



The Costs and Benefits of Long-Distance Entry: Regulation and Non-Price Discrimination

DENNIS L. WEISMAN

*Department of Economics, Waters Hall, Kansas State University, Manhattan, KS 66506-4001,
U.S.A.*

E-mail: weisman@ksu.edu

MICHAEL A. WILLIAMS*

PM Industrial Economics, 2200 Powell St. Suite 1080, Emeryville, CA 94608, U.S.A.

E-mail: mwilliams@pm-industrial.com

Abstract. A primary goal of the 1996 Telecommunications Act is to encourage competition in long-distance telephone markets. Four years after passage of this legislation, Bell Operating Companies (“BOCs”) have been granted permission to offer long-distance services in only one state. The regulatory barrier to entry is justified on grounds that the BOCs have the ability to discriminate against incumbent long-distance carriers in the provision of essential access services. We take this premise as given and quantify the critical level of discrimination required to offset the positive consumers’ surplus gains associated with the enhanced competition resulting from BOC entry into long-distance markets.

Keywords: Consumers’ surplus, discrimination, entry, Telecommunications Act.

JEL Classifications: L1, L5.

I. Introduction

More than four years have passed since the President signed into law the Telecommunications Act of 1996 (“Act”), the thrust of which was to create an overlap of long-distance and local service providers, so as to make telecommunications markets more competitive.¹ (These markets are critical to the U.S. economy, as consumers and businesses spent approximately \$250 billion on local and long-

* The authors wish to thank an anonymous referee and the editor for constructive comments on an earlier draft of this manuscript. The authors owe a special debt of gratitude to Paul MacAvoy for suggesting this research topic and for his constant encouragement and valued insights. The usual caveat applies.

¹ Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996). The provisions of the Telecommunications Act of 1996 were implemented as amendments to the existing Communications Act of 1934, which is codified throughout Title 47 of the United States Code (“47 U.S.C.”). All further references throughout this paper to the 1996 Act cite the appropriate section of 47 U.S.C.

distance services in 1998.²) In this period, Bell Operating Companies (“BOCs”) have been granted permission to offer in-region, interLATA³ services in only one state, New York.⁴ Prior to that approval, the Federal Communications Commission (“FCC”) had rejected five applications by BOCs to offer long-distance services in Louisiana (twice), Michigan, Oklahoma, and South Carolina.⁵ The primary rationale given by the FCC and the U.S. Department of Justice (DOJ) for rejection of BOC applications to offer long-distance service is that the BOC will discriminate against rival long-distance providers in favor of its own long-distance subsidiary.⁶ According to these agencies, the BOC’s incentive to discriminate results because regulation of local service prices prevents it from earning economic profits,⁷ which it can capture by leveraging its local market power into long-distance markets.⁸

Four conditions are necessary for discrimination to constitute a credible threat. First, the discrimination, if effective, must be profitable.⁹ Second, the BOC must possess the ability to discriminate by varying the quality of its access services differentially so as to discriminate only against its rivals. Third, the BOC must be able to restrict or degrade the quality of access services in ways that bias customers’ choice of long-distance carrier but remain unobservable to regulators.¹⁰ Fourth, the BOC would have to find discrimination to be an optimal strategy given the penalties for such behavior, e.g., taking into account §271(d)(6) of the Act, which specifies that “[i]f at any time after the approval of an application under [§271(d)],

² FCC (December 3, 1999, Tables 1.1 and 1.4).

³ At the time of the AT&T divestiture, the country was divided into 161 local access transport areas (“LATAs”). The BOCs were permitted to provide long-distance calling within LATAs but not between LATAs.

⁴ See FCC (December 22, 1999).

⁵ See FCC at http://www.fcc.gov/Bureaus/Common_Carrier/News_Releases/1999/nrc9101a.html.

⁶ See FCC (August 19, 1997) and DOJ (November 4, 1997).

