DOES BELL COMPANY ENTRY INTO LONG-DISTANCE TELECOMMUNICATIONS BENEFIT CONSUMERS?

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I. INTRODUCTION

As part of the Modification of Final Judgment (MFJ) that implemented the divestiture of the Bell operating companies (BOCs) from AT&T on January 1, 1984,[1] the BOCs were forbidden to carry telephone calls from one local access and transport area (LATA) to another.[2] Roughly speaking, an interLATA call is a "long" long-distance call, and an intraLATA call is "short" long-distance call, which is also sometimes called a local toll call. A BOC may supply intraLATA service, as may an interexchange carrier (IXC), such as AT&T, MCI WorldCom, or Sprint. Although the Telecommunications Act of 1996[3] superseded the MFJ, it nonetheless retained the BOCs' interLATA prohibition while establishing, in Section 271,[4] a process—involving each state public utilities commission, the Federal Communications Commission (FCC), and the

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The authors have consulted to the Bell operating companies over the course of many years. The views expressed are solely the authors' own. The authors thank Amy Sheridan and Jessica Hennessey for excellent research assistance.

[1] Modification of Final Judgment (MFJ), *reprinted in* United States v. AT&T Co., 552 F. Supp. 131, 226–34 (D.D.C. 1982), *aff'd sub nom.* Maryland v. United States, 460 U.S. 1001 (1983). For an overview of the divestiture and its aftermath, see Jerry A. Hausman & J. Gregory Sidak, *A Consumer-Welfare Approach to the Mandatory Unbundling of Telecommunications Networks*, 109 Yale L.J. 417, 426–29 (1999).

[2] For an assessment of the economic costs of the interLATA line-of-business restriction under the MFJ, see Jerry Hausman, *Competition in Long Distance and Telecommunications Equipment Markets: Effects of the MFJ*, 16 Managerial & Decision Econ. 365, 372 (1995).

[3] Pub. L. No. 104-104, 110 Stat. 56.

[4] 47 U.S.C. § 271.

Department of Justice (DOJ), acting on a state-by-state basis—by which the BOCs could earn regulatory approval to enter the interLATA market within the regions in which they provide local exchange service. As of September 1, 2002, the BOCs had received Section 271 authorizations to provide in-region interLATA service in fifteen states.[5]

For years, the competitive consequences of BOC entry into long-distance telecommunications have been debated. Now that regulators have issued the first authorizations under Section 271 and BOC entry has occurred, it is possible for the first time to evaluate directly the empirical effects of BOC entry into the in-region interLATA market.

In Part II of this Article, we review the origin of Section 271. Based on the record, we conclude that the FCC and DOJ did not expect, in their early implementation of Section 271, that BOC entry would lower prices for interLATA service.

In Part III, we present an empirical analysis designed to estimate the effect that BOC entry has had in New York and Texas, the first two states where Section 271 authorizations have been given. We discuss three major findings. First, we find that the average consumer received a savings of 8 to 11 percent on the monthly interLATA bill in the states where BOC entry occurred as compared to "control" states where BOC entry had not occurred. Second, we find that competitive local exchange carriers (CLECs) gained a substantial increase in cumulative share of the local exchange market in states where BOC entry occurred as compared to control states without BOC entry. Third, we find that there was no significant change in the local bill of the average consumer in states where BOC entry into interLATA service occurred as compared to those bills in the control states. These empirical results suggest that BOC entry in New York and Texas has led to consumer benefits in terms of lower interLATA bills and greater effective choice for local exchange services in those states.

In Part IV, we explain how these empirical results are consistent with the economic theory of "double marginalization." This economic analysis is not part of the approach that the FCC and the DOJ take in evaluating requests for Section 271 authorization, which may help explain why

[5] The fifteen states and the dates on which BOCs received § 271 authorizations in each are: Arkansas (Nov. 16, 2001), Connecticut (July 20, 2001), Georgia (May 15, 2002), Kansas (Jan. 22, 2001), Louisiana (May 15, 2002), Maine (June 19, 2002), Massachusetts (Apr. 16, 2001), Missouri (Nov. 16, 2001), New Jersey (June 24, 2002), New York (Dec. 22, 1999), Oklahoma (Jan. 22, 2001), Pennsylvania (Sept. 19, 2001), Rhode Island (Feb. 24, 2002), Texas (June 30, 2000), and Vermont (Apr. 17, 2002). *See* http://www.fcc.gov/Bureaus/Common_Carrier/in-region_applications.

these two agencies did not expect price to fall after BOC entry into the interLATA market. Our empirical findings therefore should be of use to regulators evaluating whether BOC entry into interLATA services should be allowed in other states.

II. THE ORIGIN AND IMPLEMENTATION OF SECTION 271

The FCC tried throughout the 1970s to cope with the onset of competition in the U.S. telecommunications industry. Congressional attempts to revise the basic telecommunications legislation of 1934 failed. Telecommunications policy subsequently moved from the regulatory and legislative arena to the federal judiciary with the implementation of the Modification of Final Judgment (MFJ).[6]

A. THE ORIGIN OF THE INTERLATA ENTRY RESTRICTION

Before the MFJ required divestiture, AT&T had consisted of three main parts: (1) local operating companies, such as New York Telephone, which provided about 80 percent of local U.S. telephone service; (2) AT&T Long Lines, which provided almost all domestic and international long-distance service; and (3) Western Electric, including Bell Laboratories, which provided most of the telecommunications equipment for AT&T's local and long-distance units. After divestiture, AT&T continued to operate the long-distance and equipment manufacturing units, while the local companies were divested and organized into seven Regional Bell Operating Companies (RBOCs). The individual local Bell operating companies that constituted an RBOC came to be known as BOCs. The BOCs were forbidden to carry long-distance calls from one LATA to another.[7]

The rationale for the MFJ was the "quarantine theory."[8] Before divestiture, the local companies were thought to have market power due to a natural monopoly, although they were regulated at both the state and federal level to limit the exercise of any such market power. The

[6] Many books have addressed the AT&T breakup. *See, e.g.*, ROBERT W. CRANDALL, AFTER THE BREAKUP: U.S. TELECOMMUNICATIONS IN A MORE COMPETITIVE ERA (1991); PAUL W. MACAVOY, THE FAILURE OF ANTITRUST AND REGULATION TO ESTABLISH COMPETITION IN LONG-DISTANCE TELEPHONE SERVICES (1996); PETER TEMIN, THE FALL OF THE BELL SYSTEM: A STUDY IN PRICES AND POLITICS (1987). For an exhaustive legal analysis of the MFJ, see MICHAEL K. KELLOGG, JOHN THORNE & PETER W. HUBER, FEDERAL TELECOMMUNICATIONS LAW 199–248 (1992).

