

**PUBLIC POLICY AND ENTREPRENEURSHIP: THE DEVELOPMENT OF
THE COMPETITIVE LOCAL TELEPHONE SERVICE INDUSTRY**

by

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To Molly

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From a relational standpoint, dissertations can be deceptive. On the one hand, they are perhaps the epitome of isolated scholarship. The dissertation is often one's first independent project, and the topic you pick defines your initial identity as a scholar. While working on your dissertation, you spend countless hours alone thinking up an interesting topic (or at least trying to), collecting data, and writing. Blank screens and uncertainty sometimes feel like your only friends. Yet on the other hand, dissertations always involve the help of others, even if it is not immediately apparent. Writing this acknowledgments section is a joy because it provides me with an opportunity to reflect back on the entire process and realize that I was rarely all alone.

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LIST OF ACRONYMS

CLEC	Competitive Local Exchange Carrier
ILEC	Incumbent Local Exchange Carrier
PUC	Public Utility Commission
RBOC	Regional Bell Operating Company

ABSTRACT

In this dissertation, I examine how political environments influence industry structure and entrepreneurial opportunities following deregulation. Though deregulation implies a removal of government control, I propose that deregulation remains a political process that is shaped by previous regulations and by the state actors responsible for implementing and overseeing deregulation. I test my claims by studying the competitive local telephone service industry, which was created by the federal Telecommunications Act of 1996. Regulators within state governments had historically played a large role in governing the industry and continued to oversee and implement the federal deregulatory policy. I studied the growth of competitive local exchange carriers (CLECs) at two different levels of analysis: the state and the firm. At the state-level, I examined CLEC founding rates between 1997 and 2006. I find that states with more experience with incentive-based regulation had higher founding rates and that this effect attenuated with time. Founding rates were also higher for states with new governors throughout the study and for states with new commissioners early in the study period. At the firm-level, I examined expansion decisions made by CLECs between 1997 and 2005. I find that early in the study period, CLECs were more likely to enter states that were similar to their founding state on dimensions of the political ideology of its electorate and that employed the same type of local telephone regulation in 1996. New governors and a regulatory commission with relatively recent turnover also made certain states more attractive

expansion targets. Finally, states exhibited a strong tendency to grow within the boundaries of the dominant incumbent carriers' territories. In many respects, this effect was as strong as the effect of adjacency. Thus, even after one policy has been preempted by a second policy, effects from the first policy remain. Together, the studies support my argument that a state's current policy is built upon its previous policies and that changes in political leadership can serve as punctuating moments that stimulate competition and industry development. This dissertation provides a basis upon which future research on the relationship between political environments and entrepreneurship can build.

CHAPTER I: INTRODUCTION

A look back on the U.S. since about 1980 shows an unmistakable trend toward a push for market forces, rather than government employees, to control aspects of the economy that have important societal benefits (Frank, 2000; Harvey, 2005; Prasad, 2006). The introduction of auctions for distributing spectrum rights, pollution credits for reducing emissions, and the deregulation of industries such as financial services, transportation, energy, and communication are some examples that signify an abrupt change in ideology. This symphony of market fundamentalism struck a resounding chord in 1996 with two presidential actions only weeks apart. In his state of the union address on January 23, President Clinton, in a statement that ran counter to the typical image of the Democratic party, announced that “[t]he era of big government is over.” Just 16 days later, President Clinton signed the Telecommunications Act, which introduced competition to the local telephone service industry for the first time in nearly 100 years. These events helped to signal the country’s faith in markets, a stance that has shown little sign of abating.

In my dissertation, I want to focus on one aspect of this transition: deregulation. In particular, I am interested in the development of its ensuing competition including its potential for stimulating entrepreneurship. Just how does deregulation lead to competition? The implicit theory is that like a magnetic force, entrepreneurs will be attracted to compete with incumbents with strength proportional to the unleashed

economic opportunities. Such a conception is, of course, simplified from the arguments of most mainstream economists, but even these theories typically do not see states having much influence in bringing about competition. But we have known since at least Polanyi (1944/2001) that a market utopia independent of the state does not exist. The state provides the lubricant to smooth the frictions of the market through the use of property rights, corporation law, the court system, etc.

Yet what most of us call deregulation is still different from the typical free market activity where the state is merely a supporting structure. Despite the language of withdrawal implied by the prefix “de”, state actors often maintain control over crucial elements of the industry: licensing who can operate where, setting prices, resolving disputes between incumbents and new entrants, etc. Thus, what we term deregulation is more accurately re-regulation or liberalization¹. Furthermore, the state actors themselves may try to rule and arbitrate neutrally but bring with them “ideological biases and institutional capabilities” (Vogel, 1996: 268). Understanding how entrepreneurs and ultimately competition arise following the deregulation of an industry therefore requires attention to who these state actors are, what they believe, and under what institutional and historical contexts they operate.

I believe that issues of deregulation and its relationship to entrepreneurship and industry evolution are appropriate for an organizational analysis. I further believe that organization theory can be enriched by such studies. Questions concerning the founding of new businesses have long been of interest to organizational ecologists (Hannan &

¹ Vogel (1996: 3) defines deregulation as the “reduction or elimination of government regulations” and liberalization as “introduction of more competition within a market.” Though the 1996 Telecommunications Act clearly did not reduce or eliminate the amount of regulation for the local telephone service industry (Crandall, 2005; Neuman, McKnight, & Solomon, 1997), I will use deregulation in this document to coincide with what most people mean by the term.

Freeman, 1977, 1984) while those related to political environments and regulation have traditionally received the attention of institutionalists (DiMaggio & Powell, 1983; Scott, 2001). As ecologists began to theorize about the effect of socio-political institutions (e.g., Aldrich & Fiol, 1994; Wholey & Sanchez, 1991) and institutionalists looked toward explaining entire histories of populations (e.g., Dobbin & Dowd, 1997), a sub-area emerged that some refer to as “institutional ecology” (e.g., Baum & Oliver, 1996; Baum & Powell, 1995). Though most conceptions of policy (including regulation) are related to the federal government, recent studies from an institutional ecology perspective have significantly advanced our knowledge of how policy within each of the 50 individual states creates opportunities for entrepreneurs. A state’s policy toward competition can influence how attractive it is to new entrants (Dobbin & Dowd, 1997) and can even influence the entrepreneurial opportunities in different states (Wade, Swaminathan, & Saxon, 1998). For deregulated industries, prior work finds that state policy can enhance entrepreneurial opportunities by providing financial support for novel, riskier types of technologies and by standardizing parameters in the exchange contracts between incumbents and new entrants—provided regulatory agencies’ relationships with incumbents are not too cozy (Russo, 2001; Sine, Haveman, & Tolbert, 2005).

Though we have learned much of the role that governments play in fostering competition and new businesses, research tends to focus on the effects of current policy. Many questions remain about other aspects of the political process, such as the role of individual state actors and the lingering effects of the policy that is being replaced. These factors seem particularly relevant for an industry being transformed from monopoly to competition. For instance, if market fundamentalism is indeed a driving force behind

federal deregulatory policy, do state-level variations in such ideology lead to state-level variations in deregulation outcomes? How do preexisting conditions within states influence the federal deregulation process? Can new government leaders break the bonds between political elites and incumbents that tend to hurt new entrants? To address these and related questions, I will analyze the deregulation of the industry I alluded to previously, the local telephone service industry.

DISSERTATION OVERVIEW

When local telephone service was deregulated as part of the federal Telecommunications Act of 1996, it gave rise to a new sector: competitive local telephone service. The purpose of this dissertation is to analyze how the competitive local telephone service industry developed differently across states as a function of state political environments. In particular, I focus on industry growth and study it in two different ways. Consistent with the ecological perspective of studying industry growth, I analyze state-level founding rates of competitive local telephone service providers to address the question, Why did certain states see more entrepreneurial opportunities for competitive local telephone service providers than did other states? And because many competitive providers expanded their service into territories outside their headquarters state, I also study industry growth at the firm-level. I analyze these expansion decisions in order to answer the question, Why did competitive providers choose to expand into certain states rather than into other states? Together, they provide a richer view into the relationship between state characteristics and industry growth than either could do alone.

I study five different aspects of a state's political environment. First, I examine *political ideology*—that is, the beliefs held by state government officials and by the

state's electorate regarding the role that government should play within society. I will argue that states with a more conservative ideology, which is typically associated with a preference for free markets, should see higher levels of industry growth.

Second, I explore what I am calling a state's *institutional endowment*. Relative to this context, this includes the policies that states had in place for regulating the local telephone industry *before* federal deregulation. I will argue that these policies should influence how the new, competitive industry developed *after* deregulation. States with a history of incentive-based regulation, which was guiding the industry away from monopolies and toward competition, should see higher levels of industry growth.

Third, I consider another way in which previous policy continues to shape an industry despite being preempted. Before deregulation, local telephone providers were regional monopolies, in which they were the sole providers for a given geographic territory. The largest incumbent providers covered several states. Competitive entrants were unrestricted about where they could operate, but I will argue that they will be influenced by the geographical boundaries of these large incumbents due to both transaction costs and to the cognitive conception of markets that this *legacy policy* of geographical restrictions created.

Fourth, I analyze whether the geographical location where a firm starts its operations influences what other states appear to be desirable expansion targets. I will argue that a firm's *founding conditions* cause it to structure itself a certain way and to take on characteristics that make it a better fit for some states rather than others.

Fifth, I examine how *political regime change* helps states make the transition from regulating monopolies to regulating competition. I will argue that new government

leadership, both overall and specific to those who oversee the industry, serve as punctuating moments that (1) break those ties between incumbents and the political elite and (2) stimulate the economy and attract service providers such as competitive local telephone service providers. This should lead to higher levels of industry growth.

As a final consideration, I analyze how the effect that political environments had on industry growth at the state-level may have varied over time. I will argue that as an industry gains legitimacy and as its surrounding context changes, the factors that influence its growth and its entrepreneurial opportunities may shift in their level of importance. I explore, then, the extent to which the preceding characteristics varied over time.

CONTRIBUTIONS

The goal of my dissertation is to provide a detailed examination of how political environments influence industry structure and entrepreneurial opportunities in a deregulatory setting. This contributes to theory in several ways. In particular, I provide a richer, more realistic view of political environments and their influence on organizational behavior. This includes looking at the impact of state governments, considering interactions of multiple levels of government (federal deregulation and state interpretation and implementation), and considering how new policy becomes enacted with respect to the old policy that it replaced. I also make explicit the fact that policies are implemented by actual people who bring with them their own unique histories, capabilities, and ideologies. These ideas, which used to be prevalent in that we now call “old” institutional theory of organizations, are typically ignored within the new institutional theory domain (Selznick, 1996; Stinchcombe, 1997).

Regarding the entrepreneurship literature in particular, I add to the growing number of studies that examine the demand-side of entrepreneurship (Why do certain areas see more entrepreneurship than other areas?) rather than the supply-side of entrepreneurship (Why do certain people become entrepreneurs?). To use an agricultural metaphor, a demand-side approach explores how differences in “soil” cause the “seeds” of entrepreneurship to grow at different rates. Political environments are an aspect of an area’s soil that has been understudied.

More generally, I approach this dissertation with an aim to contribute to our understanding and theories of institutional change. Two elements that I focus on are time and transition. By *time*, I refer to both the historical conditions upon which changes occur as well as the dynamics of the institutionalization process. New institutional forces, such as the policies considered here, become applied within particular contexts. The same changes applied to areas with different histories may result in different outcomes. Also, while *institutions* are often perceived of as static, *institutionalization* is dynamic; it is a process. As the object of institutional change develops and the surrounding context shifts, the effect of institutional forces should also change. By *transition*, I again refer to the role that individuals play in the process of enacting institutional change. In certain cases, turnover may be a necessary condition for creating a break from the past.

