

**MOBILE MISPERCEPTIONS**

*Oren Bar-Gill and Rebecca Stone\**

TABLE OF CONTENTS

I. INTRODUCTION.....	51
A. <i>Three Design Features</i> .....	51
B. <i>Rational Choice Explanations?</i> .....	53
C. <i>Welfare Costs</i> .....	54
D. <i>Market Solutions and their Limits</i> .....	55
E. <i>Policy Implications</i> .....	57
II. THE CELL PHONE AND THE CELLULAR SERVICE MARKET .....	59
A. <i>The Rise of the Cell Phone</i> .....	59
1. Technology.....	59
2. History.....	60
3. Economic Significance.....	62
B. <i>The Cellular Service Market</i> .....	64
1. Structure .....	64
2. Competition.....	65
3. Related Markets.....	69
a. <i>The Handset Market</i> .....	69
b. <i>The Applications Market</i> .....	72
III. THE CELLULAR SERVICE CONTRACT.....	73
A. <i>Three-Part Tariffs</i> .....	73
B. <i>Lock-In Clauses</i> .....	75
C. <i>Complexity</i> .....	76
1. Postpaid Plans — The Basics.....	76
2. Family Plans.....	77
3. Add-Ons .....	78
4. Phones and Lock-In Clauses .....	78
5. Prepaid Plans .....	79
IV. EXPLAINING THE CELLULAR SERVICE CONTRACT .....	80
A. <i>Three-Part Tariffs</i> .....	80
1. A Behavioral Economics Theory .....	80

---

\* NYU School of Law. We thank Jennifer Arlen, Adi Ayal, Lucian Bebchuk, Kevin Davis, Clay Gillette, Michael Grubb, Raghuram Iyengar, Lewis Kornhauser, Florenica Marotta Wurgler, Rick Pildes, Howard Shelanski, Phil Weiser, and workshop participants at NYU and Tel-Aviv University for their helpful comments and suggestions. We gratefully acknowledge the financial support of the D'Agostino/Greenberg Fund at NYU School of Law. Michael Biondi, Osnat Dafna, and Paul McLaughlin provided outstanding research assistance. We thank the Center for Customer Relationship Management at Duke University for letting us use its Telecom Dataset.

<i>a. Theory</i> .....	80
<i>b. Data</i> .....	82
2. Rational Choice Theories and Their Limits .....	87
<i>B. Lock-In Clauses</i> .....	90
1. A Behavioral Economics Theory .....	90
2. Rational Choice Theories and Their Limits .....	93
<i>C. Complexity</i> .....	94
1. A Behavioral Economics Theory .....	94
2. Rational Choice Theories and Their Limits .....	96
V. WELFARE COSTS .....	96
<i>A. Three-Part Tariffs</i> .....	96
<i>B. Lock-In Clauses</i> .....	97
<i>C. Complexity</i> .....	98
<i>D. Countervailing Benefits?</i> .....	98
VI. MARKET SOLUTIONS .....	99
<i>A. Catering to Sophisticated Consumers</i> .....	99
1. Unlimited Calling Plans .....	100
2. AT&T's Rollover Minutes .....	101
3. Prepaid Plans .....	102
4. Graduated ETFs .....	103
5. Open Access .....	104
<i>B. Market Solutions and Consumer Welfare</i> .....	104
VII. POLICY IMPLICATIONS .....	105
<i>A. Existing Regulations Affecting the Cellular Service</i>	
<i>Contract</i> .....	105
1. Who Can Regulate? .....	105
2. Indirect Effects .....	106
3. Direct Regulations of the Consumer-Carrier	
Relationship .....	108
<i>a. Disclosure</i> .....	108
<i>b. False Advertising</i> .....	110
<i>c. Challenging ETFs</i> .....	111
<i>B. New Proposals: Rethinking Disclosure</i> .....	112
1. From Product Attributes to Use Patterns .....	112
2. Disclosing Use Pattern Information .....	113
<i>a. Average-Use Disclosures</i> .....	113
<i>b. Individual-Use Disclosures</i> .....	114
<i>c. Individual-Use Disclosures in Real Time</i> .....	116
3. Combining Use-Pattern Information with Product	
Attribute Information .....	116
4. Mobile Disclosure .....	117
5. From Description to Prescription .....	118

No. 1]	<i>Mobile Misperceptions</i>	51
VIII. CONCLUSION.....		118

## I. INTRODUCTION

The cellular service market is an economically significant market that has substantially increased consumer welfare. From 1990 to 2008, the U.S. market grew from 5 million subscribers to 263 million subscribers. Eighty-six percent of Americans have a cell phone, and an increasing number of households rely entirely on wireless communications, giving up landlines altogether. Annual revenues of the four national carriers — AT&T, Verizon, Sprint, and T-Mobile — total over \$150 billion. Our focus, however, is on the failures of this market. We argue that the carriers design their contracts in response to systemic mistakes and misperceptions of their customers. In doing so they impose welfare costs on consumers, reducing the net benefit that consumers derive from wireless service. We focus on three design features common to most cellular service contracts: three-part tariffs, lock-in clauses, and sheer complexity.

### *A. Three Design Features*

The basic pricing scheme of the common cellular service contract is a three-part tariff comprising: (1) a monthly charge; (2) an allocation of voice minutes that the monthly charge pays for; and (3) a per-minute price for minutes beyond the plan limit. We argue that the three-part tariff is a rational response by sophisticated carriers to consumers' misperceptions about their cell phone usage. Consumers choose calling plans based on a forecast of future use patterns. The problem is that many consumers do not have a very good sense of these use patterns. The three-part tariff is advantageous to carriers because it exacerbates the effects of consumer misperceptions, leading consumers to underestimate the cost of cellular service.

Specifically, some consumers underestimate whereas others overestimate their future usage. Crucially, consumers are not aware that their estimates are incorrect, which enables firms to exploit their misperceptions. The overage fee component of the three-part tariff targets the underestimators. These consumers underestimate the probability of exceeding the plan limit and incurring an overage fee, and as a result will underestimate the cost of cellular service. The other components of the three-part tariff — the monthly charge and the fixed number of minutes that come with it — target the overestimators. These consumers think that they will use all, or most, of their allotted minutes and so expect to pay a per-minute price equal to the monthly charge divided by the number of allotted minutes. In fact, the overestimators end up using far fewer minutes and paying a much higher

per-minute price than they anticipate. Thus, overestimators also underestimate the cost of cellular service.

Carriers seem to be aware of consumer misperceptions. As a top U.S. cellular phone carrier pricing manager has explained, “people absolutely think they know how much they will use and it’s pretty surprising how wrong they are.”<sup>1</sup> We empirically confirm the prevalence of consumer misperceptions using a unique dataset of subscriber-level monthly billing and usage information for 3,730 subscribers at a single wireless provider. These data allow us to calculate not only the total cost of wireless service under each consumer’s chosen plan, but also the total amount that the consumer would have paid had he chosen other available plans. Thus, we can determine the plan that best fits his actual cell phone usage. We show that over 65% of consumers chose the wrong plan. Some chose plans with an insufficient number of allotted minutes, whereas others chose plans with an excessive number of allotted minutes. Subscribers exceeded their minute allowance 17% of the time, by an average of 33%, suggesting underestimation of use. And, during the 81% of the time when the allowance was not exceeded, subscribers used only 47% of their minute allowance on average, suggesting overestimation.<sup>2</sup>

In addition to the three-part tariff pricing structure, most calling plans come with a free or substantially discounted phone and lock the consumer in for a substantial time period — typically two years — with long-term contracts and early termination fees (“ETFs”). Lock-in clauses and the accompanying ETFs can also be explained as a market response to the imperfect rationality of consumers. Consumers underestimate the cost of lock-in if they underestimate the likelihood that switching providers will be beneficial down the road. Switching providers may be beneficial if service is not as good as promised, monthly charges are higher than expected (due to the misperception of use levels discussed above), or another carrier is offering a better deal. The lock-in that is enforced by the ETF also facilitates the common bundling of phones and service. The long-term revenue stream that lock-in guarantees enables carriers to offer free or subsidized phones. Rational consumers would not be enticed by a free phone, realizing that they will pay for this “free” phone in the long-term. Imperfectly rational consumers, by contrast, discount the long-term cost and seek out “free” phone offers.

Finally, cellular service contracts are complex and multidimensional, and choosing among numerous contracts can be a daunting task. The three-part tariff itself is complex. Lock-in clauses and ETFs add further complexity. And the true cost of a calling plan depends on

---

1. Michael Grubb, *Selling to Overconfident Consumers* 1 & n.2 (Mar. 26, 2008) (unpublished manuscript, available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=721701](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=721701)).

2. The remaining 2% use up their allowances exactly.

numerous other features. For example, most plans offer unlimited night and weekend calling, but carriers offer different definitions of “night” and “weekend.” Also, consumers must choose between unlimited in-network calling, unlimited calling to five numbers, unlimited Walkie-Talkie, roll-over minutes, and more. Finally, different carriers offer different ranges of handsets, handset subsidies vary, and so on. Complexity is further increased when family plans are added to the mix, when data services are added to voice services, when pre-paid plans are considered in addition to post-paid plans, etc. According to one industry estimate, the cellular service market boasts millions of plan and add-on combinations.

This level of complexity can itself be viewed as a contractual design feature that responds to the imperfect rationality of consumers. Complexity allows providers to hide the true cost of their contracts. Imperfectly rational consumers do not effectively aggregate the costs and prices of the many components of available plans. Inevitably, consumers will focus on a subset of salient features and prices, and ignore (or underestimate the importance of) the remaining non-salient dimensions. In response, providers will increase non-salient prices or reduce the quality of the non-salient features, which, in turn, will generate or free-up resources for intensified competition on the salient dimensions. Competition forces providers to make the salient features attractive and the salient prices low. This can be achieved by adding revenue-generating non-salient features and prices. The result is an endogenously derived high level of complexity and multidimensionality. Interestingly, consumer learning can exacerbate the problem. When consumers learn the importance of a previously non-salient feature, carriers have a strong incentive to come up with a new one, further increasing the level of complexity.

### *B. Rational Choice Explanations?*

Before we can draw normative and prescriptive implications from these behavioral theories, we must consider whether the more traditional rational choice model can explain the same design features. If the rational choice model comes up short, then we have good reason to appeal to behavioral economics to assess the appropriate policy response. The leading rational choice explanation for three-part tariffs views them as mechanisms for price discrimination or market screening between rational consumers with different ex ante demand characteristics. We show that the price discrimination argument rests on specific assumptions about the distribution of consumer types — assumptions that are not satisfied in the cell phone market. With the distribution of types that we actually observe, providers facing rational consumers will not offer three-part tariffs.

Lock-in clauses can arise when consumers are rational. This occurs when sellers incur substantial per-consumer fixed costs and liquidity-constrained consumers cannot afford to pay upfront fees equal to these fixed costs. In the cell phone market, fixed costs are indeed high with carriers investing up to \$400 in acquiring each new customer. However, these costs are also in large part an endogenous consequence of carriers' decisions to offer free or subsidized phones. This raises a series of questions. Why do carriers offer free phones and lock-in contracts? Why not charge customers the full price of the phone and avoid lock-in? How many consumers cannot afford to pay for a phone up front? For how many of these liquidity-constrained consumers is the carrier the most efficient source of credit? The rational choice model can explain the presence of lock-in clauses, but only in a subset of contracts.

The rational choice explanation for complexity is straightforward. Consumers have heterogeneous preferences, and the complexity and multidimensionality of the cellular service offerings cater to these heterogeneous preferences. It is likely that this heterogeneity explains some of the observed complexity in the cell phone market. But, it is unlikely that it can fully account for the staggering level of complexity exhibited by the long menus of multi-dimensional contracts that are available to consumers. Even for the rational consumer, acquiring information on the range of complex products and comparing different plans with many different features are time-consuming and costly activities. Beyond some level of complexity, the costs exceed the benefit of finding the perfect plan. Comparison shopping is deterred, and the benefits of the variety and multidimensionality are left unrealized. It seems that in the cell phone market the optimal level of complexity has been exceeded.

### *C. Welfare Costs*

The design of cellular service contracts is best explained as a rational response to the imperfect rationality of consumers. Mistakes that consumers make and providers' responses to these mistakes hurt consumers and generate consumer welfare costs. First, overconfident consumers choose the wrong three-part tariff, that is, they do not choose the plan that would minimize their total costs. We estimate the total annual reduction in consumer surplus from the three-part tariff structure to be \$11.92 billion. Moreover, while the average harm per consumer, \$47.68, is small, this average masks potentially important distributional implications. The \$11.92 billion harm is not evenly divided among the 250 million U.S. cell phone owners. Many of these subscribers choose the right plan. Even among those who choose the wrong plan, there is substantial heterogeneity in the magnitude of

their mistakes. We estimate that each year 42.5 million consumers make mistakes that cost them at least 20% of their total yearly wireless bill, or \$146 per consumer annually. Moreover, the distribution of mistakes implies a potentially troubling form of regressive redistribution, since revenues from consumers who make mistakes keep prices low for consumers who do not make mistakes.

Lock-in prevents efficient switching and thus hurts consumers. One survey found that 47% of subscribers would like to switch plans, but only 3% do so — the rest are deterred by the ETF. Switching is efficient when a different carrier or plan provides a better fit for the consumer. Lock-in can also slow down the beneficial effects of consumer learning and prolong the costs of consumer mistakes, since even consumers who learn from experience cannot benefit from their new-found knowledge and switch to another carrier's plan or to a prepaid plan. (Insofar as carriers allow consumers to switch among their own monthly plans, consumers can benefit from learning.) In addition to these direct costs, lock-in may inhibit competition, adding a potentially large indirect welfare cost. Since lock-in may prevent a more efficient carrier from attracting consumers who are locked into a contract with a less efficient carrier, it can deter new carriers from entering the market.<sup>3</sup>

The high level of complexity of cell phone contracts can reduce welfare in two ways. First, consumers will tend to make more mistakes in plan choice when the menus are complex, and these mistakes will reduce consumer welfare. Second, complexity inhibits competition by discouraging comparison shopping. By raising the cost of comparison shopping, complex contracts reduce the likelihood that a consumer will find it beneficial to carefully consider all his options. Without the discipline that comparison shopping provides, cellular service providers can behave like quasi-monopolists — raising prices and reducing consumer surplus.

#### *D. Market Solutions and their Limits*

Do these behavioral market failures result from imperfect competition in the cell phone market? The simple answer is 'no.' In fact, enhanced competition would likely make the identified design features more pervasive and the resulting welfare costs greater. If consumers are overconfident about their future use levels, then competition will force carriers to offer three-part tariffs. If consumers are myopic, then competition will force carriers to offer free phones

---

3. A carrier's relative efficiency depends on its costs of providing service and the quality of service that it offers. Thus, a carrier that provides the same quality of service at lower cost than another or a higher quality service at the same cost as another is a more efficient carrier.

and cover the cost of the subsidy with lock-in contracts. Finally, if consumers, faced with complex, multidimensional contracts, ignore less salient price dimensions, then competition will force carriers to shift costs to the less salient price dimensions. When demand for cellular service is driven by imperfect rationality, competitors must respond to this biased demand; otherwise they will lose business and be forced out of the market. Accordingly, ensuring robust competition in the cellular service market would not solve the problem.<sup>4</sup>

But it is a mistake to take the level of imperfect rationality as given. Competition coupled with consumer learning can reduce levels of bias and misperception and thus trigger a shift to more efficient forms of contractual design. In fact, the cellular service market has exhibited numerous examples of such market correction in recent years and now boasts a large set of products and contracts that can be seen as catering to more sophisticated consumers. At the same time, the evolution of the market demonstrates limits on the power of consumer learning to correct behavioral market failures.

We consider two key examples. First, the market has responded to greater awareness of the costs of underestimated use among consumers who have experienced the sting of large overage charges. Since 2008, the major carriers have been offering unlimited calling plans that arguably respond to demand generated by this heightened consumer awareness of misperceptions. Similarly, AT&T's roll-over feature, which predates the unlimited calling plans, can also be seen as a response to consumer learning about the costs of underestimated use in the presence of overage charges. Yet, while overage fees make it easy to learn the cost of underestimated use, the costs of overestimated use are more difficult to learn since it is not so obviously penalized. The result of this uneven learning is unlimited plans rather than the optimal two-part tariff pricing scheme comprised of a fixed monthly fee and a constant per-minute charge.

Second, the shift from a time-invariant ETF to a time-variant, graduated ETF structure responds to consumers' increased awareness and sensitivity to ETFs. This shift is not a pure market solution. Ra-

---

4. Cf. Oren Bar-Gill, *The Behavioral Economics of Consumer Contracts*, 92 MINN. L. REV. 749 (2008) (arguing that welfare losses result from sellers responding strategically to consumer misperceptions, even in competitive markets); Oren Bar-Gill, *Bundling and Consumer Misperception*, 73 U. CHI. L. REV. 33 (2006) (arguing that the bundling of products can be a response to consumer misperception even in competitive markets); Oren Bar-Gill, *The Law, Economics and Psychology of Subprime Mortgage Contracts*, 94 CORNELL L. REV. 1073 (2009) (arguing that certain elements of subprime mortgage contracts are a response to consumers' imperfect rationality and not the result of a lack of market competition); Oren Bar-Gill & Elizabeth Warren, *Making Credit Safer*, 157 U. PA. L. REV. 1 (2008) (arguing that intense competition in the credit market does not protect consumers because of a lack of perfect information and rationality); Oren Bar-Gill, *Seduction by Plastic*, 98 NW. U.L. REV. 1373 (2004) (examining exploitation of consumers' behavioral biases in the credit card market and arguing that biased contracting is not the product of imperfect competition).



ther, it is an example of how consumer learning and legal intervention can work in tandem to change business practices. The change in ETF structure likely began with a small number of consumers who learned to appreciate the cost of ETFs and initiated litigation against the carriers. The threat of liability and greater consumer awareness of ETFs then pushed carriers to adjust their ETF structures. Innovations like these suggest that the market has an impressive capacity to correct for consumer misperceptions. Yet, market solutions are imperfect. Not all biases are easily purged by learning. Not all consumers learn equally fast, as evidenced by the limited take-up of many design innovations. The speed of consumer learning and the market's response matter, since welfare costs will be incurred in the interim period. Moreover, when consumers learn to overcome one mistake, or when a previously hidden term becomes salient, carriers have an incentive to add a new non-salient term and to trigger a new kind of mistake. Even if consumers always catch-up eventually, this cat-and-mouse game imposes welfare costs on consumers.

#### *E. Policy Implications*

While market solutions are imperfect and welfare costs remain, the potential for self-correction in the cellular service market leads us to support a regulatory stance that does not impede market forces, but rather facilitates their operation. We focus on disclosure regulation. Our proposal deviates from existing disclosure rules and from other proposals for heightened disclosure regulation. While existing rules and proposals focus on the disclosure of product attribute information, i.e., information on the different features and price dimensions of cellular service, we also emphasize the disclosure of use-pattern information, i.e., information on how the consumer will use the product. To fully appreciate the benefits and costs of a cellular service contract, consumers must combine product attribute information with use-pattern information. For example, to assess the costs of overage fees, it is not enough to know the per minute charges for minutes not included in the plan, as proposed in the Cell Phone User Bill of Rights. Consumers must also know the probability that they will exceed the plan limit and by how much. The essence of our proposal lies in the recognition that use-pattern information can be as important as product-attribute information. The disclosure regime should be redesigned to ensure that consumers have access to both.

Use-pattern disclosures can be divided into average-use disclosures and individual-use disclosures. One potentially beneficial average-use disclosure would target the misperception of use levels that underlies the three-part tariff pricing structure. Carriers could be required to disclose the average overage charges that consumers pay.

Carriers could also be required to disclose the percentage of consumers who use, say, 50% or less of the allotted minutes, or the percentage of consumers who would save money if they switched to a lower fixed-fee, lower limit plan. But the efficacy of average-use disclosures is likely limited by consumer heterogeneity and by consumer optimism. Fortunately, use-pattern disclosure in the cellular service market need not be limited to average-use information. The long-term relationship between carriers and consumers allows for the provision of individualized use-pattern information.

Individual-use disclosures can also reduce consumers' misperceptions of their future use. Carriers already provide consumers with information on overage charges. This disclosure targets consumers' underestimation of use. We propose a parallel disclosure that would target consumers' overestimation of use. Carriers should be required to disclose the number of minutes used. While some carriers already provide this information voluntarily, others do not. More importantly, carriers should be required to disclose the actual monthly per-minute price, calculated as the monthly fixed fee (plus any overage charges incurred in a given month) divided by the number of minutes used that month. This disclosure could be further supplemented by information on alternative service plans that would reduce the total price paid by the consumer given his current use patterns. The proposed individual-use disclosures, including the comparison with other plans, should be provided not only on the monthly bill but also in aggregate form as part of a year-end summary to account for month-to-month variations in use.

Individual-use disclosures can also effectively be provided in real time. There are consumers who inadvertently exceed the plan limit because they cannot easily keep track of the number of minutes that they are using. To reduce the incidence of inadvertently exceeding the plan limit, carriers could be required to notify consumers when they are about to exceed the plan limit. A consumer receiving such notification may well decide to cut the conversation short, switch to a land line, or postpone the conversation until off-peak hours.

This Article contributes to a budding literature that views consumer contracts as the combined product of consumer psychology and market forces.<sup>5</sup> By providing evidence of consumer biases and pro-

---

5. See sources cited *supra* note 4; see also Stefano DellaVigna & Ulrike Malmendier, *Contract Design and Self-Control: Theory and Evidence*, 119 Q.J. ECON. 353 (2004) (considering the interaction "between profit-maximizing firms and consumers with time-inconsistent preferences and naïve beliefs"); Stefano DellaVigna & Ulrike Malmendier, *Paying Not to Go to the Gym*, 96 AM. ECON. REV. 694 (2006) (examining contract data from health clubs and suggesting that consumer overconfidence may contribute to consumer behavior); Xavier Gabaix & David Laibson, *Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets*, 121 Q.J. ECON. 505 (2006) (showing that "shrouding" of hidden fees occurs in competitive markets when some consumers are naïve and don't anticipate shrouding).

viders' contractual design responses to these biases in an important market — the cellular service market — we challenge the still dominant rational choice approach to consumer markets.<sup>6</sup> In addition to extending the reach of behavioral analysis and confirming the broad role that psychology plays in consumer markets, this Article underscores the importance of in-depth market-specific analysis. The policy implications of consumer mistakes are context-dependent. The efficacy of learning and market correction varies from market to market. In some markets learning is slower and the welfare costs of consumer mistakes higher. In these markets, heavy-handed legal intervention may be warranted. In other markets, like the cellular service market, market solutions are relatively effective, and legal intervention would facilitate rather than inhibit market forces. Finally, the range of policy tools in the regulator's arsenal varies from market to market. While disclosure mandates may have limited effect in markets where sellers have only average-use information, disclosure can have a more substantial effect in markets, like the cellular service market, where providers possess large amounts of individual-use information.

The remainder of this Article is organized as follows: Part II provides background information on the cell phone and the cellular service market; Part III describes the key features of common cellular service contracts; Part IV develops the behavioral economics theory that explains these contractual design features; Part V discusses welfare implications; Part VI considers the efficacy of market solutions; and Part VII describes our policy proposals.

