Bureaucrates as Entrepreneurs: Do Municipal Telecom Providers Hinder Private Entrepreneurs?

Janice A. Hauge, Ph.D.
Assistant Professor
University of North Texas
Denton, TX 76203

Mark A. Jamison, Ph.D.
Director, Public Utilities Research Center
University of Florida
Gainesville, FL 32611

Richard J. Gentry
University of Florida
Gainesville, FL 32611

Abstract: We consider how government-owned enterprises choose markets and 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 companies (CLEC) serve. We find that municipalities and private firms make the decisions to provide telecommunications services differently. 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. This research indicates that municipalities may not pose a significant competitive threat to CLECs, due primarily to demographic characteristics that encourage municipal as opposed to CLEC participation. It appears further that municipal participation does not preclude CLEC participation, although the reverse may be true. These results, and the finding that municipal entry restrictions have had little effect, are the first step in a more thorough analysis of municipal telecom provision.

We are grateful to David Sappington, Johannes Bauer, James Prieger, and participants at the University of Florida – London Business School "Future of Broadband" conference for helpful comments and suggestions, and Joanna Palin for excellent research assistance. Additionally, we are grateful to the New Paradigm Resources Group, the American Public Power Association, and the staff of the West Virginia Public Service Commission for providing data. The authors are responsible for all errors and omissions. This paper was previously titled "Empirical Analysis of Municipal Entry in the Local Exchange Market."

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 (2004) 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 so 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 companies (CLEC) serve. A CLEC is a privately-owned telecommunications provider that enters a 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 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. 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 telecom 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 charge lower prices for unbundled network elements relative to their costs that

[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 telecom providers were offering.[5] There are a myriad of reasons municipalities have asserted for entering the telecom 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, are essentially subsidized by captive taxpayers, and crowd out more efficient private investment. Based on these or similar concerns, fourteen 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 two types of empirical models, we seek to determine the characteristics of cities in which municipalities offer telecom services and in so doing, address the question of whether municipal

[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) and Crandall (2002) as referenced by Roycroft (2005).
[5] APPA Quarterly Communicator, Summer 2004, Volume 20 Number 3.

provision affects CLECs. Our primary finding is that while municipal entry is increasing, 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 telecom services.

II. Background

U.S. statutes provide that no state regulation should prohibit any entity from providing telecom services, but in 2004 the U.S. Supreme Court ruled that this does not prohibit states from adopting restrictions on local governments providing telecom services.[6] Although the main reason for allowing 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 telecom 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

[6] U.S. Supreme Court, 541 U.S. (2004), Numbers: 02-1238, 02-1386, 02-1405. March 24, 2004.

despite restrictions. The number of municipalities providing telecom services to public consumers has grown from 210 in 1998 to over 600 in 2002.[7] Overall, a total of 675 municipalities participated in providing some form of communications service from 1998 to 2002. Given that the number of CLECs decreased from 1,426 in 2000 to 804 in 2002, one might wonder whether some of these CLECs might have been 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]

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."[8] 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.[9] 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

[7] Data from the APPA Annual Directory and Statistical Reports covering years 1998 to 2002.
[8] Tom Giovanetti, Institute for Policy Innovation, "Government-Owned Networks – the Wrong Plan at the Wrong Time for Broadband," page 1.
[9] See Progress on Point Releases 9.7, 10.17 and 11.3 for additional details.

Broadband: Separating Fact from Fiction," in which many of the concerns raised by private executives and public officials are addressed.[10]

III. Theory and Hypotheses

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 the expected number of rivals. As a result, we expect greater customer demand, lower service provider costs, and pro-CLEC regulatory policies to result in a higher probability of CLECs serving a market. This is consistent with the empirical research that we cite in the Introduction to this paper. 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. This leads to our first hypothesis, namely, that CLECs do not view a municipal provider as providing competition in a market. We test this hypothesis using a 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.

We assume that municipal providers can be motivated by profit and by public interests, such as economic development. 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 relates 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 public interests. We test this hypothesis with a model that

[10] See http://www.appanet.org for the fact sheet and to download or order the booklet.

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 coefficients whose signs are opposite those of the corresponding coefficients in our CLEC model.

Correspondingly, if municipal providers are not motivated by profit, we assume that public interests must play a role in predicting the presence of a municipal telecom provider. For example, a city may become a telecom 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 may benefit citizens directly and could stimulate economic development. If our results show that municipal providers choose markets in the same way that CLECs choose markets, we reject our third hypothesis: that public interests play a role in predicting the presence of a municipal provider.