[7] *See* Modification of Final Judgment, § II.D, 552 F. Supp. at 227–28.

[8] *See, e.g.*, J. GREGORY SIDAK & DANIEL F. SPULBER, DEREGULATORY TAKINGS AND THE REGULATORY CONTRACT: THE COMPETITIVE TRANSFORMATION OF NETWORK INDUSTRIES IN THE UNITED STATES 55–99 (1997) (explaining and criticizing the MFJ's quarantine theory).

quarantine theory posited that, in the absence of restrictions on their ability to enter new lines of business, the BOCs would cross-subsidize competitive services with their monopolized local services and would discriminate against competing long-distance companies when providing the connection to the local network. The MFJ contained a waiver procedure by which the BOCs could request relief from the MFJ for specific services so long as "there [was] no substantial possibility that the [petitioning BOC] could use its monopoly power to impede competition in the market it seeks to enter."[9]

The district judge responsible for interpreting and enforcing the court's MFJ had a limited ability to superintend the U.S. telecommunications industry. Technology was changing rapidly in the 1980s and 1990s with the introduction of digital computer-driven switches and fiber optic transmission, but the court's evidentiary record contained information primarily from 1976. Furthermore, the MFJ's waiver process became mired in legal delay, impeding new technologies, such as cellular telephony.[10] The parties had agreed to a triennial review of the MFJ, and the first such review began in 1987. This review led to the removal of the MFJ's restraint on the provision of information services by the BOCs. Because of various appeals to the D.C. Circuit and subsequent remands, however, the first triennial review was not completed by either 1990 or 1993, when the next reviews were scheduled to take place. A second triennial review never happened.

Congress in 1996 finally overhauled the Communications Act of 1934 by passing the Telecommunications Act of 1996. The new legislation ended the MFJ. The two primary components of the Act relevant to the BOCs and other incumbent local exchange carriers (ILECs) were that they would unbundle their networks to allow competing firms to use network elements to provide competition in local telephony, and that the BOCs would be permitted to provide long-distance competition when they had met a fourteen-point, FCC-administered "checklist."

Before a BOC undergoes scrutiny under the checklist, it first must enter into an interconnection agreement, approved by its state public utilities commission (PUC), with a facilities-based provider of local exchange service.[11] Then the FCC, in consultation with the PUC, will determine whether the BOC's interconnection agreement satisfies the

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[9] Modification of Final Judgment, § VIII.C., 552 F. Supp. at 231.

[10] *See* Paul H. Rubin & Hashem Dezhbakhsh, *Costs of Delay and Rent-Seeking Under the Modification of Final Judgment*, 16 MANAGERIAL & DECISION ECON. 385, 385–87 (1995). For an analysis of the economic effects of the MFJ, see Hausman, *supra* note 2.

[11] 47 U.S.C. § 271(c)(1)(A).

checklist. If so, and if the BOC has established a structurally separate entity for the provision of in-region interLATA service, then the FCC, after consulting with and giving substantial weight to the views of the Attorney General (presumably informed by the Antitrust Division),[12] must rule, under the public interest standard of the Telecommunications Act, on the BOC's request to provide in-region interLATA service.[13]

B. Economic Expectations Underlying Implementation of Section 271

In their assessment of the public interest, the FCC and the DOJ have, since 1997, interpreted Section 271 to give little or no weight to the consumer benefits that might arise from price reductions following BOC entry into the in-region interLATA market. The FCC's 1997 ruling on Ameritech's Michigan application for in-region interLATA authority rejected the position that public interest concerns should be evaluated by assessing whether BOC entry would enhance long-distance competition.[14] The FCC stated that the public-interest inquiry "should focus on the status of market-opening measures in the relevant local exchange market."[15] For the FCC, BOC entry into the in-region interLATA market has been "an incentive or reward for opening the local exchange market."[16] That view implicitly subordinates the possible harm to consumers (in the form of delayed price reductions) from the restrictions on the BOCs while they seek that carrot.

Similarly, the DOJ based its interpretation of Section 271 on the expectation in 1997 that BOC entry into the in-region interLATA market would not produce significant price reductions for consumers. The Department's expert witness, Professor Marius Schwartz, outlined an "open local market standard" for Section 271 proceedings,[17] which relied on two main premises: (1) the local market is larger than the long-distance market, and (2) the long-distance market is more competitive

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[12] *Id.* § 271(d)(2)(A).

[13] *Id.* § 271(d)(3).

[14] *In re* Application of Ameritech Michigan Pursuant to Section 271 of the Communications Act of 1934, as amended, To Provide In-Region, InterLATA Services in Michigan, CC Dkt. No. 97-137, 12 F.C.C. Rcd. 20,543, 20,746 ¶ 386 (1997) [hereinafter 1997 Michigan Section 271 Order].

[15] *Id.* ¶ 385. For an early criticism of the § 271 process on this ground, see MACAVOY, *supra* note 6, at 175–212.

[16] 1997 Michigan Section 271 Order, 12 F.C.C. Rcd. at 20,746 ¶ 388.