My hope is that this dissertation can provide substantive contributions, too. Despite its limitations, the 1996 Telecommunications Act still is cited as landmark legislation for changing not only the American economy but American society. The impact of this legislation has been addressed by public policy scholars and economists

but is lacking the unique perspective that organization theory can provide. Furthermore, deregulation and its impact remain topics of great interest and debate, especially in areas such as the deregulated electricity industry, which has struggled to reach the level of competition envisioned by policymakers. Finally, this research can speak to general issues of policy and the economy by addressing the role that the state can play in shaping the economy via entrepreneurship, topics that remain at the forefront of public concern. This dissertation is one look into this relationship.

ORGANIZATION OF DISSERTATION

In Chapter II, I review the literature on entrepreneurship to present the theoretical foundations for this study. I pay particular attention to how entrepreneurial opportunities vary geographically and to the effects that political environments have on fostering entrepreneurship. In Chapter III, I provide the necessary historical background to the local telephone service industry and describe the important role that state governments have played, and continue to play, in its development. Chapter IV is where I present my theory and hypotheses. I develop arguments for why elements of state political environments would affect growth of the competitive telephone service industry at both state- and firm-levels of analysis. Chapters V and VI contain research methods and the results of my state-level analysis and firm-level analysis, respectively. In Chapter VIII, I conclude this dissertation with a review of my findings and contributions to both research and practice.

CHAPTER II: LITERATURE REVIEW

INTRODUCTION

The purpose of this chapter is to review the extant literature on entrepreneurship. After defining entrepreneurship as I will refer to it in my studies, I review other entrepreneurship research. I start by reviewing entrepreneurship literature conducted at an individual level of analysis—the so-called “supply side” of entrepreneurship. Next, I examine studies at the population-level of analysis, or the “demand side” of entrepreneurship. Rather than focusing on entrepreneurs themselves, the latter approach shifts attention to entrepreneurial opportunities. This latter approach is also most pertinent to the organization theory literature. I review literature on geographical heterogeneity of entrepreneurship and focus specifically on the role of political environments in creating this heterogeneity. I conclude by highlighting gaps in this literature that I intend to address with this study of the competitive local telephone service industry.

DEFINITION

No work on entrepreneurship, it seems, is complete without mentioning the lack of agreement in defining entrepreneurship. For some, it is simply the creation of a new venture (e.g., Aldrich, 2005; Gartner, 1988; Thornton, 1999). Others insist that it must involve the discovery and exploitation of some innovation that had not previously existed (Shane, 2003; Shane & Venkataraman, 2000), whether those opportunities be disruptive

(Schumpeter, 1934) or incremental (Kirzner, 1973). The former definition fits the popular conception of what an entrepreneur does and is the easier of the two to measure. The latter highlights the importance of the entire entrepreneurial process and makes explicit the fact that entrepreneurs take action in response to opportunities. It also implies that the entrepreneurial process does not always begin with the *absence* of a firm. Certainly *existing* firms can behave in ways similar to new firms that provide the same benefits that we attribute to entrepreneurship (e.g., innovation, job growth, economic development, etc.).

In this dissertation, my approach toward entrepreneurship is more aligned with the latter. I define entrepreneurship as the process of perceiving and attempting to exploit new business opportunities. In both of my studies, my measures of entrepreneurship will be entering a market in a newly created sector. The companies that do so will tend to be very young, and many of the events I examine indeed will involve the founding of a new firm. The behavior of all firms in this dissertation will involve taking risks and trying to exploit new opportunities by offering products and services in which they have a sustainable competitive advantage.

RESEARCH

Individual-Level of Analysis

Over the years, the dominant approach to studying entrepreneurship has been to try to answer questions about entrepreneurs themselves: Why do some people but not others become entrepreneurs? Why are some people better at identifying entrepreneurial opportunities? In this section, I describe two approaches for answering these questions. The first considers the dispositions, or traits, of entrepreneurs that propel them into

entrepreneurship, while the second explores the role that an individual's surrounding context has in fostering entrepreneurial behavior.

Dispositional Approach

Early writers of entrepreneurship described entrepreneurs as being different from everyone else, including others in business. Schumpeter described entrepreneurs as having a “will to compete” and who “delight in ventures” (1934: 93). For Knight, entrepreneurs are those with a “disposition to act” (1921: 269). Even those who argue of the importance of entrepreneurial opportunities note that entrepreneurs utilize intuition to perceive and capitalize upon these opportunities (Kirzner, 1973).

Perhaps it is not surprising, then, that the earliest entrepreneurship research sought to answer the question of “Why do some people become entrepreneurs?” by looking at inherent, individual traits. One of the first efforts, and still one of the most cited works in this tradition, is McClelland's (1961) argument that certain people are motivated to become entrepreneurs because they have a high *need for achievement*.² These individuals, with their high self-expectations and greater risk tolerance, would not be placated by becoming another human cog in a large, industrial firm. In a study of 55 Wesleyan graduates, McClelland (1965) compared their need for achievement scores at the time of graduation with their occupational status approximately 14 years later. He found those in entrepreneurial positions had higher need for achievement scores than

² Because this research is typically cited now only when critiquing the dispositional approach to entrepreneurship, it is ironic that the primary argument of McClelland's monograph is that need for achievement explains national economic development. He supports this by showing that the rate of economic growth between 1925 and 1950 is significantly higher in countries whose children's stories contained more need for achievement themes. He posits his theory about entrepreneurship later only as a middle-range mechanism for the country-level relationship. Though he comes to describe need for achievement as a stable personality characteristic (McClelland, 1965: 392), at least initially he ascribes its individual variation to contextual factors, such as cultural norms, religion, family history, and work history.

those in other positions and concluded, in language appropriate for the era in which he was writing, that high need for achievement “predisposes a young man to seek out an entrepreneurial position in which he can, normally, attain more of the achievement satisfactions he seeks than in other types of positions” (1965: 390). Other motivation-based explanations for entrepreneurial behavior include a need for power (Wainer & Rubin, 1969) and a need for independence (Hisrich & Brush, 1984).

Related to a having a need for achievement is an argument that entrepreneurs have a *greater propensity to take risks* than do non-entrepreneurs. A meta-analysis of 12 studies in this literature from the 1980s and 1990s found that the risk propensity of entrepreneurs is greater than that of managers, and that among entrepreneurs risk propensity is higher for those whose focus is venture creation compared to those concerned with producing family income (Stewart & Roth, 2001).

Part of this greater risk propensity may come from entrepreneurs having an *inflated sense of optimism* about their prospects of success. In a survey of 2,994 entrepreneurs who had recently started their own business, Cooper and colleagues (Cooper, Woo, & Dunkelberg, 1988) found that 81% believed their chances of success were 70% or higher. One-third believed that their chances of success were a perfect 10 out of 10. When asked to predict the chances of success for other, similar firms, respondents were less optimistic. Only 39% predicted a 70% or better chance of success for such other businesses, and 11% were 100% certain of success. Moore, Oesch, and Zietsma (2007) also find that entrepreneurs tend to behave egocentrically. In a multimethod study of actual entrepreneurs, potential entrepreneurs, and experimental

participants, they find that respondents were myopically focused on their own abilities at the expense of potential competitors.

Personality has long been a popular explanation for predicting who becomes an entrepreneur. Zhao and Seibert (2006) recently conducted a meta-analysis of the literature on the relationship between the “Big 5” personality traits and entrepreneurship. Their analysis of 23 studies finds that entrepreneurs, relative to managers, exhibit higher degrees of Conscientiousness and Openness to Experience and lower degrees of Neuroticism and Agreeableness. The authors found no difference between entrepreneurs and managers on their level of Extraversion.

Dispositional researchers continue to explore other psychological explanations for entrepreneurship behavior. A burgeoning area is in *cognition*, with arguments given for topics such as biases and heuristics (Busenitz & Barney, 1997), creativity (Ward, 2004), regulatory focus (Brockner, Higgins, & Low, 2004), and intelligence (Sternberg, 2004). Others dispositional factors recently raised in the literature include *affect* (Baron, 2008) and *psychopathology* (Hisrich, Langan-Fox, & Grant, 2007).

Of course, all these dispositional explanations are subject to the classic nature-nature, person-situation critique. One can never be certain how much of the entrepreneurial behavior is innate, how much is learned, and how much is context-specific. The ultimate test for advancing a dispositional explanation would be to investigate the influence of *genetics*. Research has begun to explore just that. Nicolaou and colleagues (Nicolaou, Shane, Cherkas, Hunkin, & Spector, 2008) compared entrepreneurial activity in 870 pairs of monozygotic twins and 857 pairs of same-sex dizygotic twins in the U.K using quantitative genetics techniques. Using several

operationalizations of entrepreneurship, they find a significantly positive effect of heritability even controlling for typical demographic explanations of entrepreneurship (e.g., gender, age, income, education, marital status, race, and immigrant status). Though this study does not identify the mechanism by which genetics may influence entrepreneurship or the specific genes that matter, it is an interesting first step.

Contextual Approach

Many argue that research on dispositional characteristics falls far short of explaining why some people become entrepreneurs and others do not. Critiques range from the use of cross-sectional studies to neglecting a potential entrepreneur's surroundings (Thornton, 1999). As Aldrich dismissively writes, "Personal traits, taken out of context, simply do not explain very much" (1999: 76).

Thus, a different body literature has accumulated over the years to examine the ways in which a person's context shapes his or her entrepreneurial propensity. Some of this research involves socially-based demographic attributes, such as *religion* (Bonacich, 1973), *marital status* (Evans & Leighton, 1989), *education* (Bates, 1995), *employment status* (Ritsila & Tervo, 2002), and *income* (Amit, Muller, & Cockburn, 1995).

Another set of explanations points to the effect of one's relationships or to life-history characteristics. Research has found that one's *family history* contributes to the likelihood of becoming an entrepreneur. Using archival data from the Wisconsin Longitudinal Study, Halaby (2003) finds that higher levels of parental education, occupational status, and income in addition to self-employment all lead to a preference for entrepreneurial, as opposed to bureaucratic, jobs. This is consistent with evidence

that children whose parents are self-employed are themselves more likely to become self-employed (Aldrich, Renzulli, & Langton, 1998).

Research on *work history* also provides an explanation for why certain individuals become entrepreneurs. In their research on social mobility, Lipset and Bendix (1959) note that entrepreneurs, relative to other occupational groups, tend to have a more heterogeneous occupational experience. Experience as an entrepreneur, too, suggests that entrepreneurship itself is a self-reinforcing process. Carroll and Mosakowski (1987) analyze survey responses of 2,172 West German respondents and find that the probability of becoming self-employed is much higher for those with *previous self-employment experience*.

Just as the type of work one has done can contribute to entrepreneurial propensity, so, too, can *where* one has worked. *Work environment* can influence the entrepreneurial spirit of employees in a number of ways. Dobrev and Barnett (2005) studied the career histories of 2,692 alumni of a prestigious U.S. business school and discovered that the probability of becoming an entrepreneur decreases as one's current organization ages and grows larger. Dobrev and Barnett argue that the routinization of old, large firms effectively constrains the innovative behavior of individuals. Sørensen (2007) supports this finding of bureaucracy's effect on entrepreneurship. Additionally, his data on the Danish labor market enables him to examine and dismiss a possible self-selection bias by nascent entrepreneurs into small firms. Having entrepreneurial role models at work also matters. In a study of over 6,000 university biotechnology scientists, Stuart and Ding (2006) find that scientists were more likely to become entrepreneurs as more of their colleagues and co-authors transitioned to commercial science—particularly when those

colleagues and co-authors were prestigious scientists who were well-connected to industry. The actions of others thus gave legitimacy to the act of leaving academia for the for-profit world.

