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## CONSUMERS AND WIRELESS *Carterfone*: AN ECONOMIC PERSPECTIVE

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*Abstract:* In this POLICY BULLETIN, we consider the argument that *Carterfone*-type rules are required in response to mobile operators' use of term contracts, early termination fees, and allegedly restrictive handset certification and support policies. First, we show that such practices by mobile operators are entirely consistent with competitive rivalry, so their use is not an indicator of market power as is frequently claimed. Second, we show that these practices drive down prices for equipment by increasing the degree of complementarity between the mobile device and mobile services. Consequently, applying wireless *Carterfone* regulations would result in higher equipment prices for consumers, with little if any compensating reduction in service prices. As such, wireless *Carterfone* regulations cause a wealth transfer from consumers to producers. From a pricing perspective, our welfare calculations imply that wireless *Carterfone* is bad for consumers and society and, therefore, such losses must be compared to any demonstrated gains from the proposed regulation.

### I. Background

In the United States, wireless telecommunications providers routinely bundle the sale of wireless services with mobile handsets—either as an enticement to acquire new customers or to retain existing customers. According to the Federal Communications Commission (“FCC”), the

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wide variety of “differentiated pricing plans . . . indicates a competitive marketplace,” and that there is “continued experimentation with varying pricing levels and structures, for varying service packages, with various handsets and policies on handset pricing.”<sup>1</sup> This bundling is often accompanied by long-term contracts (one or two years) with early termination fees if a consumer breaches their contract and cancels service before the end of the term.

By many measures, this largely deregulatory approach to the pricing and sale of wireless services and handsets has worked remarkably well. Over the past five years, the average price for a wireless voice service has declined 16% annually in real terms, or about 80% over the past five years.<sup>2</sup> Subscribership has risen 14% annually, with 100 million subscribers added from 2002 to 2006. Total usage has more than doubled over the past five years, with an annual growth of 37%.<sup>3</sup> Productivity, measured as dollars generated per industry employee, has risen by an average of 18% per year over the last half decade.<sup>4</sup> Among developed countries, the mobile market in United States has the lowest level of economic concentration, the highest calling volume, and some of the lowest prices.<sup>5</sup> At last count, 95.5% of Americans could choose among three or more wireless providers.<sup>6</sup>

However, many nonetheless assert that mobile providers in the United States—through term contracts, early termination fees, and allegedly restrictive handset certification and support policies—abuse their position in the market in order to lock customers into service contracts, limit consumer choice, and hinder mobile handset innovation. As such, these commentators have called for the application of *Carterfone*-type rules to the wireless industry that would effectively prohibit wireless service providers from bundling the sale of wireless services and mobile handsets.<sup>7</sup>

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<sup>1</sup> In the Matter of 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, WT Docket No. 07-71 (rel. Feb. 4, 2008) (“12<sup>th</sup> CMRS Competition Report”) at ¶ 112.

<sup>2</sup> *Id.* at Table 13 and 14.

<sup>3</sup> *Id.* at Table 14 and 15.

<sup>4</sup> *Trends in Telephone Service* (Feb. 2007), at Table 5.2 (year 2000 through 2004).

<sup>5</sup> *12<sup>th</sup> CMRS Competition Report*, at Table 16.

<sup>6</sup> *Id.* at Table 1.

<sup>7</sup> For example, Tim Wu, a law professor at Columbia University, provides two “economic” arguments for the bundling of handsets and services: (i) bundling provides control over handset functionality and protects revenue streams; and (ii) wireless carriers are essentially too stupid to realize that a more *Carterfone*-style strategy would be good for business. T. Wu, *Wireless Network Neutrality: Cellular Carterfone on Mobile Networks*, 1 INT’L JOURNAL OF COMMUNICATION 389 (2007)(available at: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=962027](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=962027)) at 421 (“The

(Footnote Continued....)

