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A POLICY AND ECONOMIC EXPLORATION OF WIRELESS *CARTERPHONE* REGULATION

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Abstract

Critics assert that certain practices by wireless service providers—such as handset locking, data bandwidth limitations, and control over features included on handsets—unduly hamper the ability of consumers to access advanced data communications services. Whether these wireless service providers should be required to open their networks to users’ choices of wireless handsets has been the

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focus of recent policy debates in the United States surrounding potential regulatory intervention. This intervention, often called "wireless Carterfone" rules (after an FCC 1968 decision for the landline telephone network), would ban some of these practices and mandate that service providers design their networks to accommodate the user's choice of wireless handsets and equipment. This article explores the historical background of the Carterfone decision and its application to the contemporary wireless industry in light of two significant economic implications. First, the regulations that commoditize the wireless network services industry may harm the prospects for entry and competition in that industry. Therefore, while the concentrated nature of the wireless market is often cited as a reason for imposing wireless Carterfone rules, those rules may in fact exacerbate that market concentration. Second, wireless Carterfone rules may have the effect of increasing prices for handsets without any offsetting price decrease for wireless network services. As a result, consumer welfare may decrease without any guarantee that producer or social welfare will increase.

I. INTRODUCTION AND BACKGROUND

Critics assert that certain practices by wireless service providers—such as handset locking, data bandwidth limitations, and control over features included on handsets—unduly hamper the ability of consumers to access advanced data communications services.¹ Whether these wireless service providers should be required to open their networks to users' choices of wireless handset has been the focus of recent policy debates in the United States surrounding potential regulatory intervention. This intervention, often called “wireless *Carterfone*” rules (after an FCC 1968 decision for the landline telephone network), would ban some of these practices and mandate that service providers design their networks to accommodate the user's choice of wireless handset.

Carterfone and the subsequent line of decisions began with the Federal Communications Commission's (FCC) 1968 *Carterfone* decision, in which the agency required the Bell System to allow telephone devices from unaffiliated manufacturers to be connected to the local phone network.² The Bell System's incentives to sabotage the evolution of a competitive equipment market are well understood as being a consequence of the presence of market power, vertical integration, and regulation. The FCC's decision,³ along with subsequent related decisions and rules, created the competitive telephone equipment market we observe today. This basic principle has been applied in other contexts, including cable set-top boxes, in which both a statute and various FCC rules require that the cable industry design their networks in a way that accommodates the

1. See, e.g., *Communications, Broadband and Competitiveness: How Does the U.S. Measure Up?: Hearing Before the S. Comm. on Commerce, Sci. and Transportation*, 110th Cong. (2007) [hereinafter Scott Testimony] (statement of Ben Scott, Policy Director, Free Press), available at <http://www.freepress.net/files/42407bssentestimony.pdf>; Skype Commc'ns S.A.R.L., Petition to Confirm a Consumer's Right to Use Internet Communications Software and Attach Devices to Wireless Networks, No. RM-11361 (Feb. 20, 2007) [hereinafter Skype Petition], available at http://svartifoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6518909730; Tim Wu, *Wireless Network Neutrality: Cellular Carterfone on Mobile Networks*, 1 INT'L J. COMM. 389, 393-94 (2007), <http://ijoc.org/ojs/index.php/ijoc/article/viewFile/152/96>.

2. See Scott Testimony, *supra* note 1, at 19 (“*Carterphone* [sic] rules should apply to the wireless broadband platform.”); Skype Petition, *supra* note 1, at 25-30 (calling on the FCC to “declare that wireless carrier services are fully subject to *Carterfone*” and to “enforce the mandate of *Carterfone* in the wireless industry”); Wu, *supra* note 1, at 391, 395.

3. See Use of the Carterfone Device in Message Toll Tel. Serv., 13 F.C.C.2d 420, 423 (1968); see also *Hush-A-Phone Corp. v. Am. Tel. & Tel. Co.*, 20 F.C.C. 391, 419 (1955), *rev'd per curiam*, 238 F.2d 266 (D.C. Cir. 1956).

independent manufacture and provision of set-top boxes.⁴ Wireless *Carterfone* proponents generally appeal to this line of court decisions which de-linked and eventually banned the monopoly provider of telephone service (the Bell System) from bundling the sale of telephone equipment with telephone service.

Section II demonstrates that telephone services and cable set-top boxes do not support the imposition of *Carterfone* rules on the wireless industry. Regulators in *Carterfone* responded to behavior motivated by the presence of market power, vertical integration, and regulation, all of which, when combined, provide a potent recipe for creating an incentive to sabotage the adjacent equipment market. However, none of these conditions are present in today's wireless industry. In fact, as competition has emerged, even in landline telephony, the FCC has loosened its *Carterfone*-type rules consistently. Even with regard to cable set-top boxes, in which interoperability is a statutory mandate, the FCC has refused to apply these mandates to the satellite television industry, due to the presence of competition and the widespread availability of equipment in retail outlets. These same factors unquestionably apply to the wireless telephone industry today.

Section III explores two significant economic implications of potential wireless *Carterfone* regulation. First, wireless *Carterfone* regulation would commoditize the wireless network services industry and may harm the prospects for entry and competition in that industry. Product and service differentiation are critical to how wireless carriers compete to obtain and retain subscribers. Therefore, the FCC has generally eschewed policies that would commoditize wireless services and have instead given wireless licensees flexibility to develop and deploy services with much less government command-and-control than other nations. Therefore, while the concentrated nature of the wireless market is often cited as a reason for imposing wireless *Carterfone* rules, those rules may, in fact, exacerbate that market concentration. Second, wireless *Carterfone* rules may have the

4. See 47 U.S.C. § 549(a) (2000); Implementation of Section 304 of the Telecommunications Act of 1996: Commercial Availability of Navigation Devices, Report & Order, 13 F.C.C.R. 14775, 14776 (1998) [*hereinafter* Navigation Devices Order]. The FCC extended the implementation deadline of these requirements in 2003 via the Implementation of Section 304 of the Telecommunications Act of 1996: Commercial Availability of Navigation Devices, 18 F.C.C.R. 7924, 7924 (2003), and again in 2005 via the Implementation of Section 304 of the Telecommunications Act of 1996: Commercial Availability of Navigation Devices, Second Report & Order, 20 F.C.C.R. 6794, 6794 (2005). See also Skype Petition, *supra* note 1, at 11 (noting that while “[t]he context was different” for the cable navigation device rules, “the principle was pure *Carterfone*”).

effect of increasing prices for handsets without any offsetting price decrease for wireless network services. As a result, consumer welfare may decrease without any guarantee that producer or social welfare will increase.

II. THE HISTORICAL PRECEDENT OF *CARTERPHONE* AND TODAY'S WIRELESS INDUSTRY

The FCC devised its *Carterfone* rules in order to prevent the dominant, regulated, and vertically-integrated telephone service provider from leveraging that market power into the telephone equipment market. This leveraging or sabotage of adjacent markets is a common concern with regard to many categories of vertical exclusionary conduct. In deciding whether regulatory intervention to prevent that conduct is appropriate for today's wireless industry, an obvious question is whether the conditions that lead to the threat of sabotage that were present in *Carterfone* are present in the wireless industry today.

This section explores the historical background of the *Carterfone* decision, as well as its progeny, the cable set-top box interoperability rules, and finds that it was the combination of market power and regulation that made the threat of sabotage by the dominant landline provider into the adjacent equipment market a legitimate concern. Indeed, as explained below, it was the *presence* of regulation and the lack of competition over the landline and cable networks—not their absence—that made *Carterfone* regulation necessary. However, similar conditions are not present in today's wireless industry.