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, negative correlation between the presence of a municipally-owned power utility and the presence of a municipally-owned telecom 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-owed 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 will examine data on telecommunications services offered by privately-owned power companies to see whether it supports the cost advantage argument.

IV. The Dataset

We compiled a dataset that includes all CLEC and municipal providers in the U.S. telecom market for five years (1998 – 2002).[11] 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, local telephone, etc.). 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.

[11] Our empirical analysis focuses on 2002 for this study as it is our most recent year of complete data, and we use a static model rather than a dynamic entry/exit model.

Tables 1 and 2 describe and summarize the variables for our models, in addition to listing the data sources.[12] The variables for age, median household income, race, public assistance, and education are indicators of demand. We expect demand to be inversely related to the median age of the head of household and positively correlated with total number of households, median household income, the proportion of heads of households who are white and with the proportion of heads of household who are college educated. We do not predict the effects of the proportion of households receiving public assistance. This variable may indicate low demand, but it may also imply urbanization and so indicate low costs. We expect service provider costs to be negatively correlated with the amount of urbanization, population density, and price levels for unbundled network elements, our indicators of 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 to increase the probability of the presence of CLECs in a market, but we cannot predict in advance how this might affect municipal providers. In a few markets, regulators impose price floors on CLECs. We expect this to have a negative impact on CLEC presence. We are unable to predict the possible effects of public service commissioners being appointed

[12] We considered other population characteristics such as other races and ethnicities, language, and other measures of population density, such as urban classifications, and various demographic indicators such as the employment growth rate and personal bankruptcy rate. These variables proved to be insignificant and did not affect results, so we excluded them from the model.

rather than elected[13] and the political affiliation of the governor of the state. 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. Examples of such limitations include accounting separation requirements, public hearings, voter approval, and reporting requirements. We expect the presence of effective restrictions to decrease the probability of the presence of a municipal provider.

Lastly, following Jamison (2004) we include a variable to capture the potentially conflicting effects of regulation on incumbent and CLEC incentives. Regulators require incumbents to provide unbundled network elements[14] 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) entry. To capture this effect, we

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

[14] Leasing portions of an incumbent's network is called purchasing unbundled network elements. For example, a CLEC could lease a local telephone line from the incumbent provider. The line would connect to the incumbent's building. It could then connect to the incumbent's switch or the entrant's switch, depending on how the entrant wishes to use the incumbent's facilities. Our variable is a state-wide average based on the loop, port and switching rates per month.

include as a variable the ratio of incumbents' revenues per line to the price charged for unbundled local telephone lines. 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 in non-MSA areas than MSA areas (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). Table 3 summarizes these statistics.

[PLACE TABLE 3 ABOUT HERE]

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

[PLACE 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 summary statistics for markets with neither a municipal provider nor CLECs. The second column of data represents markets with a

municipal provider, but no CLEC. The third data column characterizes markets with at least one CLEC and no municipal provider, and the last column denotes markets with at least one CLEC and a municipal provider. The numbers in the rows show the mean population per square mile, median household income, total housing units in urban areas, etc. for each type of market. Asterisks in a cell in Table 5 indicate whether the mean value represented in that cell is significantly different from the corresponding mean value for the markets with no CLECs and no municipal provider. These mean values indicate that CLECs and municipal providers differed in how population density, household income, urbanization, etc. affected their market entry decisions. We examine these issues more fully in the Results section of this paper.

[INSERT TABLE 5 ABOUT HERE]

Table 6 further examines competition between CLECs and municipal providers. It shows that 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 where 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 telecom provision, the total number of municipalities in the telecom 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 consider two types of empirical models to test our hypotheses: a bivariate probit model and logit models. The bivariate probit model tests whether CLECs and municipal providers make similar decisions on whether to serve a market. The logit models examine each type of provider's market choice. The analysis considers for each city within the United States whether there is a CLEC, a municipal provider, neither, or both. We discuss each type of model next.

