Bureaucrats as Entrepreneurs: Do Municipal Telecommunications Providers Hinder Private Entrepreneurs?

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Abstract: We consider how government-owned enterprises affect privately owned rivals. Specifically, we compare the types of markets that municipally owned telecommunications providers in the United States serve to the types of markets that competitive local exchange carriers (CLECs) serve. We find that CLECs focus on potential profitability while municipalities appear to respond to other factors, such as political considerations or the desire to provide competition to incumbents. As a result, municipal providers tend to serve markets that CLECs do not. We also find that the presence of a municipal provider in a market does not affect the probability that a CLEC also serves that market. Our results suggest municipalities may not pose a significant competitive threat to CLECs and do not preclude CLEC participation.

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I. Introduction

Situations arise in which government-owned enterprises compete against privately owned firms. Examples include the state-run postal services competing against package carriers such as Federal Express, government-owned lotteries competing against private gambling businesses, and public schools in many countries that compete with privately owned schools. For the government, which sets the rules for competitive markets, to also be a competitor raises issues of whether the government will play fairly. In a recent paper analyzing such competition, Sappington and Sidak (2003) show that government-owned enterprises may have greater incentives to create barriers to entry than do private firms. Similarly, Edwards and Waverman (2006) show that European national regulatory authorities have a greater tendency to favor incumbent telecommunications providers in issues related to competition when the providers are at least partially government owned. There are also concerns that simply the presence of a government-owned enterprise may dissuade a legitimate, private entrepreneur from entering a market.

On the other hand, a government-owned enterprise may provide a service that the citizens view as important, but that may not be commercially feasible for a private operator if at all. For example, the American Public Power Association (APPA) holds that a municipally owned utility providing telecommunications services enjoys unique cost advantages over a private company and, in some instances, may be the only commercially viable rival to an incumbent local exchange telephone company.[1]

[1] See APPA, "Community Broadband: Separating Fact from Fiction," available at http://www.appanet.org.

In this paper, we consider how government-owned enterprises choose markets and how they affect privately owned rivals. Specifically, we compare the types of markets that municipally owned telecommunications providers in the United States serve to the types of markets that competitive local exchange carriers (CLECs) serve. A CLEC is a privately owned telecommunications provider that enters a local telecommunications market in competition with an incumbent provider. We also examine how the presence of a municipally owned provider in a market affects the probability that a CLEC will also serve that market. We find that municipalities make their decisions on whether to provide telecommunications services differently than do private firms. As a result, municipal providers tend to serve markets that privately owned CLECs generally do not serve. We also find that the presence of a municipal provider in a market does not affect the probability that a CLEC also serves that market, indicating that CLECs do not view municipal providers as commercial rivals. We do not address questions about the effects of municipal provision of telecommunications on incumbent companies, customers, or taxpayers.

The literature describing changes within the telecommunications industry subsequent to The Telecommunications Act of 1996 is abundant.[2] Zolnierek, Eisner, and Burton (2001) find that CLECs are more likely to enter more urbanized areas and jurisdictions with more favorable CLEC entry policies. Roycroft (2005) also examines CLEC entry, but focuses on a subset of California markets, uses a different measure of geographic market boundaries, and uses a different measure of regulatory influence. Jamison (2004) finds that when regulators require incumbents to earn lower profit margins on unbundled network elements than on retail services,

[2] For a concise summary, see the Introduction in Jamison (2004) or Roycroft (2005).

incumbents act to limit CLEC entry.[3] Other studies find that CLECs building their own networks are more successful than those that do not.[4]

Currently there is controversy in the United States over whether municipalities should be permitted to offer telecommunications services in competition with private companies. Some observers believe that municipal investment in broadband telecommunications affords important competition for incumbent telecommunications providers and cable television providers. For example, the cities of Spokane, Washington and Concord, Massachusetts began offering broadband telecommunications for the stated purpose of providing citizens with more advanced broadband services than the incumbent telecommunications providers were offering.[5] There are a myriad of reasons municipalities have asserted for entering the telecommunications market; however, this positive motivation is not without question. Some observers raise concerns that government-owned service providers have an unfair advantage over private operators due to the government-owned providers' relationship to the government, are essentially subsidized by captive taxpayers, and crowd out more efficient private investment. Based on these or similar concerns, 14 states have adopted either a complete ban on municipal entry in telecommunications, or have created significant barriers to entry.

This paper addresses a gap in the literature by analyzing whether municipalities' increasing propensity to offer telecommunications services appears to affect participation of private firms. Using logit models of the decisions of CLECs and municipal providers to provide

[3] Unbundled network elements are portions of an incumbent's network that CLECs are allowed to lease and use for providing service in competition with the incumbent.
[4] See Foreman (2002). See also Crandall (2002) as referenced by Roycroft (2005).
[5] APPA Quarterly Communicator, Summer 2004, Volume 20 Number 3.

telecommunications services in various markets, we seek to determine the characteristics of cities in which municipalities offer telecommunications services and, in so doing, address the question of whether municipal provision affects CLECs. Our primary finding is that while municipal entry increased during the years of the study, it appears that municipalities and CLECs are rarely in direct competition in that they tend to serve areas that are demographically and economically different. The presence of a municipal provider in a market does not appear to influence the probability of a CLEC also serving that market. Moreover, it seems that restrictions that various states have imposed have not deterred municipalities from providing telecommunications services.