[17] Supplemental Affidavit of Marius Schwartz, The "Open Local Market Standard" for Authorizing BOC InterLATA Entry: Reply to BOC Criticisms at 4 ¶ 9 (Nov. 3, 1997) (filed on behalf of the U.S. Department of Justice).

than the local market.[18] He believed that the BOCs would prefer to raise the price of in-region interLATA price, not lower it.[19] Although Professor Schwartz noted that BOC entry could "accelerate" price decreases, he expected that over time the effect of that new competition would diminish.[20]

III. EMPIRICAL INVESTIGATION OF CHANGES IN LONG-DISTANCE AND LOCAL SERVICE PRICES AFTER BOC ENTRY

The initial BOC entry into in-region interLATA services that has occurred in New York and Texas provides an opportunity to investigate empirically the effects that BOC entry has had on the cost of long-distance services to consumers. Although the Telecommunication Act of 1996 requires uniform nationwide prices for interLATA service,[21] intraLATA and intrastate interLATA offerings by a given company can differ between states. Moreover, facing increased competition in a state where BOC entry had occurred, existing carriers would have greater incentives to ensure that a customer in that state was on the minimum-cost plan given his or her calling patterns.

We analyze the effect of BOC entry in New York and Texas on both interLATA and intraLATA competition. We compare outcomes in these states to outcomes in Pennsylvania and California, where BOC entry had not occurred during the period covered by the data used for our analysis.[22]

We first analyze a random sample of residential interLATA bills and find a statistically significant decrease of 8 to 11 percent in the average consumer's interLATA bill in states where BOC entry occurred relative to the average consumer's bill in states without BOC entry. We next analyze a random sample of bills for local service and find a significant increase in the share of residential customers using competitive local

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[18] *Id.* at 5 ¶ 10(A).

[19] *Id.* at 26–27 ¶ 68.

[20] *Id.* at 34 ¶ 85. Other distinguished economists also predicted in late 1997 that BOC entry would cause no significant price reduction in the interLATA market. *See* Declaration of Carl Shapiro at 8 (Oct. 1997) (filed on behalf of Sprint Corp. in opposition to BellSouth's Section 271 application in South Carolina); Declaration of Robert E. Hall at 64–65 (Oct. 1997) (filed on behalf of MCI in opposition to BellSouth's Section 271 application in South Carolina).

[21] *See* 47 U.S.C. § 254(g); Policy and Rules Concerning the Interstate, Interexchange Marketplace, Implementation of Section 254(g) of the Communications Act of 1934, as Amended, Report and Order, CC Dkt. No. 96-61, 11 F.C.C.R. 9564 (1996).

[22] Verizon has since received permission to provide interLATA service in Pennsylvania. *See supra* note 5.

exchange carriers in New York and Texas, where BOC entry occurred, relative to the share in states without BOC entry. We also find small decreases in the average bill for local service of approximately 3 to 7 percent in the states where BOC entry occurred relative to the average local bill in states without BOC entry, but the change is not statistically significant.

A. METHODOLOGY

We use a "difference-in-differences" approach to estimate the effects of BOC entry into interLATA long-distance service.[23] A difference-in-differences approach involves comparing the pre-entry to post-entry change in prices in a state where entry occurred to the change in prices over the same time period in a state where no entry occurred.[24] This approach allows us to control for differences across states due to differences in socio-demographic characteristics, LATA definition, and other factors. If BOC entry had a price-reducing effect, we would expect to see prices decrease in the state where entry occurred relative to prices in the state where no entry occurred. Conversely, if BOC entry had no effect, we would expect to see price changes of similar magnitude in both states.

The pre-entry period serves as a "control" for time-invariant economic factors that are specific to the state where entry occurred. For example, the consumers in the state might be relatively heavy users of interLATA service. This characteristic would be expected to be present in both the pre- and post-entry periods, and to exert in both periods the same influence on average interLATA rates in that state relative to rates in other states.

Similarly, by employing a control state for comparison purposes, we can account for economic factors that changed between the pre-entry and post-entry periods in the same way in both the states with BOC entry and the states without BOC entry. An example would be a change from one period to the next in the competitive interaction among nationwide long-distance providers that affected prices similarly in all states.

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[23] The technique is also called "panel data" or "first differences." It has a long history of use in econometrics. *See, e.g.*, RUSSELL DAVIDSON & JAMES G. MACKINNON, ESTIMATION AND INFERENCE IN ECONOMETRICS 683, 701 (1993); WILLIAM H. GREENE, ECONOMETRIC ANALYSIS 615–18 (3d ed. 1997).

[24] The standard difference-in-differences approach involves comparing the same unit of observation at two different points in time. The unit of observation might be an individual household or it might be more aggregated, such as a state. In this article, our approach differs slightly from the standard difference-in-differences approach in that we are comparing the same aggregated unit of observation—a state—at two different points in time, but we are using disaggregated individual household data to make the comparison.

We chose Pennsylvania to serve as the control for New York, and California to serve as the control for Texas. Pennsylvania and California were chosen as control states because of their similarity to New York and Texas, respectively, in factors such as LATAs, BOC ownership of the ILEC, and geography. SBC owns the BOCs in Texas and California, Southwestern Bell and Pacific Bell. Verizon owns the BOCs in New York and Pennsylvania, which were known as New York Telephone and Bell Atlantic–Pennsylvania during part of our sample period.

In a difference-in-differences analysis such as this one, an attempt should be made to identify and control for state-specific factors other than BOC entry that might have changed between the pre-entry and post-entry periods and been a partial cause of any observed change in prices. As discussed below, we have specifically accounted for one such potential factor, changes in interstate and intrastate access charges. Access charges, which are levied on interLATA calls, can vary across states and change at different times in different states.

B. DATA

TNS Telecoms is a company that collects data each quarter on long-distance bills from a nationwide random sample of households.[25] The data contain information on the sampled households' long-distance calls, including call length, carrier, and cost.[26] The FCC uses these data to compute information on long-distance and local telephone expenditures and other statistics.[27] We procured the TNS Telecoms data for households in New York and Texas, the first states where BOC entry occurred, and Pennsylvania and California, the control states in our analysis.[28]

Bell Atlantic/Verizon introduced interLATA service in New York at the end of December 1999, and SBC introduced interLATA service in Texas in July 2000. The most recent time period available from TNS Telecoms at the time we obtained the data was the fourth quarter of 2000. Thus, we used the second half of 2000 as the post-entry period

[25] Each household appears in the TNS Telecoms data for only one billing cycle. Thus, it is not possible to follow a specific household over time.