If information is a key ingredient for finding entrepreneurial opportunities (Shane & Eckhardt, 2003), one's network position plays a crucial role in this process (Burt, 1992). *Social networks* play a significant, if not dominant (Aldrich & Zimmer, 1986), role in determining who becomes an entrepreneur and with what success. Networks contribute to this process via the content that is exchanged between actors, the governance mechanisms such relationships yield, and an entrepreneur's positioning within the network structure (for a review, see Hoang & Antoncic, 2003). As "network" has come to be used as much as a verb as a noun, calls have come to revisit the endogeneity problem within network research (Stuart & Sorenson, 2007). Network ties are not created at random. Social actors, including entrepreneurs, most often choose their partners and do so strategically. Future research may turn the focus towards how entrepreneurs build their networks (Aldrich & Kim, 2007).

Population-Level of Analysis

Up until now, the literature reviewed has been a response to the question, "Why do certain people become entrepreneurs?" To many, the contextual approach improves upon the dispositional approach because it makes more explicit the fact that individuals operate within dynamic situations. Yet a contextual approach has an additional benefit. Context creates not just the *impetus* for becoming an entrepreneur, but also the *opportunity* to do so. By shifting research attention up a level of analysis, from the individual to the population, one can examine how context creates or destroys

entrepreneurial opportunities. Many entrepreneurship scholars would argue that this approach is even preferable to individual-level research (Gartner, 1988; Thornton, 1999).

In the organization theory literature, the tradition of examining entrepreneurial opportunities at a population-level of analysis is most often traced back to the path-breaking 1965 essay by Stinchcombe (1965). Stinchcombe articulated a host of ways in which general social processes (e.g., changes in technology, political upheavals, etc.) influence organizational behavior, including conditions under which we should see the founding of new organizations.

Building from Stinchcombe's insights and those of the human ecology literature (Hawley, 1950), population ecology arose to argue for a selection-based approach to understanding organizations. Population ecology's stated purpose was to answer the question "Why are there so many kinds of organizations?" through explanations of environmental selection, not organizational adaptation (Hannan & Freeman, 1977). In doing so, population ecologists became one of the first schools of organizational thought to focus almost exclusively on the organizational environment.

Although population ecology never explicitly focused on entrepreneurship, research in this domain contributes to entrepreneurship research for two important reasons. First, ecologists believe it is important to study all firms. In response to the tendency of organizational research to focus on large, industrial firms, they argued that firm behavior, including likelihood of survival, depends on size. By definition, analysis of all firms includes those just started. Second, their object of study is firm vital rates—both firm foundings and firm failures. Firm failures can be studied at a firm-level of analysis because researchers know all firms are that are at risk of failing. The same is not

true of foundings. To study when and why firms appear, one must take a higher-level approach and consider the founding of an organization as a property of the population to which it is added. In the language of entrepreneurship, an ecological approach to firm creation is one focused on entrepreneurial *opportunities*.

Two major theories developed to explain population dynamics, including the founding of new organizations and thus of entrepreneurial opportunities. The first is *resource partitioning theory* (Carroll, 1985). Resource partitioning theory differentiates between two types of firms: generalists (those that target mainstream segments at the core of the population) and specialists (those focused on individual, small segments on the periphery of the population). The premise of the theory is that as an industry matures, it becomes more concentrated as generalists grow. Competition among generalists leads to the failure of some generalists and the opening of some resource space—and entrepreneurial opportunities—for specialists. Later versions of the theory explained the phenomenon more in terms of an identity-based mechanism (Carroll & Swaminathan, 2000).

The second dominant ecological theory for explaining entrepreneurial opportunities is *density dependence theory*. Ecologists argue that a population's vital rates are related to the size of the population by two processes: legitimation and competition (Carroll & Hannan, 1989). When an industry is in its nascent state, more firms within it provide the industry with greater legitimacy. Increased legitimacy, in turn, attracts even more firms and the industry grows. A point is eventually reached, however, when too many firms have entered the industry than can be supported by existing resources. Competition for resources leads to the failure of some firms and discourages

new firms from entering the industry. Firm founding rate, then, follows a \cap -shaped relationship with the size, or density, of the population.

In their basic state, both theories are compelling and general—two qualities of good theories. Yet they are limited by only being able to consider the ecological environment (that is, properties of the population itself) and only focusing on a single population. These limitations were soon addressed by revisiting Stinchcombe's (1965) arguments for the influence of social factors and observing variation in social factors across time and space. Arguably the most heavily researched subarea in relation to entrepreneurial opportunities is geographical heterogeneity: comparing firm founding rates across regions. It is within this literature that I will focus my attention next.

Geographic Heterogeneity

Just as the observation that entrepreneurs appear to be different from non-entrepreneurs led researchers to ask, “Why do certain people become entrepreneurs?”, seeing geographical variation in where and when businesses are started led to a different question: “Why does entrepreneurship occurs more often in some areas than in other areas?” One immediate explanation is that such variation is due to the location of physical resources. For instance, within the energy industry oil companies are based in Texas and Oklahoma and ethanol plants in Iowa and Nebraska because that is where one typically finds raw materials for each. Other reasons given for why entrepreneurs are likely to choose one place over another for starting their business include the advantage of locating near customers (Smithies, 1941), near transportation and communication routes (Chandler, 1977; Weber, 1929), or in areas of economic wealth (Grant, 1996;

Mezias & Mezias, 2000; Reynolds, 1994) stability (McMillan & Woodruff, 2002), or capital availability (Dobbin & Dowd, 1997).

Other explanations point not to anything about the area by itself but about what the area *becomes* due to its industrial activity. Economists have traditionally argued that industrial growth is a self-reinforcing process because industrial concentration creates externalities that lead to industrial agglomeration, or clustering. Agglomeration theory suggests that such externalities include a pooled market for labor, which increases labor specialization and controls costs; the production of nontradable specialized inputs; and increased information flows among firms (i.e., knowledge spillovers) (Hoover, 1948; Krugman, 1991).

While the phenomenon of agglomeration remains present across many different industries, a number of studies have pointed to different mechanisms for the persistence of industrial clustering and have challenged the argument that such clustering is due to the economic benefits of positive externalities. Saxenian, for instance, argues that more than the mere presence of similar firms determines whether positive externalities develop. In her rich comparative study of Silicon Valley in California and Route 128 in Massachusetts, Saxenian (1994) finds that despite similar technologies and histories, Silicon Valley thrived while Route 128 experienced a continual decline. Silicon Valley's regional advantage over Route 128 was its industrial structure (network-based and interconnected versus isolated and independent) and structure of its firms (decentralized and open versus hierarchical and closed).

Similar to agglomeration theory, Sorenson and Audia, in their study of the U.S. footwear production industry between 1940 and 1989, also find that “new foundings tend

to reify the existing geographic distribution of production” (2000: 424). They argue, though, that rather than being attracted by a densely-populated region’s economies of scale, entrepreneurs are drawn to them because those regions have role models from whom they can acquire tacit knowledge and access to social ties. To support this claim, Sorenson and Audia show that states with high local densities had higher founding rates but also higher mortality rates—a condition that should not occur if the traditional economic explanation for industrial clustering were true.

The presence and population dynamics of third-party firms can also contribute to the waxing and waning of entrepreneurial opportunities across geographic spaces. Stuart and Sorenson (2003) find that in addition to the presence of other similar firms, geographical proximity to financing (in this particular case, venture capital firms) contributes to geographical heterogeneity in founding rates of biotech firms. The same can be true even for firms outside one’s own industry. Audia and colleagues (Audia, Freeman, & Reynolds, 2006) analyzed the instruments manufacturing sector between 1976 and 1988 and showed that the founding rate of instruments manufacturers increased in labor market areas in proportion to the densities of firms with which they had symbiotic (doing business with) and commensalistic (similar to; using the same kind of resources) relationships.

Collectively, these studies add a great deal to our understanding of where entrepreneurial opportunities come from and of the entrepreneurship process in its entirety. Going back to the agriculture metaphor for entrepreneurship from the introductory chapter, each demonstrates how regional differences in soil (e.g., labor,

information, financing, social capital, etc.) can yield different rates of growth for the seeds of entrepreneurship.

Yet other aspects of a region can alter the fertility of its entrepreneurial soil, too. One such aspect that I have yet to consider is its political environment. Quite often this is a taken-for-granted aspect of entrepreneurship. Perhaps due to greater media attention or to their inherently greater ‘sex appeal’, knowledge spillovers and venture capital are ‘hot’; property rights and taxes are not. Yet the political environment creates the rules of the game by which entrepreneurs must operate and can constitute significant barriers to entry. I believe that this is particularly true in the case of a deregulated industry where the old world of monopoly and the new world of competition are colliding.

In the following section, I will review a number of studies in the organization literature on the relationship between a region’s political environment and its entrepreneurial life chances. I will then point out the gaps in this literature and state my argument for why it is important that these gaps are studied.

The Political Environment and Entrepreneurship

Despite classic essays on the importance of considering how political environments shape organizational behavior and population dynamics, our knowledge of this subject remains limited. Stinchcombe (1965), as mentioned before, suggested that changes in a country’s political environment can affect its citizens’ motivations to start new organizations and the likelihood that such organizations will survive. Carroll and colleagues (Carroll, Delacroix, & Goodstein, 1988) considered a wide range of political activity (turmoil and revolution, war, institutional structure, and regulation) and developed propositions for their effect on the structure and dynamics of a population.

Most research in the organizational literature that follows in this tradition focuses on the impact of policy (Lindberg, Campbell, & Hollingsworth, 1991; Roy, 1997). For instance, governments may create tax incentives to entrepreneurs. Swaminathan (1995) studied the rise of farm wineries in the U.S. between 1941 and 1990 and found that many states passed laws intended to help farm wineries compete with larger firms. A large portion of the support in these laws came in the form of tax benefits. Swaminathan's analysis showed that founding rates were indeed higher in states where such laws were present. General marginal tax rates, too, have an effect on entrepreneurs; the higher the tax rate, the lower the rate of entrepreneurial entry (Blau, 1987; Gentry & Hubbard, 2000).

Policy can also be in the form of making resources available to entrepreneurs that enable them to start and expand their businesses. In Dobbin and Dowd's (1997) study of the development of the railroad industry in Massachusetts from the early 19th century to the early 20th century, the authors show that public capitalization policy had a significant impact on the number of new railroad firms founded. In the era when public funds in the form of bonds, land grants, and loans were made available to enterprising railroaders, founding rates soared. After railroad finance scandals saw Massachusetts and other states dramatically reduce the availability of public funds starting in the early 1870s, founding rates plummeted.

Research has pointed to the role that policy plays in constraining the behavior of firms. This is especially true in competition between incumbents and competitors in regulated sectors where often the constraints are differentially applied. One example of this is from the first era of competitive local telephony around the turn of the 20th century.

As a networked industry, telephone companies should benefit from the positive network externalities of large network size. When a company such as Pittsburgh & Allegheny Telephone Company came to serve most of the Pittsburgh market, it seemed only natural that the company would grow to serve the rest of the market and effectively suppress the opportunities for others to start telephone companies in the area. Yet this was not the case. Pittsburgh was eventually served by 11 different companies. Barnett and Carroll (1993) state that such outcomes were not uncommon. They argue that the behavior of incumbent firms was constrained by local political boundaries. Local governments were the primary regulator of telephone companies at this time and did so by requiring companies to purchase charters that determined their rates, rights-of-way, and acquisition behavior. The more local governments there were in an area, the more fragmented a company's territory was likely to become, and the better was an entrepreneur's chance to enter.