## II. THE CELL PHONE AND THE CELLULAR SERVICE MARKET

### *A. The Rise of the Cell Phone*

#### 1. Technology

The key technological innovation that underpins cellular communications is the cellular concept itself. A cellular system divides each geographic market into numerous small cells, each of which is served by a single low-powered transmitter. This allows the system to reuse the same channel or frequency many times, albeit in non-adjacent cells in order to avoid interference.<sup>7</sup> Thus, multiple users can simulta-

---

6. See Richard A. Epstein, *The Neoclassical Economics of Consumer Contracts*, 92 MINN. L. REV. 803 (2008) (defending the traditional rational choice approach).

7. See SRI INTERNATIONAL, *THE ROLE OF NSF'S SUPPORT OF ENGINEERING IN ENABLING TECHNOLOGICAL INNOVATION, FINAL REPORT PHASE II 94-97* (1998), <http://www.sri.com/policy/csted/reports/sandt/techin2/contents.html> [hereinafter SRI-NSF REPORT]. For a more technical treatment, see THEODORE RAPPAPORT, *WIRELESS COMMUNICATIONS* 26-30 (Camille Trentacoste ed., 1996), and MISCHA SCHWARTZ, *MOBILE WIRELESS COMMUNICATIONS* 62-64 (2005).

neously make use of the same frequency. Sophisticated technology locates subscribers and sends incoming calls to the appropriate cell sites, while complex handoff technologies allow mobile consumers to move seamlessly between cells.<sup>8</sup>

High demand for cellular service has prompted the development of digital technology, which generates enhanced capacity without degrading service quality. Two kinds of capacity-increasing technological solutions have emerged. The first employs time-slicing technology: signals associated with several different calls are aggregated within the same frequency by assigning to each user a cyclically repeating time slot in which only that user is allowed to transmit or receive. Time-slicing techniques include Bell Labs' time division multiple access ("TDMA") and Global System for Mobile ("GSM"), which are used by AT&T and T-Mobile, and Integrated Digital Enhanced Network ("iDEN"), which is used by Nextel.<sup>9</sup> Spread spectrum techniques, by contrast, spread many calls over many different frequencies while using highly sophisticated devices to identify which signals belong to which calls and decode them for end users.<sup>10</sup> The family of digital standards employing spread spectrum technology is known as Code Division Multiple Access ("CDMA").<sup>11</sup> CDMA standards are used by Verizon and Sprint.<sup>12</sup> The introduction of these digital cellular technologies, starting in the early 1990s, marked the advance from first generation ("1G") systems to second generation ("2G") systems. Third generation ("3G") systems, which began to operate in the U.S. in 2002, incorporate more advanced technologies that provide the increased speed and capacity necessary for multimedia, data, and video transmission, in addition to voice communications.<sup>13</sup>

## 2. History

Although the key concepts essential to modern cellular systems were conceived in 1947,<sup>14</sup> the Federal Communications Commis-

---

8. JONATHAN E. NUECHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS 265-66 (2005); SRI-NSF REPORT, *supra* note 7, at 97. For a more detailed discussion of handoff operations, see RAPPAPORT, *supra* note 7, at 31-36, and SCHWARTZ, *supra* note 7, at 235-38.

9. NUECHTERLEIN & WEISER, *supra* note 8, at 277-78; RAPPAPORT, *supra* note 7, at 400-02; SRI-NSF REPORT, *supra* note 7, at 106; *see also* SCHWARTZ, *supra* note 7, at 138-42.

10. NUECHTERLEIN & WEISER, *supra* note 8, at 277-78; RAPPAPORT, *supra* note 7, at 405-07; *see also* SCHWARTZ, *supra* note 7, at 142-58.

11. RAPPAPORT, *supra* note 7, at 405-07.

12. NUECHTERLEIN & WEISER, *supra* note 8, at 278.

13. WILLIAM STALLINGS, WIRELESS COMMUNICATIONS AND NETWORKING 329 (Vince O'Brien ed., 2002).

14. SRI-NSF REPORT, *supra* note 7, at 88. Non-cellular mobile radio systems were already in existence at that time.

sion's ("FCC") refusal to allocate substantial frequencies to mobile radio service meant that significant development of cellular telephone services was delayed for several decades.<sup>15</sup> It was not until the early 1980s that the FCC allocated 50MHz of spectrum in the 800MHz band to cellular telephone service.<sup>16</sup> The FCC rules created a duopoly of two competing cellular systems in each of 734 "cellular market areas" — one owned by a non-wireline company and one owned by the local wireline monopolist in the area.<sup>17</sup> Each carrier received 25MHz of spectrum.<sup>18</sup> The first set of cellular licenses, which pertained to the thirty largest urban markets (the "Metropolitan Service Areas," or "MSAs") were allocated by comparative hearings.<sup>19</sup> However, the FCC was so overwhelmed by the number of applicants that in 1984 Congress authorized the use of a lottery system to allocate spectrum in the remaining markets.<sup>20</sup> By 1986, all the MSA licenses had been allocated, and by 1991 licenses had been allocated in all markets.<sup>21</sup> As demand for cellular service rapidly increased over subsequent years, the FCC allocated more spectrum to wireless communications. New spectrum has been allocated by auction rather than lottery ever since Congress gave the FCC authority to issue licenses through auctions in the 1993 Budget Act, a move designed to raise revenues and cut down on delays associated with the lottery system.<sup>22</sup>

The more recent history of the cellular service market in the U.S. is one of consolidation.<sup>23</sup> As noted above, the cellular service industry began with the local structural duopolies that were created by the FCC's lottery mechanism.<sup>24</sup> With different firms operating in different geographical markets, the national market initially included a large number of players.<sup>25</sup> The number of firms increased further as the FCC auctioned off more and more radio spectrum for cell phone use. But this high level of market dispersion did not last long. The FCC placed few restrictions on the ability of firms to merge across markets, and a long history of voluntary merger and acquisition activity fol-

---

15. *See id.* at 88–90.

16. NUECHTERLEIN & WEISER, *supra* note 8, at 268.

17. FCC, FCC 06-142, ANNUAL REPORT AND ANALYSIS OF COMPETITIVE MARKET CONDITIONS WITH RESPECT TO COMMERCIAL MOBILE SERVICES, ELEVENTH REPORT, 21 F.C.C.R. 10947, 10974 ¶ 62 (2006) [hereinafter FCC ELEVENTH REPORT].

18. *Id.*

19. *Id.*

20. NUECHTERLEIN & WEISER, *supra* note 8, at 236–37.

21. FCC ELEVENTH REPORT, *supra* note 17.

22. NUECHTERLEIN & WEISER, *supra* note 8, at 237; *see* Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, Title VI, § 6002(a), 6002(b)(2), 197 Stat. 312, 387–93 (codified as 47 U.S.C. § 309(j) (2006)); *see also* Kevin Werbach, *Supercommons: Toward a Unified Theory of Wireless Communication*, 82 TEX. L. REV. 863, 877–78 (2004).

23. *See infra* Part II.B.

24. *See* FCC ELEVENTH REPORT, *supra* note 17, at 10974 ¶ 62.

25. Jeremy T. Fox, *Consolidation in the Wireless Phone Industry 7* (Net Inst. Working Paper No. 05-13, 2005), available at <http://www.netinst.org/Fox2005.pdf>.

lowed.<sup>26</sup> Soon a handful of firms — AT&T Wireless, Cingular, Nextel, Sprint, T-Mobile, and Verizon Wireless — gained a dominant position as nationwide carriers.<sup>27</sup> Consolidation activity intensified in 1999, as carriers sought to expand their coverage areas and increase the capacity of their networks,<sup>28</sup> and was further facilitated by the FCC's 2003 decision to abolish the regulatory spectrum cap that had limited the amount of spectrum that a company could own in any one geographical market, since this increased opportunities for mergers by companies with overlapping coverage areas.<sup>29</sup> Most significantly, in October 2004, Cingular and AT&T Wireless merged to become AT&T Wireless,<sup>30</sup> while in December 2004 Sprint and Nextel merged to become Sprint-Nextel.<sup>31</sup>

### 3. Economic Significance

The FCC estimates that at the end of 2007, there were 263 million cellular service subscribers in the U.S., which corresponds to a nationwide penetration rate of 86%.<sup>32</sup> The market has been growing rapidly. Cellular service providers added 21.2 million new subscribers in 2007, 28.8 million in 2006, 28.3 million in 2005, 24.1 million in 2004, and 18.8 million in 2003.<sup>33</sup> Taking a longer-term view, 258 million subscribers were added between June 1990 and the end of 2007.<sup>34</sup>

26. *Id.* at 3, 7.

27. *Id.* at 6.

28. FCC ELEVENTH REPORT, *supra* note 17, at 10970 ¶¶ 53, 55.

29. Fox, *supra* note 25, at 9.

30. FCC, FCC 05-173, ANNUAL REPORT AND ANALYSIS OF COMPETITIVE MARKET CONDITIONS WITH RESPECT TO COMMERCIAL MOBILE SERVICES, TENTH REPORT, 20 F.C.C.R. 15908, 15930 ¶ 58 (2005).

31. FCC ELEVENTH REPORT, *supra* note 17, at 10971 ¶ 56.

32. FCC, DA 09-54, ANNUAL REPORT AND ANALYSIS OF COMPETITIVE MARKET CONDITIONS WITH RESPECT TO COMMERCIAL MOBILE SERVICES, THIRTEENTH REPORT, 24 F.C.C.R. 6185, at 6279–80 ¶ 197 (2009) [hereinafter FCC THIRTEENTH REPORT].

33. *Id.*; FCC ELEVENTH REPORT, *supra* note 17, at 11017 ¶ 158.

34. See FCC THIRTEENTH REPORT, *supra* note 32, at 6279–80 ¶ 197; SRI-NSF REPORT, *supra* note 7, at 94. From a comparative perspective, penetration rates in Western European and developed Asian-Pacific countries have been, and still are, higher than in the U.S., although the U.S. is quickly catching up. For a historic comparison, see FCC, FCC 00-289, ANNUAL REPORT AND ANALYSIS OF COMPETITIVE MARKET CONDITIONS WITH RESPECT TO COMMERCIAL MOBILE SERVICES, FIFTH REPORT, 15 F.C.C.R. 17660, at 17685 (2000); FCC, FCC 02-179, ANNUAL REPORT AND ANALYSIS OF COMPETITIVE MARKET CONDITIONS WITH RESPECT TO COMMERCIAL MOBILE SERVICES, SEVENTH REPORT, 17 F.C.C.R. 12985, 13033–34 (2002); FCC ELEVENTH REPORT, *supra* note 17, at 11029 ¶¶ 158, 191. For an account of the recent convergence, see FCC, FCC 08-28, ANNUAL REPORT AND ANALYSIS OF COMPETITIVE MARKET CONDITIONS WITH RESPECT TO COMMERCIAL MOBILE SERVICES, TWELFTH REPORT, 23 F.C.C.R. 2241, 2341–43 ¶¶ 229–31 (2008) [hereinafter FCC TWELFTH REPORT]. Moreover, average minutes of use per subscriber have tended to be higher in the U.S. See FCC TWELFTH REPORT, *supra*, at 2343 ¶ 233 (noting that in the fourth quarter of 2006, average minutes of use (“MOUs”) in the U.S. was approximately 838 per month; Hong Kong came in second with 460 MOUs per month; while Europe was far behind with an average of 150 MOUs per month).

While cell phones complement landline phones for most users, a significant and increasing number of users view the cell phone as a partial or even complete substitute for the traditional, landline phone. At the end of 2005, nearly a third of American households made at least half of their long-distance calls at home from their cell phones rather than from their landlines.<sup>35</sup> In the last half of 2007, an estimated 15.8% of households used only wireless phones, up from 12.8% at the end of 2006, 8.4% at the end of 2005, and 4.2% at the end of 2003.<sup>36</sup>

The high revenues enjoyed by carriers provide an indication of the magnitude of the cellular service market. In the third quarter of 2008, Verizon posted wireless revenues of \$12.7 billion,<sup>37</sup> AT&T \$12.6 billion,<sup>38</sup> Sprint an estimated \$7.5 billion,<sup>39</sup> and T-Mobile \$5.5 billion.<sup>40</sup> Quarterly wireless revenues for the four national carriers summed to \$38.3 billion, which potentially translates into total annual wireless revenues of \$153.2 billion, ignoring seasonal variations. Wireless telecommunications have become the largest source of profit for nearly all major telecommunication providers. For example, Verizon's wireless services are about two times more profitable than its wireline offerings.<sup>41</sup> Looking at revenues from spectrum auctions is also instructive. In 2006, the FCC's Auction No. 66 raised a total of \$13.7 billion in net bids from wireless providers for 1,087 spectrum licenses in the 1710–1755MHz and 2110–2155MHz bands.<sup>42</sup> In 2008, the FCC's Auction No. 73 raised a total of \$19.0 billion in net bids from wireless providers for 1,099 licenses in the 698–806MHz band (known as the “700MHz Band”).<sup>43</sup>

Investment in telecommunications infrastructure in general — and one could argue cellular technology in particular — promotes

---

35. FCC ELEVENTH REPORT, *supra* note 17, at 11036 ¶ 206.

36. FCC THIRTEENTH REPORT, *supra* note 32, at 6301 ¶ 230.

37. Press Release, Verizon, 3rd Quarter 2008 Earnings Conference Call (Oct. 27, 2008), [http://news.vzw.com/investor/20081027\\_bw.pdf](http://news.vzw.com/investor/20081027_bw.pdf).

38. AT&T, INVESTOR BRIEFING 3RD QUARTER 2008 (Oct. 22, 2008), [http://www.att.com/Investor/Financial/Earning\\_Info/docs/3Q\\_08\\_IB\\_FINAL.pdf](http://www.att.com/Investor/Financial/Earning_Info/docs/3Q_08_IB_FINAL.pdf).

39. See Roger Cheng & Amol Sharma, *Sprint Squeezed as Customers Flee*, WALL ST. J., Nov. 8, 2008, at B5 (noting that total revenues, for 2008:3Q, were \$8.82 billion); *Sprint Nextel Corp.*, HOOVER'S CO. IN-DEPTH RECS., Dec. 11, 2008, 2008 WLNR 23757630 (noting that in 2007, 85% of Sprint's revenue came from wireless services; the \$7.5 billion figure assumes that the 85% figure carries over to 2008:3Q).

40. Press Release, T-Mobile USA, T-Mobile USA Reports Third Quarter 2008 Results (Nov. 6, 2008), [http://www.t-mobile.com/company/InvestorRelations.aspx?tp=Abt\\_Tab\\_InvestorRelations&ViewArchive=Yes](http://www.t-mobile.com/company/InvestorRelations.aspx?tp=Abt_Tab_InvestorRelations&ViewArchive=Yes) (follow “T-MOBILE USA REPORTS THIRD QUARTER 2008 RESULTS” hyperlink).

41. George Gilder, *The Wireless Wars*, WALL ST. J., Apr. 13, 2007, at A13 (stating that Verizon's mobile phones generated \$804 million in profits, whereas its wired phones generated \$393 million in profits).

42. Auction of Advanced Wireless Services Licenses Closes: Winning Bidders Announced for Auction No. 66, 21 F.C.C.R. 10521 (2006).

43. Auction of 700 MHz Band Licenses Closes: Winning Bidders Announced for Auction 73, 23 F.C.C.R. 4572 (2008).

economic growth by reducing the costs of interaction, expanding market boundaries, and enhancing information flows.<sup>44</sup> Specifically, cellular technology can create value by facilitating communication between individuals who are on the move, thus helping individuals to better coordinate their activities and respond to unforeseen contingencies.<sup>45</sup> Wireless services also boost growth by expanding telephone networks to include previously disenfranchised consumers through prepaid service that is unavailable for fixed lines.<sup>46</sup> Analysts estimate that the decades-long delay in the development of cellular networks after the discovery of the cellular concept<sup>47</sup> cost the US economy around \$86 billion (measured in 1990 dollars).<sup>48</sup>

### B. The Cellular Service Market

#### 1. Structure

The U.S. cellular service industry is dominated by four “nation-wide”<sup>49</sup> facilities-based carriers: AT&T Wireless, Verizon Wireless, Sprint Nextel, and T-Mobile.<sup>50</sup> At the end of 2007, each had networks covering at least 235 million people.<sup>51</sup> AT&T had 70.1 million subscribers, Verizon 65.7 million, Sprint Nextel 45.3 million, and T-Mobile 28.7 million.<sup>52</sup>

In addition to the national carriers, there are a number of regional carriers, including Leap, U.S. Cellular, and MetroPCS.<sup>53</sup> There is also a growing resale sector, consisting of providers who purchase airtime

---

44. Leonard Waverman, Meloria Meschi & Melvyn Fuss, *The Impact of Telecoms on Economic Growth in Developing Countries*, in THE VODAFONE POLICY PAPER SERIES NO. 3, AFRICA: THE IMPACT OF MOBILE PHONES 10, 10 (March 2005), [http://www.vodafone.com/etc/medialib/attachments/cr\\_downloads.Par.78351.File.tmp/GPP\\_SIM\\_paper\\_3.pdf](http://www.vodafone.com/etc/medialib/attachments/cr_downloads.Par.78351.File.tmp/GPP_SIM_paper_3.pdf).

45. See, e.g., Robert Jensen, *The Digital Provide: Information (Technology), Market Performance, and Welfare in the South Indian Fisheries Sector*, 122 Q.J. ECON. 879, 881–83 (2007) (describing how the introduction of cell phones revolutionized the fishing industry in Kerala, leading to dramatic reductions in price dispersion, the complete elimination of waste (previously 5–8% of the daily catch), an 8% average increase in fishermen’s profits, a 4% decline in consumer prices, and a 6% increase in consumer surplus).

46. See, e.g., Waverman et al., *supra* note 44, at 12.

47. See *supra* text accompanying notes 14–16.

48. NUCHTERLEIN & WEISER, *supra* note 8, at 268. Developing countries that lack a well-developed wireline network stand to gain even more from the development of wireless networks. See, e.g., Waverman et al., *supra* note 44, at 11 (“We find that mobile telephony has a positive and significant impact on economic growth, and this impact may be twice as large in developing countries as compared to developed countries.”).

49. This means that all operate networks in at least some portion of the Western, Mid-western, and Eastern United States. FCC THIRTEENTH REPORT, *supra* note 32, at 6199 ¶ 14.

50. *Id.*

51. *Id.*

52. *Id.*

53. *Id.*



from facilities-based carriers and resell service to the public, typically in the form of prepaid plans rather than standard monthly tariffs.<sup>54</sup>

## 2. Competition

The overlapping geographic coverage of the national and regional providers gives rise to competition between cellular service providers. The FCC estimates that 95.5% of people have three or more different operators offering cell phone services in the census blocks where they live, 90.5% live in census blocks with four or more operators, 64.9% live in census blocks with five or more operators, and 24.6% live in census blocks with six or more operators.<sup>55</sup> The FCC measures market concentration by computing the average Herfindahl-Hirschman Index (“HHI”) across 172 “Economic Areas” (“EA”s) — aggregations of counties that have been designed to capture the “area in which the average person shops for and purchases a mobile phone, most of the time.”<sup>56</sup> The HHI is a measure of market concentration that ranges from a value of 10,000 in a monopolistic market to zero in a perfectly competitive market.<sup>57</sup> In December 2006, the average HHI, weighted by EA population, was equal to 2674, while the median was given by 2730.<sup>58</sup> The FCC found virtually no change in average concentration in 2007.<sup>59</sup> These figures, however, might well underestimate market concentration, since the FCC’s methodology gives equal weight to a mobile carrier assigning cell phone numbers in one county as it does to a carrier that assigns numbers in multiple counties in a given EA.<sup>60</sup> Indeed, one analyst calculated an average HHI value exceeding 6000 with 2005 data, using the amount of spectrum controlled by a carrier in a market as a proxy for market share.<sup>61</sup>

The relatively high level of concentration in the cell phone market is the product of an ongoing consolidation process.<sup>62</sup> This consolida-

---

54. The resale sector accounted for 7% of the market at end of year 2007. *Id.* at 6200–01 ¶ 17.

55. *Id.* at 6210 ¶ 41 tbl.1.

56. *Id.* at 6212 ¶ 45.

57. Formally, the HHI is given by  $HHI = \sum_{i=1}^I (100s_i)^2$ , where  $s_i$  is the fractional market share of firm  $i$ , and  $I$  is the number of firms in the market. Thus a monopolistic market has an HHI of 10,000, a market that is equally divided between two firms has an HHI of 5000, a market that is equally divided between three firms has an HHI of 3333.33, a market that is equally divided between four firms has an HHI of 2500, etc.

58. FCC TWELFTH REPORT, *supra* note 34, at 2268 ¶ 52.

59. FCC THIRTEENTH REPORT, *supra* note 32, at 6212 ¶ 46.

60. *Id.* at 6212 ¶ 45 n.87.

61. Fox, *supra* note 25, at 15–17. Moreover, this figure excludes data on Nextel, and so the Sprint Nextel merger does not contribute to the high HHI, suggesting that this figure may underestimate the true concentration. *Id.* at 16 n.11.

62. *See supra* Part II.A.2.

tion activity is at least partly motivated by a desire to realize economies of scale and enlarge geographic scope. Broad coverage can be provided at lower cost by a single nationwide carrier than by regional carriers through roaming agreements with carriers operating in different geographic areas.<sup>63</sup> In addition, extending the national network spreads fixed costs, such as marketing expenditures and investments in developing new technology over a wider base of customers.<sup>64</sup> Finally, economies of geographic scope arising from complementarities between markets may provide an efficiency reason for consolidation.<sup>65</sup> However, even if consolidation reduces certain costs, it may increase other costs. Consolidation tends to reduce competition and facilitate collusion as the number of multi-market contacts between the dominant national carriers increases.<sup>66</sup>

The magnitude of entry barriers provides another important measure of competitiveness. If barriers to entry are low, even a market with a small number of firms will behave competitively. Government control of spectrum — limiting the amount of spectrum allocated to wireless communications and requiring that carriers obtain government-issued licenses — has the potential to create significant barriers to entry.<sup>67</sup> However, recently the FCC has alleviated many of these concerns by increasing the amount of spectrum available for cellular communication services and allowing market forces to determine market structure through elimination of the old structural duopolies and abolition of the spectrum cap.<sup>68</sup> Moreover, the Telecommunications Act and FCC regulations reduce entry barriers by imposing interconnection and roaming obligations.<sup>69</sup> The ability to purchase

---

63. See Patrick Bajari, Jeremy T. Fox & Stephen Ryan, *Evaluating Wireless Carrier Consolidation Using Semiparametric Demand Estimation* 5 (Nat'l Bureau of Econ. Research, Working Paper No. 12425, 2006), available at <http://www.nber.org/papers/w12425>; see also Fox, *supra* note 25, at 10.

