The Cingular/AT&T Wireless Merger, Wireline-Affiliated Wireless Carriers, and Intermodal Competition in Telecommunications

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Abstract

The merger of Cingular and AT&T Wireless created the single largest national-footprint wireless carrier within the U.S. Two Regional Bell Operating Companies (RBOCs), SBC and BellSouth, wholly own and control the merged entity. In addition, the second-largest wireless firm post-merger, Verizon Wireless, is also an affiliate of another RBOC. Evidence raised in the public record indicates that the RBOCs were seeking to mitigate the migration of voice traffic from their wireline networks to wireless ones, including the wireless networks of their own affiliates. As such, to the extent that wireless telephony is a substitute for wireline service the removal of AT&T Wireless from the wireless market may correspond to the loss of a major intermodal competitor to wireline telephony. Using pre-merger data from cellular market areas (CMAs) in the U.S., this paper tests three hypotheses relating to wireline-wireless competition: (1) that in not having a wireline affiliation pre-merger, AT&T Wireless designed its wireless plans to act as an intermodal competitor in all markets, (2) that Cingular and Verizon wireless designed their plans to mitigate the extent of wireline to wireless substitution, and (3) that SBC/BellSouth and Verizon attempted to prevent their wireless affiliates from serving as intermodal competitors in each other’s wireline region. The results suggest that AT&T Wireless may have served as an intermodal competitor prior to the merger, and possibly Cingular as well (although to a far lesser extent within its parents’ wireline region). On the other hand, Cingular may have been designing its wireless offerings to serve as a complement to its parents’ wireline services in order to mitigate the extent of wireless substitution. Verizon Wireless may also have designed its plans for the purpose of retaining its parent’s wireline business but, unlike Cingular, by attempting to make its wireless offerings appear as a less attractive substitute for wireline service. Specifically, it is estimated that the average plan offered by Verizon Wireless to its parent’s wireline subscribers contained approximately 414 fewer minutes relative to plans offered elsewhere. Finally, it is posited that the future urban telecommunications market may be defined in terms of broad bundles of usage-integrated telecommunications services provisioned through various RBOC-Cable duopolies.

Keywords: Bundling; Intermodal Competition; Merger; Telecommunications; Wireless Substitution

JEL Classification: K23; L12; L13; L41; L96

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1 Introduction

In October, 2004 the U.S. Federal Communications Commission (FCC)\(^1\) and U.S. Department of Justice (DOJ) approved the merger of Cingular Wireless Corporation and AT&T Wireless Services, Inc. This merger joined the second and third largest national-footprint mobile/wireless telephone carriers to form the single largest wireless carrier (formerly Verizon Wireless).\(^2\) Both the FCC and the DOJ conditioned their approvals upon specific remedies which, for the most part, involved divestitures of assets in specific markets where the extant level of intramodal competition (\textit{i.e.}, competition between competing wireless firms) was expected to be adversely impacted.\(^3\) While also recognizing potential harms to intermodal forms of competition arising from the merger (\textit{e.g.}, competition between wireless and wireline telecommunications platforms, say, between AT&T Wireless and BellSouth), neither the FCC nor the DOJ requested any additional divestitures to remedy this specific problem (due to the fact that the degree of complete substitution of wireless for primary-line wireline service has been relatively small to date).\(^4\)

The merger comes at a time when the U.S. telecommunications industry is undergoing a dramatic period of change. The demand for wireless phone services continues to grow rapidly due to their convenience (\textit{e.g.}, mobility) and enhanced features (\textit{e.g.}, Internet access, photography, \textit{etc.}). In addition, most wireless plans offer “free” long-distance calling as part of the included “bucket” of minutes. This in turn has lead to a huge shift in voice traffic from wireline networks to wireless networks. Indeed, wireless telephony is often cited as one of the

\(^1\) Memorandum Opinion and Order, \textit{In re Applications of AT&T Wireless Services, Inc. and Cingular Wireless Corporation For Consent to Transfer Control of Licenses and Authorizations}, WT Docket No. 04-70 (October 26, 2004) (hereafter “Merger Order”).

\(^2\) As of December 31, 2003 the number of subscribers (revenue) for each of the three wireless carriers was as follows. Verizon Wireless: 37.5 million ($22.5 billion); Cingular: 24 million ($15.5 billion); AT&T Wireless: 22 million ($16.7 billion).

\(^3\) See Merger Order at ¶ 254-267 for discussion of the specific divestitures stipulated by the FCC.

\(^4\) Merger Order at ¶ 247.
technologies which will introduce “intermodal competition” to the wireline phone industry and intensify the overall competitive landscape of the telecommunications sector.\(^5\)

The majority of wireline access in the U.S. is provided by the Regional Bell Operating Companies (RBOCs). The RBOCs have already made major inroads into the wireless telephony market. Cingular is a joint ventured wholly owned and operated by two of the RBOCs, namely SBC Communications Inc. and BellSouth Corporation. The Cingular/AT&T Wireless merger therefore entails the largest national wireless company being controlled by two major regional wireline providers. The third largest wireless firm post-merger, Verizon Wireless, is also partially owned by another RBOC, Verizon Communications.

As realized in the FCC’s order, the consolidation of the wireless phone market towards carriers owned by RBOC wireline carriers raises several important competitive implications. In not being an RBOC-affiliated wireless carrier, the acquisition of AT&T Wireless might remove the presence of a potentially important intermodal competitor to wireline phone service. Evidence raised in the public record suggests that AT&T Wireless was positioning itself as a “maverick” in the wireless market, offering relatively low-price and/or high-minute plans which might induce wireline subscribers to “cut the cord” and substitute wireless service exclusively for wireline service.\(^6\)

The RBOCs’ ownership of wireless affiliates also gives them the seemingly exclusive ability to offer broad “bundles” of telecommunications services comprised of local and long-distance wireline voice, wireless voice, and data (primarily DSL). If other wireline competitors are not able to offer similar bundles they might be placed at a competitive disadvantage and,

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\(^5\) Two important recent papers which empirically address the issue of substitution between wireless and wireline telephony are Rodini et al. (2003) and Ward and Woroch (2004). The findings of Rodini et al. (2003) suggest that wireless and non-primary wireline access (i.e., the extensive “participation” decisions) are moderate substitutes. Ward and Woroch (2004) consider the relationship between the usage demands (i.e., the intensive “consumption of minutes” decision) of wireline and wireless service. These authors find that the average volume of voice calling per mobile phone more than doubled over the 10 quarters spanning 1993:3-2001:4 (with the strongest growth in the included minutes of wireless plans) and estimate large positive cross-price elasticities between wireline and wireless usage; suggesting strong substitution in the usage of minutes across the two platforms.

\(^6\) Merger Order at ¶ 243.
therefore, possibly forced to exit the market. Alternatively, RBOC wireline-wireless bundling might also deter other competitors from entering the wireline and/or wireless markets if they cannot construct similar bundles.

Perceiving the strong competitive threat raised by wireless providers, some RBOCs have already begun to develop strategies to dissuade their wireline customers from cutting the cord. These measures include the offering of “integrated” wireline and wireless service offerings which combine the consumption of the two platforms by, say, allowing subscribers to share their allotment of free long-distance minutes between them or by providing wireless docking stations which allow incoming calls placed to a mobile handset to be answered on any of the subscribers wireline handsets.7 The likely purpose of these RBOC-service and product innovations is to “force” their wireline subscribers to view wireless telephony as a complement to wireline service (i.e., not as a cut-the-cord substitute) for the purpose of maintaining their traditional wireline business.8

The fact that some large wireless carriers are owned by large wireline firms also raises concerns about the possibility of “tacit collusion” between the two and the subsequent development of intermodal and intramodal sources of competition to wireline telephony. For example, to the extent that wireline competitors are seeking to dissuade wireless substitution, might their wireless affiliate’s service offers depend upon whether a potential customer resides

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7 For example, in 2004 Verizon unveiled “iobi”, a telecommunications platform which seamlessly integrates its wireline, wireless, and data services and allows subscribers to access their respective features from the platform of their choosing. See <http://newscenter.verizon.com/proactive/newsroom/release.vtml?id=83234&PROAC>. In 2003 SBC, BellSouth, and Cingular announced their “MinuteShare” service. This offering provides in-region subscribers with a single bucket of minutes which may be used for either placing long-distance wireline calls and/or wireless local and long-distance calls. See Glenn Bischoff, SBC, BellSouth and Cingular Team Up on Bucket Plan, June 5, 2003, available at <http://wirelessreview.com/microsites/newsarticle.asp?mode=print&newsarticleid=2685092&releaseid=&srid=11393&mazineid=9&siteid=3>. Bischoff cites a senior telecom analyst speaking to the purpose of the MinuteShare offering: “This is preparation for that ensuing battle [against cable companies]. MinuteShare gives them a nice tight package that will be hard for the customer to churn off of” (emphasis added).