Sometimes, it is not just what a political environment does for or to the organizations within a population that affects the population's founding rate. Especially in economically and politically stable societies, actors within a political environment are able to provide legitimacy to a population. Heightened legitimacy, in turn, raises awareness of an industry and makes it easier to obtain resources (Aldrich & Fiol, 1994). For instance, Baum and Oliver (1992) reported that the founding rate of Toronto-area day care centers had a curvilinear relationship with the population's relational density, which they measure as ties to government and community institutions. At least up to a certain point, the more service agreements with the provincial government and the more site-

sharing arrangements with community organizations (e.g., churches, public schools, etc.) collectively held within the population, the more day care centers were founded.

What makes political environments such a rich, but difficult, domain to study are the multiple layers of government found in many countries. Within a federal system like the U.S., for example, one commonly witnesses interactions within levels of analysis (state vs. state) and between levels of analysis (state vs. federal). Organization researchers have begun to explore the consequences that multiple political environments have on entrepreneurship. Consider, for example, the effect of prohibition on the brewing industry. Most U.S. citizens are aware of this country's national Prohibition Era. From the passage of the 18th Amendment in 1920 until it was repealed by the 21st Amendment in 1933, manufacturing, selling, and transporting alcohol was illegal throughout the United States. Prior to this, though, the decision on whether to ban alcohol was left to the states. As Wade, Swaminathan, and Saxon (1998) document, over 30 states passed prohibition laws between 1845 and the 18th Amendment. In addition to the variation in which states passed such laws, states also varied according when they passed them and for how long the law was in effect (several states experienced multiple episodes of prohibition). This variation had a substantial impact on the life chances of breweries. Not surprisingly, when a state passed prohibition legislation, its industry was effectively shuttered. Yet prohibition in one state led to entrepreneurial opportunities for would-be brewers in surrounding, wet states; founding rates in such adjacent states grew. Prohibition policy may have been able to control supply, but it had a much smaller effect on demand.

Russo (2001) provides an excellent example of how federal and state levels of policy can combine to create opportunities for entrepreneurs that vary geographically. In response to the energy crisis plaguing the U.S. in the 1970s, Congress passed a new federal energy bill that included the Public Utilities Regulatory Policies Act of 1978 (PURPA). Included in PURPA was an attempt to reduce the U.S.'s dependence on foreign oil by requiring electric utilities, which had previously held regional monopolies over both the production and distribution of electricity, to purchase power from private producers. Legislators thought that the private producers would be large industrial plants that already had the capabilities to generate electricity as a by-product of their production process. Yet the law also created an opportunity for entrepreneurs to build new power plants whose sole purpose would be to produce electricity and sell it to utilities. Thus was born at the national level the independent power production industry. PURPA mandated that utilities buy or exchange power with private producers at the “avoided costs of generation”—that is, the costs that utilities avoided by not producing the power themselves. Electric utilities remained regulated by states, so it was left to them to set these costs and other terms of the exchange. States that formally defined avoided costs and clearly defined the terms of exchange between the utilities and the independent power producers experienced higher founding rates of independent producers. Furthermore, states whose regulatory commissions had an accommodative relationship with their utilities experienced lower founding rates of independent producers. So while the *potential* entrepreneurial opportunities were the same across states, the *effective* entrepreneurial opportunities varied by state.

In a study of the same industry, Sine and colleagues (Sine et al., 2005) also find state-level variation in the founding rate of independent power producers as well as in the heterogeneity of the technologies producers used. Among their findings, the authors show that greater financial support from the state and federal court rulings that upheld legislation favorable to private producers of power each led to increased founding rates of independent power producers. In particular, founding rates were higher for producers using novel, and thus “riskier,” production technology.

Collectively, these studies raise our knowledge that governments influence entrepreneurial behavior in ways that well exceed the fundamentals of property rights and taxes. They also explore the mechanisms by which they do so. Governments raise and lower barriers to entry, provide financial resources, define market boundaries, and legitimate an industry or a subset of firms within an industry. When interactions occur between different governments either within or across levels, the results can become quite unpredictable.

Yet there remains much that we still do not know. As I stated in the introductory chapter, little attention is paid to the government officials that create and implement these policies, and even less attention is given to the notion that policies are applied with respect to the conditions that were already in place—conditions that could influence the speed and manner in which the new policy is enacted. That is, despite an accrual of knowledge on the effects of *policy*, we are missing a sense of the effects of *politics*—both the process by which policy evolves as well as the actual leadership and control of the state. In the chapters ahead, I will address these areas by considering the effect that

political ideology, legacy policy, and government official turnover had on the development of the competitive local telephone service industry.

I start this process in the next chapter, in which I trace the history of the local telephone service industry from the days of Alexander Graham Bell to the present. I pay special attention to the role played by state governments. My goal is to illustrate why any examination of federal deregulation of the local telephone service industry in 1996 that does not consider state government activity both before and after 1996 is incomplete.

CHAPTER III: THE LOCAL TELEPHONE SERVICE INDUSTRY

INTRODUCTION

Because understanding present-day issues of the local telephone service industry involves some knowledge of its past, I will briefly recount the history of the industry and the regulation thereof.³ Specifically, I will focus on the role of state regulators and why attention on the states is crucial for understanding how entrepreneurs and competition arose in response to deregulation. This overview provides the contextual background upon which my theory and hypotheses in the following chapter are based.

INDUSTRY HISTORY

The telephony industry dates to 1876 when Alexander Graham Bell was awarded the patent for a device that would become known as the telephone. The Bell Telephone Company, soon to emerge as American Telephone & Telegraph Company (AT&T), held a patent monopoly over the U.S. telephone system until 1894. During this time AT&T expanded vertically by constructing a long distance network (AT&T Long Lines) and acquiring the telephone equipment manufacturer Western Electric. When patents for the transmitter and receiver expired, competitors rushed to fill voids in the Bell system's coverage. Over 3,000 independent telephone companies were in operation by 1902 (Brock, 1981).

³ For more detailed histories of local telephone service competition, please see (Woroch, 2002) or (Vogelsang & Mitchell, 1997). For an account of how the telephone industry developed with respect to other forms of communications, please see (Brock, 1981).

Though competition led to increased availability and lower prices, several problems emerged. First, wherever an independent company and Bell competed directly, they did so with two separate telephone systems. Users of one system could not call users of the other system. The inefficiencies of this dual system fit the type of market failure that economists' term a "natural monopoly." Second, because AT&T owned the only long distance network in the U.S., the independents were dependent upon their competitor. The fact that AT&T was controlled at this time by J.P. Morgan and George F. Baker, dominant U.S. financiers of this era, effectively prevented the independents from constructing their own long distance network (Brooks, 1976; Gabel, 1969). Third, with the power of the vertically-integrated AT&T behind it, Bell used predatory pricing and growth-by-acquisition strategies to drive away competitors.

The solution to these problems was regulation. Local municipalities were the first to regulate the industry, with states emerging as the primary regulating force in 1907. As state efforts increased, the federal government threatened anti-trust action over AT&T's abuse of its long distance and equipment holdings. Shortly thereafter, AT&T began to advocate on its own to be regulated. AT&T executives did so in order to eliminate anti-trust issues but also to eliminate the threat of competition. AT&T saw regulation as a means to earn guaranteed, stable profits. This goal was achieved with the signing of the Kingsbury Commitment in 1913 and then again with the 1934 Communications Act, which created the Federal Communications Commission (FCC). For the next several decades, AT&T remained *the* phone company for much of the U.S. A series of lawsuits and rulings by the FCC in the 1950s through 1970s opened the equipment and long

distance industries to competition, but local service remained a regulated monopoly. Two landmark events changed this.

The first major shakeup to the local telephone service industry came in 1984. As a provision to the settlement of an anti-trust lawsuit filed by the Department of Justice, AT&T agreed to divest its local telephone companies. AT&T's 22 Bell Operating Companies were grouped into 7 newly created holding companies: Pacific Telesis, US West, Southwestern Bell, Ameritech, BellSouth, Bell Atlantic, and NYNEX. Together, these companies were called the Regional Bell Operating Companies (RBOCs), or more colloquially, "Baby Bells." (See Figure 1 for a map of the original RBOC configuration.) Upon divestiture, local telephone service remained conceptualized by the architects of the settlement as well as by most of the country as a natural monopoly requiring strict regulation.

Figure 1. Original configuration of the Regional Bell Operating Companies (1984)



A second shakeup of the industry occurred just 12 years later and reflects the transformation that had developed in conceptualizing this industry. The purpose of the federal Telecommunications Act of 1996 was to promote competition in every telecommunications sector. Specifically for the local telephone service industry, this meant an end to regulated monopoly power for the 7 RBOCs and over 1,400 other local service providers; for the first time in almost 100 years, they would have competition. The Act set forth broad parameters for how new entrants, called competitive local exchange carriers (CLECs), could compete with the incumbent local exchange carriers (ILECs). Certain conditions were crucial for determining how each CLEC would operate its business. ILECs had to interconnect with CLECs' networks, sell their services to CLECs at state-regulated wholesale prices, and unbundle their networks into piecemeal elements available to CLECs at state-regulated prices. This led to 3 types of CLECs: those that owned their own network (*facilities-based*), those that resold ILEC services under their own brand (*resellers*), and those that owned parts of their own networks (e.g., switching equipment) and leased other elements (e.g., the local loop into a home or business) from the ILEC (*hybrid*).

Reaction to the telecom act was swift. Entrepreneurs and investors alike rushed in trying to secure even a sliver of the \$100 billion market. Hundreds of new companies offering local service were founded almost immediately and raised billions of dollars in capital. Yet as the stock market fell in early 2000, so too did the hopes of those running and investing in the CLECs. By the end of 2002, scores of CLECs filed for bankruptcy, were acquired, or shut down altogether (Crandall, 2005). Entrepreneurial interest waned

at this point, though the industry has survived and has shown signs of renewal as CLECs collectively comprise nearly 20% of the local telephone service market (FCC, 2006).

This is where most accounts of the industry stop. Yet I contend that a true understanding of the transition of the industry requires knowing the role played by state regulators and legislators. More than anything else, I believe that it was their actions that led the industry to be deregulated at the federal level and that have shaped the patterns of entry and expansion exhibited since.

THE ROLE OF THE STATE

As mentioned previously, states began regulating the industry in earnest in 1907, and by 1914 over 75% did so to some degree. Variation emerged across four major forms of regulation (Cohen, 1992). States (1) controlled the prices that providers could charge subscribers; (2) mandated interconnection between the Bell system and the independents; (3) adopted anti-discrimination policies so that all who could afford service would have equal opportunity to receive it (i.e., providers could not focus exclusively on the customers they deemed most profitable); and (4) established separate regulatory commissions, usually called public utility commissions (PUCs), to oversee these functions.

The original federal regulation was considered to be very weak, and states maintained their previous positions. This changed when the U.S. Congress passed the Communications Act of 1934. This act pre-empted state policy and left states with few responsibilities aside from setting local rates and determining standards for service quality. The principles of universal service and the telephone system as a public good led states to set rates higher for businesses rather than for residential consumers and for urban

rather than for rural areas, as well as to raise long distance prices in order to subsidize local rates (Cohen, 1992).

The break-up of AT&T marked a rebirth for the role of state regulators. With intrastate and interstate services no longer dominated by a single company, states were once again granted much more autonomy and control over regulating local service.