64. Fox, *supra* note 25, at 10.

65. *Id.*

66. *Id.* at 12. Multi-market contact was an important factor in explaining supra-competitive prices in the early mobile telecommunications industry. See Philip M. Parker & Lars-Hendrik Röller, *Collusive Conduct in Duopolies: Multi-Market Contact and Cross-Ownership in the Mobile Telephone Industry*, 28 RAND J. ECON. 304, 320 (1997). There were also significant cross-ownership effects, i.e., if operators co-own an operating license elsewhere, they tend to collude more. *Id.*

67. FCC THIRTEENTH REPORT, *supra* note 32, at 6220 ¶ 65.

68. *Id.* at 6220 ¶¶ 65–66. Moreover, build-out requirements prevent providers from deterring entry by “warehousing” spectrum that they do not need. Licensees that do not build a network and use the spectrum within a specified period of time might lose their license. See 47 C.F.R. §§ 22.946–22.951; see also 47 U.S.C. § 309(j) (2006); *In re* Implementation of Section 309(j) of the Communications Act — Competitive Bidding, 9 F.C.C.R. 2348, 2386 (1994) [hereinafter Implementation of Section 309(j)].

69. 47 U.S.C. § 251(a)(1) (2006) (noting that “[e]ach telecommunications carrier has the duty to interconnect directly or indirectly with the facilities and equipment of other telecommunications carriers”); Reexamination of Roaming Obligations of Commercial Mobile Radio Service Providers, Final Rule, 72 Fed. Reg. 50064, 50064–65 (2007) [hereinafter Reexamination of Roaming Obligations]; see also *In re* Interconnection and Resale Obliga-

spectrum on the secondary market further reduces entry barriers.<sup>70</sup> Yet, advertising expenditures — amounting to billions of dollars annually<sup>71</sup> — and the economies of scale and scope described above<sup>72</sup> continue to impose substantial entry barriers.

Switching costs also affect the level of competition. Switching costs in the cellular service market are substantial, although recent developments are reducing these costs. Until recently, most consumers signed long-term contracts with fixed ETFs of approximately \$200.<sup>73</sup> Now major carriers are offering contracts with graduated ETFs that decline over the life of the contract. Likewise, historically carriers allowed only certain approved phones to be used by their subscribers on their network and “locked” the phones they sold to render them incapable of being used on other networks.<sup>74</sup> The recent trend, however, is toward open access, which allows more phones onto the network, and recent regulatory action by the Copyright Office clarified that phones can be unlocked.<sup>75</sup> Being forced to change phone numbers was also a potentially significant switching cost until it was

---

tions Pertaining to Commercial Mobile Radio Services, Second Report and Order and Third Notice of Proposed Rulemaking, 11 F.C.C.R. 9462, 9463 (1996) [hereinafter Interconnection and Resale Second Report and Order]; *In re* Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, Third Report and Order, 15 F.C.C.R. 15975, 15977 (2000). The FCC has chosen not to regulate rates charged by carriers for the provision of roaming services. Thus, carriers may freely negotiate terms subject to the statutory requirement that rates charged be reasonable and non-discriminatory. Reexamination of Roaming Obligations, *supra*, at 50065.

70. FCC THIRTEENTH REPORT, *supra* note 32, at 6220 ¶ 67. It appears to be contrary to a major facility provider’s interest to sell wholesale capacity to resellers since the resellers may compete with the provider for retail sales, reducing its profits. However, the major facility provider will be motivated to sell if it fears that one of its rivals will make the sale if it doesn’t. Marius Schwartz & Federico Mini, *Hanging Up on Carterfone: The Economic Case Against Access Regulation in Mobile Wireless* 10 (May 2, 2007) (unpublished manuscript), available at <http://ssrn.com/abstract=984240> (pointing to the growth of the resale market as evidence that the cellular service market is genuinely competitive).

71. FCC THIRTEENTH REPORT, *supra* note 32, at 6261 ¶ 158 (advertising spending for wireless telephone services totaled \$4.1 billion in 2007 according to one estimate and approximately \$5.1 billion according to another).

72. See *supra* notes 63–66 and accompanying text.

73. See *infra* Part III.B.

74. Tim Wu, *Wireless Net Neutrality: Cellular Carterfone and Consumer Choice in Mobile Broadband* 1 (New Am. Found. Wireless Future Program, Working Paper No. 17, 2007), available at [http://www.newamerica.net/files/WorkingPaper17\\_WirelessNetNeutrality\\_Wu.pdf](http://www.newamerica.net/files/WorkingPaper17_WirelessNetNeutrality_Wu.pdf); see also Spencer E. Ante, *Verizon Embraces Google’s Android*, BUS. WK., Dec. 3, 2007, [http://www.businessweek.com/technology/content/dec2007/tc2007123\\_429930.htm?campaign\\_id=yahoo](http://www.businessweek.com/technology/content/dec2007/tc2007123_429930.htm?campaign_id=yahoo) (“Verizon Wireless has created the most profitable U.S. cellular business by tightly restricting the devices and applications allowed to run on its network.”).

75. See 37 C.F.R. § 201.40(b)(5) (2008). Carriers are embracing the new open-access business model. See Ante, *supra* note 74. (“But over the past year, [Verizon’s] leadership came to conclude that it was time for a radical shift. Such a move, they reckoned, might help Verizon Wireless keep growing while holding down costs.”) Sprint Nextel and T-Mobile also support the shift to an open-handset environment, as members of the Google-led “Open Handset Alliance.” *Id.*; see also Amol Sharma & Dionne Searcey, *Verizon to Open Cell Network to Others’ Phones*, WALL ST. J., Nov. 28, 2007, at B1.

eliminated by the regulatory requirement that carriers provide local number portability.<sup>76</sup> Wireless carriers must now ensure that users can keep their current telephone numbers when they switch providers “without impairment of quality, reliability, or convenience.”<sup>77</sup> The high churn rates in the cell phone market — between 13% and 31% a year in 2007<sup>78</sup> — suggest that switching costs, while potentially substantial, are not prohibitive for many consumers.

To sum up, while there is reason to believe that the cellular service market is less than perfectly competitive, providers are actively competing to attract consumers. Declining prices are evidence of such active competition. While average minutes of use have been rising since 1994, until recently average monthly bills have been falling.<sup>79</sup> This downward trend is also observed in average revenues per minute, which some analysts believe is a good proxy for mobile pricing.<sup>80</sup>

---

76. FCC ELEVENTH REPORT, *supra* note 17, at 11012 ¶ 146. Wireless local number portability began on November 24, 2003. *In re* Telephone Number Portability, 19 F.C.C.R. 875, 876 (2004) (order). The underlying aim of wireless number portability was to ensure “customers flexibility in the quality, price, and variety of telecommunications services they can choose to purchase.” *In re* Telephone Number Portability, 11 F.C.C.R. 8352, 8368 (1996) (first report and order and further notice of proposed rulemaking). The FCC reports that from December 2003 to December 2007, 49.93 million consumers took advantage of the right to retain their phone number while switching from one wireless carrier to another. FCC THIRTEENTH REPORT, *supra* note 32, at 6272 ¶ 183.

77. 47 U.S.C. § 153(30) (2006).

78. A “churn rate” is the rate at which users cancel their cellular service in a given period of time. In first quarter 2007, the major carriers reported the following monthly churn rates: AT&T 1.7%, T-Mobile 1.9%, Verizon 1.08%. See AT&T, CONNECT AT&T INC. 2007 ANNUAL REPORT 33 (2007), [http://www.att.com/Investor/ATT\\_Annual/downloads/07\\_ATTar\\_FullFinalAR.pdf](http://www.att.com/Investor/ATT_Annual/downloads/07_ATTar_FullFinalAR.pdf); Press Release, T-Mobile, T-Mobile USA Adds Almost 1 Million Net New Customers and Reports First Quarter Results (May 10, 2007), [http://www.t-mobile.com/Company/InvestorRelations.aspx?tp=Abt\\_Tab\\_InvestorRelations&ViewArchive=Yes](http://www.t-mobile.com/Company/InvestorRelations.aspx?tp=Abt_Tab_InvestorRelations&ViewArchive=Yes) (follow hyperlink listed next to date “05/10/2007”); Press Release, Verizon, Verizon Reports Strong 1Q 2007 Results, Driven by Top-Line Growth Across Key Markets (Apr. 30, 2007), <http://investor.verizon.com/news/view.aspx?NewsID=831>. Sprint does not report total churn rates. Rather, it reports post-paid and pre-paid (Boost Mobile) rates separately. In first quarter 2007, Sprint’s post-paid churn rate was 2.3% and its pre-paid churn rate was 7%. See Press Release, Sprint Nextel, Sprint Nextel Reports First Quarter 2007 Results (May 2, 2007), [http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle\\_newsroom&ID=994142&highlight=](http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=994142&highlight=). The FCC recently reported churn rates of 1.5% to 3% per month. FCC THIRTEENTH REPORT, *supra* note 32, at 6271 ¶ 181.

79. FCC THIRTEENTH REPORT, *supra* note 32, at 6275–78 ¶ 192, tbl.12.

80. *Id.* Other measures of prices also suggest that prices have been steadily declining over this period. *Id.* at 6274–75 ¶¶ 188–91. On the other hand, there is substantial similarity between the pricing schemes offered by the major carriers. See *infra* Part III. This price matching may reflect tacit collusion among the major carriers. Cf. Meghan R. Busse, *Multi-market Contact and Price Coordination in the Cellular Telephone Industry*, 9 J. ECON. & MGMT. STRATEGY 287, 313–16 (2000). From a comparative perspective, prices — as measured by average revenue per minute — have tended to be lower in the U.S., as compared to other countries. See FCC TWELFTH REPORT, *supra* note 34, at 2343 ¶ 234. Part of the explanation may lie in the fact that Western European countries and Japan employ Calling Party Pays (“CPP”) systems in which only the calling party pays for calls — while the U.S. employs Receiving Party Pays (“RPP”) systems where both receiving and calling parties pay — giving service providers an incentive to set higher mobile termination charges. See

Competition is also observed on non-price dimensions. Competition to attract and retain customers appears to be driving carriers to improve service quality. Carriers pursue a variety of strategies to improve service quality, including network investment to improve coverage and quality and acquisition of additional spectrum.<sup>81</sup> Indeed, analysts report a decline in the number of dropped or disconnected calls — thought to be an important determinant of customer churn.<sup>82</sup> While an economic conclusion reached by politically appointed regulators should be taken with a grain of salt, it is noteworthy that the FCC described the cellular service market as one characterized by healthy competition with carriers engaging in “independent pricing behavior, in the form of continued experimentation with varying pricing levels and structures, for varying service packages, with various handsets and policies on handset pricing.”<sup>83</sup>

### 3. Related Markets

The cellular service market interacts with other markets, specifically with the market for phones/handsets and with the market for cell phone applications.

#### *a. The Handset Market*

The market for handsets is controlled by four firms: Motorola, Nokia, Samsung, and LG Electronics. In the U.S., Motorola enjoys the largest market share, controlling 33% of the handset market in the fourth quarter of 2006.<sup>84</sup> Nokia, Samsung, and LG Electronics lag behind considerably with 15% of the market each.<sup>85</sup> In total, 143 mil-

---

*id.* at 2344 ¶ 235; *see also* Mark Armstrong, *The Theory of Access Pricing and Interconnection*, in 295 HANDBOOK OF TELECOMMUNICATIONS ECONOMICS 337–40 (M. E. Cave et al. eds., 2002) (explaining why prices could be higher under CPP).

81. FCC THIRTEENTH REPORT, *supra* note 32, at 6262–63 ¶¶ 159–61.

82. *See* FCC ELEVENTH REPORT, *supra* note 17, at 11005 ¶ 130. Carriers’ marketing campaigns emphasize their “superior network coverage, reliability, and voice quality.” FCC THIRTEENTH REPORT, *supra* note 32, at 6263 ¶¶ 162–63.

83. FCC ELEVENTH REPORT, *supra* note 17, at 10987 ¶ 90. Yet, since this is an industry characterized by high network costs, this phase of apparently intense competition may be nothing more than a price war designed to squeeze out smaller carriers that will ultimately result in an increase in the market power of the remaining large carriers and an attendant rise in prices.

84. Dawn Kawamoto, *Mobile Phone Sales Ring in Strong*, CNET NEWS, Mar. 27, 2007, [http://news.cnet.com/Mobile-phone-sales-ring-in-strong/2100-1039\\_3-6170801.html](http://news.cnet.com/Mobile-phone-sales-ring-in-strong/2100-1039_3-6170801.html).

85. *Id.* The relative shares of these four firms are quite different outside the United States. Nokia is the global market leader, with 33.3% of the global market in 2006, followed by Motorola with 20.3%, Samsung with 12.8%, and LG Electronics with 6.9%. Candace Lombardi, *Mobile Phone Market Stays Strong*, CNET NEWS, Apr. 20, 2006, [http://news.cnet.com/Mobile-phone-market-stays-strong/2100-1039\\_3-6063177.html](http://news.cnet.com/Mobile-phone-market-stays-strong/2100-1039_3-6063177.html).

lion units were sold in 2006, accounting for an estimated \$8.8 billion in sales after rebates and promotions.<sup>86</sup>

In the U.S., the major cellular service providers exert significant control over the handset market. Internationally, about half of handsets are purchased through carriers and about half are sold directly to consumers through other channels.<sup>87</sup> In the U.S., by contrast, nine out of every ten cell phones are sold through a service provider.<sup>88</sup> The practice of subsidizing handset prices for consumers who sign long-term service contracts is at least partially responsible for the competitive disadvantage suffered by handset makers looking to sell directly to consumers.<sup>89</sup>

Carriers in the U.S. determine which devices consumers can operate on their networks.<sup>90</sup> The result of this control is that only a fraction of any given manufacturer's total line of products is offered. For example, in 2006, of the fifty new products Nokia introduced into the market, U.S. cellular service providers offered a scant few.<sup>91</sup> By allowing only certain approved phones on their networks, carriers influence the design of handsets.<sup>92</sup> And as a condition of network access, carriers require that developers disable certain services or features that might be useful to consumers, such as call-timers, photo sharing, Bluetooth capabilities, and Wi-Fi capabilities.<sup>93</sup>

---

86. Kawamoto, *supra* note 84. Worldwide sales of mobile handsets have been growing consistently since the market first developed in the 1990s. For example, 833.2 million handsets were shipped in 2005 compared to 714 million in 2004. Marguerite Reardon, *Cell Phone Shipments Hit Highs, but Profits Sag*, CNET NEWS, Oct. 19, 2006, [http://news.cnet.com/Cell-phone-shipments-hit-highs,-but-profits-sage/2100-1039\\_3-6127736.html](http://news.cnet.com/Cell-phone-shipments-hit-highs,-but-profits-sage/2100-1039_3-6127736.html).

87. Marguerite Reardon, *Will Unlocked Cell Phones Free Consumers?*, CNET NEWS, Jan. 24, 2007, [http://news.cnet.com/Will-unlocked-cell-phones-free-consumers/2100-1039\\_3-6152735.html](http://news.cnet.com/Will-unlocked-cell-phones-free-consumers/2100-1039_3-6152735.html).

88. *Id.* Unlocked phones that can be used on multiple carrier networks have only recently become available in the U.S. from manufacturers through their websites and through certain retail channels. By contrast, in Europe, unlocked cell phones comprise about 70% of sales. *Id.* Technological differences provide part of the explanation. Unlocked phones are available only for GSM networks. While all operators in Europe and Asia use GSM technology, in the U.S. two of the four major carriers, Sprint Nextel and Verizon, use CDMA instead. See Margaret Reardon, *Unlocking the Unlocked Cell Phone Market*, CNET NEWS, July 2, 2009, [http://news.cnet.com/8301-1035\\_3-10277723-94.html?tag=mncol](http://news.cnet.com/8301-1035_3-10277723-94.html?tag=mncol).

89. See *infra* Part III.B.

90. See Ante, *supra* note 74 (“Verizon Wireless has created the most profitable U.S. cellular business by tightly restricting the devices and applications allowed to run on its network.”); Reardon, *supra* note 87; Wu, *supra* note 74, at 11–12.

91. Reardon, *supra* note 87.

92. Wu, *supra* note 74, at 11–12.

93. *Id.* at 10–13. Some of these practices may be explained as attempts by the carriers to protect revenue sources. For instance, a phone with Wi-Fi capabilities would enable the user to make calls using the services of VoIP providers when in range of a Wi-Fi network. See *id.* at 11–13. Other practices may be designed to preserve service quality. Since spectrum is a shared resource, a “carrier must exercise some control over the handset and its features to prevent degradation of service to other users arising from those who excessively consume [network] resources.” Schwartz & Mini, *supra* note 70, at 19. There are also issues of com-

But the balance of power is shifting.<sup>94</sup> Handset brands and models are an increasingly important determinant of a consumer's choice of service provider.<sup>95</sup> Apple's launch of the iPhone represents a rare but significant example of a handset manufacturer successfully overcoming carrier pressure.<sup>96</sup> In addition, the open-access trend is starting to limit carriers' control over the handset market.<sup>97</sup> Regulation is playing an important role: one third of the recently auctioned spectrum comes with a requirement that "cellular networks allow customers to use any phone they want on whatever network they prefer, and be able to run on it any software they want."<sup>98</sup> And, perhaps sensing the inevitable, carriers are beginning to embrace the new open-access business model, reasoning that they can cut costs by eliminating handset subsidies and letting handset manufacturers bear most of the development and customer service costs.<sup>99</sup>

---

patibility between devices and networks, and networks must be able to communicate with handsets for a variety of service related purposes. *Id.* at 19–20.

94. On power struggles between carriers and handset manufacturers, as well as with application developers, see generally Jessica E. Vascellaro, *Air War: A Fight Over What You Can Do on a Cellphone*, WALL ST. J., June 14, 2007, at A1; see also Miguel Helft & Stephen Labaton, *Google Pushes for Rules to Aid Wireless Plans*, N.Y. TIMES, July 21, 2007, at A1.

95. See Rita Chang, *Proof that Handset Brands Help Sell Wireless Plans*, RCR WIRELESS, Oct. 28, 2008, <http://www.rcrwireless.com/article/20081028/WIRELESS/810289995/1081/proof-that-handset-brands-help-sell-wireless-plans#>.

96. See John Markoff, *Apple Tops Expectations as iPhone Use Spreads*, N.Y. TIMES, Oct. 22, 2008, at B3 ("Apple has already surpassed its goal of selling 10 million iPhones during 2008").

97. See George S. Ford, Thomas M. Koutsky & Lawrence J. Spiwak, *Wireless Net Neutrality: From Carterfone to Cable Boxes*, PHOENIX CTR. POL'Y BULL. No. 17, Apr. 2, 2007, at 2, <http://phoenix-center.org/PolicyBulletin/PCPB21Final.pdf>.

98. Editorial, *A Half-Win for Cellphone Users*, N.Y. TIMES, Aug. 6, 2007, at A18; see also *In re* Service Rules for the 698–746, 747–762, and 777–792 MHz Bands, 22 F.C.C.R. 15289, 15367, 15370–71 (2007) (second report and order) [hereinafter *Service Rules Second Report and Order*]. More generally, in 2005, the FCC released a policy statement indicating that it was committed to promoting network neutrality. *In re* Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, 20 F.C.C.R. 14986 (2005) (policy statement); see Richard E. Wiley, "A New Telecom Act" — *Remarks*, 31 S. ILL. U. L.J. 17, 28 (2006) (noting that "various versions of net neutrality language have been included in draft telecom reform bills"); see also *In re* Petition to Confirm a Consumer's Right to Use Internet Communications Software and Attach Devices to Wireless Networks, 22 F.C.C.R. 5042 (2007) (recognizing a petition to the FCC for a declaratory ruling that the Commission's *Carterphone* rules, which give consumers freedom to attach devices of their choosing to their phone lines applies to wireless networks).

99. See *Ante*, *supra* note 74; see also Sharma & Searcy, *supra* note 75. Nevertheless, it is likely that at least the involuntary imposition of open-access requirements will reduce the profitability of spectrum to service providers. Analysts have estimated that the open access requirements imposed in the recent auction resulted in \$3.1 billion in lost auction revenues from sales of encumbered spectrum and a 32% reduction in profitability of the purchasing wireless provider. George S. Ford, Thomas M. Koutsky & Lawrence J. Spiwak, *Using Auction Results to Forecast the Impact of Wireless Caterfone Regulation on Wireless Networks*, PHOENIX CTR. POL'Y BULL. No. 20, May 2008, at 3, <http://www.phoenix-center.org/PolicyBulletin/PCPB20Final2ndEdition.pdf>.

*b. The Applications Market*

The major cellular service providers and other mobile data providers have progressively introduced a wide variety of mobile data services and applications including text and multimedia messaging services, entertainment applications, ringtones, and games.<sup>100</sup> More recent innovations include GPS navigation services<sup>101</sup> and TV-watching and music-playing applications.<sup>102</sup> In latter part of 2007, 17.9% of total wireless service revenues were from data revenues, an increase of 30% over the previous year.<sup>103</sup>

The major carriers also exert substantial control over the applications market. Many applications are sold by the carriers, often as part of the service package,<sup>104</sup> although some application developers sell their applications directly to consumers.<sup>105</sup> Moreover, carriers influence the design, content, and pricing of cell phone applications. For example, carriers impose limits on “unlimited use” pricing plans for 3G broadband data services by restricting bandwidth and designating certain applications as “forbidden” in consumer contracts.<sup>106</sup> Carriers also create difficulties for application developers by restricting access to many phone capabilities, by imposing extensive qualification and approval requirements before allowing them to develop applications for their cell phone platforms, and by failing to develop uniform standards.<sup>107</sup>

Echoing the trends in the handset market, the carriers’ control over the application market may also be weakening. As sophisticated new applications for cell phones have begun to proliferate and the

---

100. FCC ELEVENTH REPORT, *supra* note 17, at 11007 ¶ 136–37.

101. See Marguerite Reardon, *Sprint to Include Free GPS with Data Services*, CNET NEWS, Mar. 26, 2007, [http://news.cnet.com/Sprint-to-include-free-GPS-with-data-services/2100-1039\\_3-6169263.html](http://news.cnet.com/Sprint-to-include-free-GPS-with-data-services/2100-1039_3-6169263.html) (noting that Sprint customers with certain handsets are to get GPS navigation services for free, while others can add the service for \$2.99 per day; Verizon Wireless and AT&T can buy such services for significantly more).

102. Marguerite Reardon, *AT&T Touts Mobile Video, Music Capabilities*, CNET NEWS, Mar. 27, 2007, [http://news.cnet.com/AT38T-touts-mobile-video,-music-capabilities/2100-1039\\_3-6170812.html](http://news.cnet.com/AT38T-touts-mobile-video,-music-capabilities/2100-1039_3-6170812.html) (commenting on the then-imminent launch of Apple’s application-packed iPhone on the AT&T network).

103. FCC THIRTEENTH REPORT, *supra* note 32, at 6278 ¶ 195.

104. See *infra* Part III.C.3.

105. For example, Telenav has developed a GPS application, which it sells directly from its website and also to Sprint customers via the Sprint website. Telenav, Telenav Products, <http://www.telenav.com/products/> (last visited on Dec. 20, 2009); see also Sprint, Sprint GPS Services and Navigation Applications, <http://www.nextel.com/en/services/gps/gps.shtml> (last visited Dec. 20, 2009).