[26] Each quarter, TNS Telecoms surveys roughly 30,000 consumers as to their telecommunications expenditures. A subset of those customers provides TNS Telecoms with their actual long-distance bills. Because the TNS data are proprietary, we cannot give them to a third party who might wish to replicate our results. However, the data may be readily purchased from TNS Telecoms. *See* http://www.tnstelecoms.com/quarterlytracking data.html.

[27] *See, e.g.*, FCC, TRENDS IN TELEPHONE SERVICE, tbl. 4.2 (Mar. 2000).

[28] Because we did not obtain data on states other than these four, comparisons to other states were not possible. However, for the reasons discussed above, Pennsylvania and California provide good controls for New York and Texas.

for our analysis. To control for possible seasonal effects, we used the second half of 1999 as the pre-entry period.

The data set we received from TNS Telecoms contained a total of 3,294 households that had made at least one interLATA call using one of the three largest long-distance carriers, AT&T, MCI, and Sprint.[29] From this starting point, we excluded certain observations (either households as a whole or individual calls) to obtain the dataset that subsequently formed the basis for our analysis.

First, given our focus on residential service, we excluded a small number of long-distance bills for business customers that were present in the TNS Telecoms data. Second, we eliminated a small number of observations that contained apparent data errors or anomalies (such as bills with mismatched long-distance provider and calling plan, bills with negative service charges, and calls with negative call charges). Third, because some households are billed less frequently than once a month (for example, households on threshold billing plans), we eliminated calls that were made more than 31 days from the date of the first call on the bill to ensure that each household was represented for, at most, 31 days in the data. These criteria led to a total of 68 households (out of the original 3,294) being excluded from the data.

In addition, we excluded an additional 404 households that had more than one long-distance bill during the billing cycle. Such households might have more than one telephone line (which can be indicative of home office business use, in which case the household should be eliminated from the data to avoid business customers) or might have switched service providers during the billing cycle. We also excluded an additional 62 households that had a service charge of more than $10 on their bill. A service charge of this magnitude could represent a data anomaly (in which case the household should be eliminated from the data), or it could indicate that the household was on a "block of time" calling plan where the customer gets a block of minutes for a flat fee. Finally, we excluded an additional 15 households that were apparent outliers in terms of number of long-distance minutes called (in excess of 1,000 minutes during the month). Although we believe that the 481 households identified by the last three criteria should be excluded from the analysis, if we were instead to include them, our results would not change in any meaningful way, as we discuss below.

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[29] We focused our analysis on AT&T, MCI, and Sprint because the largest competitive effect of BOC entry would be expected for these carriers. Calls made using other providers, such as dial-around services (including those dial-around services owned by AT&T, MCI, and Sprint), are not included in the analysis.

After application of the six criteria discussed above, the data set used in our analysis contained 2,745 households. For each household, we calculated a price per minute for peak (P), off-peak non-Sunday (OPA), and off-peak Sunday (OPB) minutes of use, as well as the monthly service fee if the household was on a calling plan that imposed such a fee. A price could not be calculated for a household that did not have any minutes in a given category.

C. Regression Results

We implemented the difference-in-differences approach in a regression framework. For each type of minutes of use (P, OPA, and OPB), we ran a regression of the logarithm of price on indicator variables for the household's state, indicator variables for the household's service provider, an indicator variable for the post-entry period, and an indicator variable for the post-entry period in the state where entry occurred. We ran a similar regression for the service charge. We ran separate sets of regressions for Texas/California and New York/Pennsylvania.

The state indicator variables control for state-specific, time-invariant economic factors. The factors are called "fixed effects" in econometrics.[30] The service provider indicator variables control for provider-specific economic factors, such as AT&T's brand name. The indicator variable for the post-entry period controls for economic factors specific to the post-entry period, but common to both states. The coefficients on the indicator variables for the post-entry periods in New York and Texas provide an estimate of the extent to which the change in price or monthly fee between the pre-entry period and post-entry period was different in New York from the analogous change in Pennsylvania.[31]

The detailed regression results appear in Tables 1 and 2. Standard errors appear in parentheses.[32] We discuss these regression results in the next two subsections.

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[30] *See, e.g.,* GREENE, *supra* note 23, at 615–18 (explaining fixed effects); DAVIDSON & MACKINNON, *supra* note 23, at 322 (same). For an explanation of how the use of fixed effects eliminates possible bias in coefficient estimates, see Jerry A. Hausman & William Taylor, *Panel Data and Unobservable Individual Effects,* 49 ECONOMETRICA 1377 (1981).

[31] Inclusion of household demographic variables in the regression specification improves the overall explanatory power of the regression (the R^2 figures reported in Tables 1 and 2 increase by 50 to 100%), but the results of interest are essentially unchanged.

[32] To test whether an individual coefficient is statistically significantly different from zero, one calculates the ratio of the estimated coefficient to its standard error, and then compares this ratio against a threshold value. For example, in large samples, an estimated coefficient is said to be significantly different from zero at a 5% significance level if the absolute value of the ratio equals or exceeds 1.96.

Table 1
Regression Results, New York and Pennsylvania

	LHS Variable			
	Log Peak Price	*Log Off-Peak A Price*	*Log Off-Peak B Price*	*Fee*
Intercept	–1.807	–2.252	–2.787	1.399
	(0.042)	(0.036)	(0.042)	(0.179)
New York Post-Entry	–0.172	–0.103	–0.107	0.584
	(0.063)	(0.054)	(0.064)	(0.267)
2H-00	–0.123	–0.056	0.059	0.862
	(0.046)	(0.040)	(0.048)	(0.195)
New York	–0.034	–0.064	–0.020	–0.117
	(0.044)	(0.038)	(0.045)	(0.189)
Sprint	0.083	0.082	0.507	0.495
	(0.077)	(0.067)	(0.080)	(0.318)
AT&T	0.063	0.245	0.515	0.095
	(0.039)	(0.033)	(0.038)	(0.166)
R^2	0.050	0.085	0.194	0.048
Number of Obs	1049	981	817	1271

1. *New York and Pennsylvania*

The estimated coefficients on the New York indicator variable are small in magnitude and not statistically significantly different from zero, implying that the prices and monthly fees in New York and Pennsylvania were quite similar in the pre-entry period. The estimated coefficient on the second half of 2000 indicator variable is negative for the peak price regression, indicating that Pennsylvania peak prices fell by 12 percent.

