statement the day after the formal announcement of the FCC's Anchorage decision, GCI suggested that rate increases would affect last-mile investment. It stated, in part, that "[t]he rate increase reinforces GCI's determination to finish converting the customers it serves in Anchorage using ACS unbundled loops to GCI's own facilities."[59]

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54. *Id.* at 843. In response to the question "…when you use the word dramatically what number were you thinking about?", Ms. Tindall replied that "I don't have any numbers and probably for FCC reasons I can't give you any numbers today, but I'm telling you that there is a range of numbers in between the current UNE price and the [higher] 28 dollar price where those different effects [e.g. increased investment or market exit] may occur."

55. GCI INC., *Q2 2004 Earnings Call Transcript*, July 28, 2004, at 11, *as attached to ACS Petition*, *supra* note 35, at Exhibit F.

56. *Id.* at 11. Specifically, Anthony Klarman of Deutsche Bank asked: "Will you be adding infrastructure to accelerate [DLPS deployment] against the backdrop of obviously [sic] the [Regulatory Commission of Alaska's] agreement to raise the UNE rates?"

57. *Id*. By "generous" he appears to be considering the decision generous to ACS, which was granted a significant rate increase (from $14.92 to $19.15). *See In the Matter of the Petition by GCI Communications Corp. d/b/a General Communication, Inc., and d/b/a GCI for Arbitration under Section 252 of the Telecommunications Act of 1996 with the Municipality of Anchorage d/b/a Anchorage Telephone Utility a/k/a ATU Telecommunications for the purpose of Instituting Local Exchange Competition, Order Setting Prices for Access to Unbundled Network Elements, Resale and Terms and Conditions of Interconnection,* RCA Dkt. No. U-96-89, Order No. 42 (filed June 25, 2004) at 76. [hereinafter *RCA Anchorage Decision*] ("This order sets interconnection rates for GCI to pay ACS-AN in the Anchorage market. We find that $19.15 is a fair loop rate.")

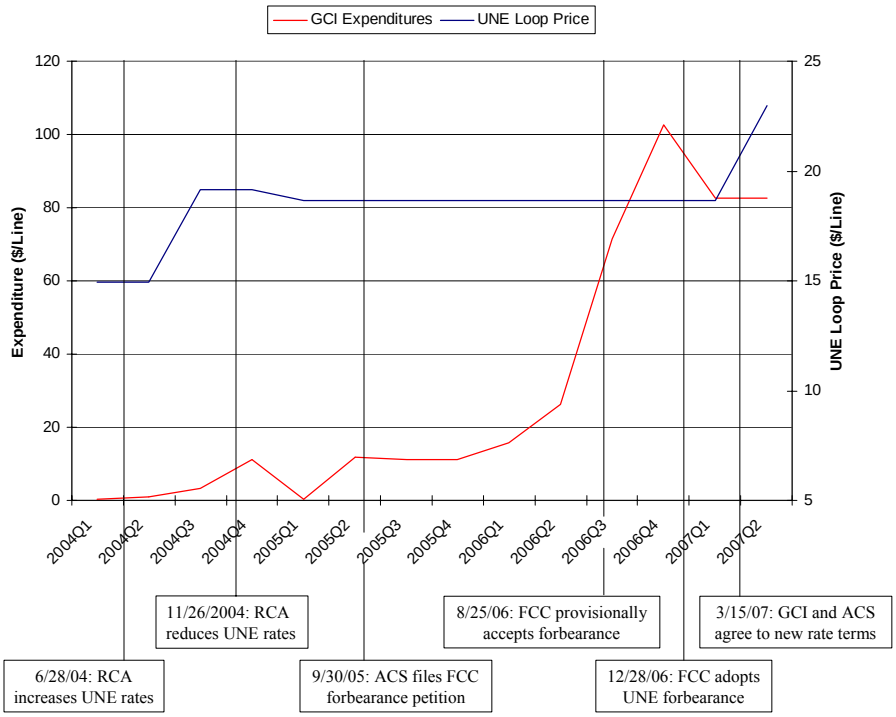
58. *Id.*

59. GCI, Inc., *GCI Comments on FCC's Anchorage Forbearance Decision*, Press Release, December 29, 2006, *as attached to* GCI Inc., SEC FORM 8-K (filed Dec. 29, 2006), at Exhibit 99.1. This statement came one day after the FCC's press release, F.C.C., *FCC Grants ACS of Anchorage,*

D. GCI Significantly Increased Investment Following the Anchorage UNE Forbearance Decision

GCI's financial reports confirm that the company's investment responded directly and significantly to the FCC's forbearance decision. As Figure 3 indicates, GCI's quarterly line extension expenditures per access line ranged between $0.41 and $11.79 for the period preceding the initiation of the Anchorage forbearance case. By comparison, GCI invested—per current access line—$71.61, $102.64, $82.77, and $82.62 on line extensions in the four quarters (Quarter 3, 2006 to Quarter 2, 2007) following the FCC's decision to grant forbearance. GCI's investment is plotted against the UNE access rate in Anchorage.

FIGURE 3: GCI LINE EXTENSION INVESTMENT PER LINE AND THE UNE RATE IN ANCHORAGE, 2004-2007



Sources: GCI Inc. SEC filings, RCA Dkt. No. U-96-89 Orders.
Note: Capital expenditures are in nominal terms.

The large discontinuity in CLEC investment appears is consistent with the hypothesis that regulators were unsuccessful in signaling accurately and credibly their intentions with respect to forbearance until very close to the time of the actual decision. The stable, low level of line extension investment preceding ACS's petition for forbearance suggests that GCI's regulated access to ACS's copper loops provided little incentive to invest in its own facilities, and also that GCI *did not anticipate* an unfavorable regulatory change that would affect its

Inc. Forbearance Relief in the Anchorage, Alaska Study Area, Press Release, Dec. 28, 2007, *available at* http://fjallfoss.fcc.gov/edocs_public/attachmatch/DOC-269254A1.pdf.

access to ACS loops. Once the FCC's intentions became clear, however, GCI substantially increased its investment in last-mile facilities.