⁷ The primary goals of public utility commissions regulating local exchange carriers are to ensure just and reasonable rates while allowing the carrier to earn a fair (i.e., non monopoly) rate of return. For example, the Colorado Public Utilities Commission states its objectives are “to maintain utility rates as low as possible for residential and business customers consistent with minimum standards for service, safety, economic viability, and the environment. . . . [and] to ensure that utilities earn a rate of return sufficient for their long-term economic viability and their ability to update their physical plant or equipment to provide reliable state-of-the-art services essential for statewide economic development”. See <http://www.dora.state.co.us/puc/pucabout.htm>

⁸ See, e.g., Schwartz (May 16, 1997). (“[I]ncentives for leverage stem in large part from asymmetric regulation: the firm’s prices for bottleneck services are regulated, but its prices for other services that rely on the bottleneck services are not regulated (or less tightly regulated).”)

⁹ Economides (1998) argues that a BOC’s incentives to discriminate are unequivocal, and it will discriminate until it drives rivals from the long-distance market. Mandy (2000 forthcoming), Weisman and Kang (2000), Sibley and Weisman (1998) and Weisman (1995, 1998) show that the incentive to discriminate is not always present. See also Reiffen (1998).

¹⁰ AT&T’s discriminatory activity against MCI in the early days of long-distance competition is not in dispute. Of course, the FCC and the DOJ were well aware of AT&T’s actions in the regard – actions that ultimately led the government to file an antitrust case against AT&T. See Temin (1987, Chapters III and IV).

the Commission determines that a Bell operating company has ceased to meet any of the conditions required for such approval, the Commission may . . . suspend or revoke such approval”.

The incentive and ability of BOCs to discriminate against incumbent long-distance carriers has been debated extensively (see, e.g., Bernheim and Willig (1994), Economides (1998), and Sibley and Weisman (1998)). We take a different tack here and assume, *arguendo*, that a BOC offering in-region, interLATA service has both the ability and incentive to discriminate against incumbent long-distance carriers. Using a Cournot model, we first calculate the consumers’ surplus gains resulting from BOC entry into long-distance services. We then estimate the increase in incumbent long-distance carrier costs from BOC discrimination required to just offset those consumers’ surplus gains. Whether or not the resulting critical degree of discrimination could be effectuated without detection depends ultimately on the ability of regulators to detect such discrimination.

II. The Critical Degree of Discrimination

We first derive the estimated benefits of BOC entry into long-distance service by determining the equilibrium Cournot price before and after BOC entry. There are assumed to be n long-distance rivals having the same market share, where the integer $n \geq 1$.¹¹ The inverse demand function is given by $P(Q)$, where $Q = q^B + nq^R$ is market demand, and q^B and q^R represent the output of the BOC and the representative rival, respectively. Let MC_B and MC_R denote the marginal cost of providing long-distance service for the (vertically integrated) BOC and the representative rival, respectively. The profit function for the BOC is given by

$$\Pi^B = [P(Q) - MC_B]q^B. \quad (1)$$

The profit function for the representative rival is given by

$$\Pi^R = [P(Q) - MC_R]q^R. \quad (2)$$

Given an inverse market demand, $P(Q) = A - BQ$,¹² solving the first-order conditions yields the equilibrium Cournot price in the long-distance market:¹³

¹¹ As shown below, the critical level of discrimination depends on the degree of market concentration as given by the Herfindahl-Hirschman Index (“HHI”), where the inverse of the HHI equals the number of equally sized firms. Since any given HHI can be obtained by an infinite number of alternative firm size distributions, the critical level of discrimination does not depend on an assumption that all long-distance carriers have the same market share.

¹² That is, we assume a linear demand curve, which is consistent with econometric practice (see e.g., Taylor, 1994) and facilitates the welfare calculations.

¹³ The corresponding expression for the equilibrium price prior to BOC entry is given by

$$P(Q) = \frac{1}{n+1}[A + nMC_R].$$

$$P(Q) = \frac{1}{(n+2)}[A + MC_B + nMC_R]. \quad (3)$$

We now calibrate the parameter values to observed prices, quantities, demand elasticities, and market concentration. Recognizing that there is some uncertainty regarding both marginal cost and market concentration values, we use two different methods to ensure that the results are robust. Under Method I, we assume the Herfindahl-Hirschman Index (“HHI”) (i.e., the number of equally sized firms) is known and then derive the marginal cost value required to generate the observed market price and quantity consistent with the underlying market demand elasticity. Conversely under Method II, we assume that the marginal cost is known and then derive the HHI (number of equally sized firms) required to generate the observed market price and quantity consistent with the underlying market demand elasticity.