106. Wu, *supra* note 74, at 13–14.

107. *Id.* at 22–25. As with carriers’ intervention in the handset market, some practices are economically justified by the need to protect the shared resource-spectrum. Other practices such as limiting access to the Internet may also be necessary to protect consumers, if unlimited access to the Internet creates security problems. See Schwartz & Mini, *supra* note 70, at 19. However, it is doubtful that all attempts by cellular service providers to control the applications market are benign.



open-access movement has gained momentum, handset manufacturers have started to put pressure on carriers to loosen their grip on the applications market. For example, the immense popularity of iPod music player allowed Apple to persuade AT&T to sell the iPhone to its customers without also offering AT&T's own line of applications.<sup>108</sup>

### III. THE CELLULAR SERVICE CONTRACT

Cellular service contracts are complex multidimensional contracts. We do not attempt a comprehensive analysis of these contracts.<sup>109</sup> Rather, we focus on three important design features: (1) the three-part tariff structure, (2) the lock-in clause, and (3) complexity. We describe these three contractual design features in turn.<sup>110</sup>

#### A. Three-Part Tariffs

As noted above, cellular service contracts are complex and multidimensional. Nevertheless, most postpaid plans, which constitute the majority of plans, price their basic voice calling service using a three-part tariff structure. The common three-part tariff is a three-dimensional pricing scheme that includes: (1) a monthly charge, (2) a number of included voice minutes, and (3) a per-minute price for minutes beyond the plan limit (the "overage"). Higher-priced plans, i.e., plans with a higher monthly charge, come with more allotted minutes and lower overages for minutes exceeding the plan limit. For example, AT&T, Sprint, and Verizon offer a \$39.99 plan with 450 minutes and \$0.45 per-minute overage, a \$59.99 plan with 900 minutes and \$0.40 per-minute overage, and a \$79.99 plan with 1350 minutes and \$0.35 per-minute overage.

---

108. Vascellaro, *supra* note 94.

109. One feature that we do not study is the definition of call types for which the subscriber is charged (or that count toward the plan limit). Specifically, while in most countries subscribers are charged only for outgoing calls, in the U.S. subscribers are also charged for incoming calls. This feature of the U.S. cellular service market seems to fit nicely within the general behavioral theory, as subscribers probably find it even more difficult to accurately estimate the number/length of incoming calls along with outgoing calls than outgoing calls alone.

110. The description of products and prices provided in Part III is largely based on information available through carriers' websites focusing on services available in the New York area. See AT&T, Cell Phones and Cell Phone Plans, <http://www.wireless.att.com/cell-phone-service/welcome/> (last visited Dec. 20, 2009); Sprint, Cell Phones, Mobile Phones, and Wireless Calling Plans from Sprint, <http://www.sprint.com> (last visited Dec. 20, 2009); T-Mobile, Cell Phone and Cell Phone Plans, Prepaid Cell Phones, Free Cell Phones, [http://www.t-mobile.com/shop.aspx?WT.z\\_unav=mst\\_shop](http://www.t-mobile.com/shop.aspx?WT.z_unav=mst_shop) (last visited Dec. 20, 2009); Verizon Wireless, Cell Phones, Smartphones, Mobile Cell Phone Plans — Verizon Wireless, <http://www.verizonwireless.com/b2c/index.html> (last visited Dec. 20, 2009). It should be noted that some variation exists between online and offline (retail store) offerings and between different geographical markets across the U.S. This variation is mentioned explicitly only when it is relevant to the analysis.

The three-part tariff was introduced in the U.S. in 1998. Before then, all wireless plans involved roaming and long-distance charges.<sup>111</sup> In 1998, AT&T revolutionized the landscape by offering a plan that allowed customers to pay a fixed monthly fee for a set number of minutes that could be used for both local and long distance calls.<sup>112</sup> As a result, AT&T gained 850,000 customers in its first year, perhaps more customers than it could serve.<sup>113</sup> AT&T's competitors soon followed with similar pricing plans.<sup>114</sup> Much of the rising popularity of cellular service was attributed to this pricing structure.<sup>115</sup>

Industry accounts of the reason for the switch to bundle pricing vary. Some argue that bundle pricing responds to consumer demand for simplicity.<sup>116</sup> Others, including AT&T's CEO at the time, suggest that the move to bundle pricing was motivated by a desire to attract heavy users.<sup>117</sup> This account is consistent with two key facts: (1) the smallest fixed fee offered was \$90 per month,<sup>118</sup> and (2) after the introduction of its One Rate plan, the average AT&T subscriber bill increased, raising the company's profitability.<sup>119</sup>

---

111. See Elizabeth Douglass, *The Cutting Edge Special Report: Wireless Communications; 'Prepaid' Idea is Catching On in U.S. Market*, L.A. TIMES, Mar. 15, 1999, at C1 (discussing trend away from long-distance and roaming charges).

112. Roger O. Crockett, *The Last Monopolist*, BUS. WK., Apr. 12, 1999, at 55.

113. *Id.*; Dan Meyer, *Coverage Problems Trigger Headaches for Carriers*, RCR WIRELESS NEWS, July 9, 2001, at 16.

114. Andrew M. Odlyzko, *The Many Paradoxes of Broadband*, FIRST MONDAY 8, Sept. 1, 2003, <http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/1072/992>. The other carriers still charged extra fees for roaming or long-distance calls. AT&T did not differentiate between calls based on these factors. See Peter Elstrom, *Wireless With All the Trimmings*, BUS. WK., Nov. 16, 1998, at 164 ("Sprint offers a similar plan that starts at \$50 a month for 500 minutes, but if you roam beyond the company's network, you pay a pricey 69 cents a minute.")

115. Odlyzko, *supra* note 114.

116. See Rebecca Blumenstein, *The Business — Package Plan: AT&T Sees Wireless as the Key to its Broader Strategy of Bundling Its Services*, WALL ST. J., Sept. 20, 1999 at R26; see also Elstrom, *supra* note 114.

117. Peter Elstrom, *Mike Armstrong's Strong Showing*, BUS. WK., Jan. 25, 1999, at 94.

A year ago, [Armstrong] promised to improve profitability by attracting high-revenue customers — even if the effort cost him revenue growth. With its innovative Digital One Rate, which carries no long-distance or roaming charges for cellular customers, the average subscriber bill rose to \$58 a month in the third quarter from \$50 six months earlier.

*Id.*; see also Elstrom, *Wireless With All the Trimmings*, *supra* note 114 ("While simplicity is flat-rate calling's biggest appeal, there is fine print you need to consider . . . . The only catch is that the cheapest plan you can get is a steep \$90 per month — so you have to be a heavy user to make it pay.")

118. Elstrom, *Wireless With All the Trimmings*, *supra* note 114.

119. Elstrom, *Mike Armstrong's Strong Showing*, *supra* note 117.

*B. Lock-In Clauses*

In addition to the three-part tariff pricing structure, most postpaid calling plans share the two features. First, they come with a free or substantially discounted phone. Second, they lock the consumer in for substantial periods of time with long-term contracts and ETFs. At the time of writing, T-Mobile gave away a Samsung t649 phone with a suggested retail price of \$199.99 for free. Consumers who want a fancier phone could get a Samsung Behold with a suggested retail price of \$399.99 for \$64.99. Similarly, AT&T and Apple heavily subsidized the iPhone, sacrificing short-term revenues,<sup>120</sup> and Sprint sold Samsung's music phones for only \$149, which is far below cost.<sup>121</sup> The free or heavily subsidized phone strategy pervades the U.S. cell phone market. A recent survey by J.D. Power found that 36% of customers receive a free cell phone when subscribing to a wireless service.<sup>122</sup>

Of course, the free phones are not really free. Carriers recoup the costs of the phones through subscription fees.<sup>123</sup> To make sure that they collect enough subscription fees to cover the cost of the phone, they lock consumers into long-term contracts.<sup>124</sup> Such lock-in is secured by substantial ETFs. For example, in June 2007, T-Mobile charged a fixed \$200 termination fee, AT&T charged a fixed termination fee of \$175, and Sprint charged a termination fee of up to \$200 depending on the service selected.<sup>125</sup> Historically, the same termination fees were charged regardless of when the agreement was broken

---

120. See Amol Sharma & Roger Cheng, *iPhone Costs Prove a Drag for AT&T*, WALL ST. J., Oct. 23, 2008, at B4 ("The company said \$900 million in customer-acquisition costs related to the iPhone shaved 10 cents off its earnings," but "AT&T executives said the investment will pay off because iPhone users are lucrative in the long-term, spending about \$95 a month on average, or about 1.6 times the amount other customers do."). The German company Deutsche Telekom, the largest telecommunications company in the European Union, has gone further, selling the iPhone for only one euro with a two year contract. *T-Mobile Will Sell New iPhone in Germany*, WALL ST. J., June 17, 2008, at B5.

121. Cliff Edwards & Roger O. Crockett, *New Music Phones — Without the i*, BUS. WK., Apr. 16, 2007, at 39.

122. Press Release, J.D. Power and Associates, *Wireless Customers are Keeping Their Mobile Phones Longer as Term Contracts Impact the Replacement Cycle 1* (May 30, 2007), <http://www.jdpower.com/corporate/news/releases/pdf/2007079.pdf>. In 2007, customers paid \$93 on average for their cell phones (after discounts), which was a decrease from \$103 in 2002. *Id.* The J.D. Power survey also provides information about average ownership tenure. Specifically, in May 2007 customers were keeping their mobile handsets for an average of 17.5 months, which represents an increase from 16.6 months in November 2006, and the first increase in average ownership tenure since 2002, when the average was 18.4 months. *Id.*

123. Wu, *supra* note 74, at 7–8.

124. When no-contract plans are offered, phone subsidies disappear. For example, a customer with no contract would be required to pay an *additional* \$400 beyond the contract price for the same iPhone. *AT&T Plans to Offer No-Contract iPhone*, WALL ST. J., July 2, 2008, at B5.

125. Carriers allow locked-in consumers to switch from one plan to another within the carrier's menu of plans without incurring an ETF.

meaning that a consumer would have paid the entire termination fee for ending a two year contract one month early.<sup>126</sup> In the wake of a number of class action lawsuits challenging the legality of these fees,<sup>127</sup> providers have begun to offer contracts with termination fees that decline over the life of the contract. Verizon led this transition when, in June 2007, it started charging customers a termination fee of \$175 minus \$5 for each full month that the customer remains on the initial contract.<sup>128</sup> By the end of 2008, all the major carriers were offering similar graduated ETFs.<sup>129</sup>

### C. Complexity

Cellular service contracts are complex and multidimensional. This complexity can be viewed as a contractual design feature. In this subsection, we attempt to provide a sense of the high level of complexity that characterizes cellular service contracts. Most cellular service contracts are highly complex even when considered in isolation. This high level of complexity increases substantially when we shift from the single-contract perspective to the perspective of a consumer facing many different multidimensional contracts. According to one industry estimate, the cellular service market boasts “millions of various plan/add-on combinations.”<sup>130</sup>

#### 1. Postpaid Plans — The Basics

Even the basic components of the common postpaid calling plan are complex. As described above, the basic pricing scheme is three-dimensional. Moreover, each provider offers a long menu of different three-part tariffs. To make things even more complicated, the menus

---

126. See generally Andrew Lavalley, *Ex-Customers Sue Qwest Over Cancellation Fees*, WALL ST. J., Oct. 17, 2008, B5 (explaining that two former Qwest customers filed a lawsuit against the provider challenging Qwest’s \$200 ETF for broadband service); cases cited *infra* note 233 (listing cases where class action lawsuits were brought against the major cellular service providers for the ETF policy described)

127. See *infra* notes 233–37 and accompanying text.

128. See Verizon Wireless, Customer Agreement, <http://www.verizonwireless.com/b2c/index.html> (last visited Dec. 20, 2009) (follow “Customer Agreement” hyperlink at the bottom of the page); see also Jeffrey Bartash, *AT&T to Cut Plan-Exit Fees*, WALL ST. J., Oct. 17, 2007, at D8.

129. See AT&T, Plan Terms, <http://www.wireless.att.com/cell-phone-service/legal/plan-terms.jsp#gsm> (last visited Dec. 20, 2009); Press Release, Sprint Nextel Corp., Sprint Launches One of the Industry’s Most Customer-Friendly Policies on Pro-Rated Early Termination Fees (Oct. 31, 2008), [http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle\\_newsroom&ID=1220442](http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=1220442); T-Mobile, T-Mobile Terms & Conditions, [http://www.tmobile.com/templates/popup.aspx?passet=fr\\_ftr\\_termsandconditions&print=true](http://www.tmobile.com/templates/popup.aspx?passet=fr_ftr_termsandconditions&print=true) (last visited Dec. 20, 2009).

130. See BillShrink.com, Frequently Asked Questions, <http://www.billshrink.com/how-it-works/> (last visited Dec. 20, 2009).

of three-part tariffs vary among providers.<sup>131</sup> Further complexity is introduced by the diversity of additional service features covered by the fixed monthly fee. Some of these features are offered by all carriers in the exact same way. Others are offered by some carriers but not others or are offered in varying formats by the different carriers.

For example, all four major carriers offer unlimited calls during off-peak times, i.e., nights and weekends. There is, however, some potentially significant variation. Nights are defined differently across carriers. For AT&T and Verizon the night begins at 9 pm and ends at 6 am. For T-Mobile the night begins at 9 pm and ends at 7 am. For Sprint the night begins at 7 pm and ends at 7 am (except for the \$29.99 plans, where the night begins at 9 pm and ends at 7 am). By varying the definition of “night,” providers can offer up to three extra hours of unlimited calling. These extra three hours represent an additional 33.3% of unlimited calling time. But since most consumers probably talk more during the three hours between 7 pm and 9 pm and between 6 am and 7 am than they do during the three hours between 1 am and 4 am, say, these extra three hours of unlimited calling probably represent much more than a 33.3% increase in value.

To take another example, consumers might also consider whether to select Verizon’s Friends and Family program, offering unlimited calls to five phone numbers selected by the user, or Sprint Nextel’s Direct Connect plans, offering customers the ability to instantly and simultaneously connect with up to 20 other Direct Connect capable users on the network.

## 2. Family Plans

We have thus far focused on individual calling plans. The four major carriers also offer family plans, adding another layer of complexity. The identifying feature of a family plan is the ability to share the allotted minutes between up to five users, each operating on a different line. For example, Verizon offers family plans with monthly charges ranging from \$69.99 to \$269.98, allotted minutes ranging from 700 to unlimited, and overages ranging from \$0.45 to \$0.20. These monthly prices include two phone lines, and families can add up to three more lines for an additional \$9.99 per month per line.

---

131. We briefly mention two additional dimensions: (1) The directionality of the calls that consume allotted minutes, and (2) the one-time activation charge. Along dimension (1), allotted minutes are typically used up on both outgoing calls and incoming calls, although at one time Sprint offered a plan with free incoming minutes. As for (2), AT&T and Sprint charge a \$36 activation fee while Verizon and T-Mobile charge \$35.

### 3. Add-Ons

Cell phones can be used for much more than voice communication. Carriers offer advanced communication services, including text messaging, multimedia messaging, and internet and email data services.<sup>132</sup> They also offer applications such as ring-tones and games, as well as monthly mobile Internet access packages.<sup>133</sup> These services and applications are marketed to consumers primarily as add-ons to their voice services.

Pricing of these services adds additional complexity. Providers offer advanced communication services to consumers in one of three modes: (1) pay-as-you-go, applied mainly to text and multimedia messaging, where the consumer pays per message sent or received;<sup>134</sup> (2) fixed-quantity monthly packages, where the consumer pays a monthly fee for a fixed number of allotted messages or megabytes of data;<sup>135</sup> and (3) unlimited-quantity monthly packages, where the consumer pays a monthly fee for unlimited messaging or data transmission.<sup>136</sup> Entertainment applications, specifically ring-tones and games, can be purchased for a one-time download rate. Advanced applications, such as GPS location services and music and TV applications, are now also available from some providers, typically for an additional monthly or daily fee.

### 4. Phones and Lock-In Clauses

Free or discounted phones that come with most postpaid plans add additional dimensions of complexity to the cellular product. Different carriers offer different phones with varying discounts. The carrier's choice between an outright discount and a rebate adds another twist. The flipside of the free or discounted phones is the lock-in clause that ties the consumer to the specific carrier. The lock-in

---

132. *Id.*

133. *Id.*

134. For example, as of December 20, 2009, Verizon charged \$0.20 per text message and \$0.25 per multimedia message. *See* Verizon Wireless, Cell Phones, Prepaid Cell Phones, Cell Phone Plans, *supra* note 110.

135. For example, as of December 20, 2009, AT&T charged \$5.00 per month for 200 text or multimedia messages and \$15.00 for 1500 messages. *See* AT&T, Cell Phones and Cell Phone Plans, *supra* note 110. Customers of Verizon's basic plan, which includes no messaging services, could add bundles containing unlimited incoming text or multimedia messages with 250, 500, 1500, or 5000 outgoing messages to non-Verizon customers and unlimited messages to Verizon customers for, respectively, an additional monthly charge of \$5.00, \$10.00, \$15.00, or \$20.00. *See* Verizon Wireless, Cell Phones, Prepaid Cell Phones, Cell Phone Plans, *supra* note 110.

136. For example, AT&T charged \$20.00 per month for unlimited messaging and \$15.00 per month for unlimited data transmission as of December 20, 2009. *See* AT&T, Cell Phones and Cell Phone Plans, *supra* note 110. Unlimited messaging and even data are covered by the monthly fee component of the basic three-part tariff in some premium plans. *Id.*

clauses vary in duration and in the magnitude of the ETF. The common lock-in period is two years, but one and three year periods are also offered. The termination fees vary between \$175 and \$200. The recent move to graduated ETFs introduced additional variation, as different carriers adopted different formulas to govern the gradual reduction in ETFs over the life of the contract.<sup>137</sup>

### 5. Prepaid Plans

We have thus far focused on postpaid plans, but the cellular service market offers another, substantially different contractual design — the prepaid plan. Not only is it difficult to choose among the many different postpaid plans, the consumer must make a preliminary choice between postpaid and prepaid. Moreover, prepaid plans themselves come in many shapes and sizes. Prepaid offerings fall into two categories: the monthly prepaid category, in which customers pay a monthly fee for a fixed number of minutes, and the pay-as-you-go category, in which customers buy credit to pay for minutes on a minute-by-minute basis.

The monthly prepaid category more closely resembles the postpaid calling plans. The main differences are that under the prepaid plans: (1) the fixed monthly fee is paid in advance, (2) there is no commitment (the subscriber can leave the carrier at any time without incurring an ETF), and (3) the allotted number of minutes cannot be exceeded in the prepaid version, not even for a high overage charge. Moreover, per-minute prices, that is, the monthly charge divided by the allotted number of minutes, are higher in prepaid plans, perhaps reflecting the loss of revenue from overage charges. For example, for a \$39.99 monthly charge, AT&T's prepaid GoPhone plan offers 300 minutes, as compared to the 450 minutes offered under AT&T's postpaid plan. Prepaid plans also offer fewer additional features. For example, night and weekend minutes are not always unlimited, and roaming charges are levied.<sup>138</sup>

The second category of prepaid plans offers pay-as-you-go service. Consumers purchase calling cards that hold varying numbers of minutes. For example, AT&T's pay-as-you-go service offers a \$15 card, a \$25 card, a \$50 card, a \$75 card, and a \$100 card. These card values translate into calling minutes at a \$0.25 per minute rate. Pay-as-you-go calling cards come with expiration dates: AT&T's \$15 card expires in 30 days, the \$25 and \$75 cards expire in 90 days, and the \$100 card expires in 365 days. AT&T's pay-as-you-go consumers can also pay a fixed fee of \$3 to use the phone for an unlimited number of minutes in a particular day, or \$1 to use the phone for a day at a rate

---

137. See *supra* notes 128–29 and surrounding text.

138. None of the four major operators charges for roaming in its postpaid pricing plans.

of \$0.10 per minute. Like the monthly prepaid plans, pay-as-you-go services typically offer higher per-minute prices and fewer additional features, as compared to the postpaid plans.

#### IV. EXPLAINING THE CELLULAR SERVICE CONTRACT

The contractual design features described in Part III can be explained as a market response to consumer mistakes.

##### *A. Three-Part Tariffs*

###### 1. A Behavioral Economics Theory

###### *a. Theory*

Basic voice services are commonly priced using three-part tariffs. To choose the right three-part tariff from the menu of available tariffs, the consumer must accurately anticipate her future cell phone usage. But many consumers, when asked to choose a calling plan, are not armed with accurate estimates of how they will use their cell phones. The three-part tariff responds to consumers' misperceptions about their future use.<sup>139</sup>

Consumers both overestimate and underestimate their use levels. A carrier who is aware that consumers suffer from such misperceptions can make its service plan appear more attractive to consumers than it really is by using a three-part tariff, charging a low per-minute price for minutes up to the plan limit and a high per-minute price thereafter. Consumers who overestimate their usage overestimate the value of the low prices because they overestimate the probability that they will consume most of these free minutes. Conversely, consumers who underestimate their usage pay insufficient attention to the high overage fees because they underestimate the probability of exceeding the plan limit. For a monopolist carrier, the three-part tariff creates opportunities for increased profits, while carriers operating in a competitive market will adopt the three-part tariff because it maximizes perceived consumer surplus.<sup>140</sup>

---

139. Other behavioral explanations are less convincing. For example, the "flat-rate bias" can explain the prevalence of two-part tariffs involving a high monthly fee and a low per-unit charge, but it cannot explain observed three-part tariffs, where high overage charges cause the marginal price to sharply increase after the consumer has used his allotted minutes. On the flat-rate bias as an explanation for tariff choice, see generally Anja Lambrecht & Bernd Skiera, *Paying Too Much and Being Happy About It: Existence, Causes, and Consequences of Tariff-Choice Biases*, 43 J. MKTG. RES. 212 (2006). On the difficulties in using the flat-rate bias to explain tariff choice in the cell phone market, see generally Grubb, *supra* note 1.

140. Grubb shows that three-part tariffs can arise when consumers are overconfident about their ability to predict their future use. This means that the same consumers exhibit a



We demonstrate these ideas using a simple numeric example. Assume that several carriers are operating in a highly competitive market. All carriers face the same cost structure: a \$10 per-consumer fixed cost and a \$0.10 per-minute variable cost. Consumers have the following preferences: they value each minute of airtime at \$0.40 per minute up to a certain saturation point,  $s$ , while minutes beyond the saturation point are worth zero to the consumer. There are two types of consumers: heavy users and light users. Fifty percent are heavy users with a saturation point of 300 minutes, and fifty percent are light users with a saturation point of 100 minutes. If consumers are rational and accurately perceive their saturation points, then the carriers will set a two-part tariff with a fixed monthly fee of \$10 and a constant, per-minute marginal price of \$0.10. Heavy users will pay  $10 + 300 \cdot 0.1 = 40$ , light users will pay  $10 + 100 \cdot 0.1 = 20$ , the carriers will just cover their costs, as expected in a perfectly competitive market. Under this two-part tariff, heavy users enjoys a surplus of  $300 \cdot (0.4 - 0.1) - 10 = 80$ , and light users enjoy a surplus of  $100 \cdot (0.4 - 0.1) - 10 = 20$ .<sup>141</sup>

We now introduce consumer misperceptions. We assume that light users overestimate their saturation point, mistakenly perceiving a saturation point of 200 minutes instead of the actual 100 minutes. And heavy users underestimate their saturation point, mistakenly perceiving a saturation point of 200 minutes instead of the actual 300 minutes. With such misperceptions, a three-part tariff becomes more appealing than the two-part tariff.