8 Carlton and Waldman (2002) and Choi (2004) present theoretical treatments highlighting the use of such forms of “technical tying” by a firm to achieve or retain its market power.
“in-region” (i.e., within the wireline parent’s region and thus possibly a consumer of the parent’s wireline service) or “out-of-region” (i.e., within some non-parent RBOC region)? Might Cingular, for instance, design wireless plans to induce out-of-region subscribers (e.g., to subscribers residing in Qwest’s territory who are not capable of cannibalizing SBC or BellSouth’s wireline service) to cut-the-cord but not offer similar packages to its parents’ in-region subscribers? This paper seeks to empirically investigate these questions by examining data on the design of wireless service plans for AT&T Wireless, Cingular Wireless, and Verizon Wireless in a cross-section of the 197 largest cellular market areas (CMAs) spanning the regions inside and outside BellSouth’s, SBC’s, and Verizon’s wireline regions. These data are measured in the period prior to the Cingular/AT&T Wireless merger’s consummation, allowing one to examine the extent to which these wireless carriers acted as intermodal competitors to wireline service based upon their respective wireline affiliations and geographic service markets.

The remainder of the paper proceeds as follows. Section 2 discusses the data, empirical methodology, and various testable hypotheses concerning the wireless carriers’ in-region vs. out-of-region strategies. Section 3 presents the results. The empirical estimates suggest that AT&T Wireless may have differentiated its service offerings between the regions of Cingular and Verizon Wireless’ wireline parents. Specifically, the results provide evidence to suggest that AT&T Wireless may have designed its regional wireless plans to serve as a wireline replacement prior to its merger with Cingular. The results further suggest that Verizon Wireless offered in-region wireless plans that would be less likely to cannibalize its parent’s wireline business in the sense that they were a relatively less attractive substitute. Cingular, on the other hand, tended to offer relatively more “attractive” wireless plans (with regard to the number of included minutes) in both its parent’s wireline region and within Verizon’s wireline region. However, the magnitude of the estimated effect is substantially larger in latter case. This may suggest that

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9 CMAs are the original regions used by the FCC in issuing licenses for cellular service. There are 734 CMAs in total, made up of 305 Metropolitan Statistical Areas (MSAs) and 429 Rural Service Areas (RSAs), the latter of which are defined by the FCC for the purpose of issuing spectrum licenses.
Cingular competed as an intermodal competitor against Verizon’s wireline service, while at the same time attempting to curtail the rate cut-the-cord substitution in its own parents’ wireline territory by designing wireless plans that would serve as a complement to their wireline services.

Section 4 then considers the potential future competitive landscape of the U.S. telecommunications industry as shaped in part from the recent exit of major competitive LECs from the local wireline market and the possible entry of cable companies into telephony. It is posited that the future telecommunications market (at least in urbanized areas) may be characterized in terms of bundled voice, data, and video/entertainment packages offered through a series of regional duopolies consisting of the RBOCs on the one hand and large cable providers on the other. Finally, Section 5 concludes.

2 Data, Empirical Methodology, and Hypotheses

The company websites of AT&T Wireless, Cingular, and Verizon Wireless were accessed to extract data on the companies’ regional wireless plans as offered in the 197 largest cellular market areas (CMAs) during the (pre-merger) May/June 2004 period. Zip codes for the largest city (in terms of population) within each CMA were entered into the web sites to obtain the monthly price and included number of (free peak-time) minutes in the “bucket” of every wireless plan offered by each of the three carriers. An Appendix containing a list of the sampled CMAs (along with their state classifications) is available upon request.

To the extent that wireline-affiliated wireless carriers seek to “dissuade” their parents’ in-region subscribers from dropping their wireline connections in favor of wireless service, one

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10 Regional wireless calling plans specify a geographic region in which a subscriber may call without incurring additional per-minute charges often referred to as “roaming charges”. A “national” wireless calling plan allows a subscriber to call anywhere in the country without incurring roaming charges, but typically include higher monthly access charges. This paper focuses on regional plans since these are the most likely plans subscribers will consider adopting in cutting-the-cord. In addition, the FCC has determined that the relevant geographic market of wireless telephony is regional and not national (see Merger Order at ¶ 89).

11 The original search considered the 200 largest CMAs, three of which were not in the continental United States and therefore dropped from the analysis.
might expect either a difference in the price and/or included minutes offered in-region vs. out-of-region. For example, *ceteris paribus*, wireline-affiliated wireless carriers may tend to increase the price of their wireless offerings to their parents’ in-region subscribers or, alternatively, tend to offer plans with relatively small amounts of included minutes (*e.g.*, if in-region wireline subscribers would be less inclined to cut-the-cord as a result).

Of course, wireline-affiliated wireless carriers may offer “large” minute plans to in-region subscribers, but *price* those plans sufficiently high so as to curtail the possibility that they are adopted as a wireline replacement. To examine this possibility Table 1 presents the average price-minute ratios for each carrier’s wireless plan in the sample. In general, the price-minute ratios are somewhat higher for the very smallest available plans (*i.e.*, 20-40 minutes) but tend to fall thereafter. Note that at any *given* price point the average price-minute ratios tend to be within a few cents of each other. This suggests that the two wireline-affiliated carriers do not price their (larger-minute) wireless plans disproportionately higher (*i.e.*, on a per-minute basis) than AT&T Wireless. Rather, to the extent that Cingular and Verizon Wireless adopt any in-region vs. out-of-region strategy to attenuate wireless substitution, they may attempt do so with regard to the *structure* (*i.e.*, the menu of minutes) associated with regional wireless calling plans offered within individual CMAs. In other words, the wireline-affiliated wireless carriers may attempt to mitigate the extent of wireless substitution in their wireline parents’ territories by only offering wireless plans that would be perceived as “less attractive” substitutes by consumers, *e.g.*, by offering only less-expensive smaller-minute plans (which may be affordable but not contain a sufficient number of minutes to induce a subscriber to drop their wireline connection) and/or

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12 See, *e.g.*, *Merger Order* at ¶ 245.

13 In addition, the carrier-specific correlation coefficients between price and included minutes are also very high in each case (*ρ > 0.97*). Thus, either an average price or average included-minutes measure may be considered as the relevant “choice variable” of the respective wireless carriers in pursuing in-region vs. out-of-region strategies.
more expensive higher-minute plans (which have enough minutes to incent a consumer to cut-the-cord but are otherwise unaffordable to the typical wireless subscriber). 14

The empirical analyses conducted below consider the average cross-section variation in wireless plan minutes by carrier and CMA (i.e., as specified on an in-region vs. out-of-region basis). To the extent that wireline-affiliated wireless carriers such as Cingular and Verizon Wireless seek to mitigate cut-the-cord substitution, one might expect these firms to offer only “smaller” wireless plans (on average) to their parents’ in-region subscribers relative to out-of-region subscribers (since they may not worry about cannibalizing another RBOC’s wireline business). On the other hand, AT&T Wireless might tend to offer “larger” plans in all regions given that the company is not owned by an RBOC (and may thus have little incentive to mitigate the extent of wireline-wireless substitution in any region).