A. *The Carterfone Decision*

The FCC's 1968 *Carterfone* decision was an important regulatory watershed in communications history. To a large extent, the ability today to purchase telephones from a variety of manufacturers at a number of retailers is a direct result of that decision. However, its full influence was not felt until it was commingled with subsequent decisions and rulemaking proceedings. The FCC's decision effectively allowed manufacturers unaffiliated with the Bell System to manufacture telephones, under strict technical standards, that consumers could purchase and connect to the telephone network without restriction or additional fees levied by the phone company. At that time, the Bell System's affiliate, Western Electric, was the exclusive (and only) manufacturer of telephones for the Bell System, and the FCC's decision to mandate a standard

technical interface to the telephone network allowed for the emergence of competition in the manufacture and sale of telephone equipment.

When considering the implications of *Carterfone* for the wireless industry, it is important to understand the environment, including the presence of regulation, in which the original decision was made. At the time of *Carterfone*, the Bell System had a virtual monopoly over the entire telephone network, stretching from telephone to telephone and everything in between. The firm was regulated at all levels, a consequence of its bargain with the government in the Kingsbury Commitment of 1913, where the government countenanced its monopoly in return for its regulatory durance.⁵ In most cases, the only source of telephone equipment was Western Electric, a wholly-owned subsidiary of the Bell System.⁶

While it has become fashionable to refer to customer premises equipment attachment rules as “*Carterfone* rules,” these principles in fact extend back much further. Indeed, the FCC’s 1968 *Carterfone* decision was the result of a decade of case-by-case litigation over the extent to which the Bell System could control the attachment of “foreign” devices onto this vertically-integrated system.⁷ The FCC confronted disputes over precursors to the telephone answering machine (one called the Jordaphone) and frequently sided with the Bell System.⁸ In one notable passage, the FCC stated generally that “telephone equipment should be supplied by and under control of the carrier itself.”⁹ The D.C. Circuit reversed this decision in 1956 and

5. STUART MINOR BENJAMIN ET AL., TELECOMMUNICATIONS LAW AND POLICY 623-28 (2001); SUSAN E. MCMASTER, THE TELECOMMUNICATIONS INDUSTRY 45-46 (2002).

6. Roger B. Noll & Bruce M. Owen, *The Anticompetitive Uses of Regulation: United States v. AT&T*, in THE ANTITRUST REVOLUTION: THE ROLE OF ECONOMICS 328, 340 (John E. Kwoka, Jr. & Lawrence J. White eds., 2d ed. 1994) (“In all but a few cases, the Bell Operating Companies purchased essentially all of their equipment from Western Electric, the Bell System’s manufacturing arm.”). While the Bell System is often criticized for its lack of innovation in telephone equipment, this lack of innovation may have been due, at least in part, to the fact that this equipment was effectively subject to price regulation. For the role of regulation in communications markets on quality, see THOMAS W. HAZLETT & MATTHEW L. SPITZER, PUBLIC POLICY TOWARD CABLE TELEVISION: THE ECONOMICS OF RATE CONTROLS 95-98 (1997) and Donald J. Boudreaux & Robert B. Ekelund, Jr., *The Cable Television Consumer Protection and Competition Act of 1992: The Triumph of Private over Public Interest*, 44 ALA. L. REV. 355, 357-59 (1993).

7. See PETER W. HUBER ET AL., FEDERAL TELECOMMUNICATIONS LAW § 8.4.1.1-2 (2d ed. 1999).

8. *Id.* § 8.4.1.1 & n.59.

9. *Hush-A-Phone Corp.*, 20 F.C.C. at 419. The *Hush-A-Phone* case involved a dispute over a simple metal device that fit over the telephone mouthpiece that cupped around the speaker’s mouth, allowing the speaker some privacy in a telephone conversation.

found that a telephone consumer had a “right [to reasonably] use his telephone in ways which are privately beneficial without being publicly detrimental.”¹⁰

Armed with this legal standard, the *Carterfone* dispute centered around a rudimentary mobile telephony device—a radio upon which a telephone handset might be placed, so that the user may communicate through the telephone via a wireless connection.¹¹ The FCC overruled the Bell System’s objections to the device, finding that such equipment could be connected to the network “so long as the interconnection does not adversely affect the telephone company’s operations or the telephone system’s utility for others.”¹² That decision touched off another decade of controversy and litigation that eventually led to the development of the rules now generally referred to as the “*Carterfone* rules,” which were eventually codified in 47 C.F.R. § 64.702.

It is important to understand, however, that the Bell System’s motivations in excluding rival equipment stemmed from its position as a regulated monopoly. This general posture carried through to the landmark antitrust action that broke up the Bell System—as noted by Noll and Own, “[t]he essence of the government’s case against the Bell System was that it had used its status as a regulated monopoly in most of its markets to erect anticompetitive barriers to entry in potentially competitive markets.”¹³ Indeed, at the time of *Carterfone*, the nation had a phone company with the following traits: (1) it was a monopoly; (2) it was vertically integrated into nearly all stages of its industry; and (3) it was regulated at nearly every level of its business.¹⁴ As discussed more fully below, that context provided opportunities and incentives for the Bell System to manipulate adjacent and unregulated markets, and to attempt to extend its dominant, monopoly position into those markets to extract the monopoly rent that regulation in its primary market prevented it from collecting.

This context is very different than that found in the mobile telecommunications industry today. In today’s wireless industry, the carriers are obviously not monopolists, and the FCC acknowledges

10. *Hush-A-Phone Corp. v. Am. Tel. & Tel. Co.*, 238 F.2d 266, 269 (D.C. Cir. 1956) (*per curiam*).

11. *Use of the Carterfone Device in Message Toll Tel. Serv.*, 13 F.C.C. 2d 420, 420-21 (1968).

12. *Id.* at 424.

13. Noll & Owen, *supra* note 6, at 333.

14. *Id.* at 330-33.

that they compete aggressively on service quality, features, and prices.¹⁵ Over ninety-five percent of the country lives in areas with three or more mobile carriers offering service.¹⁶ The FCC, therefore, has repeatedly concluded that “there is effective competition in the [wireless] market,” and this position is unchanged even after the recent mergers of several large wireless carriers.¹⁷

Second, the wireless industry is not vertically integrated into the manufacture of telephone equipment. Thus, the potential for the sabotage of competing equipment manufacturers to protect an equipment affiliate is entirely absent in the wireless industry. Since the *Carterfone* decision was essentially about actions aimed to protect the position of an affiliated equipment manufacturer, how exactly the decision applies to the wireless industry is a bit of a mystery.

Finally, and most importantly, the wireless industry is not subject to price regulation.¹⁸ The presence of regulation is critical to the *Carterfone* decision, since without regulation, a firm would have little incentive to sabotage and the decision likely would have been unnecessary in the first instance. As noted by Beard, Kaserman, and Mayo, the factors necessary for sabotage—defined as the ability to increase or raise the cost of a rival’s key input of production by non-price behavior (e.g., blocking)—include, but are not limited to, the following: (a) “[s]ignificant monopoly power in one or more markets” and (b) the “[p]resence of price or profit regulation.”¹⁹ This approach

15. Even Professor Wu admits that wireless services are available at “competitive prices to the public.” Wu, *supra* note 1, at 389.

16. Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993: Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, 23 F.C.C.R. 2241, 2245 (2008) [*hereinafter* CMRS Competition Report].

17. *Id.*; Applications of Nextel Communications, Inc., and Sprint Corp. for Consent to Transfer Control of Licenses and Authorizations, 20 F.C.C.R. 13967, 14055 (2005) (statement of Michael J. Copps, Comm’r, FCC) (“But in most of [U.S. wireless] markets four or more substantial competitors will continue to compete post-merger.”).

18. See 47 U.S.C. § 332(c) (2000); see also Petition of the Connecticut Department Public Utility Control to Retain Regulatory Control of the Rates of Wholesale Cellular Service Providers in the State of Connecticut, Report & Order, 10 F.C.C.R. 7025, 7026 (1995), *aff’d sub nom.* Conn. Dept. of Pub. Util. Control v. FCC, 78 F.3d 842 (2d Cir. 1996).

