EMPIRICAL ANALYSIS OF ENTRY IN THE LOCAL EXCHANGE MARKET: THE CASE OF PACIFIC BELL*

TREVOR R. ROYCROFT

This article examines local exchange entry in SBC's California territory. Analysis is conducted based on five-digit zip code areas. Information on economic, demographic, and regulatory variables, including prices of unbundled loops, is included in the analysis. Results of censored Poisson analysis indicate that these economic, demographic, and regulatory variables play a statistically significant role in leading to higher probabilities of low levels of entry in areas where loop prices are higher, fewer large businesses exist, and costs of self-provision are higher. (*JEL* L51, L96)

I. INTRODUCTION

The Telecommunications Act of 1996 marked a major legislative effort to change the structure of telecommunications markets in the United States. While the law affected many aspects of the telecommunications industry, the local exchange market, the last bastion of monopoly remaining after the divestiture of AT&T, commanded special attention. The act specified a new regulatory framework for the local exchange market and removed any remaining state-level legal entry barriers (i.e., grants of exclusive franchise). However, recognizing that legal barriers were not the only impediments to the development of local competition, the act went on to specify changes that recognized the likelihood of lingering technological entry barriers and the scale and scope economies that incumbent firms enjoyed.

Three paths to entry were encouraged by the act: facilities-based entry, local service resale, and unbundled network elements. To encourage entry possibilities associated with these options, the act mandated interconnection of networks, thus opening the possibility of facilities-based local exchange competition. Under this entry format, new competitive local exchange carriers (CLECs) could construct their own local networks and interconnect with the incumbent local exchange carriers (ILECs), thus gaining the network economies of a large local calling scope. The act did not stop with mandates for interconnection. A wholesale market for the ILECs' services and network technology was also created. CLECs could become resellers of the ILECs' services through the act's local service resale mandate. Alternatively, the act specified that CLECs could utilize parts of the ILECs' network, such as local loops (the wires that connect ILEC customers to the ILEC switching centers, switching, and transport), through provisions which specified the unbundling of ILEC networks. The CLEC could then combine the ILEC technology with its own technology to provide the desired local exchange services. Implementation of the Telecommunications Act under the direction of the Federal Communications Commission (FCC) also resulted in combinations of network elements, now known as UNE-platforms (or UNE-Ps), becoming available to CLECs. The combined platform of elements is much closer to a service in that it bundles most technology needed to provide local exchange service at a much lower price than local service resale. UNE-Ps have been widely adopted by CLECs.[1]

While laying out the general framework, many of the details associated with the mandates

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Roycroft: Associate Professor, J. Warren McClure School, Ohio University, 286 Lindley Hall, Athens, OH 45701. Phone 1-740-593-4887; Fax 1-740-593-4889; E-mail roycroft@ohio.edu

1. UNE-Ps are available in California, the state where this analysis is based. This research focuses on UNE loop prices, which are the most significant component of UNE-P prices in California. As is discussed later in this article, UNE loop prices are deaveraged in the state, based on density zones. The UNE-P prices in California are also deaveraged, based on the corresponding UNE loop prices.

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identified above were not specified by the act. Rather, the FCC and state public utility commissions (PUCs) were charged with the actual stewardship of opening local markets, including developing necessary rules and establishing prices for interconnection, UNEs, and wholesale services. The process of hammering out the details is ongoing because of a series of legal challenges that have wound their way through the courts, with the U.S. Supreme Court having the "last word" on several key issues. However, in spite of these legal delays, the process of competitive entry began in earnest in late 1996 and is continuing through the present period. While ILECs challenged the authority of the FCC to establish rules, the state PUCs, which had the ultimate authority to determine the prices for the components needed by local entrants, oversaw the introduction of competition in the local exchanges in their jurisdictions.

The progress of competitive entry under the provisions of the act, the FCC's rules, and the PUCs' general oversight has been mixed. It is noteworthy that the CLEC industry has suffered considerably in the high-technology bust. A *Wall Street Journal* article, commenting at the height of the CLEC bust, noted "a broad CLEC index, . . . reached a peak market cap of $242 billion in March of 2000. By last month (May, 2001), the market cap had dropped to $38 billion—an 83% decline. Of course, the stock market as a whole, and high-tech stocks in particular, also fell over that period, but the tech-heavy Nasdaq, with the CLECs in our index removed, declined 48%."[2] This analysis indicates that CLECs suffered more in the high-tech decline than other high-tech firms, and the flight of capital has influenced the progress of competition in local exchanges. In spite of these difficulties, CLEC market share, as reported by the FCC, has grown slightly over the past 2 years.