14 It is not assumed that the adoption of any particular wireless plan within the carriers’ menu of plans necessarily correlates with the actual intensity of wireless usage by its purchaser. For instance, a subscriber purchasing a low-minute monthly regional plan may very well consume a high number of minutes, assuming that they are willing to pay for the (potentially high) per-minute roaming charges. However, note that even if detailed customer wireless usage data were publicly available (which it is not), such data would not be appropriate in testing the relevant hypotheses put forward here (e.g., such data are not in themselves indicative of whether a consumer is using only wireless service, some combination of wireline and wireless service, or the relative usage of each). In the present context, the issue is whether wireline-affiliated wireless carriers are behaving in a manner to promote or mitigate the extent of wireline to wireless substitution within their parents’ wireline territories. As such, the most appropriate variables to test the hypothesis are those factors directly controlled by carriers; i.e., the actual design and regional offering of their in-region vs. out-of-region wireless plans. In contrast, carriers cannot directly determine the usage decisions of customers, only the “incentive” to adopt/use wireless service based upon the terms of the designed wireless plans. In this latter regard, it seems most plausible that carriers will attempt to do this in terms of the monthly price and included minutes of wireless plans, which are the variables emphasized in this analysis. In any event, recent survey evidence on actual customer subscription decisions is consistent with the empirical results presented below (see infra note 26), and in their review of the Cingular/AT&T Wireless merger the FCC also considered similar data on the carriers’ regional wireless plan offerings. See, e.g., Merger Order at note 585 (finding that some wireline-affiliated wireless carriers may offer more attractive wireless plans out-of-region, but that Cingular’s plans do not demonstrate a large in-region vs. out-of-region differential). The FCC also found that Cingular attempts to market its wireless plans as a complement to its parents’ in-region wireline offerings. See Merger Order at ¶ 245 (“Cingular has sought to win wireless customers by encouraging them to use wireless service in a complementary manner to their wireline service, which is likely provided by one or the other of Cingular’s parent companies in the SBC and BellSouth regions.”) (emphasis added). The estimation results presented below are consistent with both of these conclusions.
2.1 The Design of Wireless Plans in the SBC/BellSouth and Verizon Wireline Regions

A cursory examination of the data provides *prima facia* evidence that Cingular, and Verizon Wireless may have designed their offered regional plans (again, examined with respect to their included minutes) differently between their parent’s in-region vs. out-of-region wireline territories. Figures 1 and 2 graph the cumulative distribution functions of the included minutes for the regional wireless plans offered by AT&T Wireless, Cingular, and Verizon Wireless within the SBC/BellSouth and Verizon wireline territories, respectively.

Figure 1 indicates that between the 40th - 99th percentiles (*i.e.*, over the *majority* of the distribution) the cumulative distribution functions of Cingular and Verizon Wireless’ plans rise (almost everywhere) at a greater rate than does the cumulative distribution function of AT&T Wireless’ plans. This suggests that the two wireline-affiliated carriers design “smaller-minute” plans within the SBC/BellSouth’s wireline region relative to AT&T Wireless. For example, at the 50th percentile of the distribution the “average” plan offered by Cingular contains between 950 and 1050 minutes, while the average Verizon Wireless plan contains between 800 and 950 minutes. On the other hand, AT&T Wireless’ average plan at the 50th percentile of the distribution is larger (containing between 1050 and 1250 minutes) than the corresponding plans offered by either of the wireline-affiliated wireless carriers.

Similar differences between the carriers’ plans are found when examining the cumulative distribution functions pertaining to Verizon’s wireline region, as shown in Figure 2. At the 50th percentile of the distribution, the average plan offered by Verizon Wireless to Verizon’s in-region wireline subscribers contains between 800 and 950 minutes, whereas the corresponding plan for Cingular contains between 950 and 1050 included minutes. The 50th percentile plan for AT&T Wireless is again found to be larger (containing 1250 included minutes).
2.2 Univariate Tests of the Mean Differences in Wireless Plan Minutes across the RBOCs’ Wireline Regions

While reliable non-proprietary estimates of the level of usage at which a typical customer would substitute a wireline connection for a wireless phone do not exist, it is possible to make a rough approximation of the number of wireline minutes consumed by the average wireline subscriber from aggregate data published by the FCC. It is assumed that any wireless plan purchased for the intended purpose of cutting the cord (i.e., only subscribing to wireless telephony) must include at least as many minutes (including both local and long-distance) as a representative wireline subscriber would have placed over their wireline connection. In this regard, the FCC estimates that in 2001 (the last year in which these data are available), there were approximately 1065 average monthly conversation minutes per local loop. This measure is employed as an estimate of the wireline usage of a “typical” wireline subscriber below.

First consider the mean number of minutes offered by each wireless carrier inside the two relevant wireline regions (i.e., the average-sized wireless plan, measured with respect to minutes, across all offered in-region plans). Within the SBC/BellSouth wireline region, the average number of minutes (per-minute price) by carrier is as follows: 1119 ($0.03) for AT&T Wireless; 15 This figure is derived from the daily per-loop number of dial equipment minutes (DEM) for local, intrastate toll, and interstate toll. The DEMs are measured as calls enter and leave a telephone switch, and as such, there are two DEMs counted for each conversation minute. See Trends in Telephone Service, at Table 10.2, “Line Usage per Day (Dial Equipment Minutes per Loop),” Industry Analysis and Technology Division, Wireline Competition Bureau, U.S. Federal Communications Commission (August 2003), available at <http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCCState_Link/IAD/trend803.pdf>.

16 These data are likely to be somewhat upward-biased in that they include wireline minutes that would not be voice-related, e.g., dial-up Internet access, dedicated lines for facsimile machines, etc. Indeed, such forms of usage led to a large increase in the number of local DEMs in the late 1990s-2000. On the other hand, in 2001, the total number of DEMs actually fell (and for the first time since 1991) by 2% relative to the previous year (in comparison, the total number of DEMs grew, on average, by 8% over the years 1997-2000 and by 4% over the years 1993-1996 - see id.). It is likely that some of this drop can be explained in terms of the aforementioned forms of wireline usage being converted over onto broadband platforms (e.g., cable modems and DSL) by 2001. The number of residential and small business “high-speed lines” (i.e., those with speeds over 200 Kbps in at least one direction) in December, 2001 was approximately 112% higher than the number deployed one year earlier (and approximately 514 % higher than the number deployed two years earlier). See Trends in Telephone Service, supra note 14, at Table 2.3 (“Residential and Small Business High-Speed Lines”). In short, it is virtually impossible to derive any precise estimate of wireline usage that is specifically voice-related. The figures employed here are only intended as a rough approximation of such a measure.
Thus, the average AT&T Wireless and Verizon Wireless plans might contain a sufficient number of minutes to induce a “typical” SBC/BellSouth wireline subscriber to drop their wireline connection (i.e., since they are each greater than the 1065-minute threshold derived above). On the other hand, on a price per-minute basis Verizon Wireless’ plan is approximately twice as expensive as AT&T Wireless’. And while Cingular also offers a just enough minutes to potentially induce wireline-only adoption, it also does so at a per-minute price twice that of AT&T Wireless’.

With regard to the Verizon wireline region, the corresponding averages to those presented above are as follows: 1910 ($0.03) for AT&T Wireless; 1364 ($0.06) for Cingular; and only 874 ($0.06) for Verizon Wireless. These results are similar to those found in the SBC/BellSouth region. AT&T Wireless and Cingular both offer (on average) a sufficient number of minutes to induce cut-the-cord, but AT&T Wireless’ prices more competitively on a per-minute basis. What is most striking is the corresponding in-region plan offered by Verizon Wireless. This plan not only contains an insufficient number of minutes to induce wireless-only adoption, but is also priced at twice AT&T Wireless’ rate on a per-minute basis.