We assume the decision to provide telecom service in any particular market is based on some unobservable utility index that is determined by our explanatory variables. This would suggest use of a discrete choice model, such as a probit model. We use a bivariate probit in which we consider the participation decisions of CLECs and municipalities independently, realizing that those entry decisions could be related. The basic model is given by:

$$Y_{j,i,t} = f_j\left(M_{i,t}, C_{i,t}, \mathbf{X}_{i,t}, \mathbf{R}_{i,t}, S_{i,t}\right), \tag{1}$$

or more specifically,

$$Y^{*}_{c,i,t} = \beta_1 + \beta_2 M_{i,t} + \boldsymbol{\beta}_3 \mathbf{X}_{i,t} + \boldsymbol{\beta}_4 \mathbf{R}_{i,t} + \beta_5 S_{i,t} + u_{j,i,t}\,, \tag{2}$$

and

$$Y^{*}_{m,i,t} = \beta_1 + \beta_2 C_{i,t} + \boldsymbol{\beta}_3 \mathbf{X}_{i,t} + \boldsymbol{\beta}_4 \mathbf{R}_{i,t} + \beta_5 S_{i,t} + u_{j,i,t}\,, \tag{3}$$

where $Y^{*}_{j,i,t}$ is the probability that an operator of type *j* serves market *i* in year *t*; $Y_{j,i,t} = 1$ if $Y^{*}_{j,i,t} > 0$ and $Y_{j,i,t} = 0$ otherwise; $M_{i,t}$ is a dummy variable indicating whether a municipal provider is present, $C_{i,t}$ is a dummy variable indicating whether a CLEC is present; $\mathbf{X}_{i,t}$ is a vector of demographic and other variables that indicate market demand and operator costs; $\mathbf{R}_{i,t}$ is a vector of regulatory variables; $S_{i,t}$ is the indictor of state restrictions on municipal providers; $u_{i,j,t}$ is the error term; *j* = *m*, *c* indicates the type of operator (*m* = municipal provider and *c* = CLEC); and *t* = 2002. $M_{i,t}$ applies only within the CLEC equation; $C_{i,t}$ applies only within the municipal provider equation.

Because the equations' error terms may be related we cannot simply regress the equations individually as independent discrete choice models. The bivariate probit model accounts for this occurrence and provides a measure ρ that indicates the extent to which the error terms vary together. To find the joint probability of participation by CLECs and municipal providers, we assume a joint distribution for the *Y*s, and then using a bivariate normal distribution, we find the parameter estimates and correlation parameter ρ. The full model is estimated in three parts (two individual and one joint) as a standard probit model in which we use maximum likelihood estimation to determine the coefficients and ρ.

Our logit models use maximum likelihood estimation to predict CLEC and municipal provider participation using a reduced form with exclusion restrictions. The basic models are given by equations (1), (2), and (3) above. If ρ in the bivariate probit model is significantly different from zero, then we endogenize $M_{i,t}$ and $C_{i,t}$ within the logit models. We then can use these models to predict the probability of CLEC presence in a market and the probability of a municipal provider being in a market.

VI. Results

Table 7 provides the results of the bivariate probit model. The explanatory variables have the expected signs for CLECs, except for the variables that indicate regulatory flexibility and price floors for CLECs; however, the coefficients for these two variables are not statistically significant. We cannot base all conclusions on the results of the bivariate probit model however, because $\rho = -1$ and is significant. A ρ equal to zero would suggest the error terms are independent and we would effectively have two standard normal distributions orthogonal to one another. If ρ does not equal zero, the two errors are correlated, so the probability of one operator's presence is dependant on the probability of the other's presence. When ρ equals –1, the two are exactly negatively correlated.[15] This implies that CLEC and municipal providers choose markets in which to operate in almost opposite fashion, which suggests that municipal providers make their decisions on something other than the commercial considerations that

[15] Because calculations of the joint log likelihood equals the sum of the log likelihoods of the two individual probit models (if we had chosen to run two individual probit models with our data), we know that the bivariate probit model is a relatively good fit of the data.

appear to determine CLEC decisions. This raises the question of how cities make their decisions to provide telecommunications services, which we explore more fully below.

[INSERT TABLE 7 ABOUT HERE]

While some results for the bivariate probit model appear logical, we must be concerned with the endogeneity of municipal providers' and CLECs' market decisions. This and our finding that ρ is significantly different from zero indicate that further analysis is needed.

We address these issues with our logit models, the results of which we provide in Table 8.