As we have discussed in previous work, the original factual underpinning of *Carterfone* to the pre-divestiture, vertically-integrated, regulated Bell System is simply not present in the current wireless industry.<sup>8</sup> *Carterfone's* relevance as precedence is an important question, but the answer may not indicate the consequences of its general application. In this BULLETIN, we investigate some potential implications of applying *Carterfone* regulation in the workably competitive environment of the modern U.S. wireless industry.<sup>9</sup> Specifically, we study the effects on equilibrium prices of a prohibition on bundling the sale of wireless handsets with services. Our modeling effort provides a number of policy-relevant findings.

First, we show that handset subsidies can occur in a non-cooperative (that is, non-collusive) setting, so subsidies are consistent with competitive rivalry.<sup>10</sup> This finding conflicts with

carriers may, in some cases, block the development of services that might make the cell phone platform more valuable, and therefore are ultimately good for the carrier. The industry sometimes appears to prefer that a new service or application not exist at all rather than develop into a lucrative industry whose pricing and conduct it might not be able to control.”). Similarly, Rob Frieden, a law professor at Pennsylvania State University, has called for the decoupling of wireless handsets from services because, *inter alia*, “[l]ocking and limiting subsidized handsets helps carriers foreclose subscriber access to services, content and applications available from third parties that make no financial contribution to the wireless carrier and possibly compete with services offered by the carrier.” *Wireless Carterfone: A Long Overdue Policy Promoting Consumer Choice and Competition*, New America Foundation Wireless Futures Program, Working Paper No. 20 at 5 (Jan. 2008) (available at: [http://www.newamerica.net/files/Wireless\\_Carterfone\\_Frieden.pdf](http://www.newamerica.net/files/Wireless_Carterfone_Frieden.pdf)).

<sup>8</sup> *Carterfone* is a famous regulatory decision (or set of decisions) beginning in the 1960’s that opened the old vertically-integrated Bell wireline and equipment manufacturing monopoly to competition for end-user telephone equipment. *In re Use of the Carterfone Device in Message Toll Telephone Service*, 13 FCC 2d 420 (1968) , 14 FCC 2d 571 (1968) (hereinafter “*Carterfone*”); see also *Hush-A-Phone Corp. v. American Tel. & Tel. Co.*, 20 FCC 391 (1955), *rev’d*, *Hush-A-Phone Corp. v. U.S.*, 238 F.2d 266 (D.C. Cir. 1956) (*per curiam*), *on remand*, *Hush-A-Phone Corp. v. American Tel. & Tel. Co.*, 22 FCC 112 (1957). Our prior research has shown that application of *Carterfone* to the current wireless industry could very well have significant adverse effects on industry structure. G. S. Ford, T. M. Koutsky and L. J. Spiwak, *Wireless Net Neutrality: From Carterfone to Cable Boxes*, PHOENIX CENTER POLICY BULLETIN NO. 17 (April 2007) (available at: <http://www.phoenix-center.org/PolicyBulletin/PCPB17Final.pdf>); G. S. Ford, T. M. Koutsky and L. J. Spiwak, *Using Auction Results to Forecast the Impact of Wireless Carterfone Regulation on Wireless Networks*, PHOENIX CENTER POLICY BULLETIN NO. 20 (Second Edition) (May 2008) (available at: <http://www.phoenix-center.org/PolicyBulletin/PCPB20Final2ndEdition.pdf>).

<sup>9</sup> Other economists including Schwartz and Mini (2007) have argued that *Carterfone* prohibitions may harm consumers in a variety of ways, essentially because such regulation would eliminate pro-consumer and efficiency benefits of such vertical restrictions. M. Schwartz & F. Mini, *Hanging Up on Carterfone: The Economic Case Against Access Regulation of Mobile Wireless* (May 2007) (available at: [http://papers.ssrn.com/sol3/Delivery.cfm/SSRN\\_ID984240\\_code240531.pdf?abstractid=984240&mirid=1](http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID984240_code240531.pdf?abstractid=984240&mirid=1)). For similar reasons, antitrust policy on vertical restrictions remains ambiguous and calls for a balancing of the pros and cons on the particular vertical restriction in question.