It is also worthy of note that a previous increase in the regulated cost of ACS unbundled loops, which GCI might have taken as a signal of regulatory intent to follow-through on the stepping stone model, does not appear to have had a signficant effect on GCI's last-mile investment as the FCC's forbearance decision. In June 2004, the Regulatory Commission of Alaska (RCA) issued an arbitration order increasing the unbundled loop rate from $14.92[60] to $19.15.[61] Although GCI last-mile investment (line extension investment rose following the decision, from $0.95 to $3.33 per line per quarter), the effect is trivial in comparison to the increase seen after the FCC's forbearance decision.[62]

Our examination of the Anchorage forbearance decision provides support for the hypothesis that regulators have difficulty accurately signaling their intentions with respect to forbearance, suggests that the result of such signaling failures is to reduce facilities-based investment (and thus facilities-based competition) below what it would otherwise be, and shows that the impact on investment can be quickly reversed once forbearance is announced. Regulatory forbearance appears to have provided GCI with a strong incentive to accelerate facilities-based investment.

IV. SECOND CASE STUDY: FORBEARANCE FROM REGULATING NEW FIBER NETWORKS IN THE UNITED STATES

In addition to forbearing from regulation of existing services, the FCC also has, and has exercised, authority to refrain from regulating new or emerging services, particularly services that are deemed to have high risk and large potential rewards. The combination of high costs and high uncertainty regarding the potential size and value of the market make investments in new services and new technologies especially risky. Regulatory uncertainty only adds to the risk that potential investors must bear. Regulatory risk can result in suboptimal investment in new services.

This section examines how regulatory forbearance has affected U.S. incumbent LEC investment in broadband infrastructure. We find that initial regulatory uncertainty dampened incumbent investment incentives in much the same way that existing UNE regulation dampened CLEC investment incentives. We also find substantial evidence that incumbents withheld investment until a series of FCC decisions granted forbearance from unbundled access requirements for fiber-to-the-home (FTTH), fiber-to-the-curb (FTTC), and other "greenfield" fiber lines. Following regulatory forbearance, we observe a sharp increase in incumbent broadband deployment.

A. Background of Fiber and DSL Regulation in the United States

60. *See* GCI Communications Corp. d/b/a GCI, *GCI Files for Lower UNE Rates*, Press Release, Nov. 21, 2002, *available at* http://www.gci.com/about/press/acs_rates.htm.

61. *RCA Anchorage Decision*, *supra* note 57, at 76.

62. One implication of this finding is that the bifurcation of regulatory authority, in this case between the state regulator (responsible for setting access rates) and the FCC (responsible for declaring forbearance) may inhibit the ability of regulators to credibly signal their intentions. Such bifurcation is not unusual. For example, both the Australian Competition and Consumer Commission and its Department of Department of Communications, Information Technology, and the Arts have authority to forbear from imposing unbundling requirements.

Before the FCC's fiber forbearance decisions, it was presumed that fiber optic systems would be subject to the existing mandatory unbundling requirements on copper wire. In particular, the limited fiber regulation provided by the FCC's *First Report and Order* suggested that any fiber optic system would be subject to unbundling requirements.[63] The continued failure of the *Triennial Review* in the U.S. court system, however, allowed the Commission to amend its initial determinations to include fiber optic forbearance. Regulatory forbearance for consumer fiber optic loops was upheld in subsequent court action and clarified and expanded by subsequent Commission action.

1. The FCC's Report and Order and Order on Remand

Following passage of the Telecommunications Act of 1996,[64] the FCC attempted to enumerate the services that would be subjected to the new unbundled access requirements. The Commission primarily focused on copper loop telephone lines, switching, and transport services, as these services formed the backbone of the existing telecommunications infrastructure. Fiber optic and DSL technologies, which were considered new technologies, were not subject to extensive unbundled access requirements. At the time of the *First Report and Order*, fiber optic technology was used primarily by the carriers to connect their wire centers together, rather than for last-mile access. As such, the Commission provided unbundled access to incumbents' optical transmission equipment while remaining silent on as-yet-undeveloped consumer fiber access.[65] The Commission did, however, leave the door open to future high-speed consumer fiber regulation, a development opposed by incumbents. As the Commission noted in the *First Report and Order*'s discussion, incumbents protested UNE regulation (including regulation for fiber optic systems) on the grounds that it would create a disincentive to invest in new facilities.[66]

The FCC took gradual steps to clarify how it would regulate what it called "next-generation networks," including DSL and fiber optic connections. In 2003,

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63. *See*, for example, *In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996 and Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers*, *First Report and Order*, CC Dkt. Nos. 96-98, 95-185, at 215 para. 450 [hereinafter *First Report and Order*]. ("PacTel argues that local loops may be made of copper or fiber optics, or they may be digital or analog, and thus, the Commission cannot determine the elements that should be unbundled without dictating network technologies…our rules will provide new entrants with the opportunity to obtain access to a number of different variants of a particular element…"). The Commission is silent regarding exactly which loop technologies are subject to unbundling requirements, and whether fiber optic systems in particular are included.

64. S. 652, Telecommunications Act of 1996, 104th Cong. (1996) (enacted); became Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56-161 (1996).

65. *First Report and Order*, *supra* note 63, at 211 para. 440. ("The incumbent LEC must also provide, to the extend discussed below, all technically feasible transmission capabilities, such as DS1, DS3, and Optical Carrier levels that the competing provider could use to provide telecommunications services…In general, this means that incumbent LECs must provide interoffice facilities between wire centers owned by incumbent LECs or requesting carriers.")

66. *See id.* at 310-11 para. 638. ("…incumbent LECs argue that setting prices based on the forward-looking economic cost of the element will not create incentives for new entrants to build their own facilities, and will discourage efficient entry and useful investment by both incumbent LECs and their competitors.") Note that although this discussion focuses on UNE regulation generally, the arguments apply to fiber optic systems as well.

the Commission issued its *Report and Order and Order on Remand*,[67] declaring that:

> Although we require the unbundling of legacy technology used over hybrid loops, we decline to attach unbundling requirements to the next-generation network capabilities of fiber-based local loops…. We expect that this decision to refrain from unbundling incumbent LEC next-generation networks…will stimulate facilities-based deployment in two ways. First, with the certainty that their fiber optic and packet-based networks will remain free of unbundling requirements, incumbent LECs will have the opportunity to expand their deployment of these networks.[68]

Regarding competition, the Commission declared that "relieving incumbent LECs from unbundling requirements for these networks will promote investment in, and deployment of, next-generation networks."[69] The FCC also expected that forbearance would increase CLEC investment. The *Report and Order and Order on Remand* stated that "with the knowledge that incumbent LEC next-generation networks will not be available on an unbundled basis, competitive LECs will need to continue to seek innovative network access options to serve end users and to fully compete."[70] In short, this judgment was intended to spur competition and investment in the provision of fiber optic telecommunications.