Although the above evidence is consistent with the hypothesis that wireline-affiliated wireless carriers may design their in-region plans to mitigate cut-the-cord behavior, the question remains as to whether the differences in the design of the three wireless carriers’ plans across regions are statistically significant. The first formal test of this determination consists of examining the mean differences in the number of included minutes across all plans by each wireless carrier and by each relevant wireline region. Specifically, three sets of tests are conducted: (1) with regard to the carriers’ designed plans as offered within the SBC/BellSouth wireline region (e.g., do AT&T Wireless and Cingular offer the same number of minutes, on average, within the SBC/BellSouth wireline region?) , (2) with regard to the carriers’ designed plans as offered within the Verizon wireline region, and (3) with regard to the two wireline

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17 The average price-per-minute figures are calculated using the monthly rate data contained in Table 1.
territories but within carrier (e.g., is the average number of wireless minutes offered by Verizon Wireless the same between the SBC/BellSouth and Verizon wireline regions?).

The null hypothesis that the average number of minutes offered by the three wireless carriers is the same within the SBC/BellSouth or Verizon wireline regions is rejected at the 99% level of confidence. This result also suggests that the carriers may differentiate their designed plans from one another in-region. The null hypothesis that the average number of minutes offered by a given carrier is the same between the SBC/BellSouth and Verizon wireline regions is rejected at the 99% level of confidence in the Cingular and Verizon Wireless cases. Thus, the two wireline-affiliated wireless carriers may also behave differently when designing plans for their own parents’ wireline region relative to designing plans for the wireline region of each other’s parents. On the other hand, AT&T Wireless does not appear to differentiate its plans across the two wireline regions. This may suggest a “uniform” strategy across all markets, e.g., promoting cut-the-cord in all regions since, pre-merger, the company did not possess a wireline affiliation.

Finally, the fact that Cingular and Verizon Wireless offer some relatively “high-minute” (i.e., those plans with a sufficiently great number of included minutes to induce a person to drop their wireline service, ceteris paribus) in at least some in-region markets (CMAs) does not necessarily mean these firms are unconcerned with cannibalizing their parents’ wireline businesses. The relevant questions with regard to this issue are: (i) which subscribers are most likely to cut-the-cord, and (ii) which wireless plans (i.e., with regard to both price and included minutes) would tend to induce this behavior among these subscribers?

With regard to the latter question, as discussed above, one might expect an adequately-priced wireless plan with approximately 1065 included minutes to induce wireline to wireless subscription substitution, all else equal. In regard to the first question, Tucker et al. (2004)
present results of two recent surveys regarding telephone subscription patterns. The authors’ CPS data suggests that 18.0% of 15-24 year olds rely exclusively on wireless service, versus 9.6% of 23-34 year olds, 5.0% of 35-54 year olds, and only 2.5% of persons aged 55 and over. These data clearly suggest that wireless-only adoption tends to be dominated by younger individuals.

On the other hand, younger persons (e.g., those in the 15-24 year cohort) will also tend to have the lowest levels of disposable income on average, and may therefore be less likely to possess either the ability or inclination to spend, say, 175 dollars per month for Verizon Wireless’ largest in-region wireless plan (or 200 dollars per month for Cingular’s largest in-region wireless plan). In addition, according to data on customer bills derived from the TNS Telecoms Bill Harvesting® database, the 2003 average total monthly expenditure on wireless service across all households was only 41 dollars. Thus, the relatively expensive high-minute plans are unlikely those that are adopted by the “average” wireless subscriber (and much less so for the youngest subscribers). Rather, these plans may be targeted at those persons with high mobility and usage requirements (such as traveling businessmen) and not actually designed and intended as a wireline replacement. In other words, Cingular’s or Verizon Wireless’ offering of some high-minute plans in-region seems highly unlikely, in and of itself, to induce wireless-only adoption.

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18 The survey data were obtained as part of the Consumer Expenditure Interview Survey (CEIS) conducted by the U.S. Bureau of Labor Statistics, and a special February 2004 supplement of the Current Population Survey (CPS) conducted by the U.S. Census Bureau. Both sets of surveys lead to similar inferences.
19 Of course, the same holds true with AT&T Wireless’ largest offerings, e.g., it is unlikely that younger wireless subscribers would be willing (or even able) to pay 300 dollars per month for their massive 6300-minute plan.
among the subset of subscribers most likely to exhibit this behavior (i.e., young persons – due to the high monthly costs associated with them).  

2.3 Econometric Model

While the results discussed in the previous section are at least consistent with the hypothesis that Cingular and Verizon Wireless design their wireless offerings based upon in-region vs. out-of-region considerations, one could argue that the results might be driven by any number of variables which differ across the respective wireline regions. Of course, regression analysis allows for such influences to be controlled for assuming appropriate determinants of wireless-plan design (with regard to included minutes) can be identified across markets. The econometric framework presented below makes an initial attempt at such an analysis.

It is assumed that the cross-sectional variation of included minutes in the regional plans offered by wireless carriers is determined according to:

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Minutes_{ijk} = \alpha + \beta_1(SBC/BellSouth \text{ Wireline Region})_j + \beta_2(Verizon \text{ Wireline Region})_j + \Gamma X_j + \eta_{ijk}
\]

where \(i = \{AT&T \text{ Wireless}, Cingular, Verizon \text{ Wireless}\}\) indexes the wireless carrier, \(j\) the CMA, and \(k\) the specific wireless plan offered. The variable \(\alpha\) denotes the regression intercept term and \(\eta\) the normally-distributed random error term. The dependent variable is the number of (peak-time) minutes included in a given regional wireless plan.

The variable \(X\) denotes a vector of CMA demographic characteristics expected to influence the carriers’ wireless plan offerings. They include a measure of average per-capita income, the percentage of the population between the ages of 15 and 29, the percentage of the population that is white, the percentage of the population that is black, and the percentage of the population that is Hispanic.

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21 The FCC also noted that some non-wireline-affiliated regional wireless carriers appeared to design plans targeted as a wireline replacement. For instance, T-Mobile (another non-wireline-affiliated wireless carrier) offered a regional wireless plan with 3000 anytime minutes for 49.95 dollars per month (Merger Order at note 591). At this approximate price point, the regional wireless plans of Cingular and Verizon Wireless contain 750 and 600 minutes, respectively.
population residing in rural areas. Each of these demographic covariates is constructed from county-level data obtained from the 2000 decennial Census and aggregated to the CMA level.

Before proceeding, consider the hypothesized effects of the covariates in $X$. The impact of per-capita income on offered minutes is ambiguous \textit{a priori}. Markets with high incomes may demand higher minute plans all else equal, suggesting a positive relationship. On the other hand, low-income individuals may tend to substitute out of wireline service more often than wealthier persons and thus demand higher-minute wireless plans. For example, poorer persons may be more transient (and thus value the mobility wireless telephony offers) or face credit constraints in acquiring wireline phone service. In these latter instances the expected relationship between this variable and the dependent measure would be positive, all else equal. No specific \textit{a priori} predictions are made with regard to the race variables. To the extent that 15-29 year olds tend to adopt wireless service more often than older persons, they may also demand, on average, higher-minute wireless plans. On the other hand, recall that younger individuals may consume fewer high-minute wireless plans due to the high monthly access costs associated with them. As such, the expected sign of this measure is ambiguous. Finally, due to the lower quality of wireless service in rural areas (\textit{i.e.}, since it is more costly for carriers to establish and maintain cellular service there) one might expect individuals residing in these places to be less willing, on average, to substitute out of wireline telephony an into higher-minute wireless plans. If so, the expected relationship between this measure and minutes would be negative, all else equal.

Now consider the primary explanatory variables of interest. The variable $\textit{SBC/BellSouth Wireline Region}$ is an indicator which takes a value of one for those CMAs designated within either SBC or BellSouth’s wireline regions (which are defined on a state-by-state basis) and zero otherwise. The variable $\textit{Verizon Wireline Region}$ is defined in a similar fashion.\textsuperscript{22} Thus, these variables capture the influence of the RBOCs’ in-region \textit{wireline} service territories on the design

\textsuperscript{22} The wireline region of Qwest is therefore treated as the reference category.
of wireless plans offered by the wireline-affiliated (i.e., Cingular and Verizon Wireless) and
wireline-unaffiliated (i.e., AT&T Wireless) carriers.