We parameterize the model as follows. We assume (1) the pre-entry price for long-distance service equals 11.0 cents per minute;¹⁴ (2) that 344.2 billion inter-LATA conversation minutes are generated at this price;¹⁵ and (3) that the market demand elasticity is equal to -0.7 (Taylor, 1994). The linear market demand function that satisfies these conditions is given by (1) $P(Q) = 26.71 - 0.0457Q$.

In Method I, we assume the Herfindahl Index equals 0.2640, or 3.8 equally sized firms.¹⁶ The pre-entry marginal cost value consistent with the observed price, quantity, market concentration, and elasticity of demand is 6.85 cents per minute.

In Method II, we assume the marginal cost of a conversation minute of interLATA switched service equals 3.85 cents per minute (inclusive of originating and terminating access charges of 2.85 cents per minute).¹⁷ Sumpter (1990) and Jackson (1996) estimate that long-distance carriers’ long-run network costs are approximately one cent per conversation minute. The Herfindahl Index consistent with the observed price, quantity and marginal cost value is 0.455, or 2.2 equally sized firms.

It is important to observe that Methods I and II produce significantly different estimates for the marginal cost per minute of long-distance telephone service, 6.85 cents and 3.85 cents, respectively.¹⁸ The actual marginal cost value has been the subject of protracted debate in regulatory hearings to determine whether the RBOCs should be granted permission to enter the interLATA long-distance market under §271 of the Act. Notably, the range of marginal cost values produced by our two methods approximates the midrange of the estimates that have been entered into evidence in these regulatory proceedings (Weisman and Kang, 2000).

¹⁴ This equals the “average revenue per minute” for all long-distance carriers for all interstate, domestic minutes for 1998, which is the most recent available data. See FCC (1998, Table 10).

¹⁵ FCC (December 3, 1999, Table 2.6).

¹⁶ *Ibid.*, Table 1.4.

¹⁷ FCC (March 2000, Table 1.2).

¹⁸ The increasing number of long-distance calling plans that offer a 5 cent per minute (marginal) rate would seem to suggest that marginal cost is no higher than this value.

Table I. Estimated decrease in the equilibrium price of long-distance service resulting from BOC entry (Cournot Model – no discrimination)

Method	Change in the number of equally sized entrants (Δn)			
	1	2	3	4
I	6.5%	11.1%	14.5%	17.2%
II	15.5%	25.0%	31.5%	36.1%

Table II. Estimated increase in consumers' surplus for long-distance service resulting from BOC entry (Cournot Model – no discrimination) (billions of dollars annually)

Method	Change in the number of equally sized entrants (Δn)			
	1	2	3	4
I	\$2.5 (9.3%)	\$4.4 (16.2%)	\$5.8 (21.4%)	\$6.9 (25.5%)
II	\$6.2 (22.9%)	\$10.3 (38.1%)	\$13.2 (48.9%)	\$15.4 (57.0%)

Let n denote the number of equally sized firms in the market prior to entry by the BOC, and let $\Delta n > 0$ denote the change in the number of equally sized firms post-entry. Thus, if $\Delta n = 1$, a single BOC is assumed to enter with an equilibrium long-distance market share equal to $1/\text{HHI}$ (evaluated at the post-entry HHI). Of course, the incumbent long-distance carriers can have larger or smaller shares consistent with the post-entry HHI. We assume a range of post-entry values for Δn from $\Delta n = 1$ to $\Delta n = 4$.¹⁹

BOC entry lowers the equilibrium price of long-distance service (as specified in Equation (3)). Table I provides the estimated decrease in the average price of a long-distance conversation minute resulting from BOC entry, assuming no discriminatory behavior. Table II provides the estimated annual increase in total U.S. consumers' surplus (and corresponding percentage changes) associated with the price decreases in Table I.

Given these consumers' surplus gains, by how much would a BOC have to raise the costs of its rivals to just offset the gains? For Methods I and II, the marginal cost of a conversation minute of interLATA switched service is 6.85 and 3.85 cents per minute, respectively (inclusive of originating and terminating access charges of 2.85 cents per minute). Discrimination is assumed to take the form of "raising rivals' costs" so that the BOCs' marginal cost per minute is maintained at 6.85

¹⁹ This range of values accounts for the possibility that BOCs may be more likely to enter each other's service territories once they are allowed to enter the interLATA long-distance market in-region.