II. Background

In August of 1996 following passage of the Telecommunications Act of 1996 that was designed to open telecommunications markets to local competition, the General Assembly of Missouri enacted a law preventing municipalities from offering telecommunications services.[6] In the years that followed, municipalities continued to enter markets. Many private telecommunications providers sought to suppress this competitive threat and began lobbying states to restrict municipal provision of telecommunications services. U.S. statutes provide that no state regulation should prohibit any entity from providing telecommunications services, but in 2004, the U.S. Supreme Court ruled that this does not prohibit states from adopting restrictions on local governments providing telecommunications services.[7] Although the main reason for allowing

[6] Missouri Revised Statutes, Chapter 392 Telephone and Telegraph Companies, Section 392.410(7) (2006). "No political subdivision of this state shall provide or offer for sale, either to the public or to a telecommunications provider, a telecommunications service or telecommunications facility used to provide a telecommunications service for which a certificate of service authority is required pursuant to this section."
[7] U.S. Supreme Court, 541 U.S. (2004), Numbers: 02-1238, 02-1386, 02-1405. March 24, 2004.

states to restrict municipal provision is a states' rights argument and the government generally remains concerned about suppressing competition, the result of the ruling is still the same: states may restrict municipal provision of telecommunications services. As of December 2004, the following states had passed laws restricting municipal entry: Arkansas, Florida, Mississippi, Minnesota, Nebraska, Nevada, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Virginia, Washington, and Wisconsin. The setback for municipalities is not complete, however, as the Federal Communications Commission (FCC) has indicated that while states may have the right to restrict municipalities, states should not inhibit competition.

It is becoming increasingly important to address the question of restrictions on municipal provision of telecommunications as the number of municipalities doing so steadily increases despite restrictions.[8] The number of municipalities providing telecommunications services to public consumers has grown from 210 in 1998 to 665 in 2006.[9] During the years of our study (1998-2002), a total of 675 municipalities participated in providing some form of communications service. Given that the number of CLECs decreased from 1,426 in 2000 to 804 in 2002, one might wonder whether some of these CLECs were displaced by municipal providers. Figure 1 shows the total number of municipal and CLEC providers per year for 1998 through 2002.

[INSERT FIGURE 1 ABOUT HERE]

[8] Following the 2004 decision, 14 new bills were put forth in state legislatures, although only one was successful in 2005 (in Nebraska, which already had a barrier to entry). In 2006, Indiana and Tennessee each proposed a restrictive law, but neither bill was passed. Municipalities continue to enter telecommunications markets.

[9] Data from the APPA Annual Directory and Statistical Reports covering years 1998 to 2002 and the APPA Annual Directory and Statistical Report, 2006-2007.

For their part, state and local governments have been taking up the question and addressing related concerns often through consideration of studies of municipalities that have already allowed municipal entry. Such case studies are often well documented and the results hotly contested. One article, titled "Government-Owned Networks – the Wrong Plan at the Wrong Time for Broadband," states: "These projects frequently go sour. In fact, all across the country, cities are beginning to suffer from ill-fated municipal broadband projects."[10] The article continues to cite an instance in which "millions of dollars of cost overruns have forced the city to borrow from other city funds in order to cover the overruns." The Progress and Freedom Foundation has reported similar findings.[11] Countering the objections are groups like the APPA, which maintains a database of public power companies that have entered the broadband market, and the organization publishes both a brief fact sheet and a booklet titled "Community Broadband: Separating Fact from Fiction," in which many of the concerns raised by private executives and public officials are addressed.[12]

III. Theory, Hypotheses, and Measures

We presuppose that a CLEC decides whether to enter a market based on its expected profit in that market. These profit expectations are determined by anticipated customer demand, projected costs, regulatory policies, and expected number of rivals. As a result, we predict greater customer demand, lower service provider costs, pro-CLEC regulatory policies, and fewer rivals to result in a higher probability of a CLEC serving a market. Typically, researchers have estimated models of CLEC entry using ordered probits with the number of CLECs per

[10] Tom Giovanetti, Institute for Policy Innovation, "Government-Owned Networks – the Wrong Plan at the Wrong Time for Broadband," page 1.
[11] See Progress on Point Releases 9.7, 10.17, and 11.3 for additional details.
[12] See http://www.appanet.org for the fact sheet and to download or order the booklet.