In chronicling the post-1984 regulatory histories of each state, Abel and Clements (1998) describe nine different levels of regulation used by states, ranging from traditional ratebase rate-of-return to full deregulation. Many studies of state regulation of telecommunications during this era simplify this typology into 2 classes: traditional rate-of-return regulation and incentive regulation (e.g., Ai & Sappington, 2002; Donald & Sappington, 1995; Sappington & Weisman, 1996). Ratebase rate-of-return regulation is the most traditional form of regulating utilities. Regulators set a utility's prices at a level that will cover the utility's costs plus an amount commensurate with a fair return on the utility's investments. (For this reason, traditional rate-of-return regulation is sometimes referred to as "cost-plus regulation.") Traditional rate-of-return regulation therefore all but guarantees a fixed return for the utility based on its costs. There is virtually no incentive to the utility for lowering its costs and little incentive to develop new products. To address these shortcomings, regulators introduced incentive-based regulation. Through earnings sharing programs, price caps, and pricing flexibility, regulators tried to encourage providers to lower costs, improve quality, and introduce new services.

Following the AT&T divestiture, states were quick to shift away from traditional ratebase rate-of-return regulation. Figure 2 and Figure 3 displays this trend among states in the continental U.S. Iowa was the first state to use a different type of regulation and

did so right away in 1984. Seven more states followed in each of 1985 and 1986. By 1987, when 12 more states abandoned the traditional form of regulation, more than half the country had done so. In 1996, New Hampshire, North Carolina, and Wyoming became the final three states to leave behind traditional ratebase rate-of-return regulation.

Figure 2. Cumulative number of states that had stopped using traditional ratebase rate-of-return regulation for the local telephone service industry, 1984-1996

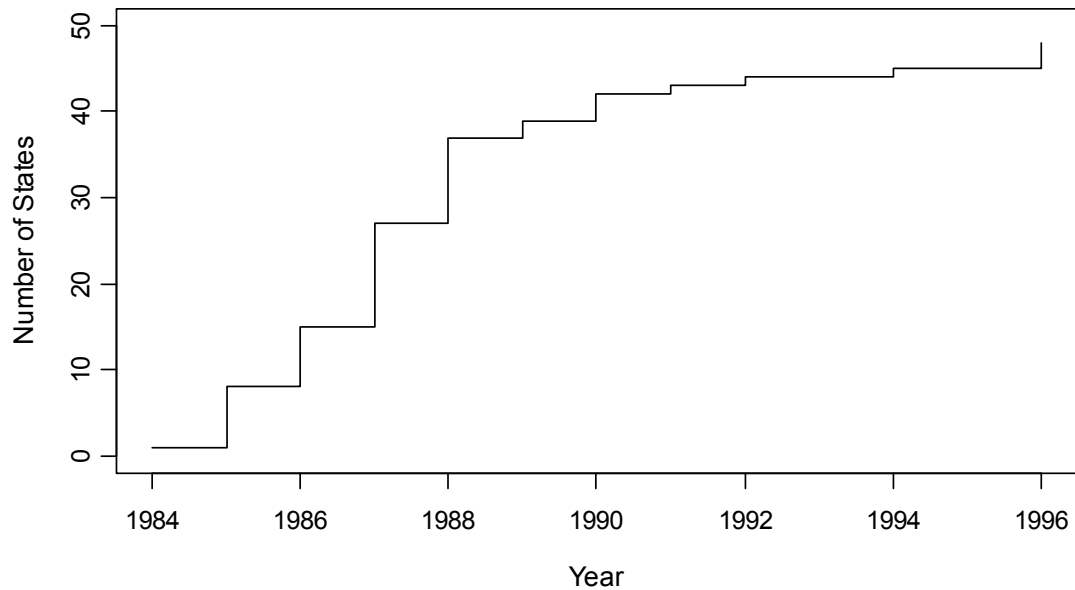
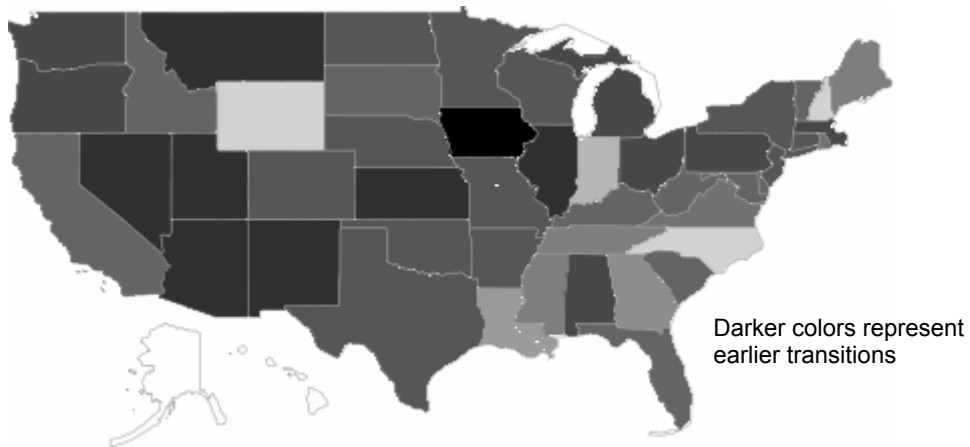


Figure 3. Cartographical representation of when states moved away from traditional ratebase rate-of-return regulation of the local telephone service industry, 1984-1996



But leaving traditional ratebase rate-of-return regulation did not mean that a state immediately began employing a full-blown incentive structure. States sometimes took mere “baby steps” toward incentive-based regulation. For instance, some states switched to “banded rate-of-return regulation.” Rather than set one specific earnings target for a utility, the commission would set prices to fall within a range (or band) of earnings. The narrower the range, the more this regulation operated just like traditional ratebase rate-of-return (Abel & Clements, 1998). For the purposes of this dissertation, I consider a state’s regulation to be incentive-based if it is accompanied by a noticeable shift away from the rate-of-return framework of regulators setting utility prices to correspond with target utility earnings. This includes indexed price caps (commission sets a maximum price that utilities can charge), rate freezes (agreements by the commission to not adjust prices for a specified period of time; formalized “regulatory lag”), pricing flexibility for competitive services (commission greatly relaxes its regulation for aspects of a utility’s service if sufficient competition for such services is present), or full deregulation. (See Abel & Clements, 1998; Sappington & Weisman, 1996 for more details.)

Together, Figure 4 and Figure 5 provide an illustration of how incentive-based regulation had spread and was being practiced when the federal Telecommunications Act was passed in 1996. Figure 4 shows that 22 of the 48 continental United States were still using a variant of traditional rate-of-return regulation in 1996. Figure 5 shows that 28 of the 48 continental United States had some experience with incentive-based regulation as well as how much experience each state had. On average, states in 1996 had 2.19 years of experience with incentive-based regulation ($\sigma^2 = 7.65$). Because some states had experimented with incentive-based regulation before switching back to rate-of-return

regulation before 1996, the two maps are not complementary. For example, Arkansas (2 years), Washington (5 years) and Vermont (6 years) each used incentive-based regulation after 1984 but had reverted back to a variant of rate-of-return regulation by 1996.

Figure 4. Type of local telephone regulation used by states in 1996

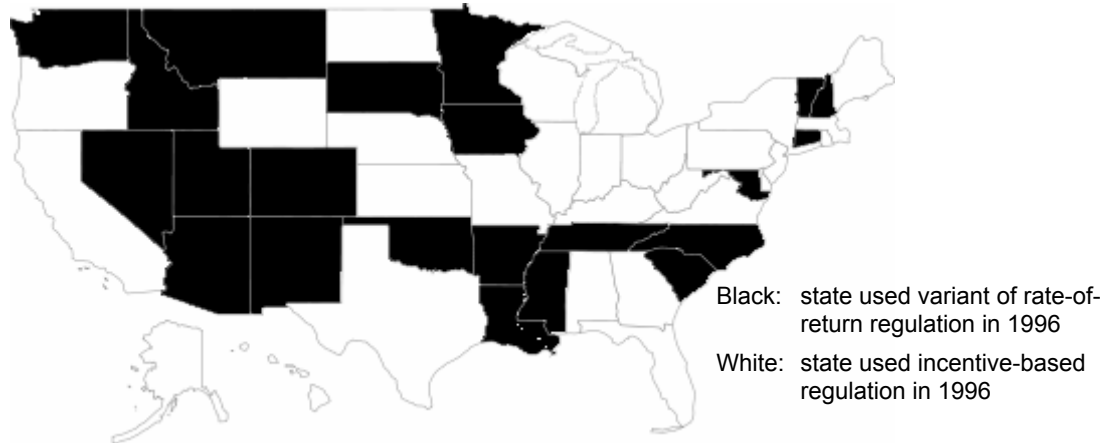
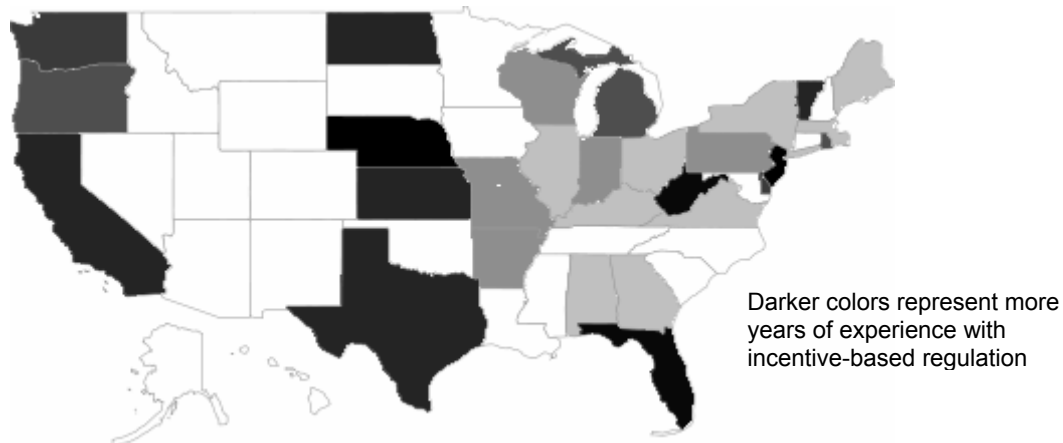


Figure 5. State experience with incentive-based regulation as of 1996



The federal 1996 Telecommunications Act once again pre-empted individual state policy, but unlike the period between 1934 and 1984, states continued to wield substantial influence on the local service industry. States had responsibility for setting parameters of the federal act and for its implementation. They licensed new providers, set retail and wholesale rates, determined the prices CLECs would pay to lease unbundled elements of the ILECs' networks, and mediated disputes between CLECs and ILECs.

Since 1996, states have varied substantially along almost each of these dimensions (Perez-Chavolla, 2007).

States, therefore, have played and continue to play a large role in the development of the competitive local telephony sector. That alone is at odds with the typical impression of deregulation. But how easy was that transition from regulation to deregulation? After all, enacting policy is like following the directions for ready-to-assemble furniture ... when the directions are written in a foreign language, the parts are not labeled, and the only way to know if it has been assembled correctly is if a directions judge rules that it is correct or if nobody complains about what has been done.

On top of this is the fact that the state actors tasked with enacting such policy, to again draw from Vogel, “do not interpret or arbitrate in a neutral fashion. They bring to this role specific ideological biases and institutional capabilities” (Vogel, 1996: 268). The people responsible for this transition—state commissioners and the regulatory staff—were, for the more part, enculturated in the monopoly era. Either their mental models of the local telephony industry had to change, or the people themselves had to be replaced with those not locked into seeing the industry through lenses of monopoly.