2. USTA II and the FCC's Order on Remand

Following the extension of forbearance to fiber optic facilities in the *Report and Order and Order on Remand*, a series of legal challenges forced the Commission to explicitly define the extent of its forbearance. Within 10 days of the release of the *Report and Order and Order on Remand*, no fewer than 13 parties—including incumbent LECs, competitive LECs, industry groups, and consumer advocates—had filed petitions for review before the courts.[71] These petitions were consolidated in *U.S. Telecom Association v. FCC.*[72] Following the D.C. Circuit's ruling in favor of forbearance from fiber unbundling, the FCC

67. *In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Deployment of Wireline Services Offering Advanced Telecommunications Capability*, *Report and Order and Order on Remand and Further Notice of Proposed Rulemaking*, CC Dkt. Nos. 01-338, 96-98, and 98-147, 18 FCC Rcd 16978 (Aug. 23, 2003) [hereinafter *Report and Order and Order on Remand*].

68. *Id.* at 17141 para. 272.

69. *Id.*

70. *Id.* at 17141 para. 272.

71. As noted in the National Association of State Utility Consumers Advocates (NASUCA) petition. *See* Reply Brief of Petitioner at ii., U.S. Telecom Ass'n v. F.C.C., 359 F.3d 554 (D.C. Cir. 2004) (No. 00-1012) (lead case), Nat'l Ass'n of State Utility Consumer Advocates (No. 03-1442). ("Petitions for review of the *Triennial Review Order* were filed by 13 parties in 11 circuit courts within 10 days of publication of the *Triennial Review Order*.")

72. *U.S. Telecom Ass'n v. F.C.C.*, 359 F.3d 554 (D.C. Cir. 2004) [hereinafter *USTA II*]. Referring to consolidation, *id.*, at ii ("On September 30, 2003, the Eighth Circuit issued an order transferring the consolidated cases to the U.S. Court of Appeal for the D.C. Circuit. The lead petition was filed by United States Telecom Association and re-docketed as Case No. 03-1310."). This consolidated incumbent LEC petitions (Verizon, case no. 03-1311; Quest, 03-1312; and AT&T Corp., 03-1331) and competitive LEC petitions (of the many, note especially WorldCom Inc., 03-1319; TDS Metrocom, 03-1325; McLeodUSA Telecommunications, 03-1329; and Covad Comm. Company, 03-1360).

expanded and qualified its forbearance in its *Order on Remand* (not to be confused with the prior *Report and Order and Order on Remand*). Finally, the D.C. Circuit Court, in *Covad Communications Co. v. F.C.C.*,[73] upheld the FCC's revised judgments in the Triennial Review. These steps, together, helped to strengthen and extend unbundling access forbearance to a variety of fiber-based telecommunications facilities.

Forbearance from fiber optic access unbundling survived judicial review in *USTA II*. Although the D.C. Circuit Court reversed and remanded much of the FCC's *Report and Order and Order on Remand* in *USTA II*, the court did find sufficient evidence to uphold forbearance from unbundling requirements for fiber optic systems. Because the FCC had focused on fiber-to-the-home (FTTH) deployment in particular, the D.C. Circuit Court paid specific attention to FTTH. To justify its decision in favor of the FCC's FTTH forbearance, the court cited the limited extent of current incumbent build-out, the high costs and potential benefits of fiber deployment, and similar incumbent and CLEC barriers to entry.[74] The court also noted that "[a]n unbundling requirement under these circumstances seems likely to delay infrastructure investment, with CLECs tempted to wait for ILECs to deploy FTTH and ILECs fearful that CLEC access would undermine the investments' potential return."[75] In this sense, the D.C. Circuit agreed that forbearance from unbundled fiber access would be a necessary and equitable solution to ensure incumbent and CLEC investment.

In late 2004, the FCC expanded its fiber forbearance to include all manner of "high capacity" loops, including DS-1 and DS-3 high capacity fiber loops. In its *Order on Remand*, the FCC stipulated a general policy of forbearance from unbundling regulation for high-capacity loops located in wire centers that serve more than a given threshold of business customers. Finding evidence that higher-capacity loops enjoyed commensurately greater revenue opportunities, the Commission set the relevant threshold for DS-3 loops at 38,000, whereas DS-1 loops were considered "impaired" if there were less than 60,000 business loops in a given wire center.[76] In addition, the Commission did not find grounds for any unbundling on the provision of access to "dark fiber," fiber optic facilities that are not in operation at a given time.[77] Subsequent FCC proceedings have extended and clarified these provisions to include FTTH and fiber-to-the-curb (FTTC) forbearance on a nationwide basis.[78]

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73. *Covad Comm. Co. v. F.C.C.*, 450 F.3d 528 (D.C. Cir. 2006) [hereinafter *Covad*].

74. *U.S. Telecom Ass'n v. F.C.C.*, *supra* note 72, at 584.

75. *Id.* at 584.

76. *In the Matter of Unbundled Access to Network Elements, Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Order on Remand*, WC Dkt. No. 04-313, CC Dkt. No. 01-338, (rel. Feb. 4, 2005) [hereinafter *Order on Remand*], at 5. ("Competitive LECs are impaired without access to DS3-capacity loops except in any building within the service area of a wire center containing 38,000 or more business lines and 4 or more fiber-based collocators. Competitive LECs are impaired without access to DS1-capacity loops except in any building within the service area of a wire center containing 60,000 or more business lines and 4 or more fiber-based collocators.")

77. *Id.* at 5. ("Competitive LECs are not impaired without access to dark fiber loops in any instance.")