However, the negative estimated coefficients on the New York post-entry variable imply that per-minute long-distance prices in New York decreased relative to prices in Pennsylvania in the post-entry period. Specifically, compared to prices in Pennsylvania, prices in New York fell by 17 percent for P, 10 percent for OPA, and 11 percent for OPB. These estimated decreases are jointly statistically significantly different from zero. Moreover, they cannot be attributed to differences in intrastate access charges because no change in these charges occurred in New York relative to Pennsylvania over the relevant period.[33] Thus, these

[33] Changes in interstate access charges, as well as changes in intrastate access charges, potentially affect long-distance prices. However, it is important to distinguish between state-specific changes and the average change across states. Our use of a control state

Table 2
Regression Results, Texas and California

	LHS Variable			
	Log Peak Price	*Log Off-Peak A Price*	*Log Off-Peak B Price*	*Fee*
Intercept	–1.739	–2.032	–2.495	1.697
	(0.043)	(0.038)	(0.042)	(0.194)
Texas Post-Entry	–0.230	–0.295	–0.207	–0.058
	(0.063)	(0.056)	(0.063)	(0.288)
2H-00	–0.100	0.004	–0.009	0.854
	(0.036)	(0.033)	(0.035)	(0.164)
California	–0.248	–0.319	–0.247	–0.291
	(0.042)	(0.038)	(0.042)	(0.192)
Sprint	–0.200	–0.120	0.283	0.369
	(0.053)	(0.048)	(0.052)	(0.243)
AT&T	0.033	0.087	0.364	–0.056
	(0.034)	(0.031)	(0.033)	(0.155)
R^2	0.067	0.088	0.153	0.031
Number of Obs	1296	1109	921	1474

Note: Standard errors in parentheses.

empirical results suggest that BOC entry had the effect of reducing prices in New York by 10 to 17 percent.

The average monthly fee for long-distance service increased in both states. In Pennsylvania, the average monthly fee increased by $0.86. In New York, the average monthly fee increased by $1.45 (the sum of the estimated coefficients on the 2H-00 and New York post-entry indicator variables). However, as discussed further below, the decrease in per-minute prices more than offset this increase in the monthly fee for the average New York consumer, resulting in a lower overall bill.

2. *Texas and California*

In the pre-entry period, Texas had substantially higher prices than California, as shown by the negative estimated coefficients for the California indicator variable. The difference between the average monthly fees

accounts for the effects on long-distance prices of the average change in interstate access charges across all states. State-specific changes in interstate access charges likely would not affect long-distance prices because these prices are constrained by statute to be the same nationwide. *See* note 21 *supra*. However, we statistically addressed this question by including an interstate access charge variable in the regression specification. We found that state-specific changes in interstate access charges had no effect on long-distance prices.

in the two states is not statistically significant. Peak prices in California fell by 10 percent between the two periods, but the small estimated changes in off-peak prices were not statistically significant.

Prices decreased in Texas relative to prices in California in the post-entry period, as shown by the estimated coefficients on the Texas post-entry indicator variable. Specifically, relative to prices in California, prices in Texas fell by 23 percent for P, 30 percent for OPA, and 21 percent for OPB. These differences are jointly statistically significantly different from zero. However, some part of the decreases in prices in Texas relative to California were likely due to differential changes in intrastate access charges in the two states.[34]

Intrastate access charges in Texas fell by approximately $0.06 between the second half of 1999 and the second half of 2000,[35] while there was no change in California intrastate access charges over the same period. Since intrastate calls account for about 32 percent of all interLATA minutes and the average price for all minutes of use was about $0.16, the access charge decreases could account for approximately 12 percentage points of the total percentage price decrease for P, OPA, and OPB.[36]

We reduce the estimated relative decrease of Texas prices by 12 percentage points to account for the effect of differential changes in intrastate access charges. The remaining percentage price decreases in Texas relative to California—that is, 11 percent for P, 18 percent for OPA, and 9 percent for OPB—are still substantial. This result suggests that BOC entry had the effect of decreasing per-minute prices in Texas by 9 to 18 percent. This range is similar to the range found in New York.

The average monthly fee increased by $0.85 in California and by approximately the same amount, $0.79, in Texas.

D. Effect on the InterLATA Bill for the Average Consumer

We used the regression results to analyze the effects of BOC entry on the cost of interLATA service for the average New York consumer and the average Texas consumer, holding constant the minutes of use. We

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[34] As with New York and Pennsylvania, a statistical test demonstrated that state-specific changes in interstate access charges had no effect on long-distance prices in Texas and California.

[35] Public Utility Commission of Texas, Report to the 77th Texas Legislature: Intrastate Switched Access Charges (Jan. 2001).

[36] The 32% intrastate percentage and the $0.16 price were obtained by averaging over the same sample of Texas households used to estimate the regression in Table 2. So long as the intrastate percentage does not exceed 60%, our results indicate that Texas prices fell by more than prices in California after accounting for the decrease in Texas intrastate access rates.

defined the average consumer for New York as one having the average number of P, OPA, and OPB minutes of use calculated over all sampled households from that state in the second half of 2000.[37] We defined the average consumer for Texas analogously.

Using the regression results, we estimated the prices and monthly fee for the average consumer in each of the two time periods. We multiplied the price in each time period by the corresponding minutes of use of the average customer, summed across the minutes of use types (P, OPA, and OPB), and added in the monthly fee to calculate the estimated bill for the average consumer in each state and each time period. The results of these calculations appear in Tables 3 and 4.