Therefore, could the transition from monopoly to competition have been easier for those states whose officials embraced market solutions? Was a state’s experience with incentive-based regulation prior to 1996 helpful in creating the policies, procedures, and overall culture that would encourage potential entrepreneurs to start CLECs in the state? Or were new state actors who were unencumbered by the mental schemas of monopoly regulation the necessary catalysts for CLEC industry growth? In the next chapter, I will explore each of these questions, as well as other aspects of a state’s political environment,

as I develop my theory for how state-level political environments influenced the rate at which the CLEC industry developed across states.

CHAPTER IV: THEORY AND HYPOTHESES

INTRODUCTION

In this chapter, I develop my theory and hypotheses regarding the growth of the competitive local telephone service industry. I examine growth at two different levels of analysis: the state-level and the firm-level. At the state-level of analysis, I consider aspects of a state's political environment—its political ideology and regulatory history as well as changes within its government officials—that theory suggests would make the state more attractive or less attractive to potential CLEC entrants. The same is true for the firm-level of analysis, where I examine certain characteristics of a state's political environment—again, its political ideology, regulatory history, and political regime stability as well as which incumbent local carrier it is served by—that make the state a desirable expansion target for an existing CLEC. Due to the high degree of overlap between the predictors in my studies, I choose to develop hypotheses for both levels in this chapter. This simultaneous look at state-level founding rates and firm-level growth rates is consistent with what Carroll and Hannan have noted: “Any process that makes it easier for entrepreneurs to mobilize resources ought also to make it easier for existing organizations to grow” (2000: 218).

Yet theorizing about foundings and expansions is not as simple as stating that each desirable characteristic of a state's political environment should yield higher founding rates and a higher likelihood that CLECs will expand into the state. The two

analyses have a subtle but fundamental difference in the set of firms known to be at risk of market entry. At the state-level, the set of CLECs making a decision to enter the state are unknown. Foundings, therefore, become properties of the population, the unit of analysis becomes the state, and variance in founding rates must be explained by properties of the population of CLECs or the state environment. At the firm-level, the analysis is different. When investigating the states into which a CLEC expands its service, it implies that the firm has already begun operations. This limits the risk set of entry to only those firms that are already in existence, and firm-level predictors can be added to the model. Doing so allows a researcher to conduct a more refined and organization-specific analysis of why firms choose to expand into certain states but not others. While there may be something about a state per se that makes it attractive to CLECs, it may instead be something about the firm *with respect to* a state that makes that state an attractive expansion target.

To facilitate comprehension, I will now outline the structure this chapter:

- First, I will discuss state political ideology and present my theory for how I believe the ideology of a state's elected officials and citizens will be related to state-level founding rates of CLECs.
- Next, I will introduce a concept I call the institutional endowment of a state, which in this case refers to a state's regulatory history of the local telephone industry. I theorize about the relationship between a state's institutional endowment and its founding rates.
- Following this, I develop my first hypotheses at the firm-level. Using the previous concepts, I argue that CLECs will be more likely to expand into states

whose political ideology and institutional endowment is similar to that of its founding state. The basis of my argument is Stinchcombe's imprinting hypothesis (1965).

- Next, I continue theorizing at the firm-level by discussing a concept that is unique to that perspective of growth. The breakup of AT&T in 1984 structured the local telephone service industry such that residents and businesses within each state were served by one of seven dominant incumbent providers. Even though deregulation did away with geographical restrictions on where local carriers could offer service, I hypothesize about how this "legacy policy" may have shaped CLEC expansion decisions due to where a CLEC initially began offering service.
- I then consider how changes in the government officials that oversee the local telephone service industry and changes in the gubernatorial office can affect market entry decisions at both levels of analysis.
- The last topic I consider is how the effects discussed above may diminish over time as the industry gained legitimacy.

Hypotheses that are related to the state-level analysis conducted in Chapter V are prefixed with "H1.". Firm-level hypotheses, analyzed in Chapter VI are prefixed with "H2.".

POLITICAL IDEOLOGY

An ideology is "is a set of beliefs about how the social world operates, including ideas about what outcomes are desirable and how they best can be achieved" (Simons & Ingram, 1997: 784). Ideologies ultimately yield specific actions (Apter, 1964: 17). A political ideology, then, is a coherent set of beliefs about the functioning of a society and

the role of government. With respect to the domain of business, one's political ideology typically refers to whether one believes that market forces or government actors are the most efficient distributors of goods and services.

Organization researchers have demonstrated a number of ways that political ideology shapes organizational behavior. With few exceptions, such studies involve ideologies held by the organization and its members. The most overt examples are those organizations created with the express purpose of promoting a political ideology and enacting political and social change, such as political parties and social movement organizations. Political ideologies have been shown to have effects on the design and functioning of individual organizations, such as the level of bureaucracy, or as Rothschild-Whitt (1979) documents in her research on collectivist organizations, the lack thereof. At the population-level, researchers have examined the ecology of ideologically-driven organizations as it pertains to changes in organization form (Simons & Ingram, 1997), founding rates (Simons & Ingram, 2003), competition (Barnett & Woywode, 2004), and mutualism (Ingram & Simons, 2000).

My interest lies not in the political ideologies held by the organizations themselves whose behavior is being studied but in the political ideologies of other actors in their field. One example of this is how the political ideology of Progressivism influenced the founding rate of thrifts in California in the early 20th century (Haveman, Rao, & Paruchuri, 2007). Initially thrifts had been established as mutual organizations of "friendly cooperation among neighbors." By the end of the 1920s, the thrift industry in California became dominated instead by thrifts that looked like "bureaucratized cooperation among strangers." Haveman, Rao, and Paruchuri argue that this

transformation was caused by the echoes of the Progressive movement and its ideology of bureaucracy with centralized power. In California, the extent to which Progressivism ideals were supported varied greatly across regions. Counties in which the ideals of this movement had become entrenched, as reflected by whether any municipalities within the county had adopted a city-manager form of government, saw an increase in the founding rate of this new bureaucratized form of thrifts.

For competitive local telephony, I theorize a similar relationship between the political ideology of a state's elected government officials and citizens and the founding rate of CLECs within the state. The 1996 Telecommunications Act was passed because federal legislators believed that even regulated competition was preferable to a monopoly. But because the federal act required state implementation and oversight, the extent to which a state's officials embraced the ideals of such competition should contribute to whether regulators set parameters that would encourage new entrants, keep incumbents from anti-competitive practices, and promote the industry to would-be entrepreneurs. The political ideology of a state's citizens should also contribute to the development of the CLEC industry. As an electorate, citizens would be more likely to push their officials for more competition, and as consumers, they would be more aware of and more attentive to competitive services.

Federal deregulation may suggest a degree of nationwide agreement in the appropriateness of transforming the local telephone industry from monopoly to markets. Yet as with any political process, the passage of the telecom act in no way constitutes uniform agreement over its goals or processes. One of the distinguishing characteristics of the United States is that individual states exhibit widespread diversity in a variety of

social areas (e.g., Putnam, 2000). This includes their opinions in business-government relations. Examples of these differences include a traditionalistic culture in Southern states (Elazar, 1984), a frontier independence in Western states (Yardley, 2007), and Progressivism in states like Wisconsin (Conant, 2006).

A penchant for free market control is associated with conservative ideology (i.e., Republicans), thus I theorize that states with a more conservative government ideology will be more likely to set the appropriate parameters of the 1996 Telecommunications Act that would encourage entrepreneurs to become CLECs. This leads to the hypothesis that a conservative government ideology should be associated with more competitors offering local telephone service.

H1.1a: States with a more conservative government ideology will have higher founding rates of CLECs.

Likewise, a state whose citizens exhibit a conservative ideology should be more likely to elect officials that would promote the industry, and such citizens would be more demanding of and receptive to competition. I therefore hypothesize that a conservative citizen ideology should be associated with more competitors offering local telephone service.

H1.1b: States with a more conservative citizen ideology will have higher founding rates of CLECs.

INSTITUTIONAL ENDOWMENT

Organizational research on the effects of policy tends to focus on how present conditions influence present and future outcomes: a new law is passed, the slate is wiped clean, and the actions subsequently taken by state actors or the changes in environmental conditions are all that matter to shaping entrepreneurship and competition. An historical view suggests otherwise (Weir & Skocpol, 1985). David Stark (1996) provides a vivid

illustration of how history matters with his study of the development of capitalism in post-socialist Hungary after the fall of communism. Stark concluded that it was only natural that capitalism in Eastern Europe would look different than capitalism elsewhere. Why? Because “organizations and institutions [are rebuilt] not on the ruins but with the ruins of [previous conditions]” (1996: 995). The starting point for capitalism in Eastern Europe was not the same as in Western Europe or in Asia, thus leading to different outcomes. Or in the macabre words of Marx,

“Men make their own history, but they do not make it as they please; they do not make it under circumstances chosen by themselves, but under circumstances directly found, given and transmitted from the past. The tradition of all the dead generations weighs like a nightmare on the brain of the living” (1852/1978).

In other words, social processes, including institutionalization, are endowed by past conditions, decisions, and processes.

The same can be said for the development of competitive local telephony. When federal legislation was passed in 1996 to open local telephony to competition, many states had already been trying to accomplish the same effect for up to 12 years. These state initiatives resulted in policies, procedures, and even pro-competition cultures that could be used as starting points for implementing new federal prescriptions or that could serve as a proxy for how motivated states were to enact policy that would attract competitors to their states. I therefore anticipate that the actions taken by states *before* the federal 1996 Telecommunications Act will help explain how the industry evolves *after* 1996.

As mentioned in the previous chapter, scholars of utility regulation typically classify the myriad regulatory programs into two classes: traditional ratebase rate-of-return regulation and incentive-based regulation (e.g., Ai & Sappington, 2002; Donald &

Sappington, 1995; Sappington & Weisman, 1996). Rate-of-return regulation all but guarantees a fixed return for the utility based on its costs. Yet under rate-of-return regulation, a utility has little to no incentive to lower its costs or to innovate. Regulators introduced incentive-based regulation such as price caps and pricing flexibility to address these shortcomings. In doing so, regulators tried to encourage utilities to lower costs, improve quality, and introduce new services. This transformation from traditional rate-of-return regulation to incentive regulation is accompanied by less direct input on the part of the regulator in setting the providers' rates. Taken to the limit, then, incentive regulation becomes deregulation, competitors replace monopolies, and firms become regulated by markets as opposed to state actors. Hence, the use of the rate-of-return model yields the greatest "policy distance" from deregulation; states employing rate-of-return regulation would have the largest gap to close in both regulation details and in regulatory mindset.

In the previous chapter, I described how the divestiture of AT&T in 1984 led many states to abandon the traditional regulatory approach and to begin experimenting with incentive-based regulation. Yet 22 of the 48 continental United States were still using a variant of rate-of-return regulation when the federal deregulation was passed in 1996. If policy distance from deregulation is indeed proportional to the efforts state actors took to implement prescriptions from the federal telecommunications act, then I anticipate that states still using rate-of-return regulation in 1996 will lag behind in creating regulatory environments conducive to CLEC entry relative to states that were using incentive-based regulation and should have lower CLEC founding rates.

H1.2a: States that in 1996 were still using a variant of traditional rate-of-return regulation will have lower founding rates of CLECs.

While the consideration of initial conditions is an important part of institutional theory, looking at one snapshot of time can be misleading. For instance, it should not be assumed that all states passed legislation with equal enthusiasm or because it fit the needs of each state's economy and society. States often emulate other states' decisions to establish policy (Ingram & Rao, 2004; Pavalko, 1989; Soule & Zylan, 1997; Zhou, 1993). Thus some states may have been more ideologically committed to the change than others. Also, states that passed incentive regulation and even pro-competition legislation earlier would have had more time to develop the processes and culture that could be leveraged with the legitimacy of federal legislation.