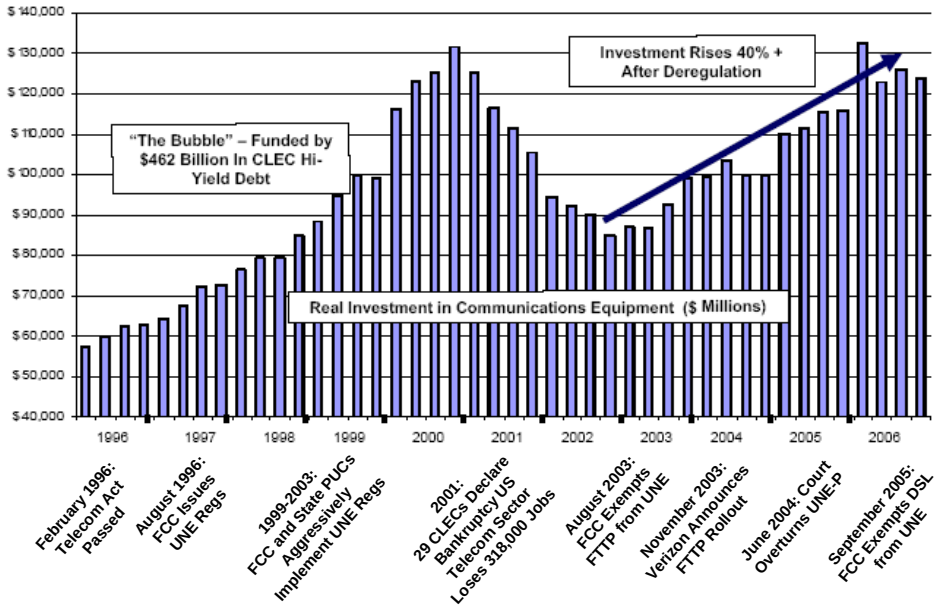
78. *See In the Matters of Petition for Forbearance of the Verizon Telephone Companies Pursuant to 47 U.S.C. § 160(c), SBC Communications Inc.'s Petition for Forbearance Under 47 U.S.C. § 160(c), Qwest Comm. Int'l Inc. Petition for Forbearance Under 47 U.S.C. § 160(c), BellSouth Telecommunications Inc. Petition for Forbearance under 47 U.S.C. § 160(c), Memorandum Opinion and Order*, WC Dkt. Nos. 01-338, 03-235, 03-260, 04-48, 19 FCC Rcd.

Now on its fourth attempt, the Commission's *Order on Remand* provisions were accepted by the D.C. Circuit Court in *Covad*. Noting that "[b]ecause we conclude that the Commission's fourth try is a charm," the D.C. Circuit Court denied all challenges to the Commission's latest attempt to clarify the scope of its unbundling rules.[79] As a result, the more extensive forbearance laid out in the *Order on Remand* and subsequent FTTC decisions have been adopted, allowing certainty of regulatory forbearance for many DS-1 and DS-3 high-capacity loops.

B. Unbundling Deregulation Spurred Investment

As shown in Figure 4, aggregate data on investment in communications equipment in the United States strongly suggest a connection between the timing of the FCC's broadband forbearance decisions.

FIGURE 4: U.S. REAL INVESTMENT IN COMMUNICATIONS EQUIPMENT, 1996-2006



Source: U.S. Department of Commerce Bureau of Economic Analysis. Capital expenditures are in real terms.

As the figure shows, passage of the Telecommunications Act led to strong initial increases in communications equipment investments, followed by a sharp downturn in 2001-2002, corresponding to the bursting of the "telecom bubble" and the collapse of CLEC investment.[80] Only in 2003, coincident with the

21496 (rel. Oct. 27, 2004) [hereinafter *October 2004 Fiber Decision*]; *see also In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Deployment of Wireline Services Offering Advanced Telecommunications Capability*, *Order on Reconsideration*, CC Dkt. Nos. 01-338, 96-98, 98-147, 19 FCC Rcd 20293 (rel. Oct. 18, 2004) [hereinafter *FTTC Decision*].

79. *Covad Comm. Co. v. F.C.C.*, *supra* note 73, at 530.

80. *See*, for example, Simon Romero, *Telecommunications Outlook: First the Bad News, then the Bad News*, N.Y. TIMES, June 18, 2002, *available at*

beginning of the FCC's increasing reliance on regulatory forbearance, did investment recover, rising by more than 40 percent over the next three years. To be fair, it is possible that the investment trend depicted in Figure 4 was affected by factors unrelated to the FCC's regulatory decisions, including the business cycle. We have not attempted to control for those factors here.

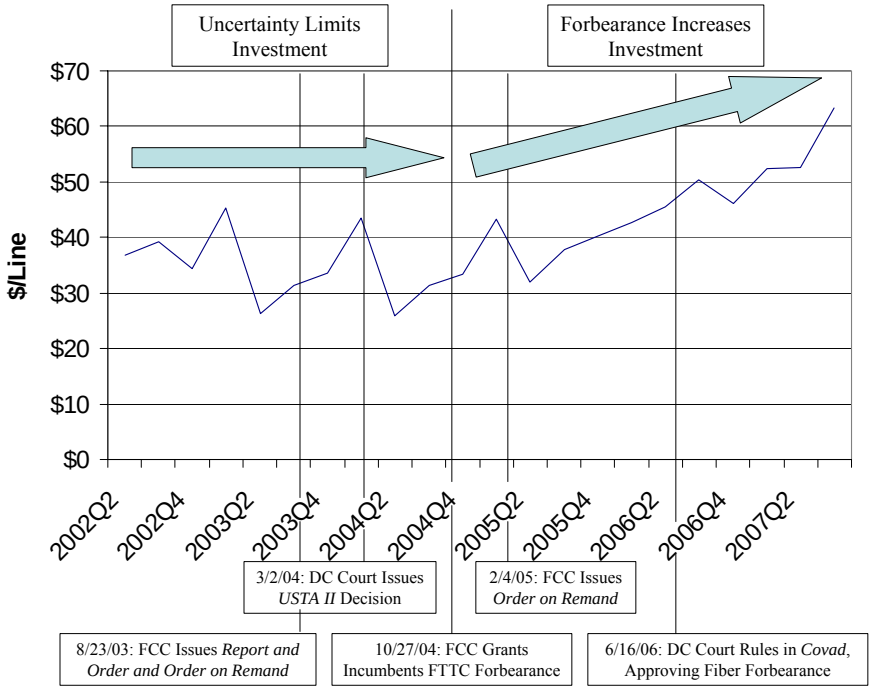
The apparent connection between regulation and investment is confirmed by a more granular examination of capital expenditures by incumbent wireline companies for the years 2002 to 2007. We examined capital expenditure and access line information for AT&T Inc., BellSouth, SBC, and Verizon.[81] Due to accounting irregularities, near bankruptcy, and the withdrawal of some necessary SEC filings, Qwest was not included in this study of incumbent LEC investment.