<sup>10</sup> Recently, J.D. Power estimated that 36% of wireless customers received a free phone from their carrier, and many more consumers received highly subsidized handsets. J.D. Power and Associates, U.S. WIRELESS MOBILE PHONE

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arguments that such practices are anticompetitive.<sup>11</sup> The coupling of handsets and services is a mode of competitive rivalry, benefitting consumers and reducing the profits of firms.<sup>12</sup>

Second, we demonstrate that the steep discounts and subsidies on wireless handsets require a strong complementarity between the equipment and the services. The so-called “restrictive practices” like phone locking, termination fees, functionality “crippling,” and even exclusive distribution rights for equipment 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.

Finally, our analysis shows that as wireless *Carterfone* regulations explicitly 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. Our model also indicates, however, that under certain conditions wireless service prices may not fall as a consequence of elimination of handset subsidies. In short, wireless *Carterfone* regulation can force consumers to pay more for the same bundled service they receive today, a decidedly anti-consumer outcome. As such, one feature of wireless *Carterfone* regulation is to affect a transfer from consumers to wireless service providers. The notion that wireless *Carterfone* is unequivocally beneficial to consumers, therefore, is simply not supported by economic analysis.

Importantly, we have not considered all the possible ramifications of wireless *Carterfone* regulation and our model here is specifically designed to consider only price effects. As such, we do not wish to exaggerate the significance of the findings and note that the main implication of the analysis is straightforward: any prohibition on coupled and subsidized handsets is not

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EVALUATION STUDY (2007). Even without conventional complementarity, below cost pricing of a good is possible. See T.R. Beard and M. Stern, *Continuous Cross Subsidies and Quantity Restrictions*, JOURNAL OF INDUSTRIAL ECONOMICS (Forthcoming 2008).

<sup>11</sup> See Frieden, *supra* n. 7; Wu, *supra* n. 7.

<sup>12</sup> See, e.g., Amol Sharma, *AT&T's Bet on the iPhone*, WALL STREET JOURNAL (June 9, 2008)(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.”); *AT&T Takes Shot At Verizon Wireless With Subsidized iPhone*, DOW JONES NEWS SERVICE (June 9, 2008) (“the 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.’”)

certain to improve customer welfare as a matter of theory and will, in fact, quite plausibly reduce consumer surplus. At best, then, policymakers must balance the claimed harms and gains to consumers and society in this case.

## II. Economic Model

The purpose of this analysis is to highlight a basic economic problem with proposals that would effectively limit the ability of wireless providers to include the sale of pre-programmed equipment to customers as a facet of their competitive rivalry. While wireless service can be purchased by consumers on a month-to-month (if not minute-to-minute) basis using their own equipment, it is commonplace for wireless service providers to offer handsets at substantial discounts to customers that commit to purchase the firm's wireless service.<sup>13</sup> Mobile handsets are complements to wireless services, but the heavy discounting or subsidization of handsets by a wireless service provider only makes economic sense when the subsidizing provider is able itself to capture the resulting increase in demand for wireless services. Such heavy discounting is unlikely to occur if the benefits of equipment price cuts accrue to all mobile providers.<sup>14</sup>

The practical effect of applying the *Carterfone* rule to the wireless industry would effectively be to break the existing linkage between handsets and services, thereby altering the incentive to subsidize the equipment. In this section we outline an economic model of the current commercial mobile wireless industry and analyze what would be the likely impact for consumers from such a prohibition. Our model shows that handset subsidies will be larger when the complementary relationship between the consumption of wireless services and equipments is stronger. An obvious implication of the theory is that steps that increase that complementarity, such as term contracts, lock-in policies, and even device crippling, increase the incentive for wireless service providers to provide equipment subsidies.<sup>15</sup> In essence, those practices viewed as anti-consumer may, in fact, be motivated by a desire to lower consumer entry barriers into the wireless market. So, far from being demons, these vertical restrictions

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<sup>13</sup> Almost all wireless carriers offer non-contract calling plans, and there is an active market for new and used end-user wireless equipment. Indeed, one of the authors of this paper has bought phones on eBay and has experienced no problems activating them with a variety of carriers without any term obligations (or even set up fees).