19. T. Randolph Beard, David L. Kaserman & John W. Mayo, *Monopoly Leveraging, Path Dependency, and the Case for a Local Competition Threshold for RBOC Entry into InterLATA Toll*, in REGULATION UNDER INCREASING COMPETITION 37 (Michael A. Crew ed., 1999); see also Olympia Equip. Leasing Co. v. W. Union Tel. Co., 797 F.2d 370, 374 (7th Cir. 1986) (“There are, however, special circumstances in which a rational monopolist may want to restrict competition in an input market; as it happens, one of those circumstances is where the monopolist’s rates are regulated.”). Likewise, we have demonstrated the role of regulation in sabotage in earlier work. See, e.g., T. Randolph Beard, George S. Ford & Lawrence J. Spiwak,

is consistent with more general and well-accepted economic treatments of leveraging.²⁰ As summarized by Ordover, Sykes, and Willig:

In sum, when a regulated firm is subject to a binding rate-of-return ceiling that exceeds its true marginal cost of capital, it has a profit incentive to expand in to the production of vertically related services. . . . If, however, the regulated firm is comparatively inefficient in producing vertically related services, it may still endeavor to extend its monopoly by means of such tactics as below-cost pricing, tie-ins, and predatory systems rivalry—all to the detriment of economic welfare.²¹

The explicit and primary role that regulation played in the *Carterfone* decision is well established. As noted in a paper by Farrell and Weiser, the Bell System's entry deterring behavior in telephone equipment was "because of the price regulation of local telephone service."²² Economists recognize that it was the combination of market power at the downstream level and classic public utility-type

Why ADCo? Why Now? An Economic Exploration into the Future of Industry Structure for the "Last Mile" in Local Telecommunications Markets, 54 FED. COM. L. J. 421, 448 (2002).

20. See generally T. Randolph Beard, David L. Kaserman & John W. Mayo, *Regulation, Vertical Integration and Sabotage*, 49 J. INDUS. ECON. 319 (2001); Joseph Farrell, *Integration and Independent Innovation on a Network*, 93 AM. ECON. REV. 420 (2003); Joseph Farrell & Philip J. Weiser, *Modularity, Vertical Integration, and Open Access Policies: Towards a Convergence of Antitrust and Regulation in the Internet Age*, 17 HARV. J.L. & TECH. 85 (2003); David M. Mandy & David E.M. Sappington, *Incentives for Sabotage in Vertically Related Industries*, 31 J. REG. ECON. 235 (2007); David E.M. Sappington & Dennis L. Weisman, *Self-Sabotage*, 27 J. REG. ECON. 155 (2005); Michael. D. Whinston, *Tying, Foreclosure, and Exclusion*, 80 AM. ECON. REV. 837 (1990).

21. J.A. Ordover, A.O. Sykes & R.D. Willig, *Nonprice Anticompetitive Practices by Dominant Firms Toward the Producers of Complementary Products*, in ANTITRUST AND REGULATION: ESSAYS IN MEMORY OF JOHN J. MCGOWAN 127 (Franklin M. Fisher ed., 1985).

22. Farrell & Weiser, *supra* note 20, at 106-07.

This exception to [the economics theorem that firms vertically integrate to "internalize complementary efficiencies" or "ICE"] has figured prominently in telecommunications policy. In particular, the Bell System allegedly leveraged its way to market power in complementary markets, denying equal access to its network to competitors in long distance and equipment manufacturing. By excluding such competitors, AT&T could rent telephones to its customers and sell equipment from its Western Electric affiliate to its operating companies or telephone subscribers at inflated rates. Such a strategy was available to AT&T because of its network-level market power, but ICE would claim the option should be unattractive because it would decrease demand for telephone subscription. But that decrease did not deter AT&T because of the price regulation of local telephone service."

As a result, a regulated monopoly will have an inexorable incentive to seek to collect that monopoly rent from adjacent markets.

Id.

regulation that created the incentive for the Bell System to leverage and exclude entry in the equipment sector (neither factor being present in today's wireless industry). Accordingly, it was the firm's efforts to evade regulation, not simply a monopolist's inherent desire to protect revenue and profits, which created the incentive to sabotage and necessitated the *Carterfone* decision.

B. Regulation as Cause for Intervention

The motivation to sabotage rivals or leverage market power is often misunderstood. Indeed, policy debates over the proper scope of intervention into these types of vertical relationships either grossly understate or overstate the need for that intervention. As summarized in Farrell and Weiser (2007), there is a set of particular instances in which a firm has the incentive to leverage market power.²³ The economic literature in this area is very large; however, the application of these theories is highly fact-based and specific to the particular industry in question. As a result, any general treatment is likely to over (or under) state the case for and against intervention.

That being said, there is no denying that the presence of regulation—particularly price regulation—can create an incentive for a monopolist to sabotage an adjacent market. While regulation can take many forms, a numerical example illustrates the effects of regulation on anti-competitive behavior, including sabotage or vertical leveraging, by assuming a simple form of price regulation.

Say there is a monopolist selling two goods, A and B. The two goods must be consumed together to make a useful product for consumers; that is, we assume the two goods are complements and consumed in fixed proportions. Let the marginal cost for each good be \$1. In the initial state, say the unregulated monopolist charges \$2 per good so that the total package (AB) costs \$4. The firm's profit is \$2, or \$1 for each of the two goods.

Now, consider the scenario where entry occurs into the Good B market. This entry results in marginal cost pricing so that the price of Good B is \$1. *Ceteris paribus*, the monopolist loses the \$1 profit from Good B and its aggregate profits fall to \$1 as consumer price falls to \$3. But the *ceteris paribus* assumption is invalid. The monopolist, as long as it is unregulated, can adjust to entry by increasing the price of Good A to \$3. As before entry, the total price is \$4 and the monopolist makes \$2 profit, except now all the profit is from Good A.

23. See *id.* at 97-105.

In such a case, the monopolist has no incentive to impede entry, since it can adjust price for Good A to maintain its profit level.

In some cases, the monopolist may even prefer entry into the B market. Say, for example, that the entrants are more efficient than the incumbent, reducing marginal cost to \$0.50. The price for Good B is \$0.50. Since the two goods are complements, the reduction in the price of Good B increases the demand for Good A. This higher demand translates into higher profits for the monopolist, even if the consumer receives a lower overall price. Compensated with higher profits, the monopolist welcomes competition for the B good.

In each of these cases, the monopolist did not impede entry because it was free to adjust its prices to maintain or increase its profits. If the monopolist cannot change price, then its behavior changes. Take the case where the entrants are equally efficient. If the price for Good A is regulated at \$2, then the monopolist's profits are reduced to \$1 with competition over Good B. Consequently, the monopolist is willing to spend up to \$1 in profit per unit to impede or sabotage entry. Even if entrants are more efficient, the monopolist may frustrate entry, since overall profits may be lower if the price for Good A is regulated below the profit maximizing level.

There are other cases where the monopolist may sabotage entry efforts even without regulation, such as the threat of competition in complementary markets. For example, if entry in the Good B market eases entry in the Good A market, then the monopolist may frustrate entrants. As shown above, the accommodation of entry requires the ability to fully adjust the price of Good A to protect profit, and the potential for competition in the monopoly market threatens the ability to adjust prices.

As noted by Farrell and Weiser, there are other cases where the monopolist would act in an exclusionary way, even with fixed proportions.²⁴ The easiest way to think about exclusionary behavior is to recognize the monopolist's preferred instrument in dealing with entry is always a price change, not exclusion. Exclusion and sabotage are costly alternatives to a price change. So, the relevant question for exclusion is this: "Why can't the monopolist adjust price to solve the entry problem in a complementary market?" Since price is preferred, observing alternative solutions to entry is evidence that the price mechanism is unavailable. This simplification also suggests that

24. See generally *id.*

efforts to impede price adjustments in response to entry are likely to result in sabotage, a fact frequently ignored in the debate.