An early and important finding within the institutional theory literature is that early adopters enact change for technical reasons while later adopters tend to do so only after the practice has become legitimated. For example, when the practice of civil service reform spread across cities, a strong predictor at the beginning of the diffusion process of whether a city would adopt civil service procedures was the internal characteristics of the city. Once the practice had become institutionalized, such technical characteristics no longer predicted adoption (Tolbert & Zucker, 1983). Furthermore, early adopters can differ from late adopters in how they apply new practices. A study of TQM adoption across more than 2,700 U.S. hospitals finds that early adopters are more likely to apply only select aspects of TQM while late adopters apply conventional forms of the standard, thus fitting with the idea that early adopters are more likely to adopt for reasons of efficiency rather than legitimacy (Westphal, Gulati, & Shortell, 1997).

In the case of the local telephone service industry, it may be that early adoption of incentive-based regulation reflects an underlying sense of pro-competition commitment

on the part of those states' legislators and regulators that is missing among late adopters. As described in the previous chapter, states varied greatly both in whether and in how long they had been using incentive-based regulation. By 1996, states had, on average, 2.19 years ($\sigma^2 = 7.65$) of incentive-based regulation experience as 28 of the 48 continental United States had at some time shifted away from traditional rate-of-return regulation. In line with institutional theory, I therefore anticipate that states with more experience using incentive-based regulation not only had more time to develop policies and cultures that moved away from monopoly regulation but were also the states most committed to developing competition within local telephony. These states should therefore have higher CLEC founding rates.

H1.2b: States with more experience with incentive regulation before 1996 will have higher founding rates of CLECs.

FOUNDING CONDITIONS

Although aspects of a state's political environment may make the state more attractive or less attractive when compared with other states on average, for individual CLECs the question of what makes a state an attractive market opportunity may be more complicated.. Firms making decisions on how to grow their business may be guided—or constrained—by where and when they were founded, a condition referred to in the organization literature as *imprinting*. According to Stinchcombe, organizations are constructed with the “social technology” available at the time of founding (p. 153). An example of where this can be seen is in the evolution of the retail industry: department stores of the mid-19th century reflected a concentration of population in urban areas as well as the development of public transportation, mail order catalogs in the late-19th century emerged with the introduction of long-haul transportation, the indoor shopping

malls developed in the mid-20th century as people moved to the suburbs and the auto became king, and now online retailers are everywhere thanks to the Internet. Whether the founding structures remain the most efficient option for an organization or whether institutionalizing forces are instead the cause, an organization's original structures and strategies often remain in place and create "a correlation between the time in history an organization was founded and its organizational structure, even decades later" (Scott & Davis, 2006: 319).

I extend these arguments of Stinchcombe here to consider how the founding conditions of a CLEC may have shaped its future decisions to expand its operations. Although some CLECs were founded with the purpose of immediately serving much of the country, most others started in one state and then expanded elsewhere as the resources and opportunities permitted (McDermott, 2002). For many entrepreneurs, this first state was likely their home state or a state in which they understood the market very well and was what they had in mind when constructing their firm. A CLEC would acquire specific knowledge and resources and choose an appropriate organizational structure, all of which would ultimately bear the imprint of its founding state.

What I argue here is that these organizational characteristics subsequently affect which markets a firm decides to enter. States that match a firm's founding state should appear as better opportunities than other states where a firm's skill sets will not apply as well. In particular, I consider a state's political ideology and regulatory conditions. I have suggested in previous sections that the ideology of a state likely represents how receptive the idea of a competitive telephony industry is within the state. As such, the ideology of a CLEC's founding state could subsequently determine the type of climate in

which a CLEC was suited to operate—i.e., one in which the CLEC battled for its slice of a growing and demanding market or one in which the CLEC itself had to work to demonstrate the need for its services to potential consumers. Regulatory conditions are also very important as they could influence the uncertainty of the environment and the degree of flexibility a CLEC had for acting. How a CLEC was allowed to set its prices, whether costs for leasing elements from an ILEC were set permanently or allowed to fluctuate, and whether a regulatory agency played an active or passive role in helping CLECs reach agreements with ILECs were all crucial elements for firms deciding whether a state was worth entering. It follows from this that given a choice between two otherwise equivalent states, a CLEC should be more likely to expand into the state that matches the ideology and regulatory conditions of its founding state.

H2.1a: A CLEC will be more likely to expand into a state with a government ideology similar to its founding state.

H2.1b: A CLEC will be more likely to expand into a state with a citizen ideology similar to its founding state.

H2.2a: A CLEC will be more likely to expand into a state that in 1996 had similar local telephone regulation as its founding state.

H2.2b: A CLEC will be more likely to expand into a state that has similar pre-1996 experience with incentive regulation as its founding state.

LEGACY POLICY

As I have argued before, one cannot understand how the competitive telephone service industry developed based solely on the 1996 Telecommunications Act. One must also take into account the effects of the 1984 divestiture of AT&T as that set in motion both state regulatory activity as well as set the boundaries of the new, dominant incumbent carriers. The geographic boundaries used to create the RBOCs in 1984 were essentially arbitrary. The objective of creating the RBOCs was to divide the 22 Bell

operating companies into 7 holding companies that were of essentially equal size, with each RBOC covering a contiguous geographic area. Thus the fact that Ohio and Pennsylvania fell under the control of different RBOCs reflects nothing about inherent similarities or differences between the markets of the two states. Aside from any economic differences, a competitive service provider that began in Ohio should have been equally likely to extend its service into Pennsylvania as it was to extend into, say, Michigan, a state within the same RBOC territory as Ohio.

Yet previous RBOC boundaries remain curiously adhered to by many CLECs. For example, consider the history of Sage Telecom, a CLEC founded in Allen, Texas in 1997. At the time, Texas was the territory of RBOC SBC, whose territory also covered Arkansas, Kansas, Missouri, and Oklahoma. Sage remained exclusively in Texas through 2001. Over the next year, they expanded into those four—and only those four—states. Sage has since expanded into six additional states, but only after SBC had acquired its peer RBOCs Pacific Telesis (California) and Ameritech (Illinois, Michigan, Ohio, and Wisconsin) as well as independent provider Southern New England Telephone (Connecticut). The only state in SBC—now AT&T—territory in which Sage did not operate at the time of AT&T's acquisition of BellSouth is Nevada.

There are two ways in which I believe that the 1984 settlement remained important in influencing CLECs' decisions after 1996: reduced transaction costs and cognitive inertia. First, interacting with the same partner repeatedly (provided that previous relationships have been positive) reduces many non-operating costs, such as search costs and legal costs (Williamson, 1985). Furthermore, the RBOCs themselves seemed to be encouraging such behavior. Shortly after the passage of the 1996 act, the

RBOCs began to offer multi-state agreements to the CLECs. Instead of an agreement that covered a relationship between a CLEC and BellSouth in Georgia, the agreement would also hold for other states in BellSouth's territory (Alabama, Florida, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee). The CLEC would still need to become a licensed carrier within each of these states before being allowed to provide service, but the multi-state agreements represented a substantial savings in legal costs to both the CLECs and the RBOCs.

But more than just a matter of cost, I believe that the RBOC boundaries were a psychological barrier to expansion. Here I extend the argument by Barnett and Carroll (1993) in explaining why states that had more local political units (e.g., number of incorporated towns and cities, counties) such as Iowa and New York, also had more independent telephone companies in the early 1900s. One explanation Barnett and Carroll give is that more political units meant more steps to be taken before one could offer service throughout a state: more charters, more rights-of-way, etc. Yet Barnett and Carroll also suggest that boundaries of this sort came to be the taken-for-granted conceptions of markets. When deciding where to offer service, telephone entrepreneurs of the day simply accepted these political boundaries as definitions of markets.

In a similar way, I believe that this cognitive inertia played a role in determining where CLECs chose to operate after 1996. In other words, it was not that an Ohio service provider always explicitly chose Michigan over Pennsylvania in a head-to-head decision simply because the costs of going to Michigan were cheaper, but that the mere thought of expanding service from Ohio to elsewhere led the CLEC to think about entering

Michigan before it thought about entering Pennsylvania because Michigan and Ohio were in the same higher-level market.

This reasoning leads me to hypothesize that the pattern of expansion among CLECs will not flow freely with the tides of profit opportunities as the 1996 Telecommunications Act might predict but will instead cluster according to the RBOC boundaries, a remnant of policy from 1984.

H2.3: A CLEC will be more likely to expand into a state when it has a pre-existing relationship with the RBOC of that state.

POLITICAL REGIME CHANGE

A consistent criticism of institutional theory is that its proponents tend to take an oversocialized approach that is devoid of agency and often people (Davis & Powell, 1992; DiMaggio, 1988; Perrow, 1986). Early work on institutions was not always that way. One of the founding statements on what is often referred to as ‘old’ institutionalism, Selznick’s *Leadership in Administration* (1957), provides a theoretical and normative look at leadership’s role in organizations and institutions. According to Selznick, leaders help define an organization’s mission with distinctive values and then “create a social structure which embodies them” (1957: 60). As changes in leadership occur, so too can changes in institutional values.

Evolutionary theorists also point to the singular ability of executive leadership to enact change. Even in periods such as regulatory upheaval, “[e]nvironments do not cause reorientations. Rather, direct responsive activity which intervenes on prior activity patterns and establishes new patterns is required for reorientations to occur” (Tushman & Romanelli, 1985: 210). If not punctuating events themselves, then new leaders bring with them fresh perspectives that enable them to initiate strategic reorientations.

Kraatz and Moore's (2002) study on American liberal arts colleges demonstrates the impact that new leadership can have on changing institutionalized organizations. The rise of professional programs within liberal arts colleges coincided with these colleges hiring new presidents, particularly presidents with previous experience with professional programs or who came from lower status schools. Fligstein (1990), too, points to the role that leadership changes play in enacting institutional change. Anti-trust legislation alone did not directly lead to, say, the rise of the multidivisional form among large corporations but was mediated by the hiring of leaders who had a finance background. For such leaders, it was natural to think of unrelated companies as a portfolio of assets that they could manage.

This focus on leadership and institutional change can be applied to the political environments faced by organizations both individually and collectively. An underappreciated point in Stinchcombe's far-ranging essay on the relationship between social structure and organizations (1965) is that change in a political environment can act as a punctuating moment that may disrupt the status quo enjoyed by older, existing organizations and provide opportunities for new entrants to emerge. Or as Aldrich and Ruef note, "Changes in governance structures and political regimes may benefit younger, less-well-established organizations by weakening connections between older organizations and the political elite" (2006: 174). Similar arguments have been made that call for more attention to ways in which a changing political environment influences organizational behavior and population dynamics (Carroll et al., 1988).

To date, most of the research on the relationships between political change and foundings of organizations has focused on the impact of political upheaval (e.g.,

Delacroix & Carroll, 1983) or of the adoption of new policy (e.g., Dobbin & Dowd, 1997) while little has considered the actual role of state actors. One notable exception is Russo's (2001) study of the independent power production industry, which I first reviewed in Chapter II. Independent power production has several similar characteristics to competitive local telephony. Federal legislation created the industry in 1978 by requiring the existing electric utilities to purchase power from independent producers. States, however, were responsible for setting many of the details of the federal act. Russo found that the governmental bodies responsible for this process—state regulatory commissions—were influential in how the industry developed across states. Some of this involved specific actions taken by the commissions. For instance, the founding rates of independent power producers were higher when state regulatory bodies standardized the terms of exchange between the independents and the utilities. Yet the relationship between the commission and the incumbent utility was also pivotal for the independent power producers' life chances. Long-standing, collegial relationships between state commissions and incumbents could lead the commission to favor the incumbents, thus delaying and suppressing competitive entry. Indeed, Russo found that founding rates were lower in states where there was an accommodative pre-existing relationship between the regulators and the utilities. One could therefore theorize that if these accommodating regulators were replaced, the environment would become more favorable for the independent producers thereby leading to an increase in founding rates.