Consider the following three-part tariff: a fixed \$10 monthly fee, 200 allotted minutes (at a marginal price of zero), and an overage charge of \$0.40 per minute beyond the 200 minute allocation. The 200 minute allocation tracks the common perceived saturation point, the \$0.40 overage is the maximal marginal price that would not deter usage beyond the plan limit, and the \$10 fixed fee is calculated to exactly cover the carrier's expected costs:  $10 + (\frac{1}{2} \cdot 100 + \frac{1}{2} \cdot 300) \cdot 0.1 - \frac{1}{2} \cdot (300 - 200) \cdot 0.4 = 10$ .<sup>142</sup> Under this tariff, heavy users will

---

tendency to both over- and underestimate future use. But, as this Article argues, three-part tariffs also should arise when some consumers overestimate and others underestimate their use. Moreover, empirical evidence suggests that most consumers either underestimate or overestimate their future use, but do not exhibit underestimation in certain months and overestimation in others. See Oren Bar-Gill & Rebecca Stone, *Pricing Misperception: Explaining Pricing Structure in the Cellular Service Market* (June 24, 2009) (unpublished manuscript) available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1425046](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1425046).

141. Price calculations add the fixed monthly fee to the number of minutes multiplied by the per-minute price. Surplus calculations take the number of minutes multiplied by the difference between the per-minute benefit and the per-minute price and subtract the fixed monthly fee.

142. The carrier's costs include a fixed cost of \$10 and an expected variable cost of \$0.1 per-minute multiplied by the expected number of minutes — 100 minutes for light users (50% of users) and 300 minutes for heavy users (50% of users). The total cost is \$30. The

pay  $10 + (300 - 200) \cdot 0.4 = 50$ . They will enjoy a surplus of  $300 \cdot 0.4 - (300 - 200) \cdot 0.4 - 10 = 70$ , less than the surplus of 80 under the two-part tariff. But their misperceptions mean that they misperceive the surplus. The perceived surplus under the three-part tariff is  $200 \cdot 0.4 - 10 = 70$ , greater than the perceived surplus of  $200 \cdot (0.4 - 0.1) - 10 = 50$  under the two-part tariff. Light users will pay \$10 under the three-part tariff. They will enjoy a surplus of  $100 \cdot 0.4 - 10 = 30$ , more than the surplus of 20 under the two-part tariff. More importantly, the perceived surplus under the three-part tariff is  $200 \cdot 0.4 - 10 = 70$ , greater than the perceived surplus of  $200 \cdot (0.4 - 0.1) - 10 = 50$  under the two-part tariff.

Intuitively, the three-part tariff extracts payments in the form of overage fees that are invisible to consumers,<sup>143</sup> while reducing or eliminating payments that are visible to consumers, specifically fixed fees and charges for minutes within the plan limit. Notice that the heavy users, who underestimate their usage levels and end up paying overage fees, are subsidizing the light users. But since the heavy users do not anticipate paying the overage fees, a competitor cannot lure them away ex ante by, for example, offering a different tariff with lower overage fees. The three-part tariff maximizes the perceived consumer surplus for both types of consumers, and thus will be selected as the equilibrium tariff in a competitive market.<sup>144</sup>

#### b. Data

We test the misperception theory using a unique dataset of subscriber-level, monthly billing and usage information for 3730 subscribers at a single wireless provider. These data provide information on which of four calling plans a subscriber has chosen and his monthly consumption of peak minutes for the period of September 2001 to May 2003. Each of the four calling plans offer a standard three-part tariff with a fixed allocation of peak minutes and steep overages for additional peak minutes consumed, as described in Table 1 below.<sup>145</sup>

---

carrier gets \$20 from overage charges that the heavy users pay on their last 100 minutes. The remaining \$10 is collected as a fixed monthly fee.

143. In a more general model, overage charges would be underestimated, but not completely invisible.

144. We generalize this example in a companion piece. See Bar-Gill & Stone, *supra* note 140.

145. The database was provided by the Center for Customer Relationship Management at Duke University. The description of the data in the text is based on the description provided by the Center. See The Center for Customer Relationship Management, Telecom Dataset, available at <http://www.fuqua-europe.duke.edu/centers/ccrm/index.html#data>; see also Raghuram Iyengar, Asim Ansari & Sunil Gupta, *A Model of Consumer Learning of Consumer Service Quality and Usage*, 44 J. MKTG. RES. 529, 535–37 (2007). The four plans are offered with many different optional features that consumers can choose from, including messaging, long-distance, and roaming. Iyengar et al. determined that actual use of these

Table 1: Menu of Three-Part Tariffs

	Plan 1	Plan 2	Plan 3	Plan 4
Market share (%)	47.36	9.92	32.1	10.62
Monthly fixed charge (\$)	30	35	40	50
Number of included minutes	200	300	400	500
Overage rate (\$)	0.40	0.40	0.40	0.40

The data reveal substantial variance in usage. Summary statistics are provided in Tables 2a–2d. For plans 1, 3, and 4,<sup>146</sup> Tables 2a–2c present the overall mean and standard deviation of minutes used. To gain an initial sense of underestimation versus overestimation of usage, we also present, for each plan, average figures for underusage — unused minutes per month — and overusage — minutes beyond the plan allocation. We then aggregate this information across all plans in Table 2d.

Table 2a: Summary Statistics — Plan 1

	Share	Plan 1 Usage/Allowance	
		Mean	Std. Dev.
Under Allowance	0.815	0.45	0.294
Over Allowance	0.178	1.46	0.624
All Consumers	1	0.633	0.538

---

features was negligible in the data set and thus ignored the added variation in contractual design. Iyengar et al., *supra*, at 536. We do the same. Furthermore, it is not entirely clear from the data that all four plans were offered at all dates in all markets. We acknowledge this limitation of the data and qualify our results accordingly. Our empirical strategy builds on Grubb, *supra* note 1, who tested a related behavioral explanation, the overconfidence theory, using a different dataset.

146. We omit information on Plan 2, since no Plan 2 subscriber remained with the plan for more than ten months.

Table 2b: Summary Statistics — Plan 3

	Share	Plan 3 Usage/Allowance	
		Mean	Std. Dev.
Under Allowance	0.836	0.466	0.297
Over Allowance	0.16	1.284	0.343
All Consumers	1	0.599	0.428

Table 2c: Summary Statistics — Plan 4

	Share	Plan 4 Usage/Allowance	
		Mean	Std. Dev.
Under Allowance	0.717	0.573	0.296
Over Allowance	0.278	1.259	0.29
All Consumers	1	0.766	0.424

Table 2d: Summary Statistics — Aggregate

	Share	All Plans Usage/Allowance	
		Mean	Std. Dev.
Under Allowance	0.813	0.466	0.297
Over Allowance	0.165	1.326	0.433
All Consumers	1	0.612	0.456

In aggregate, subscribers exceed their minute allowance 16.5% of the time, by an average of 32.6%. In the 81.3% of the time when the allowance is not exceeded, subscribers use on average only 46.6% of their minute allowance.<sup>147</sup>

We next estimate both the percentage of consumers who arguably chose the wrong plan, and the costs of their mistakes. We consider a plan choice to be a mistake when, given the consumer's usage, a different plan would have cost the consumer less. We limit our analysis

---

147. Cf. TELETRUTH, NEW NETWORKS INSTITUTE & LTC CONSULTING, PHONE BILL SURVEY OF UCAN CUSTOMERS: SAN DIEGO, CALIFORNIA MARKET FOR LOCAL, LONG DISTANCE, DSL/BROADBAND, CABLE SERVICES, WIRELESS SERVICES, WITH INTERVIEWS 45 (March 2009), <http://www.teletruth.org/docs/UCANteletruth.pdf> (finding, based on evidence from 134 wireless customers in the San Diego area, that, on average, customers used only 33% of their minute allowance each month).

to the 3456 consumers who stayed with a plan for at least ten months, and take as our unit of analysis the consumer's tenure with a plan. Given the variance in usage from month to month, we believe that identifying mistakes over shorter time horizons is less reliable. For each of the 3456 consumers, we calculate the total cost of wireless service under the consumer's chosen plan and compare it to the total amount that this consumer would have paid had she chosen each of the other three plans. We measure the magnitude of the mistakes by the difference, in both percentage and dollar terms, between the consumer's actual wireless costs and the lowest possible cost — the cost that the consumer would have paid if she could have predicted her usage with certainty.<sup>148</sup>

The results are collected in Tables 3a and 3b. In these Tables, each row represents the group of subscribers who chose a certain plan. This group is then divided into four sub-groups according to the plan that these subscribers *should* have chosen. For instance, the cell located at the intersection of the Plan 3 row and the Plan 1 column represents the sub-group of subscribers who chose Plan 3 but should have chosen Plan 1. Table 3a presents the size, in percentage terms, of these sub-groups. Table 3b presents the magnitude of the mistakes or cost-savings, both in percentage terms and in annual dollar terms, for each sub-group.

Table 3a: The likelihood of mistakes

		Optimal Plan			
		Plan 1	Plan 2	Plan 3	Plan 4
Chosen Plan	Plan 1	74.09%	21.79%	1.49%	2.49%
	Plan 3	27.20%	35.61%	21.19%	16%
	Plan 4	9.00%	10.66%	8.00%	73.33%

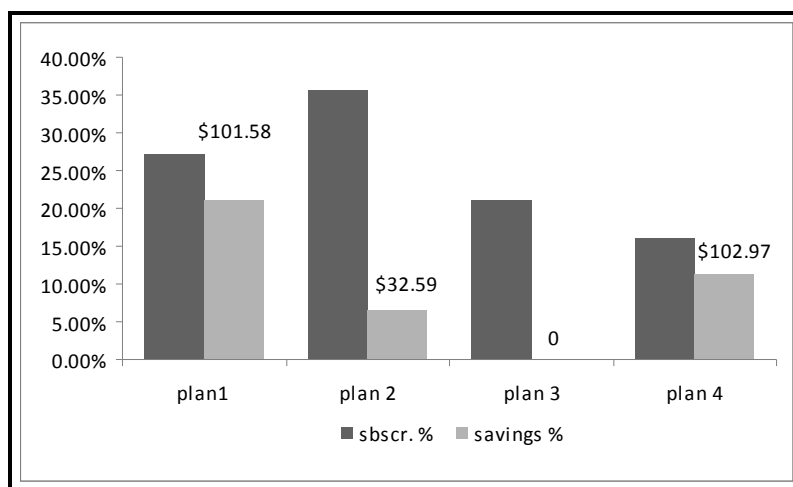
Table 3b: The magnitude of mistakes

		Optimal Plan			
		Plan 1	Plan 2	Plan 3	Plan 4
Chosen Plan	Plan 1	0%	9.56%	26.97%	28.22%
	Plan 3	\$0	\$54.16	\$203.58	\$341.71
	Plan 4	\$101.58	\$32.59	\$0	\$102.98
		36.71%	12.38%	7.00%	0%
		\$220.27	\$75.31	\$39.90	\$0

148. This analysis assumes risk neutrality.

We present the results for one group of subscribers, those who chose Plan 3, in Figure 1. We focus on this group of subscribers, since it includes significant numbers of both underestimators, who should have chosen Plan 4, and overestimators, who should have chosen either Plan 2 or Plan 1. Figure 1 displays the share of Plan 3 consumers who should have chosen each of the four plans (the dark gray bars). For those who should not have chosen Plan 3, Figure 1 shows the amount of money they would have saved, both in percentage terms (the light gray bars) and in dollar figures.

Figure 1: Plan 3 Subscribers —Likelihood and Magnitude of Mistakes



These figures underestimate the number and cost of mistakes, especially for plans with a lower allocation of minutes. For example, for subscribers who chose Plan 1, our data only reveal mistakes arising from underestimation of use, that is selection of Plan 1 when the subscriber should have chosen Plan 2, Plan 3, or Plan 4. But, it is likely that many Plan 1 subscribers who overestimated their use could have done better by choosing a prepaid plan that is not included in the dataset. We offer a conservative estimate of the number and magnitude of the cost of such overestimation by adding a hypothetical prepaid plan with a high per-minute charge of \$0.40 (equal to the overage charges in our data). An estimated 24.4% of Plan 1 subscribers would have saved \$149 annually on average had they chosen the prepaid plan.<sup>149</sup>

149. These conclusions are tentative, since prepaid plans may differ from postpaid plans on other dimensions. In particular, while the service quality offered by prepaid plans is improving, in the period when the data were collected there was still a non-negligible difference in quality between prepaid and postpaid plans.

To sum up, many consumers fail to accurately anticipate their use patterns, and the three-part tariff design can be explained as a market response to such misperceptions. Consistent with this story, providers do not seem to be troubled by consumers' use-pattern mistakes. On the contrary, they actively foster these mistakes by requiring, as a condition for network access, that handset manufacturers disable the call-timer feature that would make it easier for consumers to monitor their usage.<sup>150</sup> However, consumers are becoming more aware of their use-pattern mistakes and more frustrated with carriers who take advantage of them. As elaborated in Part VII below, the market is responding to the demand generated by these more sophisticated consumers.

## 2. Rational Choice Theories and Their Limits

The leading rational choice explanation for three-part tariffs views these pricing schemes as a mechanism for price discrimination or market screening between rational consumers with different ex ante demand characteristics. For expositional purposes, we focus on two dimensions of demand heterogeneity: average (or mean) monthly minutes of use and variance of minutes used. To begin with, suppose that consumers vary only on the first dimension. Under these conditions, the rational model cannot explain three-part tariffs: to discriminate between heavy users with high average usage and light users with low average usage, carriers would use a menu of two-part tariffs, not three-part tariffs. A two-part tariff includes a fixed monthly fee and a constant per-minute charge. Carriers can discriminate between heavy users and light users by offering an "H" tariff with a higher monthly fee and a lower per-minute charge and an "L" tariff with a lower monthly fee and a higher per-minute charge. The heavy users care more about the per-minute charge, and will thus prefer the H tariff. The light users care more about the monthly fee, and will thus prefer the L tariff.

While two-part tariffs provide a mechanism for discriminating between consumers based on their mean usage, three-part tariffs can provide a mechanism for discriminating between consumers based on variance of use. Assume that there are two types of consumers: one type with highly variable, High-Variation ("HV") demand, and another type with more predictable Low-Variation ("LV") demand.<sup>151</sup> In

---

150. Wu, *supra* note 74, at 9. For an example of the carrier-imposed difficulty customers face in determining their unused plan-minute allowances, see Sherrie Nachman, *Cranky Consumer: How to Check Up on Your Cell Phone Minutes*, WALL ST. J., June 18, 2002, at D2.

151. Formally, the cumulative distribution function ("c.d.f.") describing the priors over the demand parameter of the predictable type must cross that of the variable type once from below. Grubb, *supra* note 1, at 25–26 fig.6. For an analogous condition when there is a continuum of types, see *id.*

other words, the HV type often uses a very high number of minutes and often uses a very small number of minutes while the LV type usually consumes a more moderate number of minutes. A carrier can discriminate between the HV types and the LV types using a menu of three-part tariffs. Designing this menu, however, is quite tricky. The problem lies in the tradeoff that the HV type faces. On the one hand, the HV type is more concerned than the LV type about using a very large number of minutes and will thus prefer a tariff with a larger allocation of minutes to reduce the risk of paying substantial overage fees. On the other hand, the HV type is more concerned than the LV type about using only a very small number of minutes and will thus be more reluctant to pay the higher monthly fee that comes with the larger allocation of minutes.

Therefore, in designing the HV tariff, the carrier will have to strike a delicate balance. The HV tariff will offer a larger allocation of minutes,  $M$ , than the LV tariff,  $M^{HV} > M^{LV}$ , to accommodate the likelihood that the HV type will use a large number of minutes. The HV tariff will also include a larger monthly fee,  $F$ , than the LV tariff:  $F^{HV} > F^{LV}$ . But the effective per-minute charge,  $F/M$ , within the plan limit will be smaller under the HV tariff:  $F^{HV}/M^{HV} < F^{LV}/M^{LV}$ . This is attractive to the HV type, who is likely to use only a very small number of minutes. The LV type will not pay a higher monthly fee for extra minutes that she will most likely never use. The LV type is less concerned about paying a higher effective per-minute charge, because she will generally use most of her allocated minutes. Therefore, the LV type will choose the LV tariff.

While a three-part tariff pricing structure can facilitate price discrimination, the assumptions required for this rational choice explanation are often unrealistic. In the price discrimination model, the HV type chooses a plan with a high number of allotted minutes and the LV type chooses a plan with a low number of allotted minutes. Moreover, the highly variable use levels of the HV type imply that this type is more likely than the LV type to end up using a very low number of minutes. Our dataset suggests that this is unrealistic, as it shows that consumers who choose plans with a higher number of allotted minutes are *less* likely to end up using a very low number of minutes.

Using the subscriber-level billing and usage data described above, we plot in Figure 2 the cumulative distribution functions of usage for consumers choosing different three-part tariff plans.<sup>152</sup>

---

152. Figure 2 omits Plan 2 subscribers, since no Plan 2 subscriber remained with the Plan for more than ten months.



Figure 2: Cumulative Distribution Functions of Cell Phone Usage

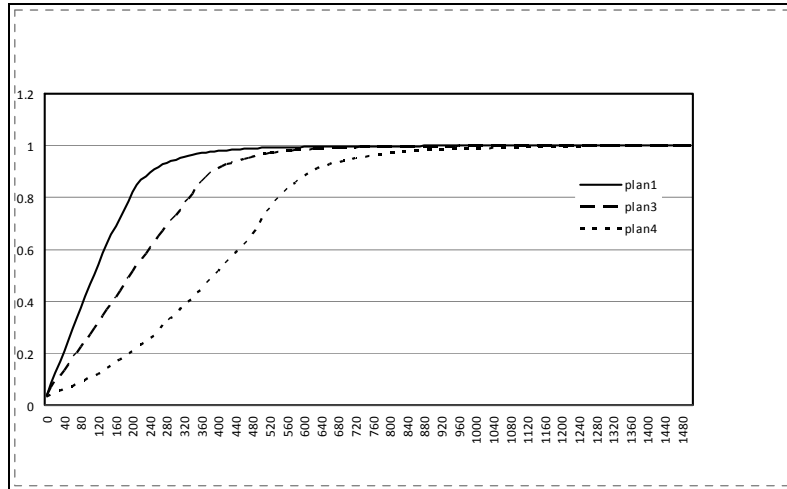


Figure 2 confirms that the cumulative distribution function corresponding to a plan with a higher number of allocated minutes first-order stochastically dominates the cumulative distribution function corresponding to a plan with a lower number of allocated minutes. In other words, consumers who choose plans with a higher number of allotted minutes are less likely to end up using a very low number of minutes. These findings are inconsistent with the price discrimination theory that we sketched above.<sup>153</sup>

An alternative rational choice explanation views the three-part tariff, and specifically the steep overage fees, as offering consumers a pre-commitment device that helps them avoid excessive usage.<sup>154</sup> Rational consumers who anticipate a temptation to talk too much may want to bind their future selves by choosing a plan with a high overage fee. However, this theory does not fit the data very well. The data reveal substantial overages, but if consumers are using the three-part tariff as a commitment device we should expect to see a clustering of minutes used just below the plan limits. Moreover, the pre-commitment theory cannot explain the large number of subscribers who consistently use a number of minutes that is well below the plan limit.

Finally, in theory, the use patterns revealed in our data are consistent with the behavior of perfectly rational but risk-averse subscribers.

153. Grubb's analysis of a different dataset yields the same conclusion. Grubb, *supra* note 1, at 34 fig. 1.

154. It is not even clear that this is a rational choice theory. Arguably, preferences that lead to temporal inconsistency and self-control problems, which generate a demand for pre-commitment devices, are in some sense irrational.

Such subscribers would choose plans with more allotted minutes than they expect to use to reduce the risk of paying substantial overage fees. As a result, most of these subscribers will end up using much less than their allotted minutes. This explanation fails for two reasons. First, given the sums of money involved, the observed plan choices are not consistent with risk aversion under the rational-choice Expected Utility Theory.<sup>155</sup> Second, while risk aversion may explain the patterns of overusage and underusage given the three-part tariff structure, it cannot explain the emergence of the three-part tariff as the equilibrium pricing structure. With rational, risk-averse subscribers, we should expect to see two-part tariffs.

### B. Lock-In Clauses

#### 1. A Behavioral Economics Theory

The lock-in clauses that are common in postpaid plans and the termination fees that enforce them can also be explained as a market response to the imperfect rationality of consumers. Consumers often underestimate the likelihood that switching providers will be beneficial down the road; service may not be as good as promised, monthly charges may be higher than expected, or another carrier may offer a better deal.<sup>156</sup> As a result, consumers underestimate the long-term cost of the lock-in clause. When consumers underestimate the likelihood that they will want to switch providers before their contract expires, they will be relatively insensitive to the ETF. Increasing the size of the ETF thus becomes an appealing pricing strategy.<sup>157</sup> Moreover, the ETF-enforced lock-in facilitates the common bundling of phones and service. Termination fees guarantee providers a long-term revenue stream, as subscribers must either refrain from switching carriers and pay for service for the duration of their contracts or switch and pay the termination fee.<sup>158</sup> This guaranteed revenue helps enable carriers to offer free or subsidized phones to attract consumers.

---

155. See Matthew Rabin, Note, *Risk Aversion and Expected-Utility Theory: A Calibration Theorem*, 68 *ECONOMETRICA* 1281, 1281 (2000). However, they may be consistent with certain behavioral accounts of risk aversion. See *id.* at 1282 n.3.

156. See Lauren Tara Lacapra, *Breaking Free of a Cellular Contract — New Web Sites Help Customers Swap or Resell Phone Service; Avoiding \$175 Termination Fee*, WALL ST. J., Nov. 30, 2006, at D1 (“[Consumers] often want out because service is poor or because the monthly costs turn out to be more than they expected.”).

157. Oren Bar-Gill, *Informing Consumers About Themselves* 10 (NYU Law Sch. Law & Econ. Res. Paper Series, Working Paper No. 07-44, 2007), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1056381](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1056381).

158. The ETF effectively deters switching. See Lacapra, *supra* note 156 (stating that according to a July 2005 survey by the U.S. PIRG Education Fund, “[r]oughly 47% of cell customers would switch or consider switching cellphone companies if early-termination fees were abolished,” but “because of the fee, only 3% of customers go ahead with terminating the contract”).

But the story is more complicated. To subsidize the cost of phones, carriers must charge an above-cost price for service. This pricing strategy is attractive only if the price of service is underestimated. As we have seen in Part V.A, such underestimation does exist. Consumers underestimate the price that they will pay in the form of overage fees when they underestimate usage. When they overestimate usage, consumers underestimate the per-minute price that they will pay under the plan. Of course, a single month's worth of underestimated service prices cannot cover the large phone subsidies. Carriers cannot increase service charges to such a level that they would cover the price of a phone (or a phone subsidy) after one month. Consequently, lock-in is crucial. Lock-in ensures that the carrier will benefit from (typically) two years' worth of above-cost and underestimated service charges or, if lock-in fails, from the underestimated termination fee. These compounded above-cost service charges can then pay for the free or subsidized phones. Lock-in also facilitates the workings of consumers' myopia, further compounding the problem. The immediate cost of the phone looms larger in the decision calculus than the costs of the service contract, which are spread over time.