C. Recent Applications of Carterfone to Telephone and Cable Networks

Rather than expand the scope of *Carterfone* regulation, as recently proposed by network neutrality advocates, the FCC has continually reduced the applicability of the decision in the communications industry, based primarily on the argument that such intervention is not required in competitive industries. Since market power is a relevant condition for sabotage, the agency's decisions have an analytically-sound foundation.

As discussed above, *Carterfone* and subsequent decisions eventually became part of a series of decisions, including the *Computer Inquiries*, that evolved into various FCC rules, including the "no bundling" rules.²⁵ In 1992, the Commission stopped applying this rule to the cellular industry. In regulatory parlance, the "incentive to cross-subsidize" is shorthand for the economic theory of sabotage discussed above, and the FCC found that motive to be reduced in the wireless industry given "the lack of regulation based on rate-of-return principles, combined with the absence of monopoly status for cellular carriers."²⁶ The FCC later observed that this decision helped consumers, giving them "the option of avoiding high up-front expenditures by bundling service and equipment [which] was one of the factors that contributed to the significant growth in the cellular market."²⁷

The FCC has also removed application of the "no bundling" rule in the interstate, inter-exchange market and for non-dominant local telephone companies.²⁸ An examination of whether the carrier had market power was central to the FCC's analysis. As the FCC observed, "[i]t is a well established economic principle, however, that in order for a buyer to be harmed by such an arrangement, the seller must have market power over the desired product such that the buyer

25. 47 C.F.R. § 64.702 (2008).

26. Bundling of Cellular Customer Premises Equipment and Cellular Service, Report & Order, 7 F.C.C.R. 4028, 4031 (1992). This decision was made when consumers only had a choice of two cellular phone operators, before the licensing and entry of PCS carriers into the wireless market.

27. Policy and Rules Concerning the Interstate, Interexchange Marketplace, Report & Order, 16 F.C.C.R. 7418, 7438-39 (2001).

28. *Id.* at 7439-40.

has no choice but to purchase it from the seller.”²⁹ The economic rationale for the “no bundling” rules are similar to the proposed *Carterfone* regime for the wireless industry. By that logic, since the FCC has determined that the wireless industry is competitive and that buyers do have choices among numerous equipment vendors, such regulatory intervention would be unwarranted.

Proponents of wireless network neutrality regulation also cite Congressional and FCC rules regarding cable set-top boxes (called “navigation devices”) as another template for regulatory intervention.³⁰ Again, the distinctions between conditions giving rise to these rules and the wireless marketplace are readily apparent, rendering the Commission’s policy and rules regarding cable set-top “navigation devices” another useless precedent for regulating the wireless industry.

The FCC’s role in set-top box interoperability was mandated by Congress, which sought to promote competition and availability of these devices.³¹ At the time this legislation was enacted, there was very little, if any, retail availability of cable set-top boxes. Section 629 of the Communications Act mandates that television “navigation devices” be interoperable so that consumers would have the ability to purchase those devices from independent sources (i.e., not their video services provider).³² Section 629 of the Act states:

The Commission shall, in consultation with appropriate industry standard-setting organizations, adopt regulations to assure the commercial availability, to consumers of multichannel video programming and other services offered over multichannel video programming systems, of converter boxes, interactive communications equipment, and other equipment used by consumers to access multichannel video programming and other services offered over multichannel video programming systems, from manufacturers, retailers, and other vendors not affiliated with any multichannel video programming distributor.³³

In response to this Congressional mandate, the FCC’s *Navigation Devices Order* requires the cable television industry to develop and support a CableCARD technology, where the tuning, descrambling,

29. *Id.* at 7431.

30. Skype Petition, *supra* note 1, at 11.

31. See Navigation Devices Order, *supra* note 4, at 14776 (noting that the rationale for the rule was to “ensure the movement of navigation devices toward a fully competitive market”).

32. *Id.*

33. 47 U.S.C. § 549(a) (2000).

and security features are effectively severed from the cable set-top box.³⁴ This CableCARD technology allows electronic manufacturers to build television sets that are fully compatible with the cable system without the need for a cable converter box, though the CableCARD must be acquired and programmed by the cable operator.³⁵

There are a number of facets to this application of *Carterfone*-like principles that are important and interesting with regard to their extension to wireless services. Like *Carterfone*, the cable set-top box rules are aimed at promoting competition in the equipment markets by giving consumers the right to purchase television set-top box equipment from manufacturers, retailers, and other vendors not affiliated with their video programming provider (usually the dominant incumbent cable company).³⁶ At the time of the decision, all converter and security technology was only available from the dominant cable operator,³⁷ so the lack of equipment from retail outlets and from different manufacturers was apparent and unquestioned. This exclusive source of equipment links the set-top box case to *Carterfone*.

In the wireless industry, by stark contrast, equipment is manufactured by numerous manufacturers and can be purchased not only in the carriers' stores, but at a large number of independent retailers including electronics stores such as Best Buy, shopping mall vendors, wireless resellers, eBay, and even Wal-Mart, as Table 1 demonstrates. In the table, the brands of landline telephones and wireless carrier handsets available for purchase on the websites of two

34. Navigation Devices Order, *supra* note 4, at 14778.

35. Matthew Torres, About.com, Introduction to CableCARD Technology, <http://tv.about.com/od/cableandsatellitetelevision/a/CableCARDintro.htm> (last visited Mar. 4, 2009).

36. The FCC recognized the common goal of the two decisions, but noted:

The parallel to the telephone has limitations. When customer ownership of telephone CPE [customer premises equipment] became available, the telephone network was effectively a national monopoly. Bell developed technical standards existed throughout an almost ubiquitous network. CPE compatible with the telephone network was part of this environment. In contrast, cable networks do not reflect universal attributes, and have substantially different designs. Nor do satellite systems share commonality beyond the most basic elements. Additionally, as Section 629 recognizes, preventing interference to other network users and maintaining the integrity of the system signal is of greater concern for video delivery systems than for telephone systems.

Navigation Devices Order, *supra* note 4, at 14780.

37. Navigation Devices Order, *supra* note 4, ¶ 8 (“The focus of Section 629, however, is on cable television set-top boxes, devices that have historically been available only on a lease basis from the service provider.”).

large retail stores are listed.³⁸ For both cases, the number of brands for wireless equipment exceeds that of wireline devices. In effect, the primary purpose of the *Carterfone* rules and set-top box legislation—the widespread availability of devices for end-users—has already been achieved in wireless communications.

More importantly, the set-top box rules explicitly recognize that there is no need for this type of regulatory intervention when competition develops. In particular, Section 629(e) sunsets these rules when the FCC determines that the market for the multichannel video programming distributors is fully competitive; that the market for converter boxes, and interactive communications equipment used in conjunction with that service is fully competitive; and that elimination of the regulations would promote competition and the public interest.³⁹

The FCC has applied this flexibility to waive the requirements of the law for competitive providers of video programming. Most notably, the FCC has affirmatively decided not to impose these rules on satellite video providers, like DirecTV and Echostar, reasoning that the availability of comparable devices was competitive:

[D]ifferences in the marketplace for DBS equipment, where devices are available at retail and offer consumers a choice, as compared to equipment for other MVPD services, particularly cable operators, provide justification for not applying the rule requiring separation of security functions to DBS service. We are reluctant to implement a rule that could disrupt an evolving market that is already offering consumers the benefits that derive from competition. In the DBS environment, *there are three service providers and at least ten equipment manufacturers competing to provide programming and equipment to consumers. The equipment is available at retail stores.* The result, over a relatively short time frame, has been lower equipment prices, enhanced options and features. Requiring DBS providers to [comply with the 629 rules]

38. We note that the number of brands offered is constantly in flux, and this specific finding may change over time. Nevertheless, it is clearly demonstrated that the ability to purchase mobile telephone equipment from a variety of manufacturers is possible today, without *Carterfone* regulation.