Table III. Increase in rivals' marginal costs required to just offset the positive consumers' surplus effects of BOC entry

Method	Change in the number of equally sized entrants (Δn)			
	1	2	3	4
I	16.0%	25.3%	31.4%	35.7%
II	84.5%	116.2%	132.7%	142.9%

and 3.85 cents per minute, respectively, while the marginal cost of its rivals is raised to reflect discriminatory behavior on the part of the BOC. This would occur, for example, if a BOC could differentially reduce the quality of its originating and terminating access services so as to cause rival long-distance carriers to incur network operations costs to ameliorate that reduction in access quality.

Table III shows the percentage increase in incumbents' marginal costs required to offset the positive consumers' surplus gains associated with BOC entry. That is, the values in Table III are the critical percentage increases in rivals' marginal costs (inclusive of access charges) required to just offset the price reductions shown in Table I, thus causing the equilibrium, post-entry price to equal 11.0 cents per minute in each case. For example, the value of 16.0 percent in the cell corresponding to Method I and $\Delta n = 1$ indicates that the BOCs would have to raise their rivals' costs by 16.0 percent in order to just offset the positive consumers' surplus gains associated with their entry into the market. (For Method II, the corresponding percentage increase equals 84.5 percent.)

The marginal cost of a minute of interLATA long-distance service for the rival is comprised of an access charge component and a network cost component. It is the network cost component of marginal cost that would have to increase to compensate for BOC discrimination. Table IV thus reports the percentage increase in rivals' network costs (marginal cost per minute less access charges per minute) required to offset the positive consumers' surplus gains associated with BOC entry into the interLATA market. For example, the value of 27.4 percent in the cell corresponding to Method I and $\Delta n = 1$ indicates that the BOCs would have to raise their rivals' costs by 27.4 percent in order to just offset the positive consumers' surplus gains associated with their entry into the market. (For Method II, the corresponding percentage increase equals 325.3 percent.)

III. Conclusions and Policy Implications

In this analysis, we estimate the extent to which the BOCs would have to raise their rivals' costs in order to just offset the positive consumers' surplus gains associated with their entry into interLATA long-distance markets. While the requisite percentage increase in rivals' costs is non-trivial, there is substantial uncertainty re-

Table IV. Increase in rivals' network costs required to just offset the positive consumer welfare effects of BOC entry

Method	Change in the number of equally sized entrants (Δn)			
	1	2	3	4
I	27.4%	43.3%	53.7%	61.1%
II	325.3%	447.2%	511.0%	550.2%

garding both the marginal cost of long-distance service and the ability of regulators to monitor and detect discrimination. Hence, as a conservative rule of thumb for policy purposes, if regulators believe that discrimination that raises rivals' marginal costs by no more than 50 percent could be detected,²⁰ then there is some support for allowing BOCs to enter long-distance markets even if they discriminate. The fact that the BOCs risk revocation of their authority to provide interLATA long-distance if discriminatory behavior is confirmed would further support such a policy decision.²¹ Conversely, if regulators are ineffectual in monitoring and detecting discrimination, the case for allowing the BOCs to enter the long-distance market prior to their being effective competition in carrier access markets weakens significantly.

References

- Bernheim, B. Douglas, and Robert Willig (1994) 'Appropriate Preconditions for Removal of the InterLATA Restrictions on the BOCs', *Affidavit Filed with the United States Department of Justice in Support of AT&T's Opposition to Ameritech's Motions for "Permanent" and "Temporary" Waivers from the Interexchange Restriction of the Decree*. Case No. 82-0192 (D.D.C. Feb. 15, 1994).
- Crandall, Robert W., and Leonard Waverman (1995) *Talk is Cheap*. Washington D.C.: Brookings Institution.
- Economides, Nicholas (1998) 'The Incentive for Non-Price Discrimination by an Input Monopolist', *International Journal of Industrial Organization*, **16**, 271–284.
- Federal Communications Commission (August 19, 1997) *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 Docket No. 97-137.
- Federal Communications Commission (1998) *Telecommunications Industry Revenue*. Washington D.C.

²⁰ The 50 percent value represents the average of Method I and Method II for $\Delta n = 1$ in Table III. To place this in proper perspective, if the actual marginal cost of long-distance telephone service is 5 cents per minute, a plausible upper-bound, the corresponding critical level of discrimination would be 45.83 percent.