geographic area as the dependent variable.[13] Following Greenstein and Mazzeo, we assume that profitability of entry in any particular county is dependent upon demand for telecommunications services and the costs of providing such services. Specifically,

$$\pi_{it} = \beta X_{it} + \gamma C_{it} + \delta R_{it} + (n)\theta_{it} + \varepsilon_{it}, \quad (1)$$

where X is a vector of demand characteristics, C is a vector of cost characteristics, R is a vector of regulatory characteristics, and θ represents the effect of commercial rivals in market *i* in year *t*. *n* represents the number of firms currently in the market. We assume that ε is an independent unobserved error term with standard normal distribution. We can then estimate the parameters of the profit function given that for any positive *n* we observe:

$$\pi_{it} = \beta X_{it} + \gamma C_{it} + \delta R_{it} + (n)\theta_{it} + \varepsilon_{it} \geq 0 \quad (2)$$

and $$\pi_{it} = \beta X_{it} + \gamma C_{it} + \delta R_{it} + (n+1)\theta_{it} + \varepsilon_{it} < 0. \quad (3)$$

We assume that a greater number of participants is associated with lower profit per provider. As noted by Greenstein and Mazzeo, under this assumption, as long as a decrease in profit is larger when an entrant is of the same type than when an entrant is of a different type, a unique equilibrium exists. We estimate the parameters of the profit function with maximum likelihood estimation using observations of participation at the county level. The likelihood function is given by: $L = \Pi^{I}_{i=1}$ Prob[CLEC, Muni)$_i$] where CLEC refers to a CLEC provider in any particular market and Muni refers to a municipal provider. [14]

[13] Greenstein and Mazzeo (2006) provide a succinct overview of the design of these models and extend the models to account for markets in which there are two types of firms. While Greenstein and Mazzeo do not specifically address municipal entrants, their model clearly allows for this "type" of entrant.

[14] The incumbent provider is assumed to exist in each market and may affect competitive providers of both types. The existence of the incumbent, however, is assumed to be exogenous. We account for the effects of the incumbent through regulatory characteristics and by including the average revenue per loop in the estimation. In our dataset, in eight cases a municipality served as an incumbent (Sylacauga, AL; Palo Alto, CA; Taunton, MA; Windom, MN; Kutztown, PA; Jackson, TN; Provo, UT; and Bristol, VA). These observations were not used in the estimations.

Given our model, we put forward four hypotheses. First, if CLECs view a municipal provider as a competitor, then we would expect the presence of a municipal provider in a market to decrease the probability of CLEC presence in that market. Therefore our first hypothesis is that CLECs do not view a municipal provider as a commercial rival in a market. We test this hypothesis using the model that predicts whether CLECs serve a market. We reject this hypothesis if the presence of a municipal provider is significantly and negatively correlated with the probability of CLEC providers.

Next, we consider whether municipal providers are motivated by profit, public interests such as economic development, political interests, or some combination. If the municipal provider is motivated by profit like a CLEC, the municipal provider may be considered as simply another "type" of telecommunications provider (similar to the local and national types described by Greenstein and Mazzeo, 2006). In this case, expected profit for a municipal provider should be determined by the same factors that determine expected profit for a CLEC, namely expected customer demand, costs, government policy, and number of rivals. This leads to our second hypothesis, which is that municipal operators have the same motivations as do CLECs, namely, that they are motivated by profit and not by other considerations. We test this hypothesis with a model that predicts whether a market will be served by a municipal provider. We reject this hypothesis if the coefficients for explanatory variables reflecting customer demand and provider costs in our municipal provider model have signs opposite those of the corresponding coefficients in our CLEC model.

If we reject our second hypothesis, we conclude that other factors play a role in predicting the presence of a municipal telecommunications provider. For example, a city may become a telecommunications provider if it believes that its citizens would benefit from competition with the incumbent telecommunications provider and that competition from a CLEC is unlikely. Examples of such benefits could include greater availability of new technologies, greater output, and lower prices. Such outcomes might benefit citizens directly and could stimulate economic development.

On the other hand, even if a municipality chooses to be a telecommunications provider, its competitive effect might be negligible if, for example, government ownership makes the municipal provider ineffective as a competitive service provider. This leads to our third hypothesis, namely, that municipalities choose to become service providers in order to provide competition to incumbents when CLEC competition is not forthcoming. If this hypothesis is true, then we would expect markets with municipal providers not to have CLECs. Therefore, we reject this hypothesis if the presence of a CLEC has no effect on whether a municipal provider also serves the market.[15]

An argument is sometimes offered that municipal providers have cost advantages over CLECs in situations where the municipal government already owns a power utility. Our fourth hypothesis is that such municipal providers have a cost advantage over CLECs. This cost advantage could result from scope economies, such as the opportunity to share billing information or customer contacts. We reject the hypothesis that such a cost advantage exists if we find a significant,

[15] This complements our first hypothesis concerning whether the presence of a municipal provider increases the level of competition in a market if CLECs are present.

negative correlation between the presence of a municipally owned power utility and the presence of a municipally owned telecommunications provider. However, a statistically significant and positive correlation is insufficient to accept the hypothesis because other reasons could exist for a positive correlation. For example, it may be that the presence of a municipally owned power utility suggests to city leaders that they can be successful in other municipally owned businesses and so are more inclined than city leaders elsewhere to compete with privately owned telecommunications businesses. It may also be that managers of municipally owned power utilities wish to expand into telecommunications for purely personal reasons and that they exert influence over city leaders to be allowed to expand their product line. We do not have sufficient data to test these alterative explanations, but we are able to examine data on telecommunications services offered by privately owned power companies to see whether they it support the cost advantage argument.