Three testable hypotheses follow with respect to the two wireline-region indicators:

Hypothesis 1 (H1): In not being a wireline-affiliated wireless carrier, AT&T Wireless will
have an incentive to induce all potential wireless customers to cut-the-cord (i.e., AT&T Wireless
will act as a maverick) by offering higher-minute plans, all else equal. Thus \( \beta_1 = 0, \beta_2 = 0 \) for \( i = \{AT&T \text{ Wireless}\} \).

The above hypothesis captures the notion that wireless carriers without a wireline affiliation will
tend to be a source of intermodal competition regardless of the geographical region in which their
services are offered. This is because such firms have no incentive to induce subscribers to retain
wireline phone service and, if so, AT&T Wireless should not design its plans in either the
SBC/BellSouth or Verizon wireline regions any differently relative to the reference area.
Therefore, the coefficient values on the wireline region indicators should be relatively “small”
(i.e., approach zero).

The second hypothesis pertains to the RBOCs’ potential desire to mitigate
cannibalization of their wireline business from wireless service providers.

Hypothesis 2 (H2): The wireline-affiliated wireless carriers, Cingular and Verizon Wireless,
will offer lower-minute wireless plans in-region (i.e., preventing their parents’ wireline
subscribers from cutting-the-cord), all else equal. Thus \( \beta_1 < 0 \) for \( i = \{\text{Cingular}\} \) and \( \beta_2 < 0 \) for \( i = \{\text{Verizon Wireless}\} \).

There are several (not necessarily independent) reasons why it might be in the incentive of
SBC/BellSouth and Verizon to “protect” their wireline business from their own wireless
affiliates. Wireline telecommunications services are provided over networks with a cost structure
characterized by high fixed costs, low marginal costs, and highly idiosyncratic (i.e., sunk)
investments.\(^{23}\) Losses in wireline subscribers (in terms of either access lines of minutes of use)
may leave the RBOCs with the classic “stranded investment” problem, i.e., investments in
regulated industries expected to become redundant as a result of competition (Baumol 2000).

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\(^{23}\) E.g., the “last mile” twisted pair of copper wires connecting the end-user’s premises to the central office
(also known as the “local loop”).
The RBOCs may attempt to curtail the migration of their wireline subscribers to their wireless affiliates in order to retain the revenues used to cover their sunk wireline investments.

The RBOCs may also wish to retain their wireline business in order to exploit potential synergies resulting from bundling wireline and wireless services which may mitigate the extent of subscriber churn. As mentioned previously, a substantial amount of local and long-distance wireline voice traffic has already been transferred to wireless networks. However, the cost of transporting a large volume of voice traffic over wireless networks is relatively more costly than transporting the same amount of traffic over a wireline network. This fact is driven in part by the necessity to invest in more spectrum, build additional transmission towers, etc. as the volume carried over a wireless network increases. The RBOCs may use their wireline networks to a back-haul a large fraction of calls originated on wireless devices in order to avoid these costs, giving them a significant cost-advantage relative to competitors.\(^{24}\) A related rationale concerns integrating wireline and wireless access platforms in order to achieve quality enhancements. Wireless calls (even those made in large metropolitan areas) continue to suffer from lower clarity and the tendency to be “dropped” due to cellular “dead spots”, network congestion, and interference. By transporting their wireless traffic over the wireline network the RBOCs may improve the call quality of their wireless services and thus differentiate their bundled wireline-wireless packages offerings and reduce the extent of churn among their wireline/wireless customers.

Finally, the RBOCs may wish to bundle their wireline and wireless offerings for the purpose of deterring entry by other intramodal service providers in either the wireline or wireless service markets (e.g., entry by competitive LECs into local wireline telephony). To the extent that subscribers value “one stop shopping”, the RBOCs would be in a unique position to offer bundled local, long-distance, wireless, and data services (among others) and, as mentioned above,

\(^{24}\) Assuming that the cost advantage is sufficiently large the firm may be able to engage, e.g., in some form of “limit pricing” (i.e., pricing integrated wireline-wireless service sufficiently low so as to deter entry into either the wireline and/or wireless service markets.
possibly realize substantial economies of scope from doing so. To date virtually no competitive LECs have offered bundled wireless and wireline voice, and the RBOCs may be unwilling to provision wireless service to their wireline competitors on a wholesale basis in the absence of regulatory provisions requiring them to do so. Therefore, by bundling wireless service with wireline voice and data the RBOCs could achieve a significant competitive advantage relative to any existing or potential wireline competitor.

The third hypothesis relates to the possible strategic interaction of the two wireline-affiliated wireless carriers:

**Hypothesis 3 (H3):** SBC/BellSouth and Verizon will seek to protect their in-region wireline businesses by not competing with one another through their wireless affiliates, all else equal. Thus, $\beta_2 < 0$ for $i = \{\text{Cingular}\}$ and $\beta_1 < 0$ for $i = \{\text{Verizon Wireless}\}$.

Ever since their formation in 1984 the RBOCs have been suspected of “implicitly colluding” with each other. For example, while the RBOCs were originally prohibited from offering interLATA long-distance service in-region they were not prohibited from serving as an interexchange carrier out-of-region. However, this was rarely the case. In addition, following passage of the Telecommunications Act of 1996 the RBOCs were required to lease-out portions of their local wireline networks in order to facilitate entry by competitive providers. The Act did not prohibit the RBOCs themselves from entering the local market of each other’s regions by leasing network elements. However, for the most part the RBOCs chose not to do so. Given the historical resistance the RBOCs have exhibited in competing with one another, it may not be unreasonable to assume that similar incentives will arise out of their wireless affiliations.

Descriptive statistics of the data appear in Table 3. The results of empirically testing $H1$, $H2$, and $H3$ within the regression framework are presented in the next section.

### 3 Empirical Results

Before proceeding, note that the model specified in Eq. (1) considers separate observations for each wireless calling plan within a CMA (by carrier) as the dependent measure.
On the other hand, the independent variables of the model only exhibit variation at the CMA level and not at the individual-plan level. This discrepancy in aggregation may exaggerate the amount of independent variation in the data and lead to a downward bias in the estimated standard errors (thus creating a false impression of statistical significance in the estimates). As such, a correction must be made to the estimated standard errors to account for the fact that plan-level disturbances may be correlated within a CMA. This correction is achieved through clustering at the CMA level.\(^{25}\) The estimated standard errors are also heteroskedasticity-consistent, which is relevant in the instant case given that the estimation relies entirely upon cross-sectional data.

Ordinary least squares (OLS) estimates of Eq. (1) appear in Table 4. The three columns correspond to the wireless plans offered by AT&T Wireless, Cingular, and Verizon Wireless, respectively. Each of the three models is statistically significant at the 1\% level (i.e., the null hypothesis that the slope coefficients are jointly zero is rejected). Consider the results pertaining to AT&T Wireless first. The results strongly support \(H1\), suggesting that AT&T Wireless offers wireless plans which may induce wireline replacement in all markets. Note that the coefficient estimate on the SBC/BellSouth wireline region indicator is only 4.6 minutes while the coefficient estimate on the Verizon wireline region indicator is only -8.1 minutes. These are extremely small values relative to the mean number of minutes offered by AT&T Wireless across all its plans (i.e., 600.6 minutes) or the mean number of minutes across plans offered within CMAs located in either SBC/BellSouth’s or Verizon’s wireline territories. This finding would suggest that AT&T Wireless tended to design “similar”-sized regional wireless plans in all markets. These estimates, taken in conjunction with Figures 1 and 2, might therefore suggest that AT&T Wireless acted as an intermodal competitor to wireline service prior to its merger with Cingular.