Market entry data on the CLEC industry reported by the FCC shows that on a state-by-state basis, lines served by CLECs range from a 3 percent market share in the state of Montana, to a 28 percent market share in the state of New York.[3] Table 1 summarizes the nationwide results reported by the FCC for the period ending June 30, 2003 (Federal Communications Commission, 2003). Overall the FCC reports about 15 percent of access lines nationwide being served by CLECs.

TABLE 1
CLEC Market Share as of June 30, 2003

State	CLEC Share (%)	State	CLEC Share (%)
Alabama	10	Montana	3
Alaska	*	Nebraska	20
Arizona	16	Nevada	9
Arkansas	*	New Hampshire	16
California	13	New Jersey	16
Colorado	16	New Mexico	*
Connecticut	10	New York	28
Delaware	10	North Carolina	9
D.C.	18	North Dakota	*
Florida	13	Ohio	11
Georgia	16	Oklahoma	11
Hawaii	*	Oregon	8
Idaho	5	Pennsylvania	17
Illinois	19	Puerto Rico	*
Indiana	9	Rhode Island	25
Iowa	13	South Carolina	8
Kansas	21	South Dakota	14
Kentucky	5	Tennessee	10
Louisiana	9	Texas	18
Maine	9	Utah	19
Maryland	10	Vermont	*
Massachusetts	19	Virgin Islands	0
Michigan	22	Virginia	16
Minnesota	17	Washington	10
Mississippi	7	West Virginia	*
Missouri	10	Wisconsin	15
		Wyoming	*
		Nationwide	15

*Indicates data withheld due to confidentiality concerns.

Service offerings by the CLEC industry have not favored all customer classes equally. The FCC reports that CLECs have not gravitated toward residential and small business customer classes. The most recent data show that approximately 62 percent of CLEC lines are associated with residential and small business customers, as opposed to 78 percent residential and small business customers for ILECs (Federal Communications Commission, 2003, Table 2). Entry patterns have not been geographically uniform. The top-10 states, based on CLEC line counts, have about 65 percent of all CLEC lines in service. Average CLEC

2. James Glassman, "Broadband Failure has a Political Cause." *Wall Street Journal*, June 21, 2001.

3. Market shares reported by the FCC represent all CLEC provisions, including resale. Lower state market shares may be present, but the FCC withholds some data to protect confidentiality.

market share in the top-10 states is about 18 percent, with the balance of the states showing an average CLEC market share of about 12 percent. The slow progress of entry and the apparent gravitation of CLECs toward the business sector have led to widespread criticism of the market environment under the act.[4] Sources as diverse as the Consumer Federation of America and the CATO Institute deem the act a "failure," but not necessarily for the same reasons.[5]

Empirical research on entry patterns in the local exchange market has been limited. Zolnierek et al. (2001) performed a study based on geographic areas associated with local access and transport areas (LATAs). They conclude that market entry is more likely in highly populated urban areas and in the market areas of Bell Operating Companies (BOCs). Crandall (2002) performs an analysis of CLEC entry strategies and finds that the most successful CLECs are those that build their own networks and interconnect with ILECs rather than relying on UNEs or local service resale entry strategies. However, Crandall does not examine CLEC entry patterns as is done in this article. Foreman (2002) presents descriptive statistics associated with the demographics of residential customers served by facilities-based CLECs. He finds that in communities where facilities-based local exchange competition is present, the community is more likely to be in close proximity to business and to have higher average income levels.

This article examines market entry patterns, thus the research is similar to Zolnierek et al. However, the approach of this article relies on data that provide more specific information than that associated with their analysis. Rather than using LATAs as the geographic basis for analysis, zip code areas will be utilized. This approach has the advantage of being able to identify demographic, economic, and regulatory characteristics of market areas more precisely than Zolnierek et al.'s analysis. In addition, this article utilizes regulatory information that is more likely to influence market entry decisions, namely the prices of UNE loops associated with particular zip code areas. Zolnierek et al. control for regulatory influence by identifying PUC expenditures per household and whether or not the state has an elected commission. Another area where this research departs from Zolnierek et al. is that information about the costs of CLEC self-provision of local exchange service is included in the analysis. If, as Crandall (2002) suggests, facilities-based entry is the winning strategy for CLECs to pursue, it is desirable to include a measure of the costs of market entry using the self-provision strategy in an analysis of CLEC entry patterns in the local exchange.