IV. The Dataset

We compiled a dataset that includes all CLEC and municipal providers in the U.S. telecommunications market for five years (1998 – 2002). Services supplied by municipal providers include those used for the city's own operations (meter reading, municipal data network, supervisory control and data acquisition, and voice) and those provided to others (cable television, long distance telephone, Internet access, broadband, fiber leasing, and local telephone). Municipal provider data is from the APPA. CLEC data is from the annual CLEC Reports from New Paradigm Resources Group, Inc., and includes both planned and operational voice and data network services provided by CLECs.

Tables 1 and 2 describe and summarize the variables for our models, in addition to listing the data sources.[16] The variables can be categorized as indicators of demand, indicators of cost, and regulatory factors. With respect to those variables affecting demand, we expect the median age of the heads of household (medage) to be inversely related to demand. Furthermore, we expect the median household income (hhincome), the percentage of heads of households who are white (whitehh), and the percentage of heads of households who are college educated (educ) to be positively correlated with demand. We do not predict the effects of the proportion of households receiving public assistance (help). This variable may indicate low demand, but it may also imply urbanization and so indicate low costs.[17] We expect service provider costs to be negatively correlated with population density (poppersqmi), our indicator of relative costs. As we described above, the presence of a municipal electric utility should increase the probability of the presence of a municipal telecommunications provider for a variety of reasons.

[INSERT TABLES 1 AND 2 ABOUT HERE.]

We also include variables that reflect the regulatory environment. We expect flexible regulation for CLECs (clec_flex) – the situation where regulators provide CLECs with broad latitude to change prices[18] – to increase the probability of the presence of CLECs in a market, but we cannot predict in advance how this might affect municipal providers. We are unable to predict the possible effects of public service commissioners being appointed rather than elected

[16] We considered other population characteristics, such as other races, ethnicity, and language. We also included other measures of population density, such as urban classification, and various demographic indicators, such as employment growth rate and personal bankruptcy rate. However, these variables proved to be insignificant and did not affect results, so we excluded them from the model.

[17] There are a number of papers that address low-income households' demand for telecommunications services, for example, Burton et al. (forthcoming), Tucker, Brick, and Meekins (2007), and Garbacz and Thompson (2003). Further related studies may provide additional insight into municipal telecommunications provision.

[18] In some markets regulators impose price floors on CLECs.

(pscappoint)[19] and the political affiliation of the governor of the state (RepGov). Presumably elected commissioners are more responsive to immediate citizen concerns, but it is unclear whether this means that the commissioners might favor CLECs, incumbents, municipal providers, or none of the above. Also, while Republicans are reputed to generally favor market forces over regulation, it is unclear what this might mean for CLECs and municipal providers. One possibility is that a Republican governor will pursue policies that favor CLECs, municipal providers, or both, presumably based on the belief that these policies lead to competition in the long run. Another possibility is that a Republican governor will adopt a more hands-off approach, presumably in the belief that such an approach will encourage competitors to focus on markets and not on regulation to obtain a competitive advantage. We also include a variable indicating the presence of state restrictions on municipal provision of telecommunications (muniban). Examples of such limitations include accounting separation requirements, public hearings, voter approval, and reporting requirements. We do not predict the effect of such restrictions. On the one hand, we would expect the presence of effective restrictions to decrease the probability of the presence of a municipal provider. However, the presence of such restrictions might increase municipal provision if the restrictions clarify the rules for municipalities. Such clarification should decrease municipalities' risk. Said another way, the absence of state policies might discourage municipal provision if cities are concerned that municipal entry might trigger state rules that opportunistically limit the effectiveness of municipal investment.

[19] We generically refer to state regulatory agencies as public service commissions. Some states elect their commissioners. In other states, commissioners are appointed. The appointment processes vary across the states, but the processes generally involve both the governor and the legislatures.

Lastly, following Jamison (2004), we include a variable to capture the potentially conflicting effects of regulation on incumbent and CLEC incentives. During the time period for our data, regulators required incumbents to provide unbundled network elements[20] to rivals. If an incumbent finds it more (conversely, less) profitable to provide retail services than to provide unbundled network elements, we would expect the incumbent to try to limit (conversely, promote) CLEC entry. To capture this effect, we include as a variable the ratio of incumbents' revenues per line to the price charged for unbundled local telephone lines (avgrev/loop). If incumbents are able to affect entry, then we would expect a negative relationship between this variable and the probability of CLEC presence in a market.

A cursory look at the data suggests that municipal providers and CLECs differ in how they choose their markets. A greater proportion of municipal providers serve markets not in designated Metropolitan Service Areas (MSAs) than in MSAs (53 percent versus 47 percent). In contrast, CLECs serve more MSA markets than non-MSA markets (93 percent versus 7 percent). Also during the time period for this study, a greater proportion of municipal providers than CLECs had served their markets for a number of years (i.e., fewer exits).[21] Table 3 summarizes these statistics.