Consider next the estimates pertaining to Cingular’s regional wireless plans. Contrary to expectations, the coefficient estimate on the SBC/BellSouth and Verizon wireline region

\(^{25}\) That is, it is assumed that the errors and independently distributed across CMAs but not necessarily within CMAs. Similar results were obtained when the clustering correction was made at the state level.
indicators are positive and statistically significant at conventional levels, thus rejecting $H_2$ and $H_3$. Each of these effects is relatively large in magnitude. The average plan offered within the parent wireline region contains approximately 99 additional included minutes relative to plans offered outside the region. The effect on included minutes is even larger with respect to the Verizon wireline region. Here, the coefficient estimate is approximately 4.4 times greater than that on the SBC/BellSouth region indicator, suggesting that the average Cingular plan offered in the Verizon wireline region contains roughly 436 additional included minutes relative to plans offered outside the region. These estimates suggest that Cingular may have behaved as an intermodal competitor within Verizon’s wireline region, and possibly even within its own parents’ wireline regions as well (although to a far smaller degree).

The estimation results found with regard to Verizon Wireless, the other wireline-affiliated wireless carrier, are dramatically different than those found with regard to Cingular. Specifically, the results suggest that the average wireless plan offered by Verizon Wireless in the SBC/BellSouth region is smaller than the average plan offered outside the region. This finding is consistent with $H_3$, although the coefficient estimate is not statistically significant at conventional levels (the magnitude of the coefficient estimate is also relatively small, suggesting only 27 fewer included minutes). On the other hand, these estimates strongly support $H_2$. The average plan offered by Verizon Wireless to its parent’s in-region wireline subscribers contains approximately 414 fewer included minutes relative to plans offered outside its parent’s regions. This finding is statistically significant at the 1% level.\textsuperscript{26} To the extent that Verizon Wireless tries not to cannibalize Verizon’s wireline business with its wireless offerings, these data may suggest that it

\textsuperscript{26} Tucker et al. (2004) also report that the proportion of wireless-only households in smallest in the Northeast (4.2%), which roughly corresponds to Verizon’s in-region wireline territory. This is consistent with the results presented here, \textit{i.e.}, that Verizon Wireless may be offering lower-minute plans to Verizon’s in-region subscribers, and thus providing less incentive to cut-the-cord. By comparison, the proportion of wireless-only households in the other Census regions is as follows: Midwest (6.1%); South (6.7%); West (6.3%).
may have done so by designing in-region wireless plans that are relatively less attractive as a wireline substitute (*i.e.*, by offering relatively smaller-minute plans in-region).

The signs of the remaining covariates are generally consistent across the three models. Per-capita income takes a negative sign in all cases, but is statistically significant only in the Verizon Wireless model. In all instances, the size of the estimated income coefficient is extremely small. The coefficient estimate on the percent of the population between the ages of 15 and 29 is also consistently negative, but larger in magnitude for the two wireline-affiliated wireless carriers. With regard to the latter, this finding is consistent with a strategy to dissuade the segment of the population most likely to cut-the-cord by offering smaller-minute wireless plans. This variable is statistically significant at conventional levels in the AT&T Wireless and Verizon Wireless models.

The coefficient estimate on the percent white is always positive and statistically significant at the 1% level in the Verizon Wireless model. The coefficient estimate on the percent black is positive and statistically significant at the 1% level in the AT&T Wireless and Cingular models, but is negative in the Verizon Wireless model (and statistically significant at the 1% level). Finally, the coefficient estimate on the percent rural is negative in each model as expected and statistically significant at the 5% in the Verizon Wireless model. This may reflect the relatively lower quality of wireless service in remote areas, and thus the tendency of rural-area residents to demand fewer high-minute wireless plans.

While the above results may suggest that the wireline-affiliated carriers may not be tacitly colluding with each other through their wireless affiliates, the finding that Cingular seemingly behaves as an “intermodal competitor” to its own parents’ wireline business (in the sense that they offer wireless plans that contain, on average, approximately 100 additional minutes relative to the reference territory) may seem somewhat counterintuitive (although, again,

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27 The negative coefficient estimate of this variable in the AT&T Wireless specification, on the other hand, might reflect the mobility and/or income constraints pertaining to younger subscribers as discussed above.
the estimation results suggest that Cingular may act as an even stronger intermodal competitor within Verizon’s wireline territory.\(^\text{28}\) On the other hand, the most recent available estimates suggest that only about 6% of the U.S. population relies exclusively on wireless service.\(^\text{29}\) This in turn suggests that the majority of telecommunications subscribers view wireline and wireless services as complementary services.

It has been understood for some time (see, e.g., Cournot 1838) that a multiproduct firm jointly producing two complementary services (e.g., wireline and wireless telephony) may increase its profits by raising output (in this case offering larger-minute plans). This effect arises from internalizing the pricing externality associated with jointly producing complements (e.g., lowering the relative price of wireless service increases the demand for wireline service if they are complements). Cingular’s offering of relatively larger-minute in-region plans may be driven the interdependent relationship its offerings share with SBC’s and BellSouth’s wireline services, and therefore possibly reflective of a strategy to internalize any demand-side pricing externalities between wireline and wireless services.\(^\text{30}\)

Another, and possibly more relevant, explanation for Cingular’s in-region behavior may lie in the “integration” of wireline and wireless telephony. Recall, for instance, that wireline-affiliated carriers and their parents may attempt to curtail cut-the-cord substitution of wireline service by designing special service and/or products that technically ties the usage of wireline and wireless platforms together. Such integrated offerings would effectively impose complementarity (i.e., joint consumption) in the subscription to (and usage of) wireline and

\(^{28}\) After all, several theoretical studies have shown that cross-ownership of firms producing substitutes can facilitate collusive behavior (see, inter alia, Choi et al. 2003; Malueg 1992; Reynolds and Snapp 1986).

\(^{29}\) Tucker et al. (2004). Recall that the majority of wireline replacement to date has occurred with regard to wireless usage (i.e., while some subscribers may place most of their long-distance calling minutes over their mobile platform, many are unlikely to adopt wireless telephony exclusively – see supra note 5). Of course, the rate of wireless (access) substitution may very well increase over time; although the current rate is far below what most analysts predicted in light of the recent FCC rules implementing number portability between wireline and wireless services. See Christopher Rhoads, Cutting the Phone Cord Isn’t as Popular as Once Predicted, WASH. POST, June 2, 2005, at B1.

\(^{30}\) Choi et al. (2004, p. 492) refer to this as a “synergy” effect. See also Weisman (2004, forthcoming) for recent theoretical analyses regarding the price-reducing (or quantity-increasing) effects of mergers between firms producing complements.
wireless services, and thus incentivize in-region wireline subscribers to retain their wireline connections while also consuming a greater quantity of wireless minutes. In its review of the Cingular/AT&T Wireless merger the FCC concluded that Cingular attempted to design its in-region wireless plans to serve as a complement to wireline service,\(^{31}\) and despite the ever-increasing uptake of wireless service, for the first time in five years the number of SBC’s wireline connections increased (as of the first quarter of 2005).\(^{32}\) This may be due in part to an SBC/Cingular strategy of integrating the usage of wireline and wireless platforms, as well as Cingular’s position as the leading wireless provider within its parents’ wireline territories.

4 RBOC-Cable Duopolies and the Future U.S. Telecommunications Market

The analysis presented here raises the question of how the future product and geographic markets of the U.S. telecommunications industry might be defined (\textit{i.e.}, at least with regard to urban residential markets). Recent court decisions have effectively removed the ability of local wireline competition to arise from requiring the RBOCs to unbundle their local networks to competitive entrants.\(^{33}\) Indeed, AT&T Corp. (the single largest wireline competitive LEC operating through unbundled network elements) recently announced that it will no longer continue to market its local or long-distance wireline services to residential telecommunications subscribers, focusing primarily on business customers instead.\(^{34}\) There is also some evidence to suggest that other major competitive LECs such as MCI and Sprint are also following a similar course.\(^{35}\) The Cingular/AT&T Wireless merger also indicates the importance wireline providers

\(^{31}\) See supra note 14.
\(^{32}\) See Rhodes, supra note 29.
\(^{33}\) See USTA II, 359 F.3d at 564-76 (D.C. Cir. 2004).
place on wireless service and the potential for increasing market consolidation in both the wireline and wireless markets.