39. 47 U.S.C. § 549(e) (2000) (“The regulations adopted under this section shall cease to apply when the Commission determines that—(1) the market for the multichannel video programming distributors is fully competitive; (2) the market for converter boxes, and interactive communications equipment, used in conjunction with that service is fully competitive; and (3) elimination of the regulations would promote competition and the public interest.”).

would serve a limited purpose and disrupt technical and investment structures that arose in a competitive environment.⁴⁰

Applying this same rationale to the wireless industry would lead to a conclusion that interoperability requirements are not necessary. The wireless communications industry in the United States contains far more than the three providers and ten equipment manufacturers noted by the Commission in the DBS waiver. Indeed, mobile handsets are available in many of the same retail stores that DBS boxes are sold, like Best Buy, in addition to myriad other distribution outlets.⁴¹ Moreover, the FCC's decision to exempt DirectTV and Echostar from Section 629 requirements also indicates that the FCC explicitly was *not* interested in a policy that would give consumers the right to use the same navigation device across different multichannel video programming distributors. In sum, based on the rationale for excluding DBS providers from the set-top rules, the FCC would have a difficult time applying the requested regulatory mandates on the wireless industry based on its decisions regarding their cable set-top box rules.

Further, consumers can switch between mobile carriers. Subscriber churn—the number of wireless customers that a carrier loses in a time period—is considerable in the wireless industry.⁴² Even carriers' attempts to limit churn, such as long-term contracts, can be circumvented by consumers. For example, many retailers like Buy.com sell unlocked wireless handsets,⁴³ and the website CelltradeUSA.com actually gives a customer seeking to leave one service provider for another the ability to exchange his or her long-

40. Navigation Devices Order, *supra* note 4, at 14800-01 (emphasis added).

41. Indeed, on the Best Buy website, eleven different brands of mobile handsets are available for sale, as opposed to twelve different brands of traditional, land-line telephones subject to Part 68 rules (in the case of traditional land line telephones, excluding duplicates and VoIP solutions such as those from Vonage). Best Buy, <http://www.BestBuy.com> (last visited Mar. 4, 2009).

42. The FCC reports that most wireless providers have a churn of between 1.5% and 3.0% per month. CMRS Competition Report, *supra* note 16, at 2249. For example, according to Sprint's 10-K filing in 2006, Sprint reported a 2004 monthly churn rate of 2.6%. Sprint Nextel Corp., Annual Report (Form 10-K), at 47 (Mar. 1, 2007), available at <http://library.corporate-ir.net/library/12/127/127149/items/238651/200610K.pdf>. Another wireless carrier, Alltel, reported a 2006 monthly churn rate of 1.57%. Alltel Corp., Annual Report (Form 10-K), at 6 (Feb. 20, 2007). A carrier with these monthly churn rates will lose 20-30% of its customers each year, or nearly a complete turnover every three to five years.

43. Buy.com, Unlocked GSM Cell Phones, <http://www.buy.com/dept/unlocked-gsm-cell-phones-bluetooth-cell-phone-accessories-cell-phones-with-service/12435.html> (last visited Mar. 5, 2009).

term contract with customers seeking to do the opposite.⁴⁴ Given these opportunities, consumers today have some ability to protect themselves from efforts by wireless companies to extract consumer surplus—certainly much more so than telephone customers of the Bell System in the 1960s.

In sum, the wireless industry is not a monopoly, wireless carriers are not vertically integrated into equipment, and the prices of wireless carriers and equipment manufacturers are not regulated. As a result, there is very little reason to expect that wireless firms today have the same incentive to sabotage or engage in harmful vertical leveraging into the mobile handset and equipment market as the monopoly Bell System or cable providers had when *Carterfone*-type regulation was imposed upon them.

III. ECONOMIC CONCERNS ABOUT WIRELESS *CARTERPHONE* INTERVENTION

Even though the oft-cited historical analogies for wireless *Carterfone* proposals do not support this intervention, calls for wireless *Carterfone* rules continue unabated in the United States. Indeed, those calls have found some receptive ears at the FCC, as the FCC has begun to base some of its decisions upon the perceived need that wireless networks should be more “open” to additional equipment and devices.

For example, in 2008 the FCC auctioned 25 MHz of spectrum with the condition that the licensee conform to particular “open platform” regulation, which are designed to “allow customers, device manufacturers, third-party applications developers, and others to use or develop the devices and applications of their choosing in C block networks.”⁴⁵ Verizon Wireless won the vast majority of these open platform licenses, paying \$4.7 billion for these “open platform” licenses that cover the contiguous United States and Hawaii.⁴⁶ FCC Chairman Kevin J. Martin described the decision to encumber this block of spectrum with open platform regulation as “a rare chance to promote innovation and consumer choice while writing on a clean

44. CelltradeUSA.com, FAQ, <http://www.celltradeusa.com/faq> (last visited Mar. 5, 2009).

45. Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, Second Report & Order, 22 F.C.C.R. 15289, 15365 (2007).

46. See Auction of 700 MHz Band Licenses Closes, Public Notice, 23 F.C.C.R. 4572, 4645 (2008).

slate.”⁴⁷ There are other proposals to impose identical open platform regulation upon another substantial block of spectrum (called the third Advanced Wireless Services Block, or AWS-III) that will be auctioned as soon as 2009.⁴⁸

As a consequence of these proposals and decisions, there is no mistaking that we may be in the midst of a fundamental restructuring of the regulatory basis of the nation’s wireless industry. The longstanding policy regime in which carriers were granted flexibility in designing their networks to accommodate diverse and different technologies and services is being transformed into one that would treat wireless network services more like a commodity.

Are these positive developments? Will consumers be better off from this flurry of “open platform” regulation of the wireless industry? To answer these questions, one must properly understand the costs and benefits of this apparently significant shift in policy. In this Section, we outline two potential harms that open platform policies may engender. First, such intervention poses the risk of commoditizing wireless network services, a development that may harm the prospects for entry and competition in the industry. The stagnation and perhaps even reduction of competition between consumers would be a real threat to consumers. Indeed, one could argue that consumers are already paying this cost. Verizon Wireless, the nation’s largest wireless provider, was the highest bidder for the “open platform” license auctioned off by the FCC in 2008—because the commodity nature of those open platform rules shrank the market and virtually preordained that a new service provider would not be able to use that license to enter the market profitably.

Second, we show below that prices for handsets are likely to rise as a result of wireless *Carterfone* requirements, and there is no guarantee that wireless service prices would fall. In that event, consumers would be plainly worse off with this regulation.

A. *Commoditization and Wireless Carterfone Regulation*

We have written elsewhere that commoditization of broadband networks would lead to increased industry concentration, produce

47. Kevin J. Martin, Chairman, FCC, Remarks at CTIA Wireless 2008 (April 1, 2008), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-281259A1.pdf.

48. See, e.g., Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band, 23 F.C.C.R. 9859 (2008).

higher prices, and potentially less innovation.⁴⁹ Moreover, the current diversity of wireless services in the United States today reduces the possibility of oligopolistic coordination.⁵⁰ Yet the leading wireless *Carterfone* proponent states plainly and approvingly that commoditization of wireless network services would be the ultimate result of applying *Carterfone*-like regulation to the industry.⁵¹ Due to the presence of large fixed and sunk costs, the commoditization of wireless network services would likely increase industry consolidation, just as it would for wireline communications networks.⁵²

We can begin to see the risk of potential industry consolidation by comparing the current United States wireless industry with those of other nations, especially those that have adopted technical

49. See generally T. Randolph Beard, George S. Ford, Thomas M. Koutsy & Lawrence J. Spiwak, *Network Neutrality and Industry Structure*, 29 HASTINGS COMM. & ENT. L.J. 149 (2007).