As displayed in Figure 5 below, U.S. incumbent LEC wireline capital expenditures remained essentially flat from 2002 to late 2004, but have trended upward since late 2004. Before the FCC's nation-wide fiber forbearance decision in October of 2004, industry-wide capital expenditures were reasonably stable around an average of $35 per line per quarter. Following that decision, industry-wide capital expenditures trended upward, with a simple average over the latter period of $45 per line per quarter. This upward trend appears to have been consolidated and extended by the D.C. Circuit Court's decision to uphold, on the fourth attempt, the FCC's proposed rules in the *Triennial Review*. Figure 5, which registers a sharp increase in per-line capital expenditures following regulatory forbearance, appears to rejects the stepping stone hypothesis.

http://query.nytimes.com/gst/fullpage.html?res=950CE2DE1F3CF93BA25755C0A9649C8B63&sec=technology&spon=&pagewanted=1 ("News over the weekend that Joseph P. Nacchio was leaving the beleaguered telecommunications company Qwest Communications International and that the fiber optic carrier XO Communications would file for bankruptcy protection came in the wake of more bad news from two more established players…This confluence of negative news, combined with the languishing bankruptcy proceedings of Global Crossing.").

81. As a result of industry consolidation, AT&T Corp., SBC, and BellSouth have merged to form AT&T Inc. Because these changes made it impossible to disentangle the contribution that AT&T Corp.'s long distance services have on AT&T Inc. capital expenditures, we included AT&T Corp.'s capital expenditures from past years as well. In this way it was hoped that long-distance capital expenditures would contribute a roughly equal share to industry capital expenditure across all years, rather than providing a spurious increase in industry capital expenditures as a result of the AT&T/SBC merger.

FIGURE 5: U.S. INCUMBENT WIRELINE CAPITAL EXPENDITURES PER LINE, 2002-2007



Source: AT&T Corp., AT&T Inc., BellSouth, SBC, and Verizon SEC filings.
Note: Capital expenditures are in nominal terms.

Individual company statements support the view that FCC forbearance has directly led to increases in next generation network investments. For example, SBC CEO Ed Whitacre suggested in June 2004 that, given a friendly regulatory environment, SBC would invest up to $6 billion in fiber-based infrastructure upgrades.[82] Following the FCC's fiber and FTTC forbearance decisions in October 2004,[83] SBC announced that it would "dramatically accelerate" its fiber deployment as a result of the FCC's action. As a result, its plan to deploy fiber to 18 million homes was expected to take roughly three years, rather than the five years originally envisioned.[84] Similarly, Verizon developed ambitious fiber deployment plans in the midst of the 2004 changes, committing to spend $2.4 billion between mid-2004 and the end of 2005 to deploy its FiOS fiber optic

82. *SBC's Whitacre Promises Big Investment – With a Catch*, TELECOM POLICY REPORT, July 11, 2004, retrieved Aug. 22, 2007, *available at* http://findarticles.com/p/articles/mi_m0PJR/is_26_2/ai_n6098380. ("Ed Whitacre, the charismatic chairman and CEO of SBC Communications, on June 22 told attendees at Supercomm 2004 that if the FCC crafts the right regulations, his company will invest up to $6 billion in upgrades to the company's telecom infrastructure.")

83. Specifically, *see October 2004 Fiber Decision*, *supra* note 78, and *FTTC Decision, supra* note 78.

84. *FCC Relieves Bells From Requirement to Unbundle FTTC Loops*, TELECOM A.M., Oct. 15, 2004. ("SBC said the [new FCC] rules would "dramatically accelerate" its fiber deployment, providing advanced broadband services to 18 million homes in 2-3 years, rather than 5 years as previously announced.")

system.[85] BellSouth also indicated in 2005 that it had extensively increased its deployment of fiber-to-the-curb since the FCC's *Order on Reconsideration* (granting FTTC forbearance) in 2004, and that favorable news upholding the FTTC decision would allow it to continue its acceleration of FTTC coverage.[86]

Recall that the incumbent analog to the stepping stone hypothesis posits that pre-forbearance investment will gradually increase up to the point of forbearance, while the alternative thesis that regulators cannot accurately signal their intentions suggests a discontinuity in investment around the time of the forbearance decision. Our examination of incumbent LEC investment from 2002-2004 supports the latter hypothesis. Figure 5 shows that incumbent investment levels over the period 2002-2004 appeared to trend downward, with each trough deeper than the preceding one, while investment turned upward sharply at about the time forbearance was announced. Taken in conjunction with the contemporaneous statements of the companies themselves, the U.S. experience with fiber tends to support the hypothesis that regulatory uncertainty leads to suboptimal investment while certainty, in the form of a court-validated forbearance order, can quickly reverse the effect.

V. THIRD CASE STUDY: FORBEARANCE FROM REGULATING NEW WIRELESS NETWORKS IN AUSTRALIA

Although our previous cases occurred in the United States, regulatory forbearance has also been employed internationally. For example, the Australian Competition and Consumer Commission (ACCC) has favored forbearance from mobile telephone regulation. In December 2004 the ACCC granted forbearance for domestic mobile roaming services. In September 2005, the ACCC adopted a similar decision involving international mobile roaming services. Most recently, although not a formal process like the former cases, the ACCC indicated in October 2006 that it would forbear, for the time being, from access regulations on Telstra's Third Generation GSM (3G) network.

The unique structure of Australian telecommunications regulation, which does not provide for the same level of regulatory certainty as in the United States, puts special emphasis on the cumulative nature of the ACCC's forbearance. Under the Australian regulatory system, services that are subject to rate or unbundled access regulation are "declared" as services by the Commission; thus, a decision not to declare a service is akin to regulatory forbearance in the American system. For each forbearance decision (domestic mobile roaming, international mobile roaming, and 3G regulation), the ACCC specifically declined to "declare" the respective service.

This process does not, however, preclude the Commission from declaring a service at a future time. For example, after declining to declare a domestic

85. *Telecom: The Fiber-Optic Quagmire*, BUSINESS WEEK, Dec. 6, 2004, *available at* http://www.businessweek.com/magazine/content/04_49/b3911038_mz011.htm. [hereinafter *Business Week FiOS Report*] ("Verizon Communications Inc. has an even more technologically ambitious goal: spending $2.4 billion by the end of 2005 to provide video and other services to some 3 million homes.")