[INSERT TABLE 3 ABOUT HERE]

Data in Tables 4 and 5 further support the supposition that CLECs and municipal providers select markets differently. Table 4 shows that in 2002 most cities (98 percent) had no CLECs

[20] Our variable is a state-wide average based on the loop, port, and switching rates per month.
[21] The majority of municipal providers entered markets in which the municipality was providing electric. These providers may have been able to take advantage of economies of scale and scope so that their association with the municipal utility company enabled them to be less vulnerable to risk and the effects of competition.

and most municipal providers (86 percent) were in these cities. However, seven percent of municipal providers were in cities with one CLEC, and slightly more than three percent of municipal providers were in cities with six or more CLECs.

[INSERT TABLE 4 ABOUT HERE]

Columns in Table 5 represent types of markets, where markets are characterized by the presence of a type of provider. The first column of data provides statistics for markets with neither a municipal provider nor CLECs. The second column of data represents markets with a municipal provider but no CLECs. The third data column characterizes markets with no municipal provider and at least one CLEC, and the last column denotes markets with a municipal provider and at least one CLEC. The numbers in the rows show the means of various market characteristics listed for each type of market. A cursory look at the means suggests significant differences in market characteristics among the different categories of telecommunications provision. We formally test for such differences and indicate with asterisks each case in which the mean value represented in a cell is significantly different from the corresponding mean value for the markets with no municipal provider and no CLECs. In other words, asterisks indicate a statistically significant difference between means in data columns one and two, and data columns one and three. These mean values indicate that municipal providers and CLECs differed in how population density, household income, urbanization, public assistance programs, and municipal restrictions affected market entry decisions. We find that cities with a municipal provider and no CLECs were generally not significantly different in market characteristics from those cities with no municipal or CLEC providers; however, cities with no municipal provider and at least one

CLEC were generally significantly different from those cities with no municipal or CLEC providers. Furthermore, if we compare market characteristics of cities with a municipal provider and no CLECs (data column 2) with market characteristics of cities with no municipal provider and at least one CLEC (data column 3), we find that each is significantly different at the .001 level with the exception of Average UNE Loop Rate, which is significantly different at the .10 significance level. In sum, cities with no municipal provider and at least one CLEC were significantly different from cities without a CLEC, whether there was a municipal provider or not. We examine these issues more fully in the Results section of this paper.

[INSERT TABLE 5 ABOUT HERE]

Table 6 further illustrates competition between CLECs and municipal providers. It shows that in relative terms CLECs were more frequently rivals to municipal providers than municipal providers were rivals to CLECs. From 1998 through 2002, the percentage of municipal providers that competed with CLECs grew from 13 percent to 28 percent and then declined to 16 percent. The decline corresponds to the decline in the number of CLECs. The relative number of markets in which CLECs competed with municipal providers was much smaller and declined over the period: the percent of markets with CLECs that also had a municipal provider was highest in 1998 (2.7 percent) and declined to 1.7 percent by 2002.

[INSERT TABLE 6 ABOUT HERE]

Lastly, analysis of the data indicates that restrictions on municipal providers may be ineffective in limiting their number. In states without restrictions on municipal telecommunications provision, the total number of municipalities in the telecommunications market increased by 21.1 percent from 2000 to 2001 and by 4.7 percent from 2001 to 2002. In states restricting municipal provision, the corresponding percentages were almost as high: 14.1 percent and 7.3 percent, respectively. Overall, from 1998 to 2002, the number of municipal providers almost doubled. Conversely, the total number of CLECs fell on average 4.1 percent in 2001 and 2002 after initially increasing rather dramatically prior to 2001.

V. Empirical Models

We estimate discrete choice models of each type of provider's market choice to test our hypotheses as presented in Section III. For each city within the United States, the analysis considers whether there is a municipal provider, a CLEC, neither, or both. Because most variation in the data results from cross-sectional differences between markets, we use only 2002 data for our regression analysis.[22]

We assume the decision to provide telecommunications service in any particular market is based on some unobservable utility index that is determined as indicated by the profit model described above. Each provider participates in a market in a given year based on the expected profitability of that market. While we do not observe profitability, we do observe a provider's choice. This

[22] Interestingly, when using data from 1999 through 2002, the results are remarkably similar in both sign and significance. Differences include a loss of significance on the coefficients for white heads of household and *pscappoint* and a gain in significance for *medage* in the municipal specification. The coefficients for *help* in both models change to positive and significant for the municipal specification and negative and significant for the CLEC specification.

would suggest the use of a discrete choice model, such as a logit model. Our basic model is given by: $Y^*_{ji} = \alpha_j + \beta_j X_i + \gamma_j C_i + \delta_j R_i + \theta_j \hat{\jmath}_i + \varepsilon_{ji}$ (4)

where Y^*_{ji} is the probability that an operator of type *j*, where $j = m$ if municipal provider and $j = c$ if CLEC provider, serves market *i*. $Y^*_{ji} = 1$ if $\pi_{ji} \geq 0$ and $Y^*_{ji} = 0$ otherwise. Let Xi represent the vector of demographic and other variables that indicate market demand and C_i represent the vector of factors reflecting operator costs; R_i represents a vector of regulatory variables, including state restrictions on municipal provision of telecommunications services. ε_{ji} is the error term. $\hat{\jmath} = m_i$ applies only within the CLEC equation and $\hat{\jmath} = c_i$ applies only within the municipal provider equation.