50. Implementation of Sections 3(n) and 332 of the Communications Act; Regulatory Treatment of Mobile Services, Second Report & Order, 9 F.C.C.R. 1411, 1471 (1994) (“Complex pricing structures, such as are used in the cellular industry, make it difficult for a carrier to sustain collusive pricing.”). Indeed, economic theory suggests that product differentiation often impedes oligopolistic coordination. As observed by Kaserman and Mayo:

[W]here firms in the market produce a product whose differences are either nonexistent or so minor that the only dimension of competition between firms is price . . . , it is relatively easy for firms to agree to establish an anticompetitive price. Where firms compete in many dimensions (for example, price, quality, and new service or product innovations), however, it becomes more difficult to successfully collude because firms will need to establish limits on competition in each of the relevant dimensions.

DAVID L. KASERMAN & JOHN W. MAYO, *GOVERNMENT AND BUSINESS: THE ECONOMICS OF ANTITRUST AND REGULATION* 159 (1995); see also PHILLIP E. AREEDA & HERBERT HOVENKAMP, *ANTITRUST LAW: AN ANALYSIS OF ANTITRUST PRINCIPLES AND THEIR APPLICATION* ¶ 404c3 (3d ed. 2006) (stating that product complexity, differentiation, or variety “multipl[ies] avenues of rivalry and hence the decisions that must be coordinated. Even if firms reach a coordinated price, they may continue to compete by improving product quality.”); F. M. SCHERER & DAVIS ROSS, *INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE* 279 (3d ed. 1990) (“When products are heterogeneously differentiated, the terms of rivalry become multidimensional, and the coordination problem grows in complexity by leaps and bounds.”). *But cf.* STEPHEN MARTIN, *ADVANCED INDUSTRIAL ECONOMICS* 116-17 (1993) (“Product differentiation reduces the incremental profit to be gained by departing from a joint-profit-maximizing configuration because product differentiation insulates rivals’ markets and reduces the extent to which a single firm can lure rivals’ customers into its own market.”).

51. Wu, *supra* note 1, at 416 (“Spectrum bandwidth is a commodity, and the interface would provide the user with a fixed maximum bandwidth and, like an electric meter, bill the consumer for the amount of bandwidth actually used”).

52. See Beard et al., *supra* note 49, at 150 (“[G]iven the economic characteristics of local communications networks, policies that promote commoditization of broadband access could lead to the monopoly provision of advanced broadband services in many markets. This outcome would harm consumers substantially.”).

specifications for 2G or 3G wireless network deployment. For example, providers of mobile 2G services in Europe must comply with the GSM Standard and 3G broadband service providers in Europe must comply with the Universal Mobile Telecommunications System (UMTS).⁵³ Moreover, in Europe, it is not possible to operate 3G broadband services on 2G spectrum bands, so 3G service providers have been required to construct new networks entirely.⁵⁴

In contrast, carriers in the United States have deployed analog and digital networks using an array of technologies based on the carrier's plans for the devices it wants to support, services it wants to provide, and the markets it services.⁵⁵ The "air interface" technologies have included, among others, GSM, iDEN, EDGE, UMTS, CDMA, EVDO, EVDO-RevA, and TDMA.⁵⁶ The Commission specifically leaves the decision about what technology to deploy to the carriers, with the view that carriers looking to maximize a return on their investment in spectrum and infrastructure are best suited to decide the fastest way to do so. This policy facilitates competition between network providers and encourages the most rapid deployment of new technology in part because new technologies can be deployed incrementally. According to Cowhey and Aronson, due to this policy, "fragmentation in standards resulted, but so did innovation, especially in CDMA deployment."⁵⁷ Moreover, according to Cowhey and Aronson, this flexible use policy "made the transition to 3G easier in the United States because incumbents could simply upgrade their existing networks rather than switch to new spectrum as was required by the European Union."⁵⁸

It appears that as a consequence of a spectrum policy regime different than those adopted in Europe, the United States has a much broader diversity of wireless network platforms and more competition among network providers than markets where governments have taken much stronger command-and-control approaches to technical

53. GSM Europe, Facts & Figures, <http://www.gsmeurope.org/news/facts.shtml> (last visited Mar. 5, 2009) ("Market penetration across GSM and 3GSM [UMTS] networks in Europe is 85%, with 15 countries having penetration figures of over 100%, and only 8 with less than 60%.")

54. Peter F. Cowhey & Jonathan D. Aronson, *Wireless Standards and Applications: Industrial Strategies and Government Policy*, ANNENBERG RES. NETWORK ON INT'L COMM'C'N 27 (2004), http://arnic.info/workshop04/Cowhey_Aronson.pdf.

55. *Id.* at 40.

56. Unstrung, Mobile Wireless Air Interface Technologies, http://www.unstrung.com/document.asp?doc_id=16857 (last visited Mar. 9, 2008).

57. Cowhey & Aronson, *supra* note 54, at 27

58. *Id.*

matters. Table 2 demonstrates that even after recent mergers, the United States, in contrast to other Organisation for Economic Co-operation and Development (OECD) countries (the exception being Denmark), has a substantial diversity among competing wireless service providers. This implies that the commoditization of wireless spectrum, as is more likely in countries with a mandated common technical standard, can significantly impact industry structure and concentration. Indeed, over a quarter of wireless subscribers in the United States receive service from a firm other than one of the top three providers nationwide.

Furthermore, the United States wireless market has, in most cases, more competitors than most other industrialized countries, higher usage rates of wireless networks, and significantly lower prices.⁵⁹ This superior market performance indicates that the current government policy of promoting network-to-network competition between wireless service providers on all possible levels, including technology and standards, is benefiting United States consumers. Restructuring the industry through the regulation that proponents of wireless net neutrality are urging would sacrifice network-to-network competition for the sake of promoting network “openness” and would likely impact the quantity, quality, and prices of wireless network services.

In addition, applying *Carterfone* to the diverse wireless industry in the United States would result in dizzying complexity. Unlike Europe and other nations, the United States has deliberately not established standard wireless network technologies and has allowed license holders to deploy any technology of their choosing, so long as it meets the conditions of the license. As a result, in the United States, providers have deployed 2G and 3G networks using myriad competing and evolving technologies. There is no evidence that it would be possible to have a single, technical standard interface that would permit a handset to operate on all of the AMPS, D-AMPS, CDPD, GSM, iDEN, WIDEN, CDMA, GPRS, EDGE, W-CDMA, and EVDO (not to mention other 3G and 4G technologies that are in development) networks that are deployed today.⁶⁰ Moreover, these

59. Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, 21 F.C.C.R. 10947, 11044 (2006).

60. In advancing his proposal, Wu (incorrectly) notes that much of “[t]he wireless world already has standardized interfaces,” citing the GSM standard requirement of SIM cards that has been implemented in Europe. Wu, *supra* note 1, at 416. But the mere presence of standards does not mean that navigating them is easy: Cowhey and Aronson describe a “standard’s maze” of no

technologies have been developed by companies and standards bodies that are rife with different decision-making procedures that are intermeshed with corporate and even mercantilist interests.⁶¹

The challenge of creating the standard technical interface for wireless equipment desired by wireless *Carterfone* proponents would be daunting. The Commission's Part 68 rules, which are the end result of *Carterfone* regulation of the wireline public switched telephone network, take up 164 pages in the Code of Federal Regulations and contain 77 separate diagrams. And those regulations apply to the design of the familiar, plug interface for a telephone to a monopoly telephone network that was generally built to national Bell System standards nationwide.⁶² The level of complexity involved in having the regulator micromanage the technical interface between hundreds of kinds of mobile devices and multiple wireless networks across the United States is hard to imagine.