[INSERT TABLE 8 ABOUT HERE]

The coefficients for the CLEC logit model have the expected signs, namely, greater regulatory flexibility and higher population density, total number of households, household income, proportion of white households, and education increase the probability of CLEC presence in a market; and higher median age of the head of a household lowers the probability of CLEC presence. Additionally, the proportion of population receiving public assistance is positively correlated with CLEC presence which we attribute to being an indicator of urbanization and therefore lower costs. 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. Consistent with Jamison (2004), a higher ratio of retail prices to unbundled network element prices lowers the number of markets served by CLECs.

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 competitor. 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 8. We first observe that some of the coefficients for demand and cost indicators have signs that are opposite those for CLECs, namely, population density, white households, total households, public assistance, and median age. Therefore we reject our second hypothesis, that municipal providers are motivated by profits in like manner as CLECs. We interpret this result as meaning that cities are 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 consider public interest issues when deciding whether to provide telecommunications services. Our model cannot confirm that public interest issues are the motivating factor because we cannot rule out other possible explanations, such as personal motivations by city leaders or employees. We elaborate on this next.

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, appointed commissioners, and Republican governors 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. We are unable to confirm why appointed commissioners have a positive effect on the probability of municipal provider presence, but a negative effect on CLEC presence. Perhaps this result comes about because appointed commissioners decrease CLEC presence, which in turn increases municipal provider presence. Further research is needed to definitively answer this question. The results for Republican governors is consistent with our interpretation of the effects of Republican governors on CLEC presence, namely that Republican governors favored policies that increase competition with the incumbent companies.

VII. Conclusion

This research indicates that municipalities may not pose a significant competitive threat to CLECs, due primarily to demographic characteristics that encourage municipal as opposed to CLEC participation. 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 telecom services in areas heretofore underserved by CLECs, in which revenues are limited by both population and income of customers. 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 telecom provision. 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 telecom investments should allow us to empirically answer the question of whether public or private entities are better able to manage risk.

Bibliography

American Public Power Association, www.APPAnet.org

APPA 2004 – 2005 Annual Directory and Statistical Report.

Consumer Advocate Division of the Public Service Commission of West Virginia, www.cad.state.sv.us

Edwards, Geoff, and Leonard Waverman. "The Effects of Public Ownership and Regulatory Independence on Regulatory Outcomes: A Study of Interconnect Rates in EU Telecommunications," Economics Department, London Business School, 2004.

Federal Deposit Insurance Corporation, www.2fdic.gov/recon, accessed 11/12/2004.

Foreman, R. D. "For Whom the Bell Alternatives Toll: Demographics of Residential Facilities-Based Telecommunications Competition in the United States," Telecommunications Policy, 26, 2002, 573 – 587.

Gentry, R. J. and M. A. Jamison. "Market behavior and survival of entrepreneurial firms - how do rookies compete?" Public Utility Research Center, University of Florida, 2005a.

Gentry, R. J., and M. A. Jamison. "Trait-based Imitation among Entrepreneurial Market Entrants," Public Utility Research Center, University of Florida, 2005b.

Giovanetti, Tom. Institute for Policy Innovation, "Government-Owned Networks – the Wrong Plan at the Wrong Time for Broadband," page 1.

Guppy, Paul. "When Government Enters the Telecom Market: An Assessment of Tacoma's Click! Network," The Progress and Freedom Foundation, Release 9.7 February 2002.

Ingram, Keith. "Citizens Come to the Rescue of Community Broadband Initiative," APPA Quarterly Communicator, Summer 2004, Volume 20 Number 3.

Jamison, Mark A. "Effects of Prices for Local Network Interconnection on Market Structure in the US," in Global Economy and Digital Society, Chapter 16, Elsevier Science, 2004.

Lassman, Kent and Randolph J. May, "A Survey of Government-Provided Telecommunications: Disturbing Growth Trend Continues Unabated," The Progress and Freedom Foundation, Release 10.17 October 2003.

Lenard, Thomas M. "Government Entry into the Telecom Business: Are the Benefits Commensurate with the Costs?" The Progress and Freedom Foundation, Release 11.3 February 2004.

National Governors Association: http://www.nga.org/cda/files/biobook.pdf, accessed June 2005.

Roycroft, Trevor. "Empirical Analysis of Entry in the Local Exchange Market: The Case of Pacific Bell," Contemporary Economic Policy, Vol. 23, No.1, January 2005, pp 107-115.