86. Dan O'Shea, *BellSouth: More Fiber in 2005*, TELEPHONY ONLINE, Jul. 1, 2005, *available at* http://telephonyonline.com/fttp/technology/bellsouth_fiber_070105/. ("BellSouth released a statement this week telling the Federal Communications Commission that it plans to deploy fiber to almost 60% more locations in 2005 than it did in 2004. The statement was a response to CLECs' attempts to have the FCC's fiber-to-the-curb ruling from last year re-written, the company said.")

mobile roaming service, the Commission acknowledged that it "intends to monitor the terms and conditions of supply of domestic roaming on CDMA networks over the next 12-24 months and will re-examine the case for declaration if the information it receives suggests that those terms and conditions are unreasonable."[87]

Australian regulators have acknowledged the important role that facilities-based competition plays in their regulatory decisions. For example, in May 2005 ACCC Commissioner Edward Willett noted:

> ULLS and LSS are unlikely to thrive unless wholesale ADSL and fixed line resale provides an effective stepping stone for greater infrastructure competition. Getting the pricing of these services right is therefore the essential first step to the removal of regulation from most areas.[88]

Importantly, Commissioner Willett's explicit discussion of ADSL broadband pricing as a "stepping stone" suggests that the ACCC has predicated its approach at least in part on the stepping stone model.[89] Commissioner Willett has also endorsed the idea that resale pricing regulation represents a "first step" toward deregulation.[90] Further endorsing a regulatory approach akin to the stepping stone hypothesis, Commissioner Willett noted that "infrastructure based competition seems to provide more rapid and sustainable development [than service based competition]."[91] Finally, he argues that the Commission has regulated to encourage facilities-based competition since the current regulatory regime began in 1997.[92] Thus, the underlying basis for the Australian approach to unbundling and forbearance appear to be similar – even if, as noted above – the resulting policies have been (?) different in important respects (e.g., Australia's refusal, to date, to forbear from unbundling new investments in fiber).

In this section, we review the ACCC's mobile telephony forbearance cases and examine the impact they have had on capital expenditures by Australia's incumbent carrier, Telstra. We find evidence to suggest that the cumulative effect of several regulatory forbearance measures convinced Telstra that an investment in 3G technology would not be subject to regulation, and thereby induced Telstra to increase its capital expenditures on 3G mobile technology.

A. ACCC Forbearance from Australian Domestic Mobile Roaming Declaration

87. *Mobile Services Review, Mobile Domestic Inter-Carrier Roaming Service, Final Report on Whether or Not the Commission Should Declare a Mobile Domestic Inter-carrier Service*, Australian Competition and Consumer Commission, Dec. 2004 [hereinafter *ACCC Final Report*], at 58.

88. Australian Competition and Consumer Commission Commissioner Ed Willett, Address at the National Telecommunications Summit 2005, Melbourne, The State of Competition in the Telecommunications Industry (May 30, 2005), [*hereinafter Willett Speech*], at 10.

89. *See id.*

90. *See id.*

91. *See id.* at 9 ("While service based competition will take us some way, especially if fuelled by the incumbents wishes to maintain market share, infrastructure based competition seems to provide more rapid and sustainable development.").

92. *Id.* at 7 ("Further progress therefore relies on a move to more infrastructure based competition. This is not a new conclusion; the ACCC has stood by this contention since 1997 when the current regulatory regime began.").

In December of 2004, the ACCC issued its *Final Report* declining to declare domestic roaming rate regulation.[93] With regard to GSM roaming, the Commission noted that it was "not satisfied that declaration of the domestic inter-carrier roaming service will promote the LTIE [long term interest of end-users]."[94] This decision followed—by roughly six years—a previous ACCC report that had also declined to declare domestic roaming as a regulated service.[95] The *Final Report* represents the first of several forbearance efforts that, cumulatively, demonstrated a willingness by the ACCC to forbear from the declaration of additional telecommunication regulations. The *Final Report* also recognized the depth of Australian mobile telecommunications competition,[96] and noted that the ACCC "should not impose regulated access" for competitive services.[97] Thus the ACCC's demonstrated forbearance, and its clear statement that unbundling would not be imposed in the face of significant competition, appear to have collectively provided Telstra with the confidence to fully invest in its 3G network.

In coming to its decision, the ACCC deemed GSM roaming services to be competitive. The Commission solicited comments from each of the four Australian mobile carriers, Hutchison Telecoms, SingTel Optus (Singapore Telecommunications Ltd.), Telstra, and Vodafone. The Commission found that the largest two users of roaming services, Vodafone and Hutchinson,[98] both "appear to be satisfied with the agreements that they have negotiated to roam on the networks of other carriers."[99] Hutchison, in particular, is quoted as considering GSM roaming services to be "provided on commercially reasonable terms."[100]

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93. *Id.*

94. *Id.* at 58. Regarding GSM, the Commission wrote "[i]n light of current supply arrangements, and in the absence of recent complaints concerning GSM domestic inter-carrier roaming, the Commission is not satisfied that declaration of a service covering GSM networks will promote competition." *Id.* at 57. Regarding CDMA, "the Commission does not consider that it has sufficient information to form the view that declaration [of CDMA roaming service] will promote competition." *Id.* at 57.

95. *Public Inquiry into Declaration of Domestic Intercarrier Roaming Under Part XIC of the Trade Practices Act of 1974*, *Report Prepared Pursuant to Section 505 of the Telecommunications Act 1997*, Australian Competition and Consumer Commission, Mar. 1997 [hereinafter *1997 Inquiry*].

96. For example, the ACCC noted that the three major carriers—Telstra, Optus (SingTel), and Vodafone—each provide service to more than 90 percent of Australia's population. *See ACCC Final Report*, *supra* note 87, at 34-35 ("The Commission understands that Telstra's CDMA and GSM networks cover 98 percent and 96 percent of the Australian population respectively. Optus's GSM network covers more than 94 percent of the Australian population and Vodafone's GSM network covers approximately 92 percent.").

97. *Id.*, at 6 ("Where existing market conditions already provide for the competitive supply of services, the access regime should not impose regulated access.").

98. The determination that Vodafone and Hutchison are the largest users of Australian roaming services is based on carriers' reported roaming agreements. *See*, for example, *ACCC Final Report*, *supra* note 93, at 28-29. ("In [the national GSM inter-carrier roaming services] market, there are two current suppliers of national inter-carrier roaming services – Telstra and Vodafone. Relevant roaming agreements include: Telstra/Vodafone…Vodafone/Hutchison…[and] Vodafone/Globalstar.")

99. *Id.* at 30.

100. *Mobile Services Review 2003, Submission to the Australian Competition & Consumer Commission* (public version), Hutchison Telecommunications (Australia) Limited and Hutchison 3G Australia Pty Limited, June 13, 2003, at 23.

Although the *Final Report* was issued before the advent of 3G service in Australia, the ACCC made clear that any future declaration of mobile roaming services would also apply to 3G technology. At the time, the ACCC had limited its examination to GSM and CDMA roaming services,[101] which were the only two standards then in operation. 3G, as a successor standard, could have been subject to any regulatory decisions imposed on CDMA or GSM. The Commission noted the link between mobile standards, suggesting that existing "agreements provide for the supply of roaming services to other 2G and 2.5G mobile network operators, as well as 3G network operators…"[102] Similarly, a speech by ACCC Chairman Graeme Samuel noted that 2G (CDMA and GSM) and 3G networks were both subject to what it calls "voice terminating access services."[103] As a result, the Commission's decision to forbear from domestic mobile roaming regulation provided some confidence that 3G networks, when completed, would be treated in a similar manner.