B. Higher Prices for End-Users

Applying *Carterfone* rules to a competitive industry has risks. Such risks are demonstrated by evaluating the effects on equilibrium prices of a prohibition on bundling the sale of wireless handsets with services. Today, the bundling of equipment and service is an essential, if not dominant, mode of competitive rivalry in wireless services. In contrast, the local telephone network at the time of *Carterfone* was not subject to competition, so addressing the linkages between equipment and service was a different and easier problem. This section demonstrates that forcing a de-bundling of wireless handsets from wireless services would likely increase prices and harm consumers. The current practice of wireless providers offering discounts or subsidies for handsets in exchange for service commitments would likely evaporate in a wireless *Carterfone* regime. As a result, the price consumers would have to pay for handsets likely

fewer than 37 standards "that must be traversed to achieve" the future generation of wireless networks. See Cowhey & Aronson, *supra* note 54, at 4, 6.

61. The European Telecommunications Standards Institute, ETSI, maintains GSM and other European standards, and it makes decisions based on the European revenues of the member companies. In the United States, the IEEE operates by requiring 75% support for a standard, following the principle of one company, one vote. The Korean government selected CDMA as its 2G standard with the intent of subsidizing the construction of handsets so as to create an export market. According to Cowhey and Aronson, in Korea, Samsung Electronics and SK Telecom are essentially in charge of standard-setting for 4G services. See Cowhey & Aronson, *supra* note 54, at 27, 33, 37, 52, 56.

62. See Revision of Part 68 of the Comm'n's Rules to Specify Standard Plugs and Jacks for the Connection of Tel. Equip. to the Nationwide Tel. Network, 62 F.C.C.2d 735-36 (1976).

would increase, and there is no guarantee that wireless service prices would decline commensurately.

To see the potential risks of applying *Carterfone* in a competitive setting, we model the decisions and competitive interactions of firms, in an imperfectly competitive market (duopoly), that sell two complementary goods: equipment and the equipment service.⁶³ The discussion of duopolistic competition will be limited to the assumption that the wireless industry is not perfectly competitive; a view held by *Carterfone* proponents.⁶⁴ For Firm A, the demands for equipment *E* and service *S* are respectively:

$$q_E^A = 1 - \gamma(p_E^A - p_E^B) \quad (1)$$

$$q_S^A = \alpha - \gamma(p_S^A - p_S^B) + \theta q_E^A \quad (2)$$

Here, q_E^A and q_S^A represent Firm A's sale of the equipment (Good E) and service (Good S), respectively. Further, p_E and p_S represent the prices of Goods E and S, respectively. Finally, α is a service demand parameter ($\alpha > 0$).

Equation (2) reveals a consistency about complimentary goods; the more phones the provider induces customers to take (Good E), the greater the demand for message services (Good S). This is consistent with the advertising practices of wireless carriers, which primarily relate to the latest available equipment rather than services. As for differentiation of the services, the closer substitute goods of the two firms are (the larger is γ), the more the relative prices between the firms matter. If the firms compete to any degree, then $\gamma > 0$, otherwise they are not substitutes. Handsets and services are complements, so our model incorporates that fact and also allows for the strength of this complementarity to vary by parameter θ (where $\theta > 0$). The goods are independent if $\theta = 0$. Given symmetry, a similar set of demands exist for firm B. The model is thus a symmetric, differentiated goods framework with price competition that incorporates, in the simplest possible way, goods complementarity. To simplify, we assume that

63. For a more detailed presentation of this model, see generally George S. Ford, Thomas M. Koutsky & Lawrence J. Spiwak, *Consumers and Wireless Carterfone: An Economic Perspective*, 21 PHOENIX CENTER POL'Y BULL 1 (2008), available at <http://www.phoenix-center.org/PolicyBulletin/PCPB21Final.pdf>.

64. Wu, *supra* note 1, at 422; Rob Frieden, *Wireless Carterfone: A Long Overdue Policy Promoting Consumer Choice and Competition* 3 (New Am. Found., Working Paper No. 20, 2008), available at http://www.newamerica.net/files/Wireless_Carterfone_Frieden.pdf.

total market demand is fixed (inelastic) and that the time period over which the equipment good is consumed is taken to be equal to the period of the service contract.⁶⁵

Given the assumptions of profit maximization, costs normalized to zero, and identical firms, we obtain the solutions for equilibrium prices:

$$p_E^A = \frac{1 - \theta(\alpha + \theta)}{\gamma}; \quad p_S^A = \frac{(\alpha + \theta)}{\gamma}; \quad (3)$$

$$p_E^B = \frac{1 - \theta(\alpha + \theta)}{\gamma}; \quad p_S^B = \frac{(\alpha + \theta)}{\gamma}; \quad (4)$$

Since we assume all prices are net of marginal cost, a price for Good *E* (equipment) below zero is taken to represent a subsidy to that good.

Inspection and simple evaluation of the first parts of (3) and (4) show that $p_E^A = p_E^B < 0$ is possible. All that is required for the subsidized price of Good *E* is for $\theta(\alpha + \theta) > 1$, and since $\theta > 0$ and $\alpha > 0$, this outcome is easily obtained. The result is intuitive; Good *E* is a complement to Good *S*, and increases in sales of Good *E* increase demand (and profit) from Good *S*. Below-cost pricing occurs in equilibrium when complementarity is sufficiently great. Good *S*, in contrast, is *never* sold at a below cost price (since $\alpha, \theta, \gamma > 0$). This result is key. It is the complementarity which is influenced by the firm and creates the incentive for subsidized handsets.

In the presence of a wireless *Carterfone* regulation, consumers purchase equipment separate from service. As a conservative assumption, the competition in equipment sales forces firms to sell handsets at marginal cost. If equipment is subsidized in the unregulated equilibrium (as it is today) then equipment prices rise (to $p_E^A = p_E^B = 0$); the first consequence of wireless *Carterfone* regulation.⁶⁶ Prices rise for two reasons. First, independent handset sellers have no incentive to subsidize handset prices, since they do not reap the benefits of the increased demand for services caused by low equipment prices. Second, the stated purpose of wireless *Carterfone* is to limit the ability of a wireless service provider to influence the

65. Joseph Farrell & Michael L. Katz, *Innovation, Rent Extraction, and Integration in Systems Markets*, 48 J. INDUS. ECON. 413, 417 (2000).

66. Recall that prices are net of marginal cost, so a price below zero is a subsidized price.

handset market in ways that increase the demand for its services. As complementarity weakens, the incentive to cut handset prices falls. So, even if signing bonuses are offered by service providers, then the size of such compensation is less than that without wireless *Carterfone* regulation. The FCC has observed in the past that absent equipment and service bundling, “consumers might have to pay higher prices for handsets upfront.”⁶⁷ Our analysis confirms the sentiment. Under wireless *Carterfone*, consumers pay more and this effect obviously reduces consumer welfare.

The effect on service prices is also of interest. To see what happens to service prices, we impose the restriction on the model that $p_E^A = p_E^B = 0$ (equipment prices equal marginal cost). In this case, $q_E^A = q_E^B = 1$ and the prices of the service in the symmetric equilibrium are:

$$p_S^A = p_S^B = \frac{\alpha + \theta}{\gamma} \quad (5)$$

Comparing Expression (5) to Expressions (3) and (4), we see that prices for Good *S* are unchanged. So, while equipment prices rise, service prices are unchanged. The inelasticity of handset demand is partially responsible for this result. However, if equipment purchases do respond to higher prices, then consumer welfare will fall in the service market as well, despite the fact service prices fall. So, our conclusions are not meaningfully impacted by this assumption.

In this model, the outcome of wireless *Carterfone* regulation is decidedly anti-consumer: consumers pay higher, unsubsidized prices for equipment but obtain no offsetting savings elsewhere. However, this outcome is beneficial to the firms since they forego their losses in providing subsidized equipment, while profits in service contracts are unaffected. In effect, the wireless *Carterfone* policy has affected a transfer from consumers to sellers.