<sup>14</sup> A carrier is unlikely to subsidize a handset that can be used on any carrier's network, since the increased demand created by the handset may end up in a rival's hands.

<sup>15</sup> See, e.g., Laura M. Holson, *AT&T Targets Business Customers with iPhone*, NEW YORK TIMES (June 9, 2008)(AT&T "said the [subsidized] \$199 up-front cost will attract new business users—even though they will have to fork over \$45 a month for unlimited data usage, \$15 more than regular customers, because business users tend to use more data services.")

effectively make wireless services affordable to more Americans. As a result, if regulation prohibits those activities, then prices must rise and, in turn, consumers would be harmed.<sup>16</sup>

#### A. *Equilibrium Prices Without Carterfone Regulation*

We model the decisions and competitive interactions of firms in an imperfectly competitive market (duopoly) that sell two complementary goods—equipment and the service that utilizes that equipment.<sup>17</sup> For Firm A, demands for equipment  $E$  and service  $S$  are

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

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

where  $q_E^A$  is Firm A's sales of the equipment Good  $E$ ,  $q_S^A$  is Firm A's sales of the service Good  $S$ ,  $p_E$  and  $p_S$  are the prices of Goods  $E$  and  $S$  for either Firm A or B as denoted by the superscripts, and  $\alpha$  is a service demand parameter ( $\alpha > 0$ ). Observe in Equation (2) that complementarity takes an intuitive, but recursive form: the more phones the provider induces customers to take (Good  $E$ ), the greater the demand for message services (Good  $S$ ). The closer substitutes the offerings of the two firms are (the larger is  $\gamma$ ), the more 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  $\theta$  (where  $\theta > 0$ ).<sup>18</sup>

Similarly, for Firm B, we have:

$$q_E^B = 1 - \gamma(p_E^B - p_E^A); \quad (3)$$

$$q_S^B = \alpha - \gamma(p_S^B - p_S^A) + \theta q_E^B. \quad (4)$$

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<sup>16</sup> To date, the FCC has chosen to experiment with these policies by mandating open networks for the Upper C Block license of the recent only 700 MHz auction. Our research has demonstrated that this restriction had a significant impact on the value of that license. See, PHOENIX CENTER POLICY BULLETIN NO. 20, *supra* n. 8. Regardless, the coupling of handsets and services remains legal for most wireless carriers.

<sup>17</sup> We limit our attention to duopolistic competition to comport with the common view among those calling for wireless *Carterfone*. See, e.g., Wu, *supra* n. 7 at 422 (“by any statistical measure, the wireless industry, like most network industries, is highly concentrated.”); Frieden, *supra* n. 7 at 3 (“the wireless industry has become significantly more concentrated”).

<sup>18</sup> The goods are independent if  $\theta = 0$ .

From Equations (3) and (4) we see that model is a symmetric, differentiated goods framework with price competition that incorporates, in the simplest possible way, goods complementarity. To simplify, we assume that 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.<sup>19</sup>

We turn now to the selection of equilibrium prices for both firms and both goods. We assume all prices are net of marginal cost. As a consequence, a price for Good *E* (equipment) below zero is taken to represent a subsidy to that good. With profit maximization and costs normalized to zero, firm *A* solves the canonical problem:

$$\max_{p_1, p_2} \{p_E^A q_E^A + p_S^A q_S^A\}. \quad (5)$$

Under the symmetry assumption, the profit maximization problem is identical for Firm *B*. The first-order conditions are

$$1 - \gamma(2p_E^A - p_E^B) - \gamma p_S^A \theta = 0; \quad (6)$$

$$\alpha - \gamma(2p_S^A - p_S^B) - \theta q_E^A = 0; \quad (7)$$

and similarly for firm *B*. With symmetry, we obtain the solutions for equilibrium prices:

$$p_E^A = \frac{1 - \theta(\alpha + \theta)}{\gamma}; \quad p_S^A = \frac{(\alpha + \theta)}{\gamma}; \quad (8)$$

$$p_E^B = \frac{1 - \theta(\alpha + \theta)}{\gamma}; \quad p_S^B = \frac{(\alpha + \theta)}{\gamma}; \quad (9)$$

Inspection and simple evaluation of the first parts of (8) and (9) 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 both  $\theta > 0$  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  $\alpha, \theta, \gamma > 0$ ).