The results of these calculations indicate that, after BOC entry, the average consumer in New York and Texas experienced substantial incremental savings over the savings experienced in the control states. In New York, the average consumer would have paid $20.03 in the pre-entry period and $18.09 in the post-entry period, for a savings of $1.94, or 9.7 percent. In Pennsylvania, this same consumer would have paid $20.95 in the pre-entry period and $20.57 in the post-entry period, for a savings of $0.39, or 1.8 percent. Thus, in New York, the average consumer

Table 3
Savings on InterLATA Bills for the Average Customer, New York and Pennsylvania

	MOU NY 2H00	*Price NY 2H99*	*Price NY 2H00*	*Price PA 2H99*	*Price PA 2H00*
Peak	46	$0.19	$0.14	$0.20	$0.18
Off-Peak A	53	$0.12	$0.10	$0.13	$0.12
Off-Peak B	33	$0.10	$0.09	$0.10	$0.10
Fee		$1.48	$2.93	$1.60	$2.46
Total Bill		$20.03	$18.09	$20.95	$20.57
$ Change v. 2H99			–$1.94		–$0.39
% Change v. 2H99			–9.7%		–1.8%
$ NY Relative to PA			–$1.55		
% NY Relative to PA			–8.0%		

[37] By using the average minutes from the second half of 2000 to calculate the estimated bill for both time periods, we avoid problems that might otherwise be caused by any shift in the mix or number of minutes that occurred between periods. Our procedure is analogous to a Paasche price index. See, e.g., HAL R. VARIAN, MICROECONOMIC ANALYSIS 166 (2d ed. 1978).

Table 4
Savings on InterLATA Bills for the Average Customer, Texas and California

	MOU TX 2H00	*Price TX 2H99*	*Price TX 2H00*	*Price CA 2H99*	*Price CA 2H00*
Peak	46	$0.17	$0.14	$0.15	$0.13
Off-Peak A	46	$0.13	$0.11	$0.10	$0.10
Off-Peak B	21	$0.10	$0.09	$0.09	$0.09
Fee		$1.80	$2.60	$1.51	$2.36
Total Bill		$17.52	$15.72	$14.98	$15.18
$ Change v. 2H99			–$1.80		$0.20
% Change v. 2H99			–10.3%		1.4%
$ TX Relative to CA			–$2.01		
% TX Relative to PA			–11.5%		

would have saved an additional $1.55, or 8.0 percent, as compared to Pennsylvania.[38]

In Texas, the additional savings in the post-BOC entry period are similar. The average Texas consumer would have paid $17.52 in the pre-entry period. (To eliminate the effect of the relative changes in intrastate and interstate access charges that occurred in Texas between the second half of 1999 and the second half of 2000, the pre-entry prices listed in Table 4 are the actual pre-entry prices less the decrease due to the change in intrastate access charges.) The same consumer would have paid $15.72 in the post-entry period, implying a savings of $1.80, or 10.3 percent.[39] In California, this same consumer would have paid $14.98 in the pre-entry period and $15.18 in the post-entry period, implying no savings (the implied loss of $0.20, or 1.4 percent, is not statistically

[38] In this calculation, we have compared the outcomes in New York and Pennsylvania based on usage of the average New York consumer in order to hold constant consumer calling patterns across the two states. However, alternatively we could have compared the outcome in New York based on usage for the average New York consumer with the outcome in Pennsylvania based on usage for the average Pennsylvania consumer. In that case, essentially the same result is obtained: the average New York consumer is calculated to save an additional 9.6% relative to the average Pennsylvania consumer.

If the 481 households that we excluded according to the last three criteria discussed above are instead included in the analysis, the average New York consumer is calculated to save an additional 7.2% relative to Pennsylvania. Thus, essentially the same result is obtained whether these households are included or excluded from the analysis.

[39] In making these calculations, we net out the effect of the decreased intrastate access charges in Texas relative to California.

significant). Thus, in Texas, the average consumer would have saved an additional $2.01, or 11.5 percent, as compared to California.[40]

E. Results for Local Exchange Services

We next considered the effect of BOC entry on competition for local exchange services. We again used the TNS Telecoms data for New York, Pennsylvania, Texas, and California for the second halves of 1999 and 2000. For each sample household, the data contain the identity of the local service provider. For this analysis, we included all households in the TNS Telecoms data that were located in areas that we identified as areas where the BOC provided local service. By definition, an analysis of intraLATA competition between BOCs and CLECs must focus on these areas and exclude areas where the BOC does not provide local service. We designated a zip code as "BOC-covered" if the BOC served at least one sample household located in the zip code. We then included all sample households that were located in a BOC-covered zip code. This approach should exclude most areas where a non-BOC ILEC provides local service.

We first analyzed the percentage of households in the TNS data that used a CLEC rather than the BOC for their local telephone service. We compared the first half of 1999 with the second half of 2000. Table 5 demonstrates that a significant increase in CLEC activity occurred after BOC entry in New York and Texas.

The CLEC share increased from 3.5 percent to 17.2 percent in New York after BOC entry. This change is much larger than the CLEC increase of 1.1 percent in Pennsylvania, where BOC entry did not occur over the same period. The difference-in-differences estimate is highly statistically significant, with a t-statistic of 6.19. Similarly, in Texas after BOC entry, the CLEC share almost doubled from 8 percent to 15.1 percent, while the change in CLEC share in California, where no BOC entry occurred, increased only slightly from 8.2 percent to 9.1 percent. Again, the difference-in-differences estimate is highly statistically significant, with a t-statistic of 2.80. We also estimated a probit model that led to very

[40] As in note 38, *supra*, alternatively we could have compared the outcomes for the average consumer in Texas and the average consumer in California. In that case, essentially the same result is again obtained: the average Texas consumer is calculated to save an additional 10.5% relative to the average California consumer.

If the 481 households that we excluded according to the last three criteria discussed above are instead included in the analysis, the average Texas consumer is calculated to save an additional 11.9% relative to California. Thus, essentially the same result is obtained whether these households are included or excluded from the analysis.