By looking at prices, a number of important conclusions can be drawn with high policy relevance. First, despite claims to the contrary, notably Wu⁶⁸ and Frieden,⁶⁹ handset subsidies are consistent with competitive rivalry.⁷⁰ The coupling of handsets and services is a

67. CMRS Competition Report, *supra* note 16, at 2320.

68. See Wu, *supra* note 1.

69. See Frieden, *supra* note 64.

70. Recently, J.D. Power estimated that 36% of wireless customers receive a free phone from their carrier, and many more consumers receive highly subsidized handsets. Press Release, J.D. Power and Associates, Wireless Customers Are Keeping their Mobile Phones Longer as

mode of competitive rivalry, benefitting consumers and reducing the profits of firms.⁷¹ Second, the steep discounts and subsidies on wireless handsets require a strong complementarity between the equipment and the services. The so-called restrictive practices of phone locking, termination fees, and even functionality “crippling” all have the effect of increasing the degree of complementarity between the device and the services. This increased complementarity drives the price cut for equipment, thereby creating consumer benefits. In this light, actions deemed anticompetitive by some are, in fact, a feature of competitive rivalry and benefit consumers substantially.

Since wireless *Carterfone* regulations explicitly and by design lower the complementarity between handset and service sales, wireless *Carterfone* regulations lower the incentive for wireless providers to offer handset subsidies. As a result, should policymakers impose wireless *Carterfone* obligations, consumers would pay more for mobile handsets. These higher prices need not be offset by lower service prices. Consequently, wireless *Carterfone* regulation can force consumers to pay more for the same bundled service they receive today. This would be a decidedly anti-consumer outcome.

IV. CONCLUSION

The practices of wireless network operators with regard to the sale and certification of mobile handsets and equipment are drawing increasing scrutiny from Congress, the FCC, and the public. Concerns over the practice of bundling the sale of equipment with service, long-term contracts, and the limited availability of certain handset models to certain networks (such as the iPhone on AT&T Wireless and the Blackberry Storm on Verizon Wireless) have resulted in calls for regulatory intervention similar to what the FCC did to the wireline telephone industry in the *Carterfone* line of decisions. The FCC has

Term Contracts Impact the Replacement Cycle (May 30, 2007), available at <http://www.jdpower.com/corporate/news/releases/pdf/2007079.pdf>.

71. There are numerous anecdotes to this concept. Amol Sharma, *AT&T's Bet on the iPhone*, WALL ST. J., June 10, 2008, at B1 (quoting Ralph de la Vega, CEO AT&T Wireless: “It seems like \$199 is the right kind of price point to get significant mass-market adoption. It’s going to impact earnings in 2008 and 2009 in a negative way, but will turn very profitable in the long term.”); Roger Cheng, *AT&T Takes Shot at Verizon Wireless with Subsidized iPhone*, DOW JONES NEWSWIRE, June 9, 2008 (“[T]he iPhone’s significant price highlights the escalating battle between it and Verizon Wireless, the nation’s two largest carriers, especially for a demographic of users that tend to spend more per month on data services. ‘The pricing is extremely aggressive and will definitely result in far more consumers getting their hands on the device,’ said Ross Rubin, an analyst at consumer research firm NPD Group. ‘They understand that to build market share in this new wireless world, they have to be a lot more aggressive.’”).

responded and has begun to encumber spectrum with *Carterfone*-like “open platform” requirements. It begs the question, however, whether the regulatory intervention is a good idea. As shown, the *Carterfone* analogy to today’s wireless industry handset practices simply does not hold water.

The wireless communications industry in the United States is not the vertically-integrated, fully-regulated Bell System of old. The *Carterfone* decision and subsequent Commission regulation was concerned about quarantining a regulated, vertically-integrated monopoly service provider from leveraging its market power into an adjacent equipment market. The need for intervention in those cases was important and unquestionably motivated by market power and the presence of (and the firm’s concurrent efforts to evade) price regulation.

As a result, there are reasons to be concerned that *Carterfone* regulation in today’s wireless industry would be harmful to consumers. One such reason is the commoditization of wireless network services. In essence, the end goal of this type of intervention would be to turn wireless service into something like gasoline; consumers would purchase those services when they need it with the handset of their choice, without any long-term commitments of any sort. While that prospect may be appealing on some level, commoditization does present a significant threat to consumers. There is the stark possibility that by shrinking the size of the wireless market, the prospects for new entry and competition would be dramatically decreased. Consumers have multiple choices of wireless providers in the United States today because we permit service and product differentiation. Shrinking the market would likely shrink the number of providers, and thereby harm consumers.

In addition, *Carterfone* rules would increase the prices that consumers pay for mobile handsets without offsetting the decrease in wireless service prices. This effect would be immediate if *Carterfone* rules were imposed because the current practice of wireless firms subsidizing the sale of mobile handsets would quickly end.

Table 1. Retail Availability of Telephone Equipment

Brands at Best Buy ^a		Brands at WalMart ^b	
PSTN	Mobile	PSTN	Mobile
Panasonic	Palm Motorola	Panasonic	Palm
Uniden	LG	Uniden	Motorola
AT&T	Samsung	AT&T	LG
VTech	Blackberry	VTech	Samsung
Philips	Sony Ericsson	Philips	Blackberry
Phonemate	Nokia	GE	Sony Ericsson
	Sanyo	RCA	Nokia
	Apple	American Telecom	Sanyo
	HTC	Emerson	HTC
		JWin	Pantech
			UTStarcom

^a BestBuy.com, Telephones,

<http://www.bestbuy.com/site/olspage.jsp?id=abcat0802000&type=category> (last visited Oct. 15, 2008).

^b WalMart.com, Phones, http://www.walmart.com/search/search-ng.do?search_query=phones (last visited Oct. 15, 2008).

Table 2. Mobile Operator Market Share According to Number of Operators, Percentage (2003)

Number of operators	1	2	3	4	5	Others
Australia	46.6	30.6	19.7	3.1		
Austria	43.9	28.7	19.4	7.8	0.2	
Belgium	49.9	35.8	14.3			
Canada	36.9	28.3	25.5	9.3		
Czech Republic	43.4	40.7	15.9			
Denmark	35.1	23.8	12.9	11.1	10.2	6.9
Finland	51.4	28.7	16.4	3.5		
France	48.8	35.3	15.9			
Germany	40.6	38.1	12.7	8.6		
Greece	37.8	35.5	23.2	3.5		
Hungary	47.4	35.8	16.8			
Iceland	66.8	32.9	0.3			
Ireland	55	40	5			
Italy	46.1	36.4	16.9	0.6		
Japan	53.9	19.6	17.3	4.2	3.3	2.5
Korea	54.4	31.1	14.4			
Luxembourg	62.7	37.3				

Table 2. (continued)

Number of operators	1	2	3	4	5	Others
Mexico	77.8	11.5	6.6	4.1		
Netherlands	39.1	25	15.6	10.9	9.4	
New Zealand	52.3	47.7				
Norway ^a	58.3	29.9	6.2	3.6	2	
Poland	35.7	32.8	31.5			
Portugal	52.3	30.2	17.5			
Slovakia	56.2	43.8				
Spain	52.4	25.8	21.8			
Sweden	43.6	38	15.1	3.3		
Switzerland	61.4	20.4	17.6	0.6		
Turkey	68.1	18.3	7.2	6.4		
United Kingdom	24.5	23.9	25.6	25.6	0.4	2
United States (2003)	23.6	13.9	13.8	10.0	8.1	30.6
United States (2006) ^b	26.6	25.2	22.0	10.7	5.2	10.3

Sources: OECD, OECD COMMUNICATIONS OUTLOOK, tbl. 2.6 (2005); FCC, ELEVENTH ANNUAL REPORT TO CONGRESS ON THE STATE OF COMPETITION IN THE COMMERCIAL MOBILE RADIO SERVICES (CMRS) INDUSTRY, app. A., tpls. 2, 4 (2006).

^a Three operators in Norway are resellers.

^b There are 150 cellular mobile operators in the United States.