Our logit models use maximum likelihood estimation to predict CLEC and municipal provider participation using a reduced form with exclusion restrictions. We endogenize the presence of municipal providers or CLECs. We then use these models to predict the probability of CLEC presence in a market and the probability of municipal provider presence in a market.

VI. Results

Table 7 provides the results of our regressions.

[INSERT TABLE 7 ABOUT HERE]

The coefficients for the CLEC logit model have the expected signs, namely, higher population density, household income, and education increase the probability of CLEC presence in a market; furthermore, higher median age of the head of a household lowers the probability of

CLEC presence as does a higher ratio of retail revenue per line to the UNE loop price. We assert that the latter is due to an incumbent's incentive to prohibit entry the greater the retail profitability of the area relative to the profitability of providing UNEs, which is consistent with Jamison's (2004) finding. The proportion of the population receiving public assistance is positively correlated with CLEC presence suggesting this variable might reflect urbanization. Appointed commissioners decrease the probability of CLEC presence, and Republican governors increase the probability of CLEC presence, indicating that elected commissioners and Republican governors were more likely to make policy decisions considered favorable by CLECs. Flexible regulation for CLECs and greater proportion of white households are both positive and significant, as expected.

The coefficient for the presence of a municipal provider in the CLEC model is positive but insignificant. Therefore we fail to reject our first hypothesis that CLECs do not view a municipal provider as a commercial rival. We interpret this as meaning that a CLEC views a market with one CLEC, one municipal provider, and one incumbent to be no more competitive than a market with one CLEC and one incumbent but no municipal provider. This calls into question whether the presence of a municipal provider adds to the intensity of competition in a market. We do not fully examine this question in this paper because we do not consider incumbent and customer responses to the presence of a municipal provider.

We now turn our attention to the results of our municipal provider model shown in Table 7. We first observe that some of the coefficients for demand and cost indicators have signs that are opposite those for CLECs, namely, the proportion of white households, population density,

population on public assistance, and median age and whether regulatory commissioners are appointed or elected. Therefore we reject our second hypothesis that municipal providers are motivated by profits in a like manner as CLECs. We suggest this result indicates that cities may be motivated by something other than profit when deciding whether to provide telecommunications services.

Furthermore, the coefficient for the presence of a CLEC is significant and negative, indicating that a municipal provider is more likely to be in a market where there are no CLECs than in a market competing with CLECs. Based on this evidence, we fail to reject our third hypothesis that cities generally provide telecommunications services to provide competition for incumbents when competition from CLECs is not forthcoming.

The coefficient for the presence of a municipal electric provider is positive and significant, so we fail to reject our fourth hypothesis, namely that there are economies of scope between municipal power providers and municipal telecommunications providers. This issue needs further analysis. A review of data in Gentry and Jamison (2005a, 2005b) indicates that few privately owned power companies become telecommunications providers (2.36% on average between 1998 and 2002). It would seem that if such scope economies existed that they would exist also for investor-owned utilities. There are at least two possible explanations for this apparent difference between decisions by municipal power utilities and investor-owned power utilities with respect to becoming telecommunications providers. One explanation might be that rate regulation of the private utilities discourages them from entering competitive local telecommunications markets. Another explanation might be that some city leaders, municipal power utility managers, or both,

extend into telecommunications for personal reasons and cost economies do not play a role in these decisions.

Lastly, we observe that the coefficients for municipal provider restrictions are positive and significant. One explanation of the restriction coefficient is that restrictions on municipal entry are more likely in states where significant numbers of municipal providers are present. However, endogenizing the restriction variable does not affect the results, so we conclude that state rules on municipal entry provide certainty for municipalities and encourage entry even if the rules impose entry restrictions.

VII. Conclusion

This research indicates that municipalities may not pose a significant competitive threat to CLECs, due primarily to differences in the objectives of private and publicly owned providers. CLECs locate in more urban areas where incomes are higher and the possibility for higher revenues through selling more services to those interested in expanded capabilities is greater. Municipalities provide telecommunications services in areas largely unserved by CLECs, in which profits are limited by both costs and demand. Anecdotal evidence suggests municipalities participate in markets in which some residents believe services provided by the incumbent are either inadequate (typically too slow a pace of innovation to attract businesses) or too expensive. It appears further that municipal participation does not preclude CLEC participation, although the reverse may be true. These results, and the finding that entry restrictions have had little deterrent effect, are the first step in a more thorough analysis of municipal telecommunications provision. Additionally, the incorporation of prices and complementary offerings (for example

combining local telecommunications services with cable and Internet access) might provide greater insight into motivations for the different types of providers. To more comprehensively analyze the possibility of crowding out, this research might be extended to incorporate effects on prices and investment, and should then be tied to theoretical research regarding the relative efficiency of private versus public entities.