Carriers are quite explicit about their strategy of offering free or subsidized phones and recouping their costs through long-term contracts with ETFs. According to the vice president of marketing for Cingular Wireless (now AT&T), the penalties are the price that consumers must pay for the inexpensive or free phones customers get when they sign up for service: "We subsidize the handset; in exchange we want a commitment from the customer."<sup>159</sup> Similarly, at the FCC hearing on ETFs, an Executive Vice President of Verizon argued:

Term contracts allow the consumer to take advantage of bundled services at competitive prices and the latest devices they choose in exchange for a commitment to keep the service for usually one or two years. In return, service providers have some measure of assurance over a fixed period of time that they may recover their investment, including equipment subsidies, costs of acquiring and retaining customers,

---

159. Caroline E. Mayer, *Gripping About Cellular Bills; Differences From 'Regular' Phones Take New Users by Surprise*, WASH. POST, Feb. 28, 2001, at G17; see also Fawn Johnson, *FCC Head Seeks Rules on Cell-Termination Fees*, WALL ST. J., June 13, 2008, at B7 ("Wireless carriers argue that the termination fees are used to subsidize the cost of cell-phones to customers. People who sign up for one- or two-year contracts receive discounts on phones and their monthly wireless rates."); CTIA, *Early Termination Fees Equal Lower Consumer Rates* 1, CITA, Apr. 2006, [http://files.ctia.org/pdf/PositionPaper\\_CTIA ETF\\_04\\_06.pdf](http://files.ctia.org/pdf/PositionPaper_CTIA ETF_04_06.pdf) (arguing that prohibiting carriers from charging ETFs will cause prices for wireless services to increase).

and anticipated revenue for providing wireless services.<sup>160</sup>

Consider, for example, the pricing of the new iPhone. In June 2008, Apple made a big splash when it announced that the new iPhone model would sell for \$200 less than its predecessor (\$199 instead of \$399).<sup>161</sup> However, at the same time Apple and its partner AT&T raised the iPhone's minimum monthly service subscription from \$60 to \$70, adding \$240 to the total cost of the two-year contract.<sup>162</sup> AT&T and Apple executives were very clear about the short-term versus long-term trade-off. They were willing to lose money on the front end, but only because they were counting on making even more money off the back-end, due to the two year lock-in contract.<sup>163</sup> Not surprisingly, when the same iPhone was later offered in unbundled form, without a two year service plan, it was priced at \$599, which is \$400 above the subsidized price (with a service plan).<sup>164</sup>

The practice of offering free or subsidized phones with lock-in contracts provides strong evidence of consumer bias. Moreover, carriers seem to understand that consumers are attracted by the short-term benefit (the free phone) even when this benefit is completely offset or even outweighed by increased long-term costs.<sup>165</sup> While bundling of phones and service is still the norm in the U.S. cellular service market, this practice seems to be in decline. Consumers are more aware of ETFs, an awareness that could partially be attributed to the ETF litigation, and carriers are reducing ETFs in response.<sup>166</sup> With lower ETFs and thus weaker lock-in, phone subsidies become more difficult to sustain. The drive towards open access also threatens the future of the bundling strategy.<sup>167</sup> After initially resisting open access, carriers are beginning to realize the benefits of shifting development and customer service costs to handset manufacturers.<sup>168</sup> Finally, it is interesting to

---

160. Thomas J. Tauke, Executive Vice President, Verizon, Testimony at FCC Early Termination Hearing 1 (June, 12, 2008) [hereinafter Verizon Testimony], available at <http://www.fcc.gov/realaudio/presentations/2008/061208/tauke.pdf>.

161. See Paul Wagenseil, *That 'Cheaper' iPhone Will Cost You More*, FOXNEWS.COM, June 11, 2008, <http://www.foxnews.com/story/0,2933,365347,00.html>.

162. *Id.*

163. See *supra* note 120.

164. *AT&T Plans to Offer No-Contract iPhone*, *supra* note 124.

165. The importance of handset subsidies is not limited to the U.S. market. Based on econometric analysis of data from Chinese markets, researchers found handset subsidies were most effective in increasing the subject firm's market share over a given period. Chong-Jian Liu et al., *The Public Incumbent's Defeat in Mobile Competition: Implications for the Sequencing of Telecommunications Reform* 12–17 (unpublished manuscript) available at <http://ssrn.com/abstract=978707>.

166. See Part III.B.

167. See *Ante*, *supra* note 74.

168. *Id.*

note that the practice of bundling phones and service has always been less common outside the U.S. and especially uncommon in Europe.<sup>169</sup>

## 2. Rational Choice Theories and Their Limits

Lock-in clauses can arise in a rational choice framework. When the seller incurs substantial per-consumer fixed costs and the liquidity-constrained consumer cannot afford to pay an upfront fee equal to these fixed costs, the optimal solution may be a lock-in contract. In the cell phone market, fixed costs are high but, more importantly, they are endogenous. Carriers invest up to \$400 in acquiring each new customer.<sup>170</sup> Many of these customer acquisition costs, however, are attributed to the free or subsidized phones that carriers offer.<sup>171</sup> This raises a series of questions. Why do carriers offer free phones and lock-in contracts? Why not charge customers the full price of the phone and avoid lock-in? Many cell phone consumers can afford to purchase the phone up-front. Moreover, it is unlikely that the carrier is the most efficient source of credit available to all of those consumers who are in fact liquidity-constrained. Thus, the rational choice model can explain the presence of these design features in only a subset of contracts.<sup>172</sup>

An alternative argument views lock-in clauses as instrumental in stabilizing demand and helping providers match capacity to demand (especially in peak hours), thus reducing costs and benefiting consumers. While lock-in clauses may reduce churn and thus reduce variation in demand, there are still substantial variations in the use-patterns of the locked-in consumers, as shown above.<sup>173</sup> More importantly, it is not clear whether or not providers need lock-in clauses to match capacity to demand. Providers have good information about their customers' use patterns, including how long they will stay with the specific provider. A related argument is that ETF-enforced lock-in generates a more predictable stream of revenues, which is necessary

---

169. *Id.*

170. Lacapra, *supra* note 156 ("It costs a cell phone company approximately \$350 to \$400 to acquire a new customer, according to Phil Doriot, a partner in the consulting firm CFI Group, who has studied company performance and customer satisfaction for major cellular service providers."); Jane Spencer, *What Part of 'Cancel' Don't You Understand? — Regulators Crack Down on Internet Providers, Phone Companies That Make It Hard to Quit*, WALL ST. J., Nov. 12, 2003, at D1 (noting that customer acquisition costs are approximately "\$339 per new customer, according to Yankee Group, a technology research firm").

171. Jared Sandberg, *A Piece of the Business*, WALL ST. J., Sept. 11, 1997, at R22.

172. The practice of imposing *time invariant* termination fees raises doubts about the argument that ETFs were necessary to cover the cost of the free or subsidized phones, either by inducing consumers to stay on and pay the monthly subscription fees or by replacing the subscription fees of consumers who leave.

173. *See supra* Part IV.A.1.b.

for carriers to recoup their large capital investments.<sup>174</sup> Again, while lock-in reduces uncertainty, carriers could generate reasonably accurate revenue estimates without it. Though reduced risk is desirable, the presence of manageable risk should not prevent investment.

### C. Complexity

#### 1. A Behavioral Economics Theory

The complexity and multidimensionality of the cell phone contract can also be explained as a market response to the imperfect rationality of consumers. Consider four basic plans offered by the four major carriers:

- (1) AT&T's \$39.99 plan with 450 minutes, \$0.45 per minute overage, unlimited night (9:00pm–6:00am) and weekend minutes, unlimited calling to AT&T customers, rollover minutes.
- (2) Verizon's \$39.99 plan with 450 minutes, \$0.45 overage, unlimited night (9:01pm–5:59am) and weekend minutes, unlimited calling to Verizon customers.
- (3) Sprint's \$39.99 plan with 450 minutes, \$0.45 overage, unlimited nights (7:00pm–7:00am) and weekends, unlimited calls to customers on the Sprint network.
- (4) T-Mobile's \$29.99 plan with 500 minutes, \$0.45 overage, unlimited calls to customers on the T-Mobile network, unlimited nights (9:00pm–6:59am) and weekends.<sup>175</sup>

To choose among these products, the consumer must answer a series of nontrivial questions. How important is unlimited calling within the network? If unlimited calling within the network is important, on which network are most of the consumer's friends located? How valuable is unlimited calling during weekends? How valuable is unlimited calling at night? How large is the difference between unlimited calling at night when "night" is between 7:00pm and 7:00am as compared to a shorter "night" between 9:00pm and 6:00am? How valuable is the rollover feature? There is considerable complexity even when the comparison is between plans (1) to (3), which offer consumers the same monthly charge, number of allotted minutes, and overage charge. But, of course, the different dimensions of the three-part tariff also change from one carrier to the next and from one plan to the next in a single carrier's menu of offerings. Consumers must choose the combination of monthly charge, allotted minutes, and

---

174. See Verizon Testimony, *supra* note 160, at 2; see also CTIA, *supra* note 159, at 1.

175. Information as to basic plans acquired from sources cited *supra* note 110.

overages they prefer. As explained above, this choice requires accurate estimates of the distribution of their future usage.

A perfectly informed and perfectly rational consumer would easily navigate this maze and find the best plan for him. But the amount of information required is substantial, since it includes information about both available plans and the consumer's own use patterns. It is unlikely that he will have all this information. Moreover, as shown above, consumers are often mistaken about their future use. Even if the consumer had the necessary information, translating this information into a metric that would allow him to rank the different plans is a daunting challenge that most consumers cannot be expected to overcome.

Complexity allows providers to hide the true cost of the contract. Imperfectly rational consumers cannot effectively aggregate the costs associated with the different options and prices in a single cell phone contract. Inevitably, consumers will focus on a subset of salient features and prices, and ignore or underestimate the importance of the remaining, non-salient features and prices. In response, providers will increase prices or reduce the quality of the non-salient features, which in turn will generate or free up resources for intensified competition on the salient features. Competition forces providers to make the salient features attractive and the salient prices low. This can be achieved by adding revenue-generating, non-salient features and prices. The result is an endogenously derived high level of complexity and multi-dimensionality.

This account of complexity as a response to imperfect rationality is a dynamic one. It recognizes that consumers learn and that a feature or a price that was not salient last month may become salient next month. ETFs provide such an example.<sup>176</sup> When one price dimension becomes salient, competition focuses on this dimension and carriers shift to a new, less salient price dimension. According to some accounts, carriers facing increased competition on fixed monthly fees and allocations of included minutes are now relying more heavily on revenues from charges for new data services.<sup>177</sup> The proposed account of complexity not only allows for consumer learning, but also uses consumer learning to explain the increasing level of complexity of the cellular service contract: when consumers learn the importance of a previously non-salient price dimension, carriers have a strong incentive to create a new price dimension.

---

176. *See infra* Part V.B.

177. Andrea Petersen & Nicole Harris, *Hard Cell: Chaos, Confusion and Perks Bedevil Wireless Users*, WALL ST. J., Apr. 17, 2002, at A1.

## 2. Rational Choice Theories and Their Limits

The rational choice explanation for complexity is straightforward. Consumers have heterogeneous preferences. Different consumers want different kinds of cellular services, so the complexity and multidimensionality of the cellular service offerings cater to the heterogeneous preferences of cell phone users. This surely explains some of the observed complexity in the cell phone market. But it is unlikely that it fully explains the staggering level of complexity exhibited by the long menus of cell phone contracts. Even for the rational consumer, acquiring information on the range of complex products is costly. Even for the rational consumer, comparing different plans with different multidimensional features is costly. At some point, these costs exceed the benefits of finding the perfect plan. When complexity deters comparison shopping, the benefits of the variety and multidimensionality are left unrealized. The rational choice account must balance the costs and benefits of complexity. It seems that in the cell phone market the level of complexity has reached a point beyond what we should expect if it was simply a response to rational consumer demand.<sup>178</sup>

## V. WELFARE COSTS

We have argued that the design of cell phone contracts can be explained as a response to the imperfect rationality of consumers. In this Part, we assess the extent to which the mistakes that consumers make and providers' responses to these mistakes harm consumers and generate welfare costs.

### A. Three-Part Tariffs

We have shown that misperceptions of use levels lead many consumers to choose the wrong plan — the wrong three-part tariff.<sup>179</sup> The average consumer in our data made a mistake that cost him 8% of his total wireless bill, or \$47.68 annually. Extrapolating from our data

---

178. A market for “comparison shopping services” is emerging, with vendors such as BillShrink.com and Validas offering to find the best product/plan for any consumer who would be willing to pay a fee. See *infra* notes 248–49 and accompanying text. The availability of comparison shopping services reduces the cost of comparison shopping and increases the optimal level of complexity in a rational choice model. However, it seems that most cell phone users do not avail themselves of the services offered by BillShrink.com and Validas. The emergence of a market for “comparison shopping services” suggests that complexity makes it difficult for consumers to comparison shop by themselves. But since the majority of consumers do not seek help from professional comparison shoppers and thus do not benefit from the high level of complexity, the rational choice explanation for complexity is less convincing.

179. See *supra* Part IV.A.1.b.



onto the entire U.S. population of cell phone users, numbering 250 million, we obtain a \$11.92 billion annual reduction in consumer surplus.

While the \$11.92 billion figure is substantial, the average per-consumer harm, \$47.68, is small. But these averages hide potentially important distributional implications. The \$11.92 billion is not evenly divided among the 250 million U.S. subscribers. In our data, 35% of subscribers chose the right plan. Even among subscribers who chose the wrong plan, the magnitude of the mistake, that is, the extra payment as compared to the right plan, varies substantially. In our data, 34% of consumers made mistakes that cost them at least 10% of their total wireless bill, or \$113 annually, and 17% of consumers made mistakes that cost them at least 20% of their total wireless bill, or \$146 annually. Ten percent of consumers made mistakes that cost them at least 25% of their total wireless bill, or \$60 annually. This implies that the really large mistakes, in percentage terms, had smaller stakes in dollar terms.

While harm to consumers is important, it should be emphasized that a reduction in the consumer surplus is not a welfare cost in and of itself. Yet the identified consumer mistakes do generate welfare costs. First, consumer mistakes imply allocative inefficiency, since consumers are not buying the right products. Second, social welfare is reduced by regressive redistribution. Such redistribution occurs when carriers profit from consumer mistakes. But regressive redistribution occurs even if these excess profits are competed away if wealthier consumers are less prone to make mistakes. The distribution of mistakes implies that revenues from consumers who make mistakes keep prices low for consumers who do not make mistakes.

### B. Lock-In Clauses

Lock-in prevents efficient switching and thus hurts consumers. A 2005 survey found that 47% of subscribers would like to switch plans, but only 3% do so — the rest are deterred by the early termination fee.<sup>180</sup> Switching is efficient when a different carrier or plan provides a better fit for the consumer. Moreover, in light of the rapid technological advances in handset technology, a two year lock-in is relatively long.<sup>181</sup> Beyond these efficiency costs, consumers lose from lock-in when it prevents them from accepting a better deal offered by a competing carrier. Lock-in can slow down the beneficial effects of

---

180. Lacapra, *supra* note 156.

181. See Abe Burhanuddin, *Smartphone, a Modern Lifestyle Convergence*, JAKARTA POST, Aug. 21, 2007, <http://www.thejakartapost.com/news/2007/08/21/smartphone-modern-lifestyle-convergence.html> (discussing recent worldwide developments in handset technology).

consumer learning. Consumers gradually learn to avoid misperception and form more accurate estimates of their future use. If lock-in prevents these consumers from switching to a plan that better fits their actual use patterns, it prolongs the welfare costs identified in Part V.A. Similarly, consumers will gradually learn the implications of their complex cell phone contract. For example, they may learn that they do not use their phone very often between 6am and 7am, and thus conclude that they are not benefitting from the longer definition of “night” in Sprint’s unlimited night calling. If lock-in prevents these consumers from switching to a different carrier, it prolongs the welfare costs of complexity.<sup>182</sup>

In addition to these direct costs, lock-in may inhibit competition, adding a potentially large indirect welfare cost. We have already mentioned that lock-in may prevent a more efficient carrier from attracting consumers who are locked into a contract with a less efficient carrier. Since lock-in makes large-scale entry into the market more difficult, incumbents may have a greater incentive to seek monopolization through predation or merger than in markets where easy entry limits incumbents’ market power.<sup>183</sup>

### C. Complexity

The high level of complexity of cellular service contracts can reduce welfare in two ways. First, consumers will tend to make more mistakes in plan choice when the choices are complex. Second, complexity inhibits competition by discouraging comparison shopping. By raising the cost of comparison shopping, complex contracts reduce the likelihood that a consumer will find it beneficial to comparison shop. Without the discipline that comparison shopping provides, cell phone service providers can behave like quasi-monopolists — raising prices and reducing consumer surplus.

### D. Countervailing Benefits?

Three-part tariffs, lock-in clauses, and complexity harm consumers and increase carriers’ profits. Competition among carriers, even if imperfect, forces carriers to give back to consumers some of these profits. Carriers will compete away excess profits by reducing prices that are salient to consumers. Handset subsidies are the primary way in which benefits flow back to consumers. However, these counter-

---

182. See *infra* Part V.C.

183. Joseph Farrell & Paul Klemperer, *Coordination and Lock-In: Competition with Switching Costs and Network Effects*, in 3 HANDBOOK OF INDUS. ORG. 1967, 2005 (Mark Armstrong & Robert Porter eds., 2007), available at [http://www.nuff.ox.ac.uk/users/klemperer/Farrell\\_KlempererWP.pdf](http://www.nuff.ox.ac.uk/users/klemperer/Farrell_KlempererWP.pdf).

vailing benefits do not eliminate the identified welfare costs. Even if all excess profits are returned to consumers, there will still be an efficiency cost. Consumer mistakes and the contractual design features that respond to these mistakes lead consumers to misperceive the relative costs and benefits of different products. As a result, consumers choose the wrong products and use these products sub-optimally. Moreover, even if all excess profits are returned to consumers as a group, there is no reason to believe that the benefit received by a consumer will precisely offset the harm to that same consumer. In fact, it is likely that consumers who are more prone to mistakes will be cross-subsidizing consumers who are less prone to mistakes. The resulting redistribution can reduce social welfare. Finally, one important effect of lock-in and complexity is to reduce the level of competition in the cellular services market. Reduced competition means that less of the excess profits will find their way back into the hands of consumers.

## VI. MARKET SOLUTIONS

Consumers make mistakes and carriers respond to these mistakes. However, consumers also learn from their mistakes,<sup>184</sup> and carriers respond to demand generated by the growing number of increasingly sophisticated consumers. Moreover, in a competitive market, carriers may have an incentive to correct consumer mistakes, at least when these mistakes prevent consumers from fully appreciating the benefits of the carrier's product. We begin in Section A by describing a number of products and contracts that arguably respond to demand by more sophisticated consumers. In Section B, we examine whether these market solutions in fact solve the behavioral market failures identified in this Article.

### A. Catering to Sophisticated Consumers

The cellular service market boasts a large set of products and contracts that arguably cater to more sophisticated consumers.

---

184. See Martin Gaynor et al., *Cell Phone Demand and Consumer Learning — An Empirical Analysis* 25 (NET Inst., Working Paper No. 05-28, 2005), available at <http://www.netinst.org/Shi.pdf> (examining consumer behavior in Asia; finding “shrinking posterior variances” of demand parameters to be evident of learning behavior). During the first three months of their study, they also found a decline in the average number of minutes used, a diversification of plan choices over time, a rapid decline in the deviation of actual payment from the optimal payment, and a rapid increase in the proportion of consumers choosing the optimal plan. *Id.* at 6–7. But this relatively quick learning and adjustment behavior is a function of Thai calling plans, which have no lock-in feature. With lock-in, learning is slower, since consumers cannot experiment with multiple plans over a short period of time.

## 1. Unlimited Calling Plans

In February 2008, Verizon broke with industry pricing norms by offering a \$99 unlimited calling plan.<sup>185</sup> Soon after AT&T followed suit, and T-Mobile went even further by including unlimited text messaging along with unlimited voice in its unlimited plan.<sup>186</sup> Sprint then unveiled a \$99 plan that featured “unlimited voice, text messages, email, web surfing, video, and other premium services.”<sup>187</sup> Unlimited calling plans arguably respond to consumer complaints about overage fees. Most likely, a sufficiently large subset of consumers, experiencing the sting of large overage charges, generated demand for plans without overage fees.<sup>188</sup>

The rise of unlimited plans demonstrates both the power and possible unevenness of consumer learning. We have presented the three-part tariff as a response to consumer misperceptions about future use. Of the different components of the three-part tariff, the overage fee, is likely to be the one which consumers learn to appreciate most quickly. When consumers exceed the plan limit, they receive a very direct and painful feedback which helps them learn. But, as argued above, the underestimation of use that triggers overage charges is just one-half of the problem. The other half — overestimation of use — is more difficult to learn. For a consumer using 50% of the allotted minutes, implying a much higher per-minute rate than initially expected, there is no direct feedback because the consumer still pays the same monthly fixed fee. We doubt that many consumers divide this fee by the number of minutes actually used to derive the real per-minute price. The

---

185. Roger Cheng, *Business Technology: Virgin Mobile to Join Flat Rate Phones Frenzy*, WALL ST. J., June 24, 2008, at B4.

186. *Id.*

187. *Id.* While these plans still entail a contract, smaller companies, like Virgin Mobile, offer similar plans even without a lock-in contract. *Id.* The innovation was the introduction of unlimited voice service. Data plans were always advertised as unlimited, but the fine print included actual limits. Specifically, in the terms and conditions of their subscriber contracts AT&T, Sprint, and Verizon reserve rights to impose additional charges or terminate service if users use more than five gigabytes in a month, *see, e.g.*, AT&T, Plan Terms, *supra* note 129, while T-Mobile reserves such rights if users exceed ten gigabytes of usage in a month, *see* T-Mobile, T-Mobile Terms & Conditions, *supra* note 129. Moreover, carriers typically reserve rights to impose restrictions on consumers' usage of other carriers' wireless networks (“offnet usage”). Similarly, unlimited voice plans are not always truly unlimited. For example, AT&T imposes limits on its unlimited voice services, specifying that voice services are provided primarily for live dialog between two individuals. If a consumer's use of the service for conference calling or call forwarding exceeds 750 minutes in a given month, the carrier may terminate the service or, after providing the user with notice and an option to terminate, change the plan to one with no unlimited usage components. *See* AT&T, Plan Terms, *supra* note 129.

188. *See* Amol Sharma & Dionne Searcey, *For Big Talkers, Wireless Firms Offer Flat Rates*, WALL ST. J., Feb. 20, 2008, at D1 (explaining that carriers are eliminating overage penalties because consumers “detest” these penalties).

result of this uneven learning is unlimited plans, rather than the optimal two-part tariff pricing scheme.<sup>189</sup>

Moreover, the currently available unlimited plans are attractive only to a relatively small fraction of heavy users. With their high monthly fees, the unlimited plans are less attractive than the standard three-part tariff plans for most users.<sup>190</sup> Therefore, the unlimited plans are, at best, a limited market solution, targeted at a small segment of cell phone users. These heavy users may learn more quickly and more readily demand products that cater to their needs. A more general market solution to consumer learning about underestimation and overage costs, such as a two-part tariff, is still absent and, as mentioned above, so is a market solution to the overestimation problem.