²¹ In addition, there is some evidence to suggest that long-distance prices are in excess of competitive levels. See Taylor and Taylor (1993), MacAvoy (1996) and Taylor and Zona (1997). Crandall and Waverman (1995, Chapter 5) provide a summary of recent studies examining the competitiveness of the long distance market.

- Federal Communications Commission (December 3, 1999) *Statistics of Communications Common Carriers* (1998/1999 edn.). Washington D.C.
- Federal Communications Commission (December 22, 1999), *Federal Communications Commission Authorizes Bell Atlantic to Provide Long Distance Service in New York*. Press Release. Washington D.C.
- Federal Communications Commission (March 2000) *Trends in Telephone Service*. Washington D.C. <http://www.dora.state.co.us/puc/pucabout.html>
http://www.fcc.gov/Bureaus/Common_Carrier/News_Releases/1999/nrc9101a.html
- Jackson, Charles L. (1996) 'A Bottom-Up Estimate of the TSLRIC of Long-Distance Calling', *Strategic Policy Research* (unpublished paper).
- MacAvoy, Paul W. (1996) *The Failure of Antitrust and Regulation to Establish Competition in Long-Distance Telephone Service*. Washington D.C.: AEI Press; Cambridge, MA.: The MIT Press.
- Mandy, David M. (2000) Killing the Goose that May Have Laid the Golden Egg: Only the Data Knows whether Sabotage Pays', *Journal of Regulatory Economics*, **17**, 157–172.
- Reiffen, David (1998) 'A Regulated Firm's Incentive to Discriminate: A Reevaluation and Extension of Weisman's Result', *Journal of Regulatory Economics*, **14**, 79–86.
- Schwartz, Marius (May 16, 1997) Affidavit Submitted on Behalf of U.S. Department of Justice, *Application of SBC Communications, Inc., et al. Pursuant to Section 271 of the Telecommunications Act of 1996 to Provide In-Region, InterLATA Services in the State of Michigan*. FCC CC Docket No. 97-121.
- Sibley, David S. and Dennis L. Weisman (1998) 'Raising Rivals' Costs: The Entry of an Upstream Monopolist into Downstream Markets', *Information Economics and Policy*, **10**, 551–570.
- Sumpter, John (1990) Direct testimony on behalf of AT&T Communications of California, Inc., Application of AT&T Communications of California, Inc. (U 5002 C) for authority to provide intrastate AT&T 800 READYLINE service.
- Taylor, Lester D. (1994) *Telecommunications Demand in Theory and Practice*. Boston, MA: Kluwer Academic Publishers.
- Taylor, William E., and Lester D. Taylor (1993) 'Post-Divestiture Long-Distance Competition in the United States', *American Economic Review*, **83**, 185–190.
- Taylor, William E., and J. Douglas Zona (1997) 'An Analysis of the State of Competition in Long-Distance Telephone Markets', *Journal of Regulatory Economics*, **11**, 227–255.
- Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996) *codified throughout* 47 U.S.C.
- Temin, Peter (1987) *The Fall of the Bell System*. New York, NY: Cambridge University Press.
- United States Department of Justice (November 4, 1997) *Application by BellSouth Corporation, BellSouth Telecommunications, Inc., and BellSouth Long Distance, Inc. for Provision of In-Region, InterLATA Services in South Carolina*. CC Docket No. 97-208.
- United States Department of Justice (December 10, 1997) *Application by BellSouth Corporation, BellSouth Telecommunications, Inc., and BellSouth Long Distance, Inc. for Provision of In-Region, InterLATA Services in Louisiana*. CC Docket No. 97-231.
- Weisman, Dennis L. (1995) 'Regulation and the Vertically Integrated Firm: The Case of RBOC Entry into InterLATA Long Distance', *Journal of Regulatory Economics*, **8**, 249–266.
- Weisman, Dennis L. (1998) 'The Incentive to Discriminate by a Vertically Integrated Firm: A Reply', *Journal of Regulatory Economics*, **8**, 87–91.
- Weisman, Dennis L., and Jaesung Kang (2000) 'Incentives for Discrimination when Upstream Monopolists Participate in Downstream Markets', Kansas State University Working Paper.