Table 5
Residential Shares for Local Service

Time Period	*State*	*BOC*	*BOC Share*	*CLEC Share*
1H 1999	NY	Bell Atlantic	96.5%	3.5%
2H 2000	NY	Bell Atlantic	82.8%	17.2%
1H 1999	PA	Bell Atlantic	94.1%	5.9%
2H 2000	PA	Bell Atlantic	93.0%	7.0%
1H 1999	TX	SBC	92.0%	8.0%
2H 2000	TX	SBC	84.9%	15.1%
1H 1999	CA	Pacific Bell	91.8%	8.2%
2H 2000	CA	Pacific Bell	90.9%	9.1%

similar results.[41] Table 6 reports our findings that the probability that a consumer would subscribe to the BOC for local service fell after the BOC received permission to offer in-region interLATA service, as can be seen by the negative estimated coefficients for the New York and Texas Post-Entry indicator variables. Standard errors are in parentheses. The estimated effects of entry are highly statistically significant.

We conclude that CLECs' cumulative market share increased significantly after BOC entry into interLATA service. Most of the change in CLEC share is attributable to AT&T Local and MCI Local, which have been driven by competition to offer a bundle of local and long-distance services because the BOC can now offer a similar package to residential consumers.

Finally, we examined the changes in local telephone bills in the states where BOC entry occurred as compared to the control states without BOC entry. The local telephone bill amount in the data includes charges for local telephone service and vertical services, such as call waiting, caller identification, and voice messaging services, but excludes charges for toll service (interLATA or intraLATA). The estimated coefficients appear in Table 7, with standard errors in parentheses.[42]

[41] Probit is a statistical technique often used in situations where the variable to be explained (the "dependent variable") takes on only two discrete values (in contrast to least squares regression, which is generally used when the dependent variable takes on a continuum of values). Probit is useful for analyzing the factors that affect which of two discrete outcomes occur. For example, here we analyze two potential outcomes for the household's choice of local service provider. The household can either choose the BOC or not. The dependent variable is equal to one if the household chooses the BOC and zero otherwise.

[42] The local bill analyses in Tables 6 and 7 are based on a larger number of observations (households) than the long-distance price regressions in Tables 1 and 2. The primary reason for the difference in number of observations between the two sets of analyses is that, while the TNS Telecoms data provide local bill information on all sampled households,

Table 6
Probit Model Results

New York and Pennsylvania		*California and Texas*	
Intercept	1.559	Intercept	1.395
	(0.098)		(0.062)
New York Post-Entry	–0.779	Texas Post-Entry	–0.312
	(0.156)		(0.128)
2H-00	–0.087	2H-00	–0.062
	(0.119)		(0.080)
New York	0.255	Texas	0.010
	(0.132)		(0.103)
Pseudo-R^2	0.059	Pseudo-R^2	0.012
Number of Obs	2853	Number of Obs	3239

Note: Standard errors in parentheses.

In New York after BOC entry, we found that the local telephone bill decreased 6.6 percent relative to local bills in Pennsylvania, although the change is only marginally statistically significant at the 12 percent level. In Texas after BOC entry, we found a decrease of 2.8 percent relative to local bills in California, which is not statistically significant.[43] We conclude that, following BOC entry into interLATA service, customers' local telephone bills decreased, but the decrease appears to be smaller than the decrease in interLATA long-distance bills.[44] The smaller decrease for local bills might be expected, as both AT&T Local and MCI Local mainly resell the BOC's local service. With those carriers making only a limited investment in local network facilities, we would not expect the cost basis for AT&T and MCI to differ very much from that of the BOC.

F. Summary of Empirical Results

Our analysis suggests that the interLATA bills of residential consumers in New York and Texas have fallen by a substantial amount after BOC

the data provide the detailed information on long-distance calls necessary to conduct the long-distance price regressions on only a subset of sampled households. If the sample used for the local bill analyses is restricted to include only those households appearing in the long-distance price regressions, the results are very similar to those reported in Tables 6 and 7.

[43] As with the results reported in Tables 1 and 2, the results in Table 7 are robust to the inclusion of household demographics in the specification.

[44] It is possible that increased use of vertical services in the states with BOC entry might have led to increases in the local bill that partially offset the decreases in the local bill

Table 7
Local Bill Regression Results

New York and Pennsylvania		*California and Texas*	
Intercept	3.707	Intercept	3.195
	(0.187)		(0.059)
New York Post-Entry	–0.066	Texas Post-Entry	–0.028
	(0.042)		(0.050)
2H-00	0.013	2H-00	0.051
	(0.032)		(0.030)
New York	0.167	Texas	0.403
	(0.080)		(0.083)
NYNEX	–0.379	PacBell	–0.165
	(0.201)		(0.058)
Bell Atlantic	–0.437	SBC	–0.126
	(0.187)		(0.074)
All Other Companies	–0.385	All Other Companies	–0.004
	(0.197)		(0.077)
R^2	0.031	R^2	0.092
Number of Obs	2853	Number of Obs	3237

Notes: (1) GTE is the omitted company indicator variable; (2) standard errors in parentheses.

entry into in-region interLATA long-distance service. By using Pennsylvania and California as control states, we have been able to control for factors common to all states that have caused a decrease in long-distance prices. We have also accounted for differences in intrastate access charges across states. The analysis estimates that the average consumer saved 8 percent per month on the interLATA bill in New York and 12 percent in Texas.

To summarize the empirical findings in terms of consumer savings on a nationwide basis, we use the midpoint of the estimates for percentage changes in interLATA bills and local telephone bills of the average consumer as well as average household expenditure on local and long-distance services on a nationwide basis.[45] We estimate that the average household would save $25.20 per year on long-distance service and $19.20 on local service if the results from New York and Texas applied to the nationwide telephone expenditure amounts.

due to increased competition for local phone service. However, given the data available, we are unable to test this possibility.

[45] We use data for 1999 residential telephone expenditures from FCC, TRENDS IN TELEPHONE SERVICE tbl. 3.2 (Dec. 2000).

These results provide useful information for regulators who will examine the issue of whether the BOCs should receive Section 271 approvals in other states. The results suggest that consumers will benefit from lower long-distance bills following BOC entry.