Sappington, David E.M. and Gregory Sidak, "Incentives for Anticompetitive Behavior by Public Enterprises," *Review of Industrial Organization*, Vol. 22: 183 – 206, 2003.

State Telephone Regulation Report, http://www.warren-news.com, accessed May 2005.

US Census 2000, www.census.gov, accessed 11/12/2004.

U.S. Supreme Court, 541 U.S. (2004), Numbers: 02-1238, 02-1386, 02-1405. March 24, 2004.

Wall Street Journal, "Telecom Giants Oppose Cities on Web Access," November 23, 2004, Page B1, http://online.wsj.com.

Wikipedia, List of United States Governors available at: http:// en.wikipedia.org/wiki, accessed June 2005.

Zolnierek, James, James Eisner and Ellen Burton. "An Empirical Examination of Entry Patterns in Local Telephone Markets," Journal of Regulatory Economics, 19:2, 2001, pp 143 – 159.

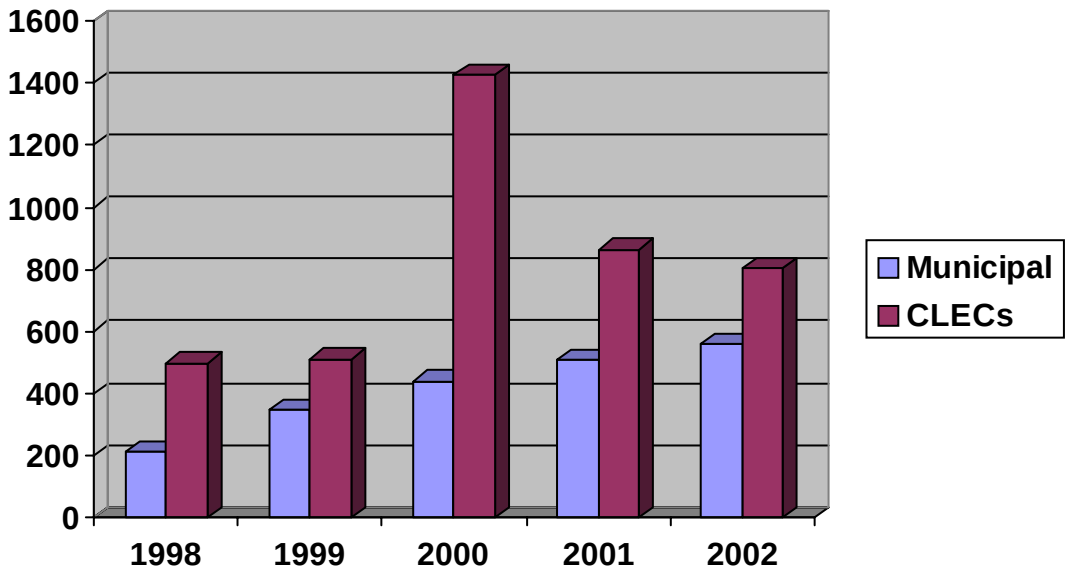

Figure 1. Total Municipal Telecom Providers and CLECs in the United States by year, 1998-2002.

Variable Definitions and Sources		
Variable Name	**Variable Description**	**Source**
CLEC	CLEC = 1 if one or more CLECs are operating within that city in the given year	New Paradigm Resources Group publications
municipal	municipality = 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	clec_flex = 1 if CLEC regulation reported as "flexible regulation" in 2002	*State Telephone Regulation Report* , - multiple issues - published by Warren News
clec_floor	cec_floor = 1 if CLEC regulation reported as "price floor" in 2002	*State Telephone Regulation Report* , - multiple issues - published by Warren News
educ	Proportion of people with a college education or higher, by county in the year 2000	US Census Bureau http://www.census.gov
electric	electric = 1 if municipality provides electric within that city in the given year	American Public Power Association http://www.appanet.org.
help	Proportion 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
hhtotal	Total number of households per county in year 2000	US Census Bureau http://factfinder.census.gov
loop	Average local loop rate (UNE price) by state by year	Public Service Commission of West Virginia http://www.cad.state.wv.us/
medage	Median age of the county in year 2000	US Census Bureau http://factfinder.census.gov
muniban	muniban = 1 if the state has any restrictions on municipal provision of telecom services in the given year	State's legislative websites
poppersqmi	Population per square mile, by county in year 2000	US Census Bureau http://www.census.gov
pscappoint	pscappoint = 1 if the state's public service commissioners are appointed; 0 if elected, by year	State public utility commission websites
RepGov	RepGov = 1 if the state's governor is Republican in the given year	List of United States Governors, from Wikipedia http://en.wikipedia.org/wiki/List_of_United_States_Governors and the National Governors Association http://www.nga.org/cda/files/biobook.pdf
urban	urban = 1 if the county is classified as an urban area	US Census Bureau http://www.census.gov
whitehh	Proportion of white households per county in the year 2000	US Census Bureau http://www.census.gov
year	1998 - 2004; the empirical models use one year of data: 2002	