B. ACCC Forbearance from International Mobile Roaming Declaration

The ACCC reinforced its commitment to regulatory forbearance when, in September 2005, it similarly declined to declare an international mobile roaming service.[104] In its review, the Commission states that "[t]o date, the Commission has not considered it necessary to take enforcement or regulatory action in relation to pricing of wholesale or retail international roaming services."[105] Although only a small number of mobile subscribers use international roaming services[106]—and thus the impact of an international roaming service is likely to be less than that of a domestic Australian roaming service—the Commission's decision further clarified and strengthened its commitment not to impose mandatory unbundling in the face of evidence of wireless competition.

C. ACCC Forbearance from 3G Declaration

The two roaming decisions created a foundation for a credible commitment by the ACCC to forbear from declaring 3G wireless service. In October 2006,

101. GSM and CDMA are mobile telephony standards. GSM is the most common worldwide, particularly in Europe. CDMA is the most popular standard in the United States (although 3G technology, which is based on GSM, is also coming into service).

102. *ACCC Final Report*, *supra* note 93, at 57.

103. Australian Competition and Consumer Commission Chairman Graeme Samuel, Address at the RACV Club 501, Business Forum (Oct. 26, 2006) [hereinafter *Samuel Address*], at 3. Quotation is based on Mr. Samuel's speaking notes, which are available at: http://www.accc.gov.au/content/item.phtml?itemId=768517&nodeId= f37c29f8d506f2bb5b3715768728d1cd&fn=Telecommunications%20and%20Media.pdf. ("...an outcome of the Mobile Services Review is that all mobile providers are obliged to supply a voice terminating access service…it applies to all their mobile networks, regardless of whether it is a 2G or a 3G network.")

104. *Mobile Services Review, International Inter-carrier Roaming, A Final Report on the Provision of International Inter-carrier Roaming Services*, Australian Competition and Consumer Commission, Sept. 2005.

105. *Id.* at 53.

106. *Id.* at 6. ("Review suggests that the number of mobile phone subscribers who use international roaming services represent only a small proportion of all mobile phone subscribers. For example, Optus indicated in its submission that less than 2% of its total mobile subscriber base used international roaming services as of June 2003.") Optus figures from SingTel Optus, *Submission to ACCC on Mobile Services*, June 2003, para. 9.9.

for example, ACCC Chairman Graeme Samuel stated that "[t]he declaration of a resale mobile service (for example, wholesale end-to-end mobile service) that Optus appears to be advocating in relation to Telstra's 3G 'Next G' 850 MHz network has not been contemplated by the ACCC,"[107] explaining that while the Commission is "committed to the ongoing monitoring of this commercial environment,"[108] "[s]ince the Mobile Services Review, the Commission has not seen a need to take any steps towards declaring any other services…on mobile networks."[109] Chairman Samuel's comments effectively confirmed what market participants already knew: Based on its prior decisions, the ACCC was unlikely to demand unbundling of 3G wireless networks.

Evidence also suggests that the ACCC grasps the link between regulatory forbearance and efficient infrastructure investment. The Chairman began his discussion of Telstra's 3G network by characterizing the mobile telephony market as more competitive—and thus less likely to need regulation—than wireline services,[110] and noted the extent of current 3G infrastructure investment, including network investments by Hutchison, Telstra, Optus, and Vodafone.[111] He explained that "Telstra properly seeks certainty for its new infrastructure investment,"[112] and he intimated that "the ACCC has long recognized the more enduring benefits of efficient facilities-based competition."[113]

D. Incumbent Responded to Regulatory Forbearance by Increasing Capital Investment

The ACCC's treatment of 3G wireless services also sheds light on the importance of credible regulatory commitment for investment decisions. We examined how Telstra's mobile telephony capital expenditures responded to the Commission's forbearance decisions. Our analysis encompasses the years 2001-2007, a period preceding and including the deployment of Telstra's 3G mobile services. To account for subscriber growth, we measured mobile capital expenditures on a per-mobile line basis. In addition, we tracked the deployment of Telstra's 3G network as another (albeit likely lagged) measure of the strength and pace of 3G investment.

As displayed in Figure 6, Telstra's mobile telephony capital expenditures increased significantly following the issuance of the ACCC's international roaming service forbearance decision. Before forbearance (particularly the international roaming decision), Telstra's mobile capital expenditures per line ranged between $15 and $45 per line. Once the regulator credibly committed to forbear, however, investment roughly doubled, to approximately $60 per line.

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107. *Samuel Address*, *supra* note 103, at 4.

108. *Id.* at 4.

109. *Id.* at 4.

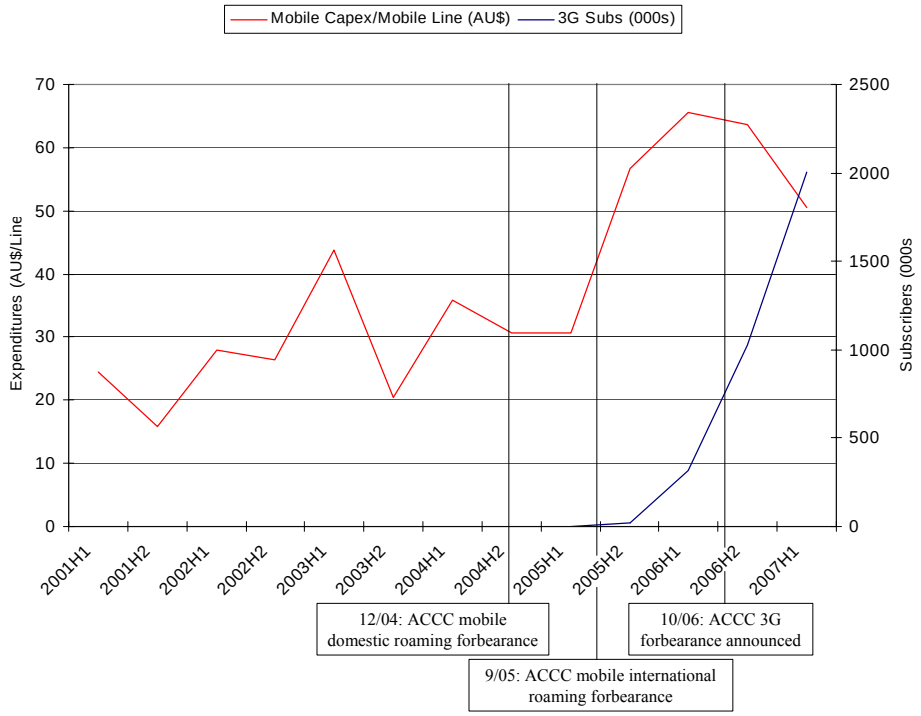
110. *Id.* at 4. Specifically, under the heading "Telstra's third-generation Next G network," the Chairman notes that "the retail mobile services market is exhibiting more encouraging market outcomes than the markets for fixed-line telecommunications services."