We also find that CLEC shares for local residential service increased substantially in New York and Texas following BOC entry into in-region interLATA service. This result suggests that, if the BOCs receive Section 271 approvals in other states, an increase in CLEC share would occur, as competition would require the long-distance companies to offer their customers bundled packages of long-distance and local service. This increased choice also benefits consumers. We found a small decrease in local bills following BOC entry. The lack of a larger effect is most likely due to the fact that most CLEC service to residential customers is resale of the BOC service without facilities-based competition.

IV. DOUBLE MARGINALIZATION AND ITS RELEVANCE TO IMPLEMENTATION OF SECTION 271

Our empirical results are consistent with the predictions of economic theory. Economic theory predicts that BOC entry would lead to lower prices for two reasons: first, BOC entry adds an additional competitor; second, and likely more important, due to its vertical integration the BOC has a greater incentive to lower prices than would an otherwise equally efficient long-distance provider.

The BOCs have a significant economic incentive to lower prices because of the increase in long-distance traffic that a lower price will cause. An increase in long-distance traffic increases the access revenues that the BOCs receive for supplying local network connections for long-distance calls. Thus, the BOCs receive two "profit margins," one on long-distance calls and one on access.[46] Economists have recognized the price-decreasing effect of this "double marginalization" for decades.[47]

Double marginalization occurs when two companies have a vertical supplier-customer relationship. The upstream company sets its price, and thus its margin between price and marginal cost, to maximize its own profits. The downstream company likewise sets its price and margin

[46] This analysis of double marginalization was submitted in the initial § 271 authorization proceedings. *See, e.g.*, Declaration of Jerry A. Hausman, at 11 ¶ 19, 19 ¶ 37, 34 ¶ 72 (Oct. 2, 1997) (filed in support of BellSouth's § 271 application in Georgia).

[47] *See* Joseph Spengler, *Vertical Integration and Antitrust Policy*, 58 J. POL. ECON. 347, 351–52 (1950). For a contemporary exposition, see DENNIS W. CARLTON & JEFFREY M. PERLOFF, MODERN INDUSTRIAL ORGANIZATION 398–401 (3d ed. 2000); JEAN TIROLE, THE THEORY OF INDUSTRIAL ORGANIZATION 174 (1988).

to maximize its profit, treating what it pays the upstream company as a cost. If the upstream company begins to offer the downstream product also, it generally will set the final price of the downstream product to maximize its profits jointly from both the upstream and downstream products. The company offering the combined product will often find that it can increase its profits by lowering the price of the final product below the price that would be set in the previous situation. The company offering the combined product will take into account how a lower price on the final product will increase the sale of and profits from the upstream product, while a company offering only the final product will not.

Suppose, for example, that a BOC's incremental margin over marginal cost on the provision of network access is $0.02 per minute, while the IXC's profit-maximizing price for residential long-distance service results in a margin of $0.04 per minute over its marginal cost (which includes what it pays for access). It would not be profit increasing for the IXC to decrease price because the profit gain from an increased level of sales would not offset the profit loss from a lower margin on existing sales. Of course, the BOC also would earn a margin of $0.02 from access on the increased sales if the IXC were to lower its price, but this effect on BOC profits is irrelevant to the IXC's pricing decision.

In contrast, in the same sitution, a BOC providing long distance service will find it to be profit maximizing to lower the long-distance price. The BOC will recognize that it will earn a margin of nearly $0.06 per minute, rather than $0.04 per minute, on increased sales: $0.02 for access plus nearly $0.04 for long-distance service. Thus, the BOC has a greater incentive to charge lower long-distance prices than does an IXC because BOC pricing decisions consider the additional margin earned on access service when long-distance sales are expanded by lower prices. Furthermore, when the BOC lowers the long-distance price, the IXCs will lower their prices, which will increase the number of long-distance minutes demanded and consequently the number of access minutes demanded from the BOCs.[48]

Although the analysis of double marginalization originally was derived for the case of monopoly, it also applies to imperfect competition, which

[48] This economic reasoning holds true under a wide range of specific assumptions about the exact size of the relevant margins. For a theoretical model showing this price-reducing effect of BOC entry into the in-region interLATA market, see DAVID E.M. SAPPINGTON & DENNIS L. WEISMAN, DESIGNING INCENTIVE REGULATION FOR THE TELECOMMUNICATIONS INDUSTRY 258–61, 267–71 (1996). *See also* David S. Sibley & Dennis L. Weisman, *The Competitive Incentives of Vertically Integrated Local Exchange Carriers: An Economic and Policy Analysis*, 17 J. POL'Y ANALYSIS & MGMT. 74 (1998); Dennis L. Weisman, *Regulation and the*

characterizes telecommunications markets because of the large fixed and common costs. The Areeda-Hovenkamp antitrust treatise, for example, observes that "[t]he double marginalization model appears to make robust predictions that vertical integration results in increased output and lower prices any time the affected markets are something less than perfectly competitive."[49] Under current regulatory policies, access and long-distance services are both sold at prices exceeding marginal (incremental) cost, so as to cover the large fixed costs of local and long-distance networks. Although access reform since the Telecommunications Act of 1996 has decreased the BOCs' access margin, it has not eliminated the entire margin. Thus, double marginalization still leads to the prediction that BOC entry into the in-region interLATA market will lead to lower long-distance prices. Our econometric findings are consistent with this economic analysis, which has not been taken into account by the DOJ and FCC in their Section 271 implementation analyses.

V. CONCLUSION

Consumers have benefited in New York and Texas from BOC entry, which has enabled them to pay between 8 and 11 percent less each month for their interLATA calls than comparable customers pay in Pennsylvania and California. At the same time, BOC entry into New York and Texas has stimulated greater local competition from CLECs than had occurred by that period in Pennsylvania and California. The empirical evidence is consistent with well-accepted economic analysis concerning double marginalization. In light of that empirical evidence, the Federal Communications Commission and the Department of Justice should reevaluate their analysis for allowing BOCs to enter in-region interLATA markets.

Vertically Integrated Firm: The Case of RBOC Entry into InterLATA Long Distance, 8 J. REG. ECON. 249 (1995).

[49] 3A PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW ¶ 758b at 30 (2d ed. 2002).