An important further step is to consider who (the municipal provider, the municipality's citizens, or someone else) absorbs the commercial risk when the city becomes a telecommunications provider. Cities have claimed they do not need the high rates of return that private companies need in order to justify their investment. Considering revenues, prices and municipal funding of telecommunications investments should allow us to empirically answer the question of whether public or private entities are better able to manage risk.

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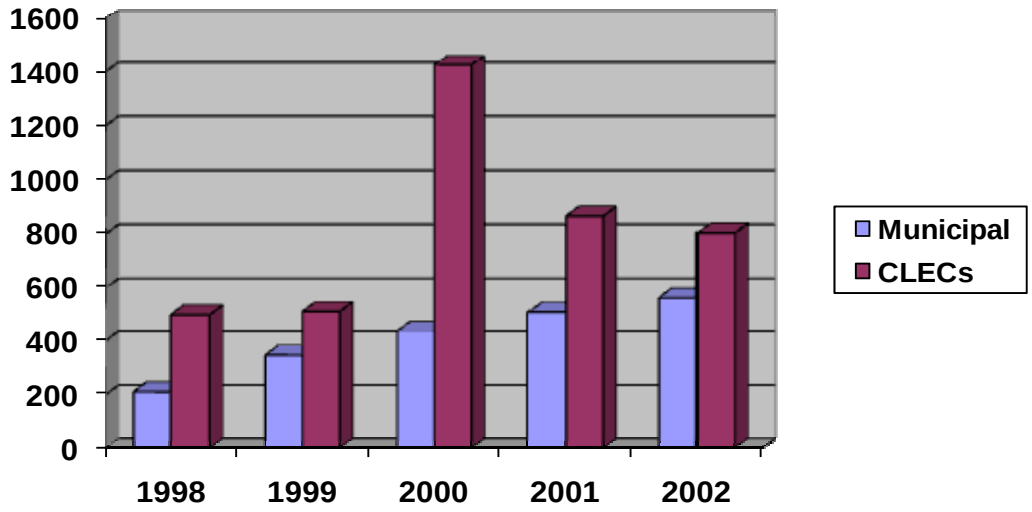

Figure 1. Total Municipal Telecommunications Providers and CLECs in the United States by year, 1998-2002.

Table 1. Variable Names, Descriptions, and Sources

Variable Name	Variable Description	Source
pCLEC	Equals 1 if one or more CLECs are operating within that city in the given year	New Paradigm Resources Group publications
pmunicipal	Equals 1 if the municipality provides any external services to consumers in the given year	American Public Power Association http://www.appanet.org.
avgrev / loop	Average revenue per line / average local loop rate (UNE price) by state by year	Public Service Commission of West Virginia http://www.cad.state.wv.us/; Federal Communications Commission http://www.fcc.gov
clec_flex	Equals 1 if CLEC regulation reported as "flexible regulation" in 2002	*State Telephone Regulation Report*, - multiple issues - published by Warren News
educ	Percent of population with college education or higher, by county in the year 2000	US Census Bureau http://www.census.gov
electric	Equals 1 if municipality provides electric within that city	American Public Power Association http://www.appanet.org.
help	Percent of households receiving public assistance, by county in the year 2000	US Census Bureau http://www.census.gov
hhincome	Median annual household income by county, year 1999	US Census Bureau http://www.census.gov
UNE loop	Average local loop rate (UNE price) by state by year	Public Service Commission of West Virginia
medage	Median age of the county in year 2000	US Census Bureau http://factfinder.census.gov
muniban	Equals 1 if the state has any restrictions on municipal provision of telecom services in the given year	State's legislative Web sites
poppersqmi	Population per square mile, by county in year 2000	US Census Bureau http://www.census.gov
pscappoint	Equals 1 if the state's public service commissioners are appointed; 0 if elected, by year	State public utility commission Web sites
RepGov	Equals 1 if the state's governor is Republican in the given year	National Governors Association http://www.nga.org/cda/files/biobook.pdf
whitehh	Proportion of white households per county in 2000	US Census Bureau http://www.census.gov

Table 2. Variable Summary Statistics, 1999 – 2002

Variable Name	Obs	Mean	Std. Dev.	Min	Max
pCLEC	203,252	0.05	0.72	0.00	48.00
pmunicipal	203,252	0.01	0.09	0.00	1.00
avgrev	203,252	34.28	4.99	25.28	45.88
clec_flex	203,248	0.54	0.50	0.00	1.00
educ	203,252	0.85	0.08	0.47	1.00
electric	203,252	0.04	0.19	0.00	1.00
help	203,248	0.03	0.02	0.00	0.37
hhincome	203,248	48.28	12.81	15.17	108.76
UNE loop	203,248	15.70	4.35	7.01	27.75
medage	203,248	37.03	3.68	20.00	58.60
muniban	203,248	0.05	0.21	0.00	1.00
poppersqmi	203,252	0.37	1.39	0.00	52.42
pscappoint	203,252	0.81	0.39	0.00	1.00
RepGov	203,252	0.56	0.50	0.00	1.00
whitehh	203,248	0.87	0.14	0.01	1.00
year	203,252	2001	1.11	1999	2002