Cable companies have begun to make inroads into the residential voice market. These firms have already offered traditional circuit-switched telephony for some time (although the high costs of modifying the cable network to do so have largely limited the geographical range of its deployment). The aforementioned retreat of many major competitive LECs from the residential voice market may give cable operators additional incentive to enter telephony and compete against the RBOCs. And, unlike resellers or most competitive LECs, cable companies could provide voice services entirely over their own networks. This would result in the presence of large, entrenched facilities-based competitors with considerable brand-name recognition competing against the RBOCs in the latter’s core businesses, and doing so with new enhanced service offerings. This is something which has been largely unachievable to date given the past technological and regulatory characteristics of the local wireline exchange market.

Cable operators are particularly well positioned to offer packet-switched voice services, commonly referred to as voice-over-Internet-protocol (VoIP) calling. VoIP functions by converting analog voice signals into digital packets which are then trunked over the Internet. Therefore, VoIP telephony may completely bypass the RBOCs wireline facilities and may also include various enhanced features which are not available with traditional wireline voice service (e.g., real-time video conversations, simultaneous voice and data transfer, etc.).

How then might the RBOCs respond to the entry of cable companies into telephony? Clearly the RBOCs will wish to limit the extent of subscriber churn to cable and will therefore develop strategies to do so. One possible strategy might be the development of broad bundled service offerings36 (i.e., allowing subscribers to obtain multiple services from the firm, possibly at a discount, and providing them with one bill) which not only combine several telecommunications services, but also integrate the usage of two or more of the sub-services

36 See Bischoff, supra note 7.
comprising the bundle. As mentioned above, the RBOCs may realize various cost and/or churn-reducing benefits from “integrating” the provision of wireline and wireless telephony (e.g., by allowing subscribers to use their wireline phones to access their wireless long-distance minutes and using the wireline network to back-haul voice traffic originated on wireless devices). Some RBOCs have also made initial attempts to bundle satellite video entertainment service with voice, perhaps in anticipation of the entry of cable operators into telephony.37 In short, future RBOC service offerings may be largely comprised of bundled voice (e.g., wireline and wireless service integrated through minutes usage), data (e.g., DSL), and video entertainment services (e.g., achieved through partnering or acquiring satellite operators or by deploying fiber directly to end users’ premises).

Cable operators would likely respond to RBOC bundles by also developing bundles of their own. These firms already possess the capacity to offer most telecommunications services. As mentioned above, local and long-distance service can be provisioned by cable companies through VoIP or traditional circuit-switched telephony. Cable companies already possess the majority of the broadband access market through their cable modem offerings and, of course, already offer a wide range of video entertainment services. The “missing piece” in cable’s bundles is wireless telephony. Given the ever-increasing use of mobile services among subscribers, failing to have a wireless component might greatly limit the perceived value of cable’s bundles relative to the RBOCs’. Therefore, cable companies may begin to purchase

37 In March 2004 Verizon began offering DirectTV satellite television to subscribers in New York and other East Coast cities who also purchased its telephone and data services. This was done in response to Cablevision’s offering of local and long-distance telephony to its Internet subscribers. Peter Grant, Here Comes Cable...And It Wants a Big Piece of the Residential Phone Market, WASH. POST, September 13, 2004, at R4. In 2002, SBC began to bundle EchoStar satellite television with its data services. See <http://www.sbc.com/gen/press-room?pid=4800 &cdvn=news&newsarticleid=7500>. BellSouth also plans to offer DirectTV satellite television as part of a bundle to its in-region subscribers. See BellSouth, DirectTV Partner to Offer Satellite TV as Part of Service Package, Aug. 28, 2003, available at <http://www.rednova.com/news/stories/3/2003/08/27/story146.html>. See also Almar Latour, To Meet the Threat from Cable, SBC Rushes to Offer TV Service, WALL ST. J., February 16, 2005, at A1 (discussing SBC’s attempts to offer on-demand video entertainment services over its own fiber cables).
wireless spectrum in the near future or attempt to acquire the extant major wireline-unaffiliated wireless carriers (e.g., T-Mobile) and other smaller regional wireless firms. Customer acquisition and/or retention strategies of the RBOCs and cable operators might therefore consist of “competition in bundles.”

To the extent that the above scenario materializes the future geographic market of telecom becomes transparent. Cable operators are typically awarded exclusive service contracts with individual municipalities, and the service territories of the RBOCs are defined on a state-by-state basis. Therefore, the future long-run geographic market may consist of various “regional duopolies” defined at the municipality level. In other words, within a given state a subscriber will always have the option of purchasing voice, data, and entertainment from the state’s RBOC and, depending on their area of residence, a particular cable provider (e.g., Comcast, Time Warner, etc.).

5 Conclusion

Using data from the largest CMAs in the U.S., this paper examines the nature of competition in the wireline-wireless telecommunications market prior to the merger of Cingular and AT&T Wireless. The results suggest that AT&T Wireless behaved as an intermodal competitor to wireline service in all wireline markets prior to its merger with Cingular, and that Cingular may have acted as an intermodal competitor out-of-region against Verizon’s wireline business. On the other hand, Cingular’s positive in-region results suggest that Cingular may have attempted to curtail cut-the-cord behavior by designing wireless plans as a complement to its parents’ wireline service. This is consistent with recent evidence that SBC’s in-region wireline

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38 Cable operators may also attempt to “integrate” the usage of their bundled services in order to reduce costs and/or mitigate subscriber churn. For instance, video telephony could be received (or Web browsing done) through a subscriber’s television.

39 In the short-run there may be other wireless and wireline-unaffiliated firms offering voice service over VoIP (e.g., Vonage). However, the inability of such firms to provide broad bundles of various telecommunications services in a manner similar to the RBOCs and cable companies might greatly limit the extent of their operations.
business has expanded despite the dramatic increase in wireless subscription rates nationally, and may partially reflect the company’s success of limiting the migration of its wireline customers to its own-affiliated and other wireless providers. Finally, the results pertaining to Verizon Wireless are more consistent with the notion that the carrier designed its in-region plans as a relatively less attractive substitute to Verizon’s wireline services (by designing smaller-minute plans with a higher price per-minute in-region).

Given the increasing consolidation of the wireless market by the RBOCs it is argued that the future urban telecommunications market may be defined in terms of bundled voice, data, and video services as offered by various RBOC-Cable duopolies. Clearly policy makers will need to address the possibility of a strategic “détente” between these two players, and develop regulatory and structural remedies to facilitate more competitive in-region outcomes while recognizing the increasing importance of product and service bundling/integration. Future theoretical research directed towards this issue therefore seems especially warranted.

While this paper focused on the “supply-side” of the market pertaining to wireline-affiliated wireless carriers and intermodal competition (i.e., by focusing on their actual “output” decisions across markets), future empirical work could make extensions by measuring the effect of wireline-wireless service bundling/integration on the extent of competition in the wireline and wireless voice markets. RBOCs with wireless-affiliates may be able to leverage their in-region wireline market power to the wireless market by offering bundled wireline-wireless services that offer features (e.g., one bill for services, a common wireline-wireless voice mailbox, discounts, quality enhancements, minute-sharing across the two platforms, etc.) which independent wireless carriers inherently cannot match. While some of the above innovations certainly increase consumer welfare, they may also decrease the viability of independent wireless carriers (as well as independent wireline carrier who cannot offer a wireline-wireless bundle) to compete in the
long-run.\textsuperscript{40} This may remove an important competitive check on the pricing behavior of the RBOCs and their wireless affiliates and, as a result, these carriers may not fully pass-on the benefits of integrated services to their customers. Evaluating the determinants and extent of such behaviors and their effects on competition in wireline/wireless telephony should prove a fruitful area for future applied work.