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<sup>19</sup> This assumption is common in that it simplifies the calculations and isolates particular effects. See J. Farrell and M. Katz, *Innovation, Rent Extraction, and Integration in Systems Markets*, 48 JOURNAL OF INDUSTRIAL ECONOMICS 413-32 (2000) at 417.

What do these results tell us? Consider first that wireless *Carterfone* advocates most frequently attribute the alleged nefarious behaviors of wireless firms to the decidedly non-economic concept of “revenue protection.”<sup>20</sup> Our model seems to support that general sentiment, but the model also demonstrates that this effort is pro-consumer. Term contracts, handset locking, device crippling, and other measures all raise the complementarity between equipment and services. By doing so, the practices encourage, or allow may be the better word, the providers to increase the subsidy they offer to consumers for handset purchases. These price cuts for equipment lower entry barriers for consumers into the wireless market.<sup>21</sup> In this light, the non-economic term “revenue protection” clearly loses its pejorative connotation.<sup>22</sup> Behaviors characterized as unduly restrictive like locking policies and term contracts may very well be consumer friendly when all price effects are considered. We further consider this possibility next.

#### B. *Equilibrium Prices with Wireless Carterfone Regulation*

We turn now to our analysis of the impact that wireless *Carterfone* regulation would have upon the behavior of firms in our model. As discussed above, wireless *Carterfone* regulation would effectively prohibit the coupling of equipment to service, thus eliminating the subsidization of equipment by carriers. In the presence of a wireless *Carterfone* regulation, consumers now purchase equipment separate from service. As a conservative assumption, we assume that competition in equipment sales forces firms to sell the handsets at marginal cost.

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<sup>20</sup> See, e.g., Wu, *supra* n. 7 at 420 (“A more plausible explanation for the behavior seen here is this: carriers believe it makes sense to block a feature to protect an existing revenue source, or to keep their own costs low, even if that behavior is bad for actors in the equipment and application markets and hurts innovation.”); Frieden, *supra* n. 7 at 13 (“Limiting, blocking, and disabling handset access to the plethora of existing and prospective services bolsters carriers’ revenue streams by foreclosing competitive alternatives in ways that constitute “an unwarranted interference with a person’s use of their telephone,” an outcome appellate courts will not tolerate, nor should the FCC.”). Strictly speaking, the term “revenue protection” is not an economic concept. Most obviously, firms are profit maximizers, not “revenue protectors.” However, in economics terminology, “revenue protection” might be interpreted as an effort to make the demand curve more inelastic, but much of what firms of all types do has the same purpose. For example, advertising often aims to decrease the elasticity of demand, and that sense is “revenue protection.” Similarly, even something basic like efforts to provide good customer service speaks volumes to firms’ efforts to reduce churn, and, consequently, to protect revenue.

<sup>21</sup> P. Klemperer, *The Competitiveness of Markets with Switching Costs*, 18 RAND JOURNAL OF ECONOMICS 138-50 (1987).

<sup>22</sup> In the debate over network neutrality, one must ask whether the pejorative connotation that has been applied to the term “profit maximization” might similarly be lost if careful scrutiny were applied.

If equipment is subsidized in the unregulated equilibrium (as it is today), then the first consequence of wireless *Carterfone* regulation is that equipment prices rise (to  $p_E^A = p_E^B = 0$ ).<sup>23</sup> Under wireless *Carterfone*, consumers pay more and this effect obviously reduces consumer welfare. 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 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 (in place of a discounted handset), then the size of such compensation is less than that without wireless *Carterfone* regulation.