The move by Sprint and other carriers to bundle voice, messaging, and data services in a single “unlimited” plan with a single monthly fixed-fee<sup>191</sup> may be responding to learning of a different kind. Consumers are “confused” by complex, multidimensional contracts and are demanding greater “simplicity.”<sup>192</sup> While a single-price “unlimited everything” plan is simpler, its simplicity can be overstated. In measuring simplicity, it is not enough to consider the price and other product attributes of only a single plan. The level of complexity is a result of the interaction between product attributes and consumer usage patterns across a carrier’s entire menu of plans. So, for example, in order to choose between a \$99 unlimited plan and a limited plan with a lower monthly fee (plus possibly separate charges for text messaging and data services), consumers must still form accurate estimates of their future use and calculate the expected total price of both plans — a potentially difficult task.

## 2. AT&T’s Rollover Minutes

Consumer use varies from month to month. For example, a consumer may talk 350 minutes one month and 550 minutes the next month. With a standard 450 minute plan, this consumer will waste 100 minutes in the first month and pay overage charges for 100 minutes. With AT&T’s 450 minute plan, which includes the rollover minutes feature, the 100 spare minutes in the first month are not wasted. Rather they are “rolled over” to, that is, added to the available

---

189. Many consumers probably still overestimate their usage and could benefit from moving from an unlimited plan to a limited plan with a lower monthly fee. *See supra* Part IV.A.1.b.

190. *See* Jeff Blyskal, *Mostly Talk: New Unlimited Cell Plans Won’t Pay for Most*, CONSUMERREPORTS.ORG, Feb. 26, 2008, <http://blogs.consumerreports.org/electronics/2008/02/mostly-talk-new.html>.

191. *See* Cheng, *supra* note 185.

192. Blumenstein, *supra* note 116.

minutes for, the second month.<sup>193</sup> This means that in the second month the consumer has 550 minutes instead of 450 minutes and thus will not pay any overage.<sup>194</sup> The rollover feature, which predates the unlimited calling plans described above, can also be seen as a response to consumer learning about the costs of underestimated use and overage charges. But, unlike unlimited plans that directly respond to underestimation of use, the rollover feature seems to respond to a different bias — overconfidence about use levels, which implies underestimation of use in some months and overestimation of use in others. By enabling the consumer to smooth his uneven use over time, the rollover feature mitigates the costs of overconfidence.

### 3. Prepaid Plans

Prepaid, no-contract plans are the natural choice for a sophisticated consumer who has learned the costs of lock-in and demands flexibility. This flexibility, however, comes at a cost. Not only do prepaid, no-contract subscribers forgo the phone subsidies offered to postpaid, locked-in subscribers, they also pay higher per-minute charges (at least as compared to postpaid subscribers who use all the allotted minutes under their plans). As a result, even a sophisticated consumer would be reluctant to choose a prepaid plan. In fact, prepaid, no-contract plans were designed for distinct segments of consumers, specifically younger and poorer consumers who have low credit scores and do not qualify for a postpaid plan.<sup>195</sup> In other words, prepaid plans are not a market response to consumer learning. Nonetheless, these plans are attractive to sophisticated consumers with relatively low use levels.

Despite their potential benefits, prepaid plans have a rather limited market share. In the U.S., only 16% of cell phone users have prepaid plans, and among households with incomes above \$75,000, only

---

193. Unused minutes do not roll over forever. They expire after a year.

194. In this example, the rational non-AT&T customer will switch to a 900 minute plan and pay an additional \$20 per month because this charge is smaller than the average overage paid in the seemingly cheaper plan:  $\$45 / 2 \text{ months} = \$22.50 \text{ per month}$ .

195. FCC TWELFTH REPORT, *supra* note 34, at 2297–98 ¶¶ 116–18; *see also* Gerry Khermouch & Catherine Yang, *Richard Branson: Winning Virgin Territory*, BUS. WK., Dec. 22, 2003, at 45 (noting that Virgin is attracting young customers by offering no-contract prepaid cellular service). No-contract plans are less profitable for carriers, even though the rates per minute of use are higher. For example, T-Mobile generates about \$24 in revenue per prepaid customer, as opposed to about \$52 per postpaid contract user. Marin Perez, *T-Mobile's Data Revenues Increase From Android-Powered G1*, INFORMATIONWEEK, Nov. 6, 2008, <http://www.informationweek.com/news/telecom/business/showArticle.jhtml?articleID=212001129>; *see also* FCC TWELFTH REPORT, *supra* note 34, at 2297 ¶ 116 (noting that prepaid plans were not heavily promoted by the industry in the past because average revenues per unit tend to be lower and churn rates higher relative to postpaid calling plans). It can thus be inferred that prepaid plans are targeted at consumer groups that would not use cell phones absent the prepaid option, or that would pose too great a credit risk to qualify for a postpaid plan.

6% of cell phone users have prepaid plans.<sup>196</sup> These figures lend support to the proposition that many prepaid users likely did not choose prepaid plans but rather were denied the postpaid option. This reinforces the claim that prepaid plans target weaker segments of the market and, for the most part, do not compete directly with postpaid plans. Importantly, the low take-up of prepaid plans is not attributed to a lack of familiarity with the prepaid option, as 86% of Americans report that they are familiar with prepaid cell phones.<sup>197</sup> Arguably, consumers are aware of the prepaid option but unaware of the cognitive biases that render this option less attractive or, more accurately, render the postpaid alternative more attractive. But this is starting to change. Prepaid plans are now attracting consumers from segments of the market previously controlled by postpaid plans. In 2008, sales of prepaid plans grew 13% in North America, nearly three times faster than traditional postpaid plans.<sup>198</sup>

It should also be noted that prepaid plans, while solving the lock-in problem, do not eliminate consumer mistakes. Misperceptions about future use may still lead consumers to choose the wrong monthly prepaid plan. Expiration dates on minutes purchased under pay-as-you-go plans may be a response to consumers' overestimation of use.

#### 4. Graduated ETFs

As described in Part III.B, carriers have been moving from a time-invariant ETF to a time-variant, graduated ETF structure. This shift responds to consumers' increased awareness and sensitivity to ETFs. The change in the design of ETF provisions is not a pure market solution. Rather, it is an example of how consumer learning and legal intervention can work in tandem to change business practices. The ETF story likely began with a small number of consumers who learned to appreciate the cost of ETFs and initiated litigation against the carriers. The threat of liability probably pushed carriers to adjust their ETF structure. But the litigation also facilitated greater awareness and sensitivity to ETFs among consumers. This adjusted demand was something that carriers could not ignore.

---

196. OPINION RESEARCH CORPORATION, PREPAID PHONES IN THE U.S.: MYTHS, LACK OF CONSUMER KNOWLEDGE BLOCKING WIDER USE 4, 10 (Dec. 4, 2008), [http://www.newmillenniumresearch.org/archive/120408\\_prepaid\\_myths\\_survey\\_report.pdf](http://www.newmillenniumresearch.org/archive/120408_prepaid_myths_survey_report.pdf).

197. *Id.* at 3.

198. Jenna Wortham, *Cellphones Without Strings*, N.Y. TIMES, Feb. 20, 2009, at B1 (describing the growing attraction of prepaid plans and citing Pali Research, an investment advisory firm, regarding the growth rate of prepaid plans); *see also* FCC THIRTEENTH REPORT, *supra* note 32, at 6246 ¶ 117 (noting that according to one analyst's figures, the percentage of major operators' customers who subscribe to prepaid plans increased from 15% at the end of 2006 to 17% at the end of 2007).

## 5. Open Access

Finally, the open-access movement in wireless telecommunications is a market-driven development that could reduce the costs of lock-in and handset-service bundling. While carriers are still the leading handset retailers, recent developments are diminishing their power such that it is likely that handset manufacturers will increasingly sell their products directly to consumers, who can use the phone on any network. Open access is not a response to consumer learning about biases and the cost of lock-in. Nevertheless, it is an important development that can reduce the costs of consumer biases.

### *B. Market Solutions and Consumer Welfare*

Cell phone users learn from their mistakes, and the cellular service market seems quite responsive to demand generated by these increasingly sophisticated consumers. From a policy perspective, the question is to what extent market solutions mitigate the welfare costs identified in Part V. First, we have shown that the market promptly responds when consumers quickly learn about the implications of their mistakes, as they do when underestimated use leads to overage charges. But we have also shown that the market responds more sluggishly when learning is slower because the feedback mechanisms are weaker, as is the case with overestimated use. Second, while the market solutions described above have the potential to minimize the welfare costs of the identified behavioral market failure, in practice their effects are more limited. The reason is that many consumers do not take advantage of these market solutions. For example, unlimited plans with their high monthly fees are attractive only to a small fraction of heavy users. Prepaid plans are chosen by a small minority of consumers. If consumers are not aware of their mistakes, then they will not search for products that reduce the likelihood and consequences of mistakes.

Finally, it is evident that consumers learn and that the market responds to the demand generated by these more sophisticated consumers. But this does not mean that welfare costs are not incurred during the interim period. We need to ascertain the speed of consumer learning and of the market response to changing demand in order to assess the magnitude of welfare costs. Moreover, when consumers learn to overcome one mistake, or when one hidden term becomes salient, carriers have an incentive to add a new non-salient term and to trigger a new kind of mistake.<sup>199</sup> Even if consumers always catch up eventually, this cat-and-mouse game imposes welfare costs. Wireless opera-

---

199. See Gabaix & Laibson, *supra* note 5, at 1–2.



tors are among the leading generators of consumer complaints.<sup>200</sup> Market solutions, while important, are clearly imperfect.

## VII. POLICY IMPLICATIONS

The identified behavioral market failure imposes substantial welfare costs. Consumer learning coupled with market forces works to reduce these welfare costs, but do not eliminate them. Can legal intervention help, perhaps only by reinforcing consumer learning and market correction? In this Part, we initially survey existing rules and regulations affecting the cellular service contract. We then tentatively propose several reforms, focusing on the disclosure regime. Focusing on disclosure targets the behavioral market failure by reducing consumer misperceptions. More intrusive regulations, such as forcible unbundling of equipment and service contracts, would eliminate costs associated with consumer misperceptions, but at the cost of eliminating efficiency benefits that can arise through bundling in competitive markets.

### A. Existing Regulations Affecting the Cellular Service Contract

#### 1. Who Can Regulate?

The FCC has plenary jurisdiction to license radio spectrum for wireless communication under the Communications Act of 1934.<sup>201</sup> Accordingly, states lack the authority to license radio spectrum for intrastate uses.<sup>202</sup> Moreover, the Omnibus Budget Reconciliation Act of 1993 amended the Communications Act to preempt states from regulating the entry of, or rates charged by, any wireless provider; states, however, retain the right to regulate other terms and conditions.<sup>203</sup> Consumers can sue wireless carriers under state tort, contract, and consumer protection laws for false advertising, misleading billing practices, and poor service.<sup>204</sup> States can petition the FCC for author-

---

200. See Spencer E. Ante, *The Call for a Wireless Bill of Rights*, BUS. WK., Mar. 20, 2008, at 80, available at [http://www.businessweek.com/magazine/content/08\\_13/b4077080431634.htm?campaign\\_id=rss\\_tech](http://www.businessweek.com/magazine/content/08_13/b4077080431634.htm?campaign_id=rss_tech) (noting that, according to the Better Business Bureau, for each of the past three years, the wireless sector has received more complaints than any other industry). In the second quarter of 2008, the FCC received 13,560 complaints about wireless telecommunications. FCC, QUARTERLY REPORT ON INFORMAL CONSUMER INQUIRIES AND COMPLAINTS RELEASED 1 (Jan. 8, 2009), available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-287780A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-287780A1.pdf).

201. William R. Drexel, *Telecom Public Policy Schizophrenia: Schumpeterian Destruction Versus Managed Competition*, 9 VA. J.L. & TECH. 5, 7–8 (2004), [http://www.vjolt.net/vol9/issue2/v9i2\\_a05-Drexel.pdf](http://www.vjolt.net/vol9/issue2/v9i2_a05-Drexel.pdf); see also 47 U.S.C. § 301 (2006).

202. Drexel, *supra* note 201, at 8.

203. *Id.*; see also 47 U.S.C. § 332(c)(3)(A) (2006).

204. NÜECHTERLEIN & WEISER, *supra* note 8, at 273. Carriers, however, argue that such regulation is preempted as it amounts to entry or rate regulation. See *infra* note 232.

ity to regulate rates for any commercial mobile service, which will be granted upon a demonstration that market conditions fail to adequately protect consumers against “unjust and unreasonable rates or rates that are unjustly or unreasonably discriminatory.”<sup>205</sup> In addition, states retain the authority to impose requirements on telecommunications services that are “necessary to ensure the universal availability of telecommunications service at affordable rates.”<sup>206</sup> State and local governments also retain zoning authority that gives them control over the placement of wireless service facilities, so long as the regulations do not have the effect of unreasonably discriminating among providers or prohibiting the provision of wireless services.<sup>207</sup>

## 2. Indirect Effects

Under the 1996 Telecommunications Act, wireless carriers are subject to certain provisions designed to promote competition.<sup>208</sup> For instance, all telecommunications carriers have “the duty to interconnect directly or indirectly with the facilities and equipment of other telecommunications carriers.”<sup>209</sup> The FCC invoked its authority to enact competition-enhancing regulations when it extended manual roaming obligations — previously imposed only on cellular providers — to broadband PCS (personal communications service)<sup>210</sup> and certain SMR (specialized mobile radio)<sup>211</sup> carriers.<sup>212</sup>

205. 47 U.S.C. § 332(c)(3)(A)(i) (2006).

206. *Id.* § 332(c)(3)(A).

207. *Id.* § 332(c)(7).

208. A stated purpose of the Act is “[t]o promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies.” Telecommunications Act of 1996, Pub. L. No. 104-104, purpose statement, 110 Stat. 56, 56 (1996) (codified as amended at 47 U.S.C. §§ 251–76 (2006)).

209. 47 U.S.C. § 251(a)(1) (2006).

210. The FCC has set aside the spectrum between 1850 MHz and 1990 MHz for broadband PCS. PCS licenses have been assigned through auction since 1995 with some blocks assigned on the basis of 51 Major Trading Areas and others on the basis of 493 Basic Trading Areas. FCC ELEVENTH REPORT, *supra* note 17, at 10974–75 ¶ 63. Broadband PCS systems are similar to cellular systems, except that they operate in different spectrum bands and have been designed from the beginning to use a digital format. *Id.*

211. Specialized Mobile Radio (SMR) services were created by the FCC in 1974 to provide land mobile communications on a commercial basis to businesses, government agencies, and individuals. U.S. CONG. OFFICE OF TECH. ASSESSMENT, THE 1992 WORLD ADMINISTRATIVE RADIO CONFERENCE: ISSUES FOR THE U.S. INTERNATIONAL SPECTRUM POLICY 39 (1991). In 1979, the FCC allocated 19 MHz of spectrum in the 800 and 900 MHz bands exclusively for SMR services. FCC ELEVENTH REPORT, *supra* note 17, at 10975–76 ¶ 64. Nextel (and now Sprint-Nextel) is an SMR provider.

212. *See In re Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services*, Second Report and Order and Third Notice of Proposed Rulemaking, FCC CC Docket No. 94–54, 11 F.C.C.R. 9462, 9463 (1996) (invoking its general authority under the Telecommunications Act to extend number portability requirements, explicitly imposed only on local exchange carriers, to wireless providers). In other areas, the FCC has taken a deregulatory approach on the grounds that the market is sufficiently competitive. Thus, in

However, as we have seen, enhanced competition is not a general solution to the identified behavioral market failure. If consumers suffer from a systematic bias, competition may force carriers to design their contracts in response to this bias. Nevertheless, regulations designed to enhance competition have an indirect effect on the carrier-consumer relationship and the cell phone contract — an effect that is often beneficial to consumers, including imperfectly rational consumers. First, competition can help reduce consumer bias as competing carriers develop market solutions and advertise them to consumers. Second, regulation designed to increase competition by reducing switching costs<sup>213</sup> can help imperfectly rational consumers by preventing, or at least increasing the costs to carriers of, bundling strategies.

While regulation affecting consumer switching costs limits providers' ability to employ bundling strategies, the FCC does not directly regulate the practice of bundling of equipment and service. The FCC held that the Communications Act's general prohibition on offering more favorable terms on services and equipment that are purchased together rather than separately does not apply to wireless carriers.<sup>214</sup> The FCC judged that the markets were sufficiently competitive to ensure that the risks of carriers leveraging market power from the services market to the equipment market were sufficiently low and outweighed by the benefits of permitting bundling. In particular, the FCC determined that permitting bundling allows carriers to provide service and equipment more economically.<sup>215</sup>

If consumers are rational, it makes sense to permit bundling when both markets are competitive. But the conclusion no longer necessarily follows when, for example, consumers systematically underestimate the cost of service so that carriers have an incentive to backload the pricing by reducing the cost of the handset and increasing the

---

1996, the FCC determined that its rules prohibiting wireless carriers from imposing restrictions on resellers would “sunset” by 2001. NUECHTERLEIN & WEISER, *supra* note 8, at 272.

213. *E.g.*, *In re Telephone Number Portability*, FCC CC Docket No. 95-116, 19 F.C.C.R. 875, 875-76 (2004) (mandating number portability between networks); *see also* 37 C.F.R. § 201.40(b)(5) (2008) (exempting software that “unlocks” wireless handsets from the Digital Millennium Copyright Act). On this dimension, the U.S. is converging to the European model. *See Ante*, *supra* note 74 (“European and Asian mobile carriers [have] backed technologies that allow subscribers to switch to rivals with ease.”). In Europe, regulations mandating uniform technological standards have facilitated switching and competition by making it easier for consumers to take their phone from one carrier to another. FCC THIRTEENTH REPORT, *supra* note 32, at 6250-51 ¶ 126. And cell phone providers “use unlocked GSM-type phones, which contain SIM cards” and allow users to switch their phones between networks. Reinhardt Krause, *Sales of SIM Cards Might Shuffle Deck in Wireless Services*, INVESTOR'S BUSINESS DAILY, Sept. 18, 2008.

214. NUECHTERLEIN & WEISER, *supra* note 8, at 270.

215. *In re Bundling of Cellular Customer Premises Equipment and Cellular Service*, Report and Order, FCC CC Docket No. 91-34, 7 F.C.C.R. 4028, 4030 (1992).

price of service. Consumers end up purchasing too many cell phone contracts because they underestimate the overall cost of the bundle.

### 3. Direct Regulations of the Consumer-Carrier Relationship

Regulation of the consumer-carrier relationship is largely limited to regulation of the information that the provider must disclose to its consumers. We begin by describing affirmative disclosure mandates. We then proceed to discuss the flip-side of disclosure mandates, namely, the prohibition on misleading disclosures, usually in advertising. We conclude with a description of the legal challenge to early termination fees — the most prominent non-disclosure regulation.<sup>216</sup>

#### *a. Disclosure*

Exercising its powers under the Communications Act, the FCC promulgated rules intended to prevent fraudulent behavior by telecommunications providers and to increase the transparency of providers' billing practices. Providers must clearly identify the name of the service provider associated with each billed charge and prominently display a toll-free telephone number that customers can call to inquire about or dispute any charges.<sup>217</sup> Most importantly, since 2005 charges must "be accompanied by a brief, clear, non-misleading, plain language description of the service or services rendered" that is "sufficiently clear in presentation and specific enough in content so that customers can accurately assess that the services for which they are billed correspond to those that they have requested and received, and that the costs assessed for those services conform to their understanding of the price charged."<sup>218</sup> The underlying rationale is "to allow

---

216. One form of regulation that is conspicuously missing is rate regulation. The states are preempted from influencing rates except in very limited circumstances described above. See *supra* note 203 and accompanying text. Under the Communications Act, wireless providers have an obligation to charge rates that are just, reasonable, and not discriminatory, and the FCC is authorized to prescribe what is reasonable and just if a carrier is found to be in violation of its duties under the Act. See 47 U.S.C. §§ 201(b), 202(a), 205(a) (2006). However, the FCC has generally chosen to forbear from regulating rates for wireless communications services. Using its authority under the Communications Act § 332, the FCC has exempted wireless carriers from common carriers' tariff obligations and market entry and exit regulations on the grounds that competition renders such forms of regulation unnecessary. See NUCHESTERLEIN & WEISER, *supra* note 8, at 270.

217. 47 C.F.R. § 64.2401(a)(1), (d) (2008).

218. 47 C.F.R. § 64.2401(b) (2008). In 1999, the FCC set out general truth-in-billing principles that required that bills (1) "be clearly organized, clearly identify the service provider, and highlight any new providers;" (2) "contain full and non-misleading descriptions of charges;" and (3) "contain clear and conspicuous disclosure of any information that the consumer may need to make inquiries about, or contest charges." *In re* Truth-in-Billing and Billing Format, First Report and Order and Further Notice of Proposed Rulemaking, FCC CC Docket No. 98-170, 14 F.C.C.R. 7492, 7496 (1999) [hereinafter Truth-in-Billing 1999]. Although the FCC intended that these principles should apply to both wireline and wireless

consumers to better understand their telephone bills, compare service offerings, and thereby promote a more efficient competitive marketplace.<sup>219</sup> Further disclosure requirements are imposed at the state level. In particular, state laws regulate wireless line item charges — discrete charges that are separately identified on a consumer’s bill.<sup>220</sup>

There have been calls for more stringent disclosure requirements. For instance, in 2003, Senator Schumer introduced a bill — The Cell Phone User Bill of Rights — designed to improve disclosure and make it easier for consumers to choose among providers and plans. The bill sought to ensure that marketing materials and contracts clearly spell out the terms and conditions of service plans by requiring that all wireless contracts and marketing materials display a box containing standardized information on a number of key issues. Providers would have to disclose rate information, including the monthly fixed charge, per minute charges for minutes not included in the plan, and the method for calculating minutes charged. Information on included weekday and daytime minutes and nights and weekend minutes, long-distance charges, roaming charges, incoming call charges, and charges for directory assistance would also have to be displayed. Termination and start-up fees and trial periods would have to be outlined as would any taxes and surcharges. In addition, the Bill would authorize the FCC to monitor service quality industry-wide and make the resulting data publicly available to enable consumers to make informed choices among providers.<sup>221</sup> The Bill has not been enacted into law.

---

carriers, wireless carriers were initially exempted from the rule implementing (2) that required charges on bills to be accompanied by a brief, clear, non-misleading, plain language description of the service or services rendered. *See In re Truth-in-Billing and Billing Format, Second Report and Order, Declaratory Ruling, and Second Further Notice of Proposed Rulemaking, FCC CC Docket No. 98-170, 20 F.C.C.R. 6448, 6450-52 (2005)* [hereinafter *Truth-in-Billing 2005*]. However, the exemption was lifted in 2005. *Id.* at 6456.