II. RESEARCH APPROACH AND DESCRIPTION OF THE VARIABLES HYPOTHESIZED TO INFLUENCE CLEC ENTRY

The focus of the research is to analyze factors influencing the degree of competitive entry in local exchange market areas. The market areas analyzed are SBC's California operations, which do business under the name "Pacific Bell." These market areas provide a good deal of diversity, both on a geographic and economic basis. High-density urban and low-density rural areas are present. During the study period (year-end 2001), CLEC market share in California was 9 percent, close to the then-current nationwide average of 11 percent, and the 8 percent average market share for states not in the top-10 CLEC state markets. The state, while providing a great deal of diversity in terrain, density, and local market characteristics, has had a relatively "average" experience with local competition (this "average" experience is also reflected in more recent statistics).

It would be desirable to have detailed information regarding the methods used by CLECs to enter specific local exchange market areas, including the number of CLECs, line counts, and details of the entry methods used (e.g., facilities-based versus resale or UNEs). Information at this level of detail is not readily available. However, the FCC collects some information from CLECs. From this information, the FCC reports the number of CLECs serving at least one customer in five-digit zip code areas. Thus entry patterns can be

4. Zolnierek et al., (2001) provide a review of some of the critical commentary associated with the act.

5. For the Consumer Federation of America opinion, see, for example, "Lessons from the Telecommunications Act of 1996: Deregulation Before Meaningful Competition Spells Consumer Disaster," February 2001. Available at http://www.consumersunion.org/telecom/lessondc201.htm. For the CATO Institute opinion, see, for example, "Telecommunications Act/Broadband Policy/ FCC Reform." Available at http://www.cato.org/tech/broadband.html#papers.

identified based on five-digit zip code areas, with information on the number of CLECs that report serving customers in a five-digit zip code area as of December 31, 2001. While these data do not provide a level of detailed information that might be desirable, they do provide a metric of entry activity. It is hypothesized that the level of CLEC entry in a five-digit zip code area is related to factors that reflect economic and regulatory influences on CLEC decisions to provide service in the zip code area. For each zip code area these factors include:

1. The number and relative size of businesses. The aggregated statistics published by the FCC indicate that CLECs serve a lower percentage of residential and small business customers than ILECs. Given that large business users of telecommunications services offer the potential for higher margins, as an artifact of both regulatory rate design which tended to set rates for large businesses higher than residential and small business rates and the cost economies that may be associated with serving a large business customer, it is expected that larger numbers of businesses and larger numbers of larger businesses would be positively associated with CLEC entry in a zip code area.

2. Household income. Absent nonmarket incentives, it would be expected that CLECs would rather serve customers with higher incomes. Foreman (2002) finds that areas with facilities-based CLECs have higher than average household incomes. As higher-income households are likely to have higher expenditures on telephone services, it is expected that higher incomes will be positively associated with CLEC entry in a zip code area.

3. Whether the area is rural. An examination of the FCC's aggregate data reveals that states which have a high percentage of rural areas have a lower CLEC presence. Furthermore, Zolnierek et al. (2001, p. 151) show that the percentage of households in urban areas is positively related to higher levels of competition. From an economic perspective, rural areas are more likely to exhibit higher costs of service, associated with lower population densities, thus it is expected that a negative relationship will exist between rural areas and CLEC entry in the zip code area.

4. The cost of UNEs. CLECs that want to combine their own technology with ILEC technology require UNEs. On a per customer basis, local loops are the most significant UNE expense faced by a CLEC (UNE loop prices are also the most significant component of UNE-P rates). In California, UNE loops have prices that are deaveraged into three zones (as do UNE-Ps). Other UNEs (e.g., switching) are sold at statewide average prices. Thus UNE loop prices introduce variability across geographic areas in the price of UNEs and UNE-Ps faced by CLECs. Higher UNE loop prices translate into higher operating expenses for CLECs, and given that loop prices are not associated with retail prices associated with various customer classes, operating margins are likely to be lower with higher UNE loop prices.[6] Thus it is expected that there will be a negative relationship between UNE loop prices and CLEC entry in the zip code area.

5. The cost of self-provision of local exchange service. New market entrants can build their own facilities to serve customers. The costs of building a network will depend on a variety of factors, including customer density and geographic factors such as soil conditions and terrain. Higher costs of self-provision will lead to lower expected margins, especially given that ILEC retail rates are averaged, based on broad geographic areas. It is thus expected that there will be a negative relationship between the cost of self-provision and CLEC entry in the zip code area.

III. DESCRIPTION OF THE DATASET

The number of CLECs by zip code for year-end 2001 was developed from the FCC's Form 477.[7] In collecting this data, the FCC agrees to provide CLECs a degree of confidentiality. The result of the confidentiality is that zip code areas with between one and three CLECs only report this range when the FCC publishes the information. For zip codes with CLECs numbering other than between one and three, the total number of CLECs is reported. As will be discussed further below, a censored data approach will be utilized given the lack of specific data in zip code areas with between one and three CLECs.

To include the regulatory variable, UNE loop price, analysis of the data hinges on

6. The same UNE loop prices are charged regardless of whether the loop is ultimately used to serve a business or residential customer.

7. See http://www.fcc.gov/wcb/iatd/comp.html under Zip Codes by Number of Competitive Local Exchange Carriers As of 12/31/01. Posted 7/02.

the ability to link zip code locations with Telcordia's Common Language Locator Code (CLLI). The CLLI code identifies each telephone company central office. For Pacific Bell California, there are a total of 601 CLLI code locations in Pacific Bell's operating territory.[8] Each CLLI code was matched to a zip code by obtaining the location of the central office from the TelcoData.us Telecommunications Database (http://www.telcodata.us/cllicode.html) and MapQuest. From the street location, the U.S. Postal Service's zip code lookup tool was used (http://www.usps.com/ncsc/lookups/lookup_zip%264.html). While the CLLI code specifies a central office with a unique location, it is possible that the area served by the central office has more than one zip code, however, the difficulty associated with determining all zip code areas associated with a CLLI code is a weakness in the analysis that the researcher could not address. To clarify the zip code analysis being conducted, the term "central office zip code" will be used to distinguish the zip code information from additional zip codes the central office may serve. However, the ability to associate a zip code with a CLLI code and central office provides a reasonable basis for examining CLEC operations in the context of the regulatory and economic variables hypothesized to influence CLEC entry.

The existence of multiple CLLI codes for some zip code areas had an impact on the construction of the dataset. The economic variables associated with the number and size of businesses, household income, and rural characteristics of the area were reported on a zip code basis. The regulatory variable UNE loop price and the economic variable related to the cost of self-provision were available only on a CLLI code basis. Thus, where multiple CLLI codes were associated with a single zip code area, a weighted average UNE loop price and weighted average cost of self-provision was generated for the central office zip code areas that contained more than one CLLI code.[9] The weighted average was based on the overall line count for the CLLI codes in question. After addressing the situations where multiple CLLI codes were present in a zip code area, 557 unique central office zip code areas were established.

Prices of unbundled loops are deaveraged into three zones in California.[10] As there are a variety of local loop technologies that can be purchased (e.g., basic two-wire, four-wire, digital subscriber line, etc.), it was necessary to select a loop price to utilize. The price of the basic two-wire loop, which is capable of providing all voice-grade services (as well as dial-up data services), was used. Thus the variable *Loop Price* is the price of an unbundled basic two-wire loop in the cental office zip code area. The deaveraged rates went into effect in August 2000. Thus observed entry patterns reflect a relatively short period of loop price deaveraging. It is assumed that CLECs responded rapidly to the changed input prices, however, follow-up research is needed to determine whether the observed entry patterns vary over a longer period of deaveraging.

The number of business establishments for each central office zip code area was obtained from the U.S. Census Bureau's "Zip Code Business Patterns" for 1999 (http:/censtats.census.gov/cbpnaic/cbpnaic.shtml). Information on the number of establishments within a central office zip code area was gathered, based on the establishment's size as identified by the number of employees. The variable *Number of Establishments Employing 1-99* identifies the number of business establishments in the central office zip code area that employ between 1 and 99 individuals. The variable *Number of Establishments Employing* 100+ identifies the number of business establishments in the central office zip code area that employ 100 or more individuals.

Information on the median household income was obtained from Census 2000

8. The 601 number is obtained from Appendix A to the settlement agreement establishing the zones and deaveraged UNE rates (CPUC, 2002).

9. A weighted average cost of self-provision was created for all cases where this adjustment was performed. Many of the UNE loop prices were in the same zone and thus had the same price, but several were not and thus weighted average prices were utilized.

10. The deaveraged rates in effect at year-end 2001 were the result of an interconnection agreement between AT&T and Pacific Bell that was filed August 14, 2000, pursuant to an August 3, 2000, California Public Utility Commission Opinion that affirmed a final arbitrator's report, with some modifications. The deaveraged UNE rates were also available to any other telecommunications carrier on the same terms and conditions. Prior to this agreement, the rates in effect were not deaveraged. See CPUC (2000).

results.[11] For median income, Table P77 (Median Family Income in 1999 Dollars) was used. Thus the variable *Median HH Income* indicates the median family income in 1999 dollars for the central office zip code area.

Information on the percentage of the population residing in rural areas was also obtained from Census 2000 results. For the percentage of the population within a central office zip code area classified as either urban or rural, Table p5 (Urban and Rural) was used. The variable *% Rural* identifies the percentage of the population in the central office zip code area that is classified as rural.

Finally, information on the cost of self-provision was developed using the FCC's Hybrid Cost Proxy Model. The model can produce cost estimates on a CLLI code basis. The model was modified so that line counts would be consistent with a 30 percent market share. A 30 percent market share was selected to approximate a forward-looking perspective that a CLEC which constructed its own facilities would adopt. As is noted by Crandall (2002, p. 72), given the high fixed cost nature of telecommunications plants, gains from self-provision are only expected in the long term. Thus it would be expected that network capacity would likely exceed initial demand for service. The variable *Cost at 30%* is the total direct cost of providing local exchange service estimated for serving a 30 percent market share (overhead costs were not included in the estimate).

IV. STATISTICAL APPROACH

The number of CLECs operating in a zip code area, as reported by the FCC, is the dependent variable. The variable is discrete, ranging from 0 to 13 CLECs per zip code area in the dataset. However, the FCC protects CLEC confidentiality for areas where only a few CLECs operate. The FCC censors data in zip code areas where one to three CLECs are present. Figure 1 shows the count of CLEC entry by zip code area. An appropriate approach for addressing censored count data is the use of a censored Poisson model (Greene, 2003, p. 778). Such a model was applied to the data. Using the level of CLEC entry as the dependent variable, the censored Poisson regression was performed utilizing the independent variables *Loop Price*, *Number of Establishments Employing 1–99*, *Number of Establishments Employing 100+*, *Median HH Income*, *%Rural*, and *Cost at 30%*. For a mathematical statement of the econometric model, please see the appendix.

11. Summary File 3 accessed at http://factfinder.census.gov/servlet/DatasetMainPageServlet?_ds_name=DEC_2000_SF3_U&_program=DEC&_lang=en).

V. RESULTS

Table 2 shows the censored Poisson regression results. The chi-squared test for this model results in a value of 1244, which is significant at a level of less than 1 percent. Thus the hypothesis that the independent variables have no impact on explaining observed CLEC entry is rejected. Two goodness-of-fit values are reported which are analogous to the conventional R^2 statistic. A measure based on standardized residuals (R^2_P) has a value of .7543. A measure based on deviances (R^2_D) has a value of .6962 (see Greene, 2003, p. 742). Regression coefficient signs in Table 2 are as expected and the *t*-statistics associated with the estimated coefficients indicate significance at 5 percent or less for all coefficients. For comparative purposes, ordinary least squares (OLS) was also performed on the data, substituting a fixed value of two for the censored CLEC category. The results of the OLS regression are shown in Table 3. The *F*-value for the regression is 170.51, which is significant at less than 1 percent The R^2 of the OLS

TABLE 2
Regression Results (Censored Poisson)

Variable	Coefficient	*t*-value	Significance Level
Constant	2.2528	16.606	0.00
Loop Price	−0.06287	−4.665	0.00
Number of Establishments Employing 1–99	0.0001612	2.723	0.01
Number of Establishments Employing 100+	0.004304	3.428	0.00
Median HH Income	0.0000017	1.997	0.05
% Rural	−1.07389	−2.744	0.01
Cost at 30%	−0.01492	−3.403	0.00
$\chi^2 = 1244$; *p*-value 0.00			
$R^2_P = .7543$			
$R^2_D = .6962$			

FIGURE 1
Distribution of CLEs by Zip Code Area

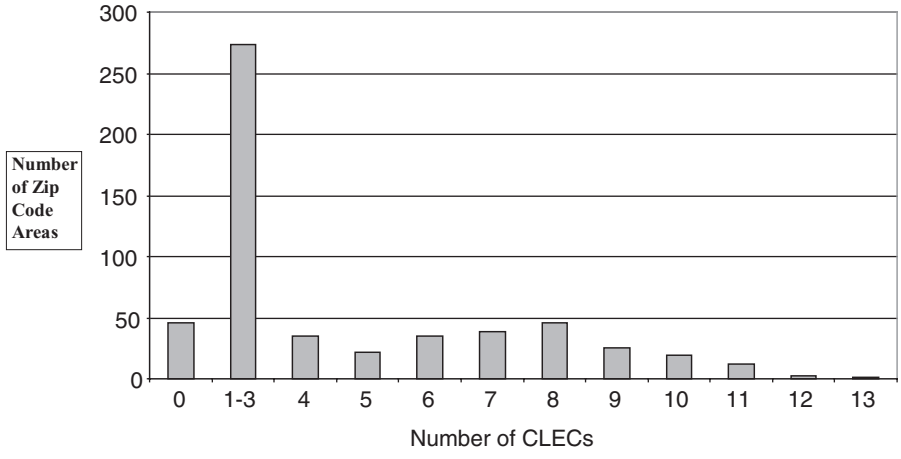

TABLE 3
Regression Results (Ordinary Least Squares)

Variable	Coefficient	*t*-value	Significance Level
Constant	5.5015	13.474	0.00
Loop Price	−0.2112	−9.033	0.00
Number of Establishments Employing 1–99	0.001308	4.952	0.00
Number of Establishments Employing 100+	0.04328	6.650	0.00
Median HH Income	0.000006537	1.922	0.05
% Rural	−0.3458	−1.135	0.26
Cost at 30%	−0.001259	−2.607	0.01
$F = 170.51$; *p*-value 0.00			
Adjusted $R^2 = .647$			

TABLE 4
Summary of Elasticities

Variable	Value	*t*-statistic	Significance Level
Loop Price	−2.656656	−3.077	0.00
Establishments Employing 1–99	0.273231	1.865	0.06
Establishments Employing 100+	0.164301	2.315	0.02
Median HH Income	0.290717	1.382	0.17
% Rural	−0.98606	−1.883	0.06
Loop Cost at 30% Market Share	−3.199595	−2.308	0.02

regression is .647. The OLS results have the same coefficient signs as the censored Poisson results, but the *% Rural* coefficient is not significant at 5 percent with the OLS model.

Elasticities were also calculated based on the censored Poisson results and are reported in Table 4. Elasticities that are statistically significant at the 5 percent level include those associated with *Loop Price, Number of Establishments Employing 100+*, and Loop *Cost at 30% Market Share*. For the loop price, the elasticity indicates that a 1 percent increase in loop price leads to a 2.65 percent decrease in the number of CLECs in a zip code area, holding other factors constant. For the number of establishments employing more than 100, a 1 percent increase in the number of large employers increases the number of CLECs in the zip code area by about 0.16 percent. Finally, a 1 percent increase in the cost of a self-provided loop decreases the number of CLECs in the zip code area by about 3.2 percent. Elasticities for *Number of Establishments Employing 1-99* and *%Rural* have the expected sign, but are significant at 6 percent. *Median HH Income* elasticity has the expected sign, but does not reach the 10 percent significance level.

VI. SUMMARY OF THE STATISTICAL ANALYSIS

The results discussed above add insight into market entry patterns observed in Pacific

Bell territory. The analysis controls for factors affecting two of the three available entry paths available to CLECs under the Telecommunications Act of 1996, self-provision and UNE loops.[12]

The results support the generally held belief that higher levels of entry are associated with the presence of large business customers (holding other factors constant). It is also apparent that higher costs of self-provision are associated with lower levels of entry, controlling for UNE loop prices and the other economic variables.

Finally, the results also point to the importance of UNE loop prices on CLEC entry decisions. Other factors held constant, higher loop prices are associated with lower levels of competitive entry. Since the data on the number of CLECs in each zip code area include those that use UNEs and those that use their own facilities, the results are likely showing the impact of UNE prices primarily on non-facilities-based entry. It is less likely that lower loop prices would lead to higher levels of facilities-based entry, or vice versa.[13] Nonetheless, this indicates that this important regulatory variable influences CLEC decisions about entry, holding economic and demographic factors constant.

VII. CONCLUSION

The results discussed above illustrate outcomes that are not entirely consistent with the objectives of the Telecommunications Act of 1996. The authors of the legislation indicated the desirability of increased competition for American telecommunications consumers.[14] As has been discussed above, specific demographic characteristics such as residing in a rural area, not being a business, or not being a large business reduce the probability that consumers in a zip code area, for the dataset analyzed, will face high levels of CLEC entry.

The impact of the regulatory variable, UNE loop price, is important for regulators and policymakers to consider. The Telecommunications Act specifies that UNE loop prices (as well as other UNE prices) should be based on cost. The results of this article emphasize the importance of determining the answer to the question, "What does a UNE cost?" The elasticities discussed above indicate that UNE loop prices do have an impact on competitive entry, holding other factors constant. Thus the process of setting loop prices and adjusting loop prices can be expected to have an impact on the level of CLEC activity in a state. Recent actions taken by the FCC suggest a more conservative approach to determining the prices of unbundled network elements may be emerging.[15] The results of this article indicate that the higher UNE prices that may result will likely lead to lower levels of CLEC activity. However, the dynamic response of the CLEC industry, which might face new incentives to construct their own facilities, could result in a more robust CLEC presence in the long term; only time will tell on this point.

The results also point to difficulties associated with introducing competition in segmentable local exchange market areas. It is entirely reasonable to expect that the large business sector of the market will attract the interests of new entrants, a pattern that reflects the experience in other market segments where competitive entry has been allowed, such as the long-distance and special access markets. In these other markets, over time, competition has tended to establish a broader reach. However, broad-reaching competition in the local exchange has, to date, been slow to emerge. If CLECs can identify areas with few large businesses or higher costs of self-provision, then it is more likely that these areas will not see high levels of market entry, perhaps for an extended period of time. Regulators and policymakers, if they are interested in

12. In California, UNE-P prices are also set based on the deaveraged UNE rates. As resale discounts are set on a statewide basis in California, it is unlikely that variation in resale rates between zip code areas will be influencing CLEC entry decisions.

13. Lower UNE loop prices could have some impact on facilities-based entry, by allowing CLECs to "test the waters" prior to building their own facilities.

14. See the preamble to the Telecommunication Act of 1996.

15. The FCC's 2003 "UNE Pricing Review Rulemaking" and "Triennial Review Order" both point to a revision in thinking about pricing UNEs which would, if implemented, result in higher UNE prices than those established to date. See, *In the Matter of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers*, WC Docket 03-173, FCC 03-224, September 15, 2003. See also, *In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Deployment of Wireline Services Offering Advanced Telecommunications Capability*, CC Dockets 01-338, 96-98, & 98-147. FCC 03-36, August 21, 2003.

using competition as a means to control market power in the local telephone market, will need to develop additional mechanisms to encourage entry in areas where CLECs are less likely to provide service or accept the prospect of continuing the application of more conventional methods of price control for incumbent telephone companies.

APPENDIX

The Poisson regression model specifies that each y_i is drawn from a Poission distribution with parameter λ_i which is related to the explanatory variables, x_i. The model's primary equation is

$$(1) \qquad \text{Prob}\ (Y_i = y_i\, x_i) = \frac{e^{-\lambda_i}\lambda_i{}^{y_i}}{y_i!}, \quad y_i = 0, 1, 2, \ldots,$$

where λ_i can be expressed in log linear form as:

$$(2) \qquad \text{in}\ \lambda_i = \boldsymbol{x}_i'\beta.$$

While the Poisson model is frequently applied to count data based on a *rate* of observations (e.g., the number of accidents per month), it may also be applied to a population (see Greene, 2002, p. E20–21 and Agresti, 1996, p. 81). LimDep was used to perform the censored Poisson regression.

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