\textsuperscript{40} Indeed, after obtaining the authority to enter the in-region InterLATA long-distance market the RBOCs began to offer bundled local and long-distance service to their in-region subscribers. The RBOCs subsequently realized dramatic growth in the uptake of these bundles and, consequently, their in-region long-distance market shares. That this growth occurred \textit{despite} the fact that the RBOCs’ in-region wireline competitors had \textit{already} been offering local/long-distance bundles for some time further highlights the competitive concerns related to the RBOCs’ bundling of wireline and wireless services (\textit{i.e.}, the latter of which the RBOCs’ competitors may not be able to bundle).
References


Figure 1
Cumulative Distribution of Included Minutes of Wireless Plans Offered in the SBC/BellSouth Wireline Regions
Figure 2
Cumulative Distribution of Included Minutes of Wireless Plans Offered in the Verizon Wireline Region
### Table 1
Average Price-Minute Ratios of Sample Wireless Plans

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<th>AT&amp;T Wireless</th>
<th>Cingular</th>
<th>Verizon Wireless</th>
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<td>Monthly Price</td>
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<td>Included Minutes</td>
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\[ \rho (\text{Price, Minutes}) = 0.99 \]

\[ \rho (\text{Price, Minutes}) = 0.99 \]

\[ \rho (\text{Price, Minutes}) = 0.97 \]

Note: All figures correspond to the regional wireless plans offered by the three carriers in the 197 largest CMAs during May/June 2004. The variable \( \rho \) denotes the Pearson correlation coefficient between a given wireless plan's monthly price and its corresponding number of included minutes. See text for details.
### Table 2
Tests of the Equality of Means for Included Wireless Minutes by Carrier and Wireline Region

<table>
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<th>t-statistic</th>
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<td></td>
<td>Ho: $\mu_1$(AT&amp;T Wireless) = $\mu_1$(Cingular)</td>
</tr>
<tr>
<td></td>
<td>Ho: $\mu_1$(Cingular) = $\mu_1$(Verizon Wireless)</td>
</tr>
<tr>
<td></td>
<td>Ho: $\mu_1$(Verizon Wireless) = $\mu_1$(AT&amp;T Wireless)</td>
</tr>
<tr>
<td></td>
<td>(2) Across-Carrier-Within-Verizon Wireline Region:</td>
</tr>
<tr>
<td></td>
<td>Ho: $\mu_2$(AT&amp;T Wireless) = $\mu_2$(Cingular)</td>
</tr>
<tr>
<td></td>
<td>Ho: $\mu_2$(Cingular) = $\mu_2$(Verizon Wireless)</td>
</tr>
<tr>
<td></td>
<td>Ho: $\mu_2$(Verizon Wireless) = $\mu_2$(AT&amp;T Wireless)</td>
</tr>
<tr>
<td></td>
<td>(3) Within-Carrier-Across-Region:</td>
</tr>
<tr>
<td></td>
<td>Ho: $\mu_1$(AT&amp;T Wireless) = $\mu_2$(AT&amp;T Wireless)</td>
</tr>
<tr>
<td></td>
<td>Ho: $\mu_1$(Cingular) = $\mu_2$(Cingular)</td>
</tr>
<tr>
<td></td>
<td>Ho: $\mu_1$(Verizon Wireless) = $\mu_2$(Verizon Wireless)</td>
</tr>
</tbody>
</table>

Note: The variable $\mu$ denotes the mean value of included wireless minutes. Reported t-statistics are absolute values. *** denotes statistical significance at the 99% level of confidence.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes(AT&amp;T Wireless)</td>
<td>600.62</td>
<td>1376.15</td>
<td>45.00</td>
<td>6300.00</td>
</tr>
<tr>
<td>Minutes(Cingular)</td>
<td>222.46</td>
<td>611.64</td>
<td>50.00</td>
<td>5000.00</td>
</tr>
<tr>
<td>Minutes(Verizon Wireless)</td>
<td>252.51</td>
<td>637.39</td>
<td>100.00</td>
<td>3300.00</td>
</tr>
<tr>
<td>SBC/BellSouth Wireline Region</td>
<td>0.64</td>
<td>0.48</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Verizon Wireline Region</td>
<td>0.24</td>
<td>0.43</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Income</td>
<td>20891.75</td>
<td>3738.52</td>
<td>9899.00</td>
<td>38350.00</td>
</tr>
<tr>
<td>% Ages 15-29</td>
<td>23.47</td>
<td>2.82</td>
<td>13.59</td>
<td>38.58</td>
</tr>
<tr>
<td>% White</td>
<td>78.46</td>
<td>12.54</td>
<td>21.16</td>
<td>97.21</td>
</tr>
<tr>
<td>% Black</td>
<td>11.47</td>
<td>10.33</td>
<td>0.29</td>
<td>45.58</td>
</tr>
<tr>
<td>% Rural</td>
<td>22.43</td>
<td>18.48</td>
<td>0.47</td>
<td>71.94</td>
</tr>
</tbody>
</table>

Note: See text for variable descriptions and data sources.
### Table 4
Estimated Impact of Wireline-Affiliation on Wireless Plan Included Minutes

<table>
<thead>
<tr>
<th></th>
<th>Minutes (AT&amp;T Wireless)</th>
<th>Minutes (Cingular)</th>
<th>Minutes (Verizon Wireless)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBC/BellSouth Wireline Region</td>
<td>4.57***</td>
<td>99.01**</td>
<td>-26.81</td>
</tr>
<tr>
<td></td>
<td>(2.18)</td>
<td>(2.30)</td>
<td>(1.39)</td>
</tr>
<tr>
<td>Verizon Wireline Region</td>
<td>-8.05***</td>
<td>436.08***</td>
<td>-414.24***</td>
</tr>
<tr>
<td></td>
<td>(3.79)</td>
<td>(4.74)</td>
<td>(6.74)</td>
</tr>
<tr>
<td>Income</td>
<td>-1.04E-4</td>
<td>-0.01</td>
<td>-0.01***</td>
</tr>
<tr>
<td></td>
<td>(1.60)</td>
<td>(0.86)</td>
<td>(4.06)</td>
</tr>
<tr>
<td>% Ages 15-29</td>
<td>-2.56***</td>
<td>-13.63</td>
<td>-9.72***</td>
</tr>
<tr>
<td></td>
<td>(4.13)</td>
<td>(0.98)</td>
<td>(2.63)</td>
</tr>
<tr>
<td>% White</td>
<td>0.10</td>
<td>0.45</td>
<td>-3.56***</td>
</tr>
<tr>
<td></td>
<td>(0.82)</td>
<td>(0.18)</td>
<td>(3.03)</td>
</tr>
<tr>
<td>% Black</td>
<td>0.45***</td>
<td>8.96***</td>
<td>-4.75***</td>
</tr>
<tr>
<td></td>
<td>(2.66)</td>
<td>(2.99)</td>
<td>(4.07)</td>
</tr>
<tr>
<td>% Rural</td>
<td>-0.15</td>
<td>-1.31</td>
<td>-1.52**</td>
</tr>
<tr>
<td></td>
<td>(1.33)</td>
<td>(0.63)</td>
<td>(2.21)</td>
</tr>
<tr>
<td>Constant</td>
<td>1975.44***</td>
<td>1309.18**</td>
<td>2120.28***</td>
</tr>
<tr>
<td></td>
<td>(90.94)</td>
<td>(2.60)</td>
<td>(13.00)</td>
</tr>
<tr>
<td>Observations</td>
<td>1470</td>
<td>919</td>
<td>975</td>
</tr>
<tr>
<td>F (H₀: All slopes = 0)</td>
<td>5.85***</td>
<td>8.58***</td>
<td>17.74***</td>
</tr>
</tbody>
</table>

Note: All models estimated by OLS. Standard errors reflect clustering at the CMA level and are corrected for heteroskedasticity. The t-statistics are shown in parentheses. * denotes statistical significance at the 10% level, ** statistical significance at the 5% level, and *** statistical significance at the 1% level in a two-tailed test.