219. *Truth-in-Billing 2005, supra* note 218, at 6450. The FCC rejected the argument that competitive market conditions eliminate the need for the requirement concluding, on the contrary, that “the provision of clear and truthful bills is paramount to efficient operation of the marketplace” even under otherwise competitive conditions. *Id.* at 6456.

220. *Id.* at 6462. The FCC argued that these laws constitute rate regulation and are therefore preempted under § 332(c)(3)(A) of the Communications Act. *Id.* at 6462-63. However, the 11th Circuit previously held that the Communications Act does not give the FCC the authority to preempt states’ ability to regulate the use of line items in wireless customer bills, arguing that such regulation affects the presentation of charges but not the amount charged and that line item charges are not rates but rather are part of the “other terms and conditions” that are subject to state regulations under § 332(c)(3)(A). *See Nat’l Ass’n of State Util. Consumer Advocates v. FCC, 457 F.3d 1238, 1254 (1996)*.

221. *Cell Phone User Bill of Rights, S. 1216, 108th Cong. (2003)*. A similar bill, the Wireless Consumer Protection and Community Broadband Empowerment Act, was proposed more recently by Representative Edward Markey. *See* Press Release, Office of Rep. Edward Markey, Markey Holds Hearings on Draft Bill to Address Wireless Customer Protections, Feb. 27, 2008, [http://markey.house.gov/index.php?option=com\\_content&task=view&id=3281&Itemid=241](http://markey.house.gov/index.php?option=com_content&task=view&id=3281&Itemid=241).

In 2004, the California Public Utility Commission (“CPUC”) promulgated a similar set of rules.<sup>222</sup> These regulations required wireless providers and other telecommunications operators to (1) ensure that subscribers receive clear and complete information about rates, terms, and conditions when customers sign up for the service; (2) produce clearly organized bills that only contain charges that the subscriber has authorized; and (3) list all federal, state, and local taxes, surcharges, and fees separately.<sup>223</sup> The regulations were suspended by the CPUC less than a year after their adoption, after the term expirations of two commissioners who supported the rules.<sup>224</sup> The drive for improved disclosure, however, is continuing. Twenty-two states have introduced some form of a Cell Phone User Bill of Rights.<sup>225</sup>

*b. False Advertising*

In addition to affirmative disclosure regulation, providers are subject to negative disclosure regulation, i.e., restrictions on what providers can tell consumers, mainly through advertising. Unfair or deceptive advertising is generally policed by the FTC under the Federal Trade Commission Act.<sup>226</sup> However, the FTC Act explicitly excludes “common carriers subject to the Acts to regulate commerce,” including the 1934 Communications Act,<sup>227</sup> to avoid interfering with the FCC’s regulation of common carriers.<sup>228</sup>

The FCC has interpreted section 201(b) of the Communications Act, which prohibits “unjust and unreasonable” practices,<sup>229</sup> as giving it the authority to police unfair or deceptive advertising by common carriers.<sup>230</sup> However, it appears that the FCC rarely invokes its authority under section 201(b).<sup>231</sup> Instead, advertising by cellular service

---

222. See Press Release, California Public Utilities Commission, PUC Sets Protection Rules for Consumers Through Telecommunications Bill of Rights, May 27, 2004, [http://docs.cpuc.ca.gov/published/NEWS\\_RELEASE/36910.htm](http://docs.cpuc.ca.gov/published/NEWS_RELEASE/36910.htm).

223. *Id.*; Robert W. Hahn et al., *The Economics of “Wireless Net Neutrality,”* 3 J. COMPETITION L. & ECON. 399, 413 (2007).

224. *California Suspends Wireless Bill of Rights*, CONSUMERAFFAIRS.COM, Jan. 28, 2005, [http://www.consumeraffairs.com/news04/2005/cpuc\\_wireless.html](http://www.consumeraffairs.com/news04/2005/cpuc_wireless.html).

225. See Ante, *supra* note 74.

226. See 15 U.S.C. § 45(a)(2) (2006) (giving the FTC authority to prevent “unfair methods of competition in or affecting commerce and unfair or deceptive acts or practices in or affecting commerce.”).

227. *Id.*

228. See *FTC v. Verity Int’l, Ltd.*, 194 F. Supp. 2d 270, 275 (S.D.N.Y. 2002). Thus, a wireless carrier is beyond the reach of the FTC at least insofar as it engaged in providing telecommunications services. See *id.* at 274.

229. 47 U.S.C. § 201(b) (2006).

230. See *In re Bus. Disc. Plan, Inc., Order of Forfeiture*, 15 F.C.C.R. 14461 (2000), *aff’d in relevant part, In re Bus. Disc. Plan, Inc., Order on Reconsideration*, 15 F.C.C.R. 24396, 24398 (2000).

231. In arguing that 47 U.S.C. § 201(b) gave it the authority to assess a forfeiture against Business Discount Plan for using unjust and unreasonable telemarketing practices in con-

providers is mainly regulated at the state level. Consumers have been using state tort law, specifically fraud and misrepresentation, contract law, and deceptive advertising laws to hold providers accountable for service that fell short of what the provider's advertisements promised.<sup>232</sup>

*c. Challenging ETFs*

On one important dimension, early termination fees, the law has moved beyond the regulation of information provided by carriers. Class action lawsuits against cellular service providers have been initiated across the United States by customers alleging that ETFs are not proper liquidated damages provisions and violate various state laws as a result.<sup>233</sup> In one such lawsuit, the Alameda County Superior Court found that Sprint's ETF was an unlawful penalty under California Civil Code 1671(d) and ordered Sprint to pay \$18.25 million to class members who paid their ETFs and credit \$54.75 million to those who

---

nection with its "slamming" violations, the FCC cited only two instances in which it had invoked § 201(b) for a similar purpose in the past, suggesting that the FCC does not frequently invoke this authority. *See In re Bus. Disc. Plan, Inc.*, Order of Forfeiture, 15 F.C.C.R. at 14469.

232. *See, e.g.*, *Pac. Bell Wireless, LLC v. Pub. Utils. Comm'n*, 44 Cal. Rptr. 3d 733, 753–54 (Cal. Ct. App. 2006) (upholding multimillion dollar fine against wireless service provider for, inter alia, failing to disclose to customers known network problems and misleading customers regarding network's coverage and service in violation of state law); *Union Ink Co. v. AT&T Corp.*, 801 A.2d 361, 365–67, 378 (N.J. Super. App. Div. 2002) (holding that plaintiff's state law fraud and negligent misrepresentation claims arising from AT&T's alleged misrepresentations of the quality and reliability of its cellular phone service were not preempted by federal law). Providers have been pushing for broad preemption of such regulation on grounds that it constitutes regulation of "entry or rates charged" which is prohibited under § 332(c)(3)(A). Specifically, they have argued that "any determination of monetary liability [under state consumer protection, tort, or contract claims] is equivalent to a finding that the service was inadequate for the price charged and therefore necessarily constitutes a finding that the rates originally charged were unreasonable." *In re Wireless Consumers Alliance, Inc.*, FCC Memorandum Opinion and Order, 15 F.C.C.R. 17021, 17035 (2000). However, the FCC rejected this argument, holding that state law claims must generally proceed, unless the particular facts and circumstances of the case indicate that they amount to rate or entry regulation. In particular, the FCC reasoned that in calculating damages arising from breach of contract or false advertising claims, a court need not rule on the reasonableness of the carrier's charges in order to calculate compensation though it may take price into account; rather, it is assessing the difference between promise and performance. *Id.* at 17035–36, 17040–41; *see also Fedor v. Cingular Wireless Corp.*, 355 F.3d 1069, 1074 (7th Cir. 2004) (holding that breach of contract claim based on allegation that carrier deferred billing for calls to later period was not preempted); *DeCastro v. AWACS, Inc.*, 935 F. Supp. 541, 550 (D.N.J. 1996) (holding that claim about failure to disclose a particular billing practice was not preempted); *Tenore v. AT&T Wireless Servs.*, 962 P.2d 104, 115 (Wash. 1998) (holding that deceptive advertising claim that carriers failed to disclose practice of rounding up to nearest minute was not preempted).

233. *See, e.g.*, *Greene v. T-Mobile USA, Inc.*, No. C07-1563RSM, 2008 WL 351017 (W.D. Wash. Feb. 7, 2008); *Waudby v. Verizon Wireless Servs., LLC*, No. 07-470(FLW), 2007 WL 1560295 (D.N.J. May 25, 2007); *In re Cell Phone Termination Fee Cases*, No. A115457, 2008 WL 2332971 (Cal. Ct. App. June 9, 2008).

were charged but did not pay their ETFs.<sup>234</sup> Verizon Wireless recently settled a set of early-termination lawsuits for \$21 million.<sup>235</sup> Other state actions have been stayed pending the outcome of FCC proceedings,<sup>236</sup> which have been initiated to determine whether these state law claims are preempted by federal law on the grounds that ETFs constitute “rates charged” within the meaning of § 332(c)(3)(A) of the Communications Act.<sup>237</sup> The FCC public hearings on ETFs began on June 12, 2008.<sup>238</sup>

In the wake of this litigation, carriers have moved to prorate their termination fees over the life of the contract and now some form of time-sensitive ETF applies to new postpaid contracts initiated with any of the major carriers.<sup>239</sup>

### B. New Proposals: Rethinking Disclosure

#### 1. From Product Attributes to Use Patterns

As we have seen, consumers in the cellular service market learn, often quite effectively, to appreciate the implications of their biases and mistakes. Competition then pushes carriers to respond with products that reduce the resulting costs to consumers. While these market solutions are imperfect, the market’s responsiveness suggests that the regulation best suited for the cellular service market would facilitate rather than inhibit market forces. It is, therefore, not surprising that many of the existing and proposed laws and regulations have focused on the provision of information. We too focus on rules governing information provision, specifically, on disclosure regulation.

Our proposals, however, deviate from existing disclosure regulation and from other proposals for heightened disclosure regulation in an important way. Current disclosure regulation focuses on the disclosure of product attribute information, i.e., information on the different

---

234. *Ayyad v. Sprint Spectrum LP*, No. RG03-121510, 2008 WL 2937047 (Cal. App. Dep’t Super. Ct. July 28, 2008).

235. Lavalley, *supra* note 126.

236. *See, e.g., Greene*, 2008 WL 351017; *Waudby*, 2007 WL 1560295.

237. *Waudby*, 2007 WL 1560295, at \*1.

238. Materials from the public hearing are available at FCC, Public Hearing on Early Termination Fees (ETF), <http://www.fcc.gov/realaudio/presentations/2008/061208/>; *see also* Amy Schatz, *FCC May Set Cell-Termination Fees*, WALL ST. J., May 24, 2008, at A2. Schatz discusses the possible preemption effect of FCC regulation.

Wireless-phone companies could erase hundreds of millions of dollars in potential liability under a plan being weighed by federal regulators, who are considering overseeing fees charged to consumers who cancel cell phone contracts early. The plan could deal a fatal blow for lawsuits, pending in several states, brought by consumers angry about fees of as much as \$175 that wireless companies charge to break contracts.

*Id.*

239. *See supra* notes 128–29 and accompanying text.



features and price dimensions of cellular service.<sup>240</sup> Our proposal, on the other hand, emphasizes the disclosure of use-pattern information, i.e., information on how the consumer will use the product.

The proposed Cell Phone User Bill of Rights illustrates the current exclusive focus on product attribute information. It requires comprehensive disclosure of fees and charges.<sup>241</sup> However, a truly informed choice cannot be based on product attributes alone. To fully appreciate the benefits and costs of a cellular service contract, consumers must combine product attribute information with use-pattern information. To assess the costs of overage fees, it is not enough to know the per-minute charges for minutes not included in the plan, as proposed in the Bill; consumers must also know the probability that they will exceed the plan limit and by how much. Likewise, to assess the benefit of unlimited night and weekend calling, consumers must also know how many “night” and “weekend” minutes they will use as well as the precise contractual definition of “night” and “weekend.” The essence of our proposal lies in the recognition that use-pattern information can be as important as product attribute information. The disclosure regime should be redesigned to ensure that consumers have both categories of information.

## 2. Disclosing Use-Pattern Information

Conventional wisdom assumes that sellers have better information about product attributes while buyers have better information about use patterns. If a buyer has better information about how she will use the product, then it makes no sense to require sellers to disclose use-pattern information. The best that sellers can do is to provide general statistical information on product use. The buyer, on the other hand, has specific information on how *she*, not the average consumer, will use the product, or so the conventional account goes.

While in many markets the conventional wisdom is correct, it is not true of the cellular service market. Carriers have valuable statistical use-pattern information that is not available to subscribers. More importantly, they have individualized use-pattern data, collected over the course of their relationships with their subscribers. As suggested below, disclosing this information can empower consumers and facilitate the efficient functioning of the cellular service market.

### *a. Average-Use Disclosures*

Carriers collect and analyze enormous amounts of use-pattern information. They know how the average subscriber will use her cell

---

240. *See supra* Part III.A.

241. *See supra* note 221 and accompanying text.

phone. More importantly, the heterogeneity of the subscriber base allows carriers to provide average-use information for subgroups of consumers who are similar — in terms of demographic characteristics, product choices made, etc. — to the consumer receiving the use-pattern disclosure. As the subgroup over which the averaging takes place becomes smaller, the consumer heterogeneity problem decreases, and the value of the average-use information to the individual consumer increases. However, excessively small subgroups may also be undesirable. Averaging over large numbers has the benefit of reducing randomness. Reducing the size of the subgroup reduces this benefit. The optimal size of a subgroup is the product of a tradeoff between the benefit of reducing heterogeneity and the benefit of reducing randomness.

One potentially beneficial average-use disclosure would target the misperception of use levels that underlies three-part tariffs by requiring carriers to disclose the average average charges that consumers pay. Carriers could also be required to disclose the percentage of consumers who use, for example, 50% or less of their allotted minutes or the percentage of consumers who would save money if they switched to a lower fixed-fee, lower limit plan. Consumers' underestimation of the cost of lock-in could be targeted by requiring carriers to provide information about the percentage of consumers who stop using their phones but continue paying for them before the end of the lock-in period. Carriers could also be required to disclose the percentage of consumers who broke the contract and paid the exit penalty.<sup>242</sup>

#### *b. Individual-Use Disclosures*

Despite their potential benefits, average-use disclosures suffer from important shortcomings. Even when averaging across smaller subgroups of consumers, substantial heterogeneity remains. Heterogeneity limits the value of average-use information to any individual consumer. Moreover, heterogeneity allows optimistic consumers to further discount the value of average-use information. Most people think that their driving skills are above average (but of course, most people cannot be better than others given a symmetrical distribution of ability about the mean).<sup>243</sup> Similarly, optimistic consumers might all think that they will never exceed the plan limit, even when provided with information that the average consumer pays \$50 a month

---

242. Both of these disclosures are incomplete measures of the cost of lock-in since they do not capture consumers who continue using their phones only because they are locked in.

243. See David A. Armor & Shelley E. Taylor, *When Predictions Fail: The Dilemma of Unrealistic Optimism*, in *HEURISTICS AND BIASES: THE PSYCHOLOGY OF INTUITIVE JUDGMENT* 334, 334 (Thomas Gilovich et al. eds., 2002); Neil D. Weinstein, *Unrealistic Optimism About Future Life Events*, 39 *J. PERSONALITY & SOC. PSYCHOL.* 806, 818–19 (1980).

in overage fees. Fortunately, use-pattern disclosure in the cellular service market need not be limited to average-use information. The long-term relationship between carriers and consumers allows for the provision of individualized use-pattern information.<sup>244</sup>

Individual-use disclosure can reduce consumers' misperceptions of their use levels. Carriers already provide consumers with individualized information on overage charges. Arguably, this disclosure reduced consumers' underestimation of use and contributed to the demand to eliminate overage fees — a demand that is now met by unlimited calling plans. We propose a parallel disclosure requirement that would help reduce the costs consumers incur due to overestimation of use. Carriers should be required to disclose the number of minutes used. (Some carriers already do so voluntarily.) Moreover, they should be required to disclose the actual per-minute price, calculated as the monthly fixed-fee divided by the number of minutes used.<sup>245</sup>

Individual-use disclosure can also help consumers evaluate the costs and benefits of other plan features. Carriers could be required to disclose the number of night and weekend minutes used and the costs saved by the unlimited nights and weekends feature. They could also be required to disclose the number of minutes used in in-network calling and the associated savings. Likewise, Verizon, which offers unlimited calls to five numbers, could be required to disclose the number of minutes used calling these five numbers, and the costs saved by this feature.

The existing and proposed disclosures could be further supplemented by information on alternative service plans and add-on features that would reduce the total price paid by the consumer given her current use patterns.<sup>246</sup> The proposed individual-use disclosures, including the comparison with other plan and add-on combinations, should be provided on the monthly bill, but also in aggregate form on a year-end summary to account for month-to-month variations in use. Thus, by highlighting the importance of individual-use disclosures, we urge lawmakers to revisit another key feature of the proposed Cell

---

244. Of course, consumers have access to the same use-pattern information. But while providers save the information and analyze it, consumers tend not to notice it and even if they do notice it, they tend to forget it.

245. A related disclosure is now voluntarily implemented by T-Mobile which offers "overage alerts" when subscribers get close to their monthly limit.

246. Utility companies in Germany have voluntarily adopted an even more pro-consumer policy. At the end of the year they retroactively match each consumer to the service plan under which the consumer pays the lowest total price given her use over the past year. See Ian Ayres & Barry Nalebuff, *In Praise of Honest Pricing*, 45 M.I.T. SLOAN MGMT. REV. 24, 27 (2003). A similar idea is already being applied by cell phone companies in other countries. See, e.g., Orange.fr, Forfait Ajustable Pro, [http://sites.orange.fr/boutique/files/html/pe\\_packpro\\_forfait\\_ajustable.html](http://sites.orange.fr/boutique/files/html/pe_packpro_forfait_ajustable.html) (last visited Dec. 20, 2009) (Orange in France offers to charge the subscriber at the end of the month according to the plan that best fits the subscriber's usage during that month).

Phone User Bill of Rights. This Bill focuses on disclosures provided at the time of contracting, which makes perfect sense when carriers are disclosing product attribute information. Individual-use information, on the other hand, is not available to carriers when a new subscriber signs up for service. Continuous disclosures throughout the life of the contract are equally important.

*c. Individual-Use Disclosures in Real Time*

In addition to after-the-fact disclosure of individual-use information in the monthly bill or in a year-end summary, individual-use information can sometimes be provided in real time. The challenge of keeping track of cumulative use has increased with the invention of multiple-limit plans. For example, plans with different limits for peak and off-peak minutes, have increased the chance that consumers inadvertently exceed their plan limits. To help consumers avoid this, carriers could be required to notify their subscribers when they are about to exceed the plan limit.<sup>247</sup> A consumer receiving such notification may well decide to cut the conversation short, switch to a land line, or postpone the conversation until off-peak hours.

3. Combining Use-Pattern Information with Product Attribute Information

In describing our proposals, we have focused on the disclosure of use-pattern information as opposed to product-attribute disclosures. But, in fact, the more appealing proposals argue for total cost disclosures, which combine both. For example, the disclosure of actual per-minute prices combines product attribute information, i.e. the monthly fixed-fee, and use-pattern information, i.e. the number of minutes used. Taking total cost disclosure one step further, carriers could be required to disclose a comprehensive total cost of ownership (“TCO”) figure for their calling plans — the total amount paid, or to be paid, by a consumer, including overage charges and ETFs, over the duration of a plan, or on a yearly basis. For new subscribers, this TCO figure can be based on average-use information. For existing subscribers, who are considering whether to renew their plan, switch plans, or even switch carriers, the TCO figure can be based on individual-use information.

TCO information for a single plan, specifically for the subscriber’s current plan, may be insufficient. To effectively compare different plans, the subscriber needs TCO information on all plans. Carriers could be required to provide TCO information for their entire

---

247. Such a disclosure is now voluntarily implemented by T-Mobile. *See supra* note 245.

menu of plans or, at least, for several main offerings. Perhaps a better solution would be to require carriers to disclose only the plan with the lowest TCO for the prospective subscriber and for the existing subscriber whose use patterns have changed. For example, the monthly bill or yearly summary can include a notice if an alternative plan would have a lower TCO than the subscriber's current plan. An even better solution would utilize the emerging market for comparison-shopping services. Companies like BillShrink.com<sup>248</sup> and Validas<sup>249</sup> promise to find the right plan for each consumer. But they currently do this based on minimal, usually self-reported, use-pattern information.<sup>250</sup> If carriers were required to provide comprehensive use-pattern information in electronic form, websites such as Bill-Shrink.com or Validas would be better able to provide useful recommendations.

Consumer choice should be guided by information about the total cost of the product. Conventional wisdom assumes that consumers have better information about their own use patterns and thus need only product attribute disclosures to calculate total cost. We have shown that carriers may well have better use-pattern information, as well as better product attribute information. They can more easily combine the two categories of information into a total cost disclosure. Therefore, there is a *prima facie* case for mandating total cost disclosures.<sup>251</sup>

#### 4. Mobile Disclosure

Traditional disclosure mandates require sellers to provide information printed on a piece of paper. Mobile technology opens the door to a variety of innovative disclosure methods. In particular, carriers can provide information via voice messages, via text messages, and even via multimedia messages. These modes of disclosure may be more effective than the traditional paper disclosure because of their immediacy.

---

248. BillShrink.com, We Empower and Inspire People to Save Money, <http://billshrink.com/about/> (last visited Dec. 20, 2009).

249. Validas, Personal Report: How It Works, <http://fixmycellbill.com/personal.aspx?section=how> (last visited Dec. 20, 2009).

250. *See id.*

251. We concede that our arguments only establish a *prima facie* case for total cost disclosures, since our analysis did not consider all the costs and benefits of revamping the current disclosure regime. At the very least, however, our analysis suggests that the current debates, e.g., over the Cell Phone User Bill of Rights, should consider total cost disclosures.

## 5. From Description to Prescription

A final clarification is in order: we developed a behavioral economics theory of contractual design in the cellular service market. We then proposed an enhanced disclosure regime to improve the operation of the cellular service market. It is important to note that our policy prescription does not depend on our behavioral description. Even if all consumers were perfectly rational but imperfectly informed about their use patterns, our disclosure regime would still be beneficial. But imperfect information coupled with systemic biases generates greater costs than imperfect information alone. Hence, the benefits of our proposed disclosure regime are likely to be greater in light of our behavioral story.

## VIII. CONCLUSION

The cellular service market, boasting annual revenues exceeding \$150 billion, is one of the largest and most important consumer markets in the United States. While cell phones provide obvious benefits to consumers, cellular service contracts are designed to exploit the cognitive biases of many consumers. Using a unique dataset of subscriber-level, monthly billing and usage information for 3,730 cell phone users, we show that 65% of consumers choose the wrong service plan — mistakes triggered by a key contractual design feature, the three-part tariff, that preys on consumers' misperception of use levels. These mistakes, we show, cost consumers almost \$12 billion annually. Consumer welfare and market efficiency are further reduced by the ETF-enforced lock-in feature and by the sheer complexity of the cell phone contract, which also respond to the imperfect rationality of consumers. Since consumer mistakes often result from consumers' misperceptions about their own future use patterns, disclosure mandates that would require carriers to provide consumers with use-pattern information could greatly reduce these costs.