Broader changes in political leadership also can have an influence on corporations. New political leaders can be elected with promises to promote particular types of policies, including legislation that encourages new entrants in a given industry.

And following Aldrich and Ruef's comment above, in a situation such as the deregulation of an existing monopoly, new political leaders can also be important to potential entrepreneurs because this turnover in leadership levels the playing field with respect to the relationships between the competing organizations and the political elite.

Here I test this theory of political regime change in the competitive local telephony industry. My general proposition is that a change in the political power structure will break any pre-existing link between incumbent service providers and state actors to the benefit of entrepreneurs. This change should be perceptible at both the state-level and firm-level of analysis. The two bodies of government that I consider are the ones with the most power to influence the industry's development: the public utilities commission office and the governor's office.

State public utilities commissions have the final responsibility for implementing the provisions of the federal act. This includes setting the wholesale rates at which CLECs can obtain a product from the ILECs, arbitrating any difficulties CLECs have in securing their necessary agreements with the ILECs, and, ultimately, issuing certificates of public convenience and necessity that allow CLECs to legally operate. As part of their decision to enter business in a particular state, operators of CLECs had to assess the extent to which the state's commission had eased barriers to entry. Kraatz and Moore (2002) point out two ways that new commissioners may benefit CLECs in this context. First, new leaders may bring with them new mental models and assumptions. This helps overcome the ingrained, institutionalized beliefs that often remain resistant to change even when viable alternatives exist (Powell & DiMaggio, 1991; Scott, 2001). Second, new leaders may attenuate or even replace institutionalized values of an organization. As

these values are often put forward and upheld by leadership (Selznick, 1957), it follows that new leadership brings with it the potential for new values. Within public utility commissions, then, new commissioners could be the necessary catalyst for transforming a commission's approach away from a model of traditional regulation and toward one of competition, all to the benefit of CLECs.

H1.3a: States with at least one new public utilities commissioner will have higher founding rates of CLECs.

H2.4a: A CLEC will be more likely to expand into a state that has at least one new public utilities commissioner.

Though individual commissioners play an important role in regulating utilities, commissions are groups ranging from 3 to 7 commissioners. While a new commissioner may bring with him/her a new idea on the issue of local telephony, he/she may not be able to convince the rest of the commission of its merits or may simply not feel comfortable attempting to do so. The question of when and how an individual might influence a group is a long-studied topic within social psychology. Though those holding a minority opinion can change the opinions of other group members (Moscovici, Lage, & Naffrechoux, 1969), quite often minorities comply with or conform to the group's dominant position (Asch, 1955; Sherif, 1936). Creating change in a commission may, therefore, require change in a group-level characteristic of the commission. One such instance of change is when the replacement of commissioners leads to a change in which political party is in control of the commission. Such a change in the commission's power structure may be necessary for the commission to put forth new values and agendas, including the embrace of local telephone competition.

H1.3b: States with a new political party in control of its commission will have higher founding rates of CLECs.

H2.4b: A CLEC will be more likely to expand into a state with a new political party in control of its commission.

In addition to considering binary “new/not new” measures of change, it may be more appropriate to view change on a continuum at both the individual and group levels. At the individual level, I consider the average tenure of a commissioner. Almost by definition, commissioners that have served longer are more likely to have developed working relationships with incumbents. Furthermore, they are also more likely to have become enculturated into the commission during the monopoly era. Lower average tenure increases the chances of breaking old political ties and of introducing new approaches that support the new paradigm of competition.

H1.3c: States with longer tenured commissioners will have lower founding rates of CLECs.

H2.4c: A CLEC will be more likely to expand into a state with shorter tenured commissioners.

Likewise, if new commissioners can be successful in gaining support for their ideas, then the amount of time that a commission has been intact as a unit could be a meaningful measure of a commission’s ability to accept change and of weakening relations with incumbents.

H1.3d: States with longer tenured commissions will have lower founding rates of CLECs.

H2.4d: A CLEC will be more likely to expand into a state with shorter tenured commissions.

The governor’s office has also played an important role in the development of telecommunications policy and industry. One indirect influence is via the regulatory commission in states where commissioners are governor appointees. Yet many governors also took a strong interest in the telecommunications industry because of its

state-level benefits. Bonnett (1996) notes that state leaders saw telecommunications as a means to more efficiently disseminate information to citizens, to improve the management of state agencies, and to stimulate a state's economic development. Especially as concerns for the economy and unemployment rose, this last reason became particularly important. An improved telecommunications infrastructure could lead to economic development by (1) attracting firms to the state, (2) making firms already in the area more productive, and (3) reducing the regional economic stratification between a state's urban and rural areas (Read & Youtie, 1996).

By 1996, governors had begun acting in a way that showed their belief in the causality between telecommunications and an improved economy. Assuming that a superior telecommunications infrastructure would attract call centers, telemarketers, and data processing centers, Nebraska's leaders deregulated its local telephone service rates in the mid-1980s to encourage telecom providers to build more capacity and introduce more services (Mueller, 1993). Though rates themselves did not fall as predicted by economic theory, companies did flock to Nebraska making Omaha the "1-800 capital of the world" (Maney, 2004).

Wisconsin's Governor Tommy Thompson likewise recognized the economic importance being placed on telecommunications. In the early 1990's he created a Blue Ribbon Telecommunications Infrastructure Task Force. The purpose of doing so was stated very clearly: "Nearly every aspect of our lives is being revolutionized by telecommunications. And the only way to maintain Wisconsin's competitiveness for the 21st Century is to make sure that we have a first-rate telecommunications network in place" (Bonnett, 1996).

And in 1992, in the midst of an economic crisis, the New Jersey state legislature relaxed the regulation of local provider New Jersey Bell in exchange for the company's commitment to replace copper wires throughout the state with fiber. The program, called "Opportunity New Jersey," was championed by Governor James Florio in an effort to benefit New Jersey in its competition with New York, Pennsylvania, and Connecticut for businesses and the jobs they could bring to the state (Read & Youtie, 1996).

Governors, therefore, had sufficient reason to be concerned with their states' telecommunications policy, and they had shown willingness to take action. As with previous discussion of leadership change, new governors had the ability to be the change agents that propelled their states away from a mindset of traditional regulation toward one of competition, which would have benefited CLECs.

H1.4: States with a new governor will have higher founding rates of CLECs.

H2.5: A CLEC will be more likely to expand into a state that has a new governor.

TEMPORAL EFFECTS

To this point, discussion has proceeded with the assumption that each factor that shapes the development of the CLEC industry within a state works with constant force through the time period. Institutions, after all, endure as sources of stability and order (Clemens & Cook, 1999; Scott, 2001). Yet there is something a bit ironic about a study of institutional change—even one over a short, approximately 10-year period—that does not consider the possibility of an ebb and flow of institutionalizing and deinstitutionalizing agents. In fact, amidst this changing period it is likely that certain factors that lubricated the frictions of transformation from the era of monopoly to the era of competition began to play a diminishing role as the industry became established. Such

a process occurred in the development of the biotechnology industry. Although regions located closer to sources of venture capital firms initially had higher founding rates of CLECs, this effect dissipated as the industry matured (Stuart & Sorenson, 2003).

I would therefore like to consider the possibility that the institutional forces I have considered thus far are contingent upon time. Several reasons form the basis of this thinking. For one, the first few years following the federal Telecommunications Act saw battles taking place not only in the marketplace but also in the courtroom. ILECs defended their territories and objected to the idea of being forced to provide their product and open their resources to their competitors while the FCC and the states debated over issues of interpretation and jurisdiction. Over time, though, many of these issues were resolved or withered and the CLEC industry matured and developed both cognitive and sociopolitical legitimacy. Another stabilizing factor was the gradual transformation of state commissions. As more of the commissions became populated with individuals who had never served during the era of regulated monopolies, it became less likely that new commissioners would hold vastly different mental models from those presently serving on the commissions. In fact, over two-thirds of state commissioners serving in 1996 had been replaced by 2001.

Not every change in the CLEC landscape was a stabilizing force, however. While some sources of uncertainty had been reduced on the part of CLECs, ILECs, regulators, and customers, others were emerging. Certain FCC rules took away popular—and profitable—methods for entrepreneurs to offer service, and the dot-com boom of the late-1990s, which had fueled growth of the CLEC industry with telecommunications-dependent customers and readily available financing, passed. Yet because the particular

factors that I consider in this paper are those most likely to help the transition from regulated monopolies to regulated competition, I would ultimately expect these forces to play a diminishing role in make a region attractive to CLECs. This diminishing effect should be apparent in both state-level founding rate analysis and firm-level expansion pattern analysis.

- H1.5a: The effect that a conservative government ideology has on founding rates will decrease over time.**
- H1.5b: The effect that a conservative citizen ideology has on founding rates will decrease over time.**
- H1.6a: The effect that using traditional rate-of-return regulation in 1996 has on founding rates will decrease over time.**
- H1.6b: The effect that pre-1996 experience with incentive-based regulation has on founding rates will decrease over time.**
- H1.7a: The effect that a new commissioner has on founding rates will decrease over time.**
- H1.7b: The effect that a change in political party control of a commission has on founding rates will decrease over time.**
- H1.7c: The effect that commissioner tenure has on founding rates will decrease over time.**
- H1.7d: The effect that commission tenure has on founding rates will decrease over time.**
- H1.8: The effect that a new governor has on founding rates will decrease over time.**
- H2.6a: The effect that a similar government ideology has on a state's attractiveness as a CLEC expansion target will decrease over time.**
- H2.6b: The effect that a similar citizen ideology has on a state's attractiveness as a CLEC expansion target will decrease over time.**
- H2.7a: The effect that similar 1996 local telephone regulation has on a state's attractiveness as a CLEC expansion target will decrease over time.**

- H2.7b:** The effect that a similar pre-1996 experience with incentive-based regulation has on a state's attractiveness as a CLEC expansion target will decrease over time.
- H2.8:** The effect that a pre-existing relationship with an RBOC has on a state's attractiveness as a CLEC expansion target will decrease over time.
- H2.9a:** The effect that a new commissioner has on a state's attractiveness as a CLEC expansion target will decrease over time.
- H2.9b:** The effect that a change in political party control of a commission has on a state's attractiveness as a CLEC expansion target will decrease over time.
- H2.9c:** The effect that commissioner tenure has on a state's attractiveness as a CLEC expansion target will decrease over time.
- H2.9d:** The effect that commission tenure has on a state's attractiveness as a CLEC expansion target will decrease over time.
- H2.10:** The effect that a new governor has on a state's attractiveness as a CLEC expansion target will decrease over time.

CHAPTER V: STATE-LEVEL FOUNDING RATES

INTRODUCTION

In this chapter, I present analysis that tests my hypotheses about state-level founding rates of CLECs following the deregulation of the local telephone service industry in 1996. I first describe my sample of states and data along with all variables and their data sources. Subsequently, I provide a detailed specification of the regression model I use. Next, I present descriptive statistics of my data followed by results from the regression analyses. After conducting some diagnostic checks of the model, I conclude with a discussion of my results, including a summary of which hypotheses received support