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:

$$p_S^A = p_S^B = \frac{\alpha + \theta}{\gamma}. \quad (10)$$

Comparing Expression (10) to Expressions (8) and (9), we see that prices for Good S are unchanged. So, while equipment prices rise, service prices are unchanged.<sup>24</sup> 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.

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<sup>23</sup> Recall that prices are net of marginal cost, so a price below zero is a subsidized price. Also note the FCC has observed that absent bundling, “consumers might have to pay higher prices for handsets upfront.” 12<sup>th</sup> CMRS Competition Report, *supra* n. at ¶ 192.

<sup>24</sup> 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.

### C. Consumer-Supplied Equipment and Service Prices

Some commentators lament the fact that consumers are not normally offered a discount on services if the consumer supplies its own handset equipment.<sup>25</sup> Our analysis also provides one potential explanation as to why nominal wireless service prices are not different between consumers that are offered a handset subsidy and those that provide their own equipment.<sup>26</sup> In our model, service prices are not altered or affected by the handset subsidy. Stated simply, the price for wireless services is established independent of the price for mobile equipment.<sup>27</sup>

### D. Caveats

Although the extremely clean nature of our theoretical conclusions is, of course, an artifact of the model specification, the result obtained is not “special” in any sense. While some of the potential welfare consequences of *Carterfone*-type regulation is isolated by the modeling technique, the basic results of the model persists even with more general specifications (though it may be much more difficult to see). We consider only price effects and show that any prohibition on coupled and subsidized handsets is not certain to improve customer welfare as a matter of theory and, in fact, will quite plausibly reduce consumer welfare.

Indeed, there may be other consequences of wireless *Carterfone* regulation that we do not consider here. In particular, if there are pro-consumer, pro-efficiency reasons (such as economies of scope or pro-consumer price discrimination) for bundling the sale of handsets and services, as discussed by Schwartz and Mini (2007), losing those efficiencies would have an adverse impact on welfare that our model will not capture.<sup>28</sup> Regulations like wireless *Carterfone*, which do not regulate prices *per se*, would likely impose costs on firms that are eventually passed on to consumers. We have not modeled such costs and the associated price effects. Nor do we consider the potential gains and losses to consumers of alterations in handset design resulting from *Carterfone* regulation. Therefore, at best, we have a tradeoff. Wireless *Carterfone* regulations bring both costs and benefits and some quantification of these is necessary for sound policy decisions.

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<sup>25</sup> Frieden, *supra* n. 7 at 6 (“Wireless carriers do not offer a lower monthly service rate for existing or prospective customers who trigger no handset subsidy burdens.”).

<sup>26</sup> An analogy may be useful. If you bring your own sandwich to a fast food store, do you get a discount on a soda? The answer is no, even though it is typically the case that very high margins on drinks support lower margins on food.

<sup>27</sup> While typically not receiving a discount on services, consumers that supply their own equipment are usually free from term contracts and termination fees (which is effectively a discount).

<sup>28</sup> Schwartz and Mini (2007), *supra* n. 9.

### III. Conclusion

Because early termination fees and the phone “locking” practices of wireless providers have been the subject of considerable scrutiny in the last year, there are important public policy implications from the model presented in this BULLETIN. First and most importantly, we demonstrate that there is a clear linkage between the subsidization of handsets by wireless providers and these restrictive practices. In a very real way, early termination fees and handset locking rules directly increase the equipment subsidies that wireless firms provide to consumers. If such practices were eliminated or restricted by regulation, then one should expect to see handset subsidies decline, which would force consumers to pay a higher price for those handsets.

At the same time, those higher prices would *not* necessarily be offset by lower per-minute wireless service prices. Indeed, our model shows that wireless service prices can operate independently of handset subsidies. There is a very real possibility that wireless *Carterfone* regulation would make consumers substantially worse off, by forcing them to pay more for wireless handsets while keeping wireless service prices the same. Such a result is decidedly anti-consumer.

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