Table 1
Variable Names, Descriptions, and Sources

Variable Name	Obs	Mean	Std. Dev.	Min	Max
CLEC	51148	0.97	0.18	0.00	1.00
municipal	51148	0.01	0.11	0.00	1.00
avgrev / loop	50848	2.37	0.49	1.33	4.03
clec_flex	51147	0.36	0.48	0.00	1.00
clec_floor	51147	0.00	0.04	0.00	1.00
educ	51147	0.82	0.07	0.47	1.00
electric	51147	0.06	0.24	0.00	1.00
help	51147	0.03	0.02	0.00	0.37
hhincome	51147	37,779.52	10,231.79	9,333.00	82,929.00
hhtotal	51147	99,305.93	286,085.10	0.00	3,270,909.00
loop	51148	15.41	4.31	7.01	27.41
medage	51147	37.23	3.64	20.00	54.30
muniban	51148	0.35	0.48	0.00	1.00
poppersqmi	51148	364.24	1,388.34	0.10	52,419.40
pscappoint	51147	0.90	0.29	0.00	1.00
RepGov	49778	0.56	0.50	0.00	1.00
urban	51050	0.50	0.50	0.00	1.00
whitehh	51147	0.82	0.16	0.00	1.00
year	51148	2002	0.00	2002	2002

Table 2
Variable Summary Statistics

Municipal Providers						
	Markets in MSAs		**Markets not in MSAs**		**All Markets**	
Number of Years in the Market	**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						
	Markets in MSAs		**Markets not in MSAs**		**All Markets**	
Number of Years in the Market	**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 telecom 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 3
Total Number of Providers by MSA (five year span)

Number of CLECs per City	Number of Cities with given the Number of CLECs	Percentage of Observations	Number of Municipal Providers given the 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 4
Number of Cities with Indicated Number of CLECs and Municipal Providers, 2002 (51,148 cities total)

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 both a municipal provider and at least one CLEC
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 5
Differences Among CLEC and Municipal Provider Markets for Selected Variables, 2002

Year	Markets with a Municipal Provider			Markets with CLECs	
	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 6
Cities with Competition between CLECs and Municipal Providers vs. Cities without such Competition, 1998 – 2002

	Municipal Provider		CLEC	
Variable	Coefficient (standard error)		Coefficient (standard error)	
municipal			2.941	***
			(0.0489)	
CLEC	3.321	***		
	(0.062)			
muniban	0.119	***		
	(0.031)			
electric	1.486	***		
	(0.041)			
loop			0.019	***
			(0.004)	
CLEC_flex			-0.049	
			(0.029)	
CLEC_floor			0.214	
			(0.241)	
poppersqmi	-7.30E-05	***	3.70E-05	***
	(1.92E-05)		(6.69E-05)	
hhincome	0.005	*	0.024	***
	(0.002)		(0.001)	
hhtotal	-0.030	*	0.091	***
	(0.015)		(0.012)	
help	4.75E-06		-1.10E-05	***
	(2.61E-06)		(2.17E-06)	
pscappoint	-0.120	**	0.007	
	(0.047)		(0.041)	
RepGov	-0.049		-0.055	
	(0.030)		(0.027)	
_cons	-2.683	***	-3.402	***
	(0.074)		(0.101)	
ρ	-1			
		Significance Levels:		
		* = .05		
		** = .01		
		*** = .001		

Table 7
Bivariate Probit Results
(Year 2002; 49, 068 observations)

Variable	Municipal Provider **Coefficient (standard error)**	CLEC **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)
hhtotal	-8.40E-07 (3.58E-06)	5.16E-08 *** (9.11E-07)
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)
_cons	-5.101 *** (1.053)	-5.779 *** (0.941)

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

Table 8
Logit Model Results
(Year 2002; 49,746 observations)