111. *Id.* at 1 ("Technologies at the center of the transformation [of telecommunications companies to provide media]:…3G mobile telephone – Hutchison (2 years), Telstra, Optus, Vodafone. All similar speeds developing to around 14.4 14.4 Mbps with HSDPA (high speed downlink packet access) towards middle 2007.")

112 *Id.* at 4.

113. *Id.* at 4. In addition, see the Chairman's recommended paths to regulatory certainty as discussed *supra* at note 103.

FIGURE 6: TELSTRA MOBILE CAPITAL EXPENDITURES PER MOBILE LINE AND 3G SUBSCRIBERS, 2001-2007



Sources: Telstra *Full Year* and *Half Year* company reviews.
Note: Capital expenditures are in nominal terms.

Figure 6 suggests that positive incumbent response requires the clarity provided by multiple forbearance decisions. Specifically, the sharp increase following the second forbearance decision (regarding international mobile roaming service) suggests that Telstra committed to its 3G investment after the ACCC had bolstered its forbearance credentials with its international roaming decision. The second decision likely was interpreted by Telstra to mean that the ACCC would forbear from regulating a new 3G network as well, a decision confirmed by Chairman Samuel's later comments.

Telstra's 3G infrastructure investment may also have been encouraged by 3G investments made by other market participants, because these investments would have made a declaration of 3G service more difficult politically. Any regulation of 3G services would necessarily have included *all* operators which had made substantial investments in 3G networks, including the (smaller) Vodafone and Hutchison networks.[114] As a result, these firms would also stand to lose if their

114. Regarding Vodafone, *see* Jeremy Roche, *Vodafone Australia to Launch 3G in October*, ZDNET AUSTRALIA, July 27, 2005, *available at* http://www.zdnet.com.au/news/communications/soa/Vodafone-Australia-to-launch-3G-in-October/0,130061791,139204328,00.htm. ("Vodafone today announced its third-generation (3G) network would be commercially launched in Sydney, Melbourne, and Canberra this October – rolling out to Brisbane, Adelaide, and Perth in early 2006."). Regarding Hutchison, *see* James Pearce, *3's a Company…Finally*, ZDNET AUSTRALIA, Apr. 15, 2003, *available at* http://www.zdnet.com.au/news/communications/soa/3-s-a-company-finally/0,130061791,120273730,00.htm. ("Hutchison launched its '3' mobile service in Australia today…").

3G networks were opened to other mobile telephone entrants, and would thus likely oppose a declaration of 3G services. It is possible that Telstra took these regulatory incentives into account as well when it decided to invest in a nationwide 3G network.

While it appears that the ACCC's 2004 and 2005 decisions were effective in persuading some market participants of its intentions to forbear, it also seems that others remained unconvinced. For example, Optus limited its investment in 3G to a partnership with Vodafone,[115] which covered a small urban footprint, and initially was limited to major cities and several airports.[116] Only after Chairman Samuel's October 2006 declaration that the ACCC would not force Telstra to open its 3G network to competitors (including Optus), did Optus (in January 2007) announce plans to develop its own nationwide 3G network.[117] Thus, it appears that while the ACCC's forbearance signals may have been understood and accepted by at least some market participants, it was unsuccessful in credibly communicating its intentions to Optus.

VI. CONCLUSION

This is the first paper to examine the investment behavior of incumbents and entrants around the time of regulatory forbearance decisions. We find evidence that an entrant will significantly increase investment around the decision to forbear from regulating an *existing* access technology. We also find evidence that an incumbent will significantly increase investment around the decision to forbear from regulating a *new* service. While our results do not impugn the theoretical underpinnings of the stepping stone model, they do suggest that a key assumption of the model – that regulators can credibly signal their intentions to follow the model's recommendations – cannot be taken for granted. Indeed, in all three of our case studies, it appears that at least some market participants failed accurately to assess the regulator's intentions.

These findings suggest that robust facilities-based competition—the primary goal of unbundled access regulation—is better served by moving forward the date of regulatory forbearance than by gradually relaxing unbundling requirements. Because it is difficult for a regulator to credibly commit to removing an unbundling obligation at some future date, the best strategy for an entrant is to defer investment (and continue leasing access at regulated rates) until the time of forbearance. It is an even harder for a regulator to commit to forbearing from regulating a new service in the future. Whereas the regulator can signal its commitment to deregulate at some future date by adjusting wholesale rates upwards in the case of existing access technologies, no such policy

115. Optus, Optus Breaks 3G Boundaries, Press Release, Nov. 14, 2005, *available at* http://www.optus.com.au/portal/site/aboutoptus/menuitem.813c6f701cee5a14f0419f108c8ac7a0/?vgnextoid=a31814e79fc87010VgnVCM10000029867c0aRCRD&vgnextchannel=11fbfaf924954010VgnVCM10000029a67c0aRCRD&vgnextfmt=default.

116. *Id.* ("Optus today launched its 3G services in Sydney, Canberra, Melbourne, Brisbane's CBD and Brisbane, Adelaide and Perth airports.").

117. Optus, Optus Announces Bold Expansion of Its 3G Mobile Network Across National Footprint, Press Release, Jan. 30, 2007, *available at* http://www.optus.com.au/portal/site/aboutoptus/menuitem.813c6f701cee5a14f0419f108c8ac7a0/?vgnextoid=27e13268b6070110VgnVCM10000029867c0aRCRD&vgnextchannel=daf6d7ef03820110VgnVCM10000029867c0aRCRD&vgnextfmt=default. Note also that new portions of the 3G network will be owned exclusively by Optus, rather than through a partnership of Optus and Vodafone.

instrument exists in the case of a new technology. Thus, expediting the date of forbearance is even more critical for stimulating investment in new technologies.