Table 3. Total Number of Providers by MSA, 1998 - 2002

Municipal Providers

Number of Years in the Market	Markets in MSAs		Markets not in MSAs		All Markets	
	No. of Providers	Percent of Total	No. of Providers	Percent of Total	No. of Providers	Percent of Total
One Year Only	57	18.04%	83	23.12%	140	20.74%
Two Years Only	52	16.46%	69	19.22%	121	17.93%
Three Years Only	70	22.15%	59	16.43%	129	19.11%
Four Years Only	57	18.04%	81	22.56%	138	20.44%
All Five Years	80	25.32%	67	18.66%	147	21.78%
Total	316	46.81%	359	53.19%	675	100.00%

CLECs

Number of Years in the Market	Markets in MSAs		Markets not in MSAs		All Markets	
	No. of Providers	Percent of Total	No. of Providers	Percent of Total	No. of Providers	Percent of Total
One Year Only	4507	64.52%	387	68.50%	4894	64.82%
Two Years Only	1150	16.46%	134	23.72%	1284	17.01%
Three Years Only	1237	17.71%	44	7.79%	1281	16.97%
Four Years Only	79	1.13%	0	0.00%	79	1.05%
All Five Years	12	0.17%	0	0.00%	12	0.16%
Total	6985	92.52%	565	7.48%	7550	100.00%

Total = Total number of cities with telecommunications services provided by a municipality or CLEC.
By definition, municipal providers serve only one city each.
A CLEC may appear in more than one city per year.

Table 4. Number of Cities with Indicated Number of CLECs and Municipal Providers, 2002 (51,148 cities total)

Number of CLECs per City	Number of Cities with given Number of CLECs	Percentage of Observations	Number of Municipal Providers given Number of CLECs	Percentage of Observations
0	50,101	97.95	520	86.09
1	634	1.24	42	6.95
2	141	0.28	11	1.82
3	74	0.14	1	0.17
4	30	0.06	5	0.83
5	35	0.07	5	0.83
>5	131	0.26	20	3.31
6	22	0.04	5	0.83
7	14	0.03	4	0.66
8	12	0.02	1	0.17
9	7	0.01	2	0.33
10	8	0.02	1	0.17
>10	70	0.14	7	1.16

Table 5. Differences Between CLEC and Municipal Provider Markets for Selected Variables, 2002

Market Characteristics	Cities with no municipal provider and no CLECs	Cities with a municipal provider and no CLECs	Cities with no municipal provider and at least one CLEC	Cities with a municipal provider and at least one CLEC
Number of Cities	49,581	520	961	84
Average Population per Square Mile	350.34	236.22	1,135.49 ***	514.29
Average Median Household Income	37,586.91	38,501.91	46,906.68 ***	42,466.05 ***
Average Number of Housing Units - Urban	83,543.10	78,288.94	26,007.10 ***	162,945.10 **
Average Number of Housing Units - Rural	12,397.82	11,887.98	13,456.29 ***	14,410.74
Average Number of Cities with a Municipal Telecom Provision Ban	0.35	0.44 ***	0.317	0.42
Average Number of States in which PSC is Appointed vs. Elected	0.81	0.75 ***	0.87 ***	0.77
Average Local Loop Rate	15.41	15.33	15 **	15.69
Average Number of Households on Public Assistance	3,367.13	3,128.07	9,617.16 ***	6,184.17

Table 6. Cities with Competition between CLECs and Municipal Providers vs. Cities without such Competition, 1998 – 2002

	Markets with a Municipal Provider			Markets with CLECs	
Year	Number of Markets Competing with CLECs	Number of Markets without CLECs	Percentage of Markets with CLECs	Number of Markets without a Municipal Provider	Percentage of Markets with a Municipal Provider
1998	36	270	13.33%	492	2.71%
1999	51	418	12.20%	501	2.44%
2000	101	365	27.67%	1033	2.68%
2001	97	472	20.55%	988	2.08%
2002	84	520	16.15%	963	1.68%

Table 7. Logit Model Results

	Year 2002; 49,746 observations	
	Municipal Provider	**CLEC**
Variable	**Coefficient** (standard error)	**Coefficient** (standard error)
pclec	-6.353 * (3.104)	
pmunicipal		0.487 (0.524)
muniban	0.462 ** (0.194)	
electric	5.271 *** (0.107)	
avgrev / loop		-0.520 *** (0.091)
CLEC_flex		1.484 ** (0.526)
poppersqmi	-0.207 (0.154)	0.160 *** (0.033)
hhincome	0.027 (0.008)	0.064 *** (0.003)
whitehh	-7.868 *** (0.391)	1.268 ** (0.485)
help	-38.710 *** (4.907)	8.756 * (3.573)
educ	5.079 *** (0.920)	2.192 ** (0.800)
medage	0.033 (0.015)	-0.098 *** (0.015)
pscappoint	0.486 ** (0.181)	-0.955 *** (0.142)
RepGov	0.705 *** (0.142)	0.717 *** (0.101)
constant	-5.101 *** (1.053)	-5.779 *** (0.941)

Significance levels:
* = .05
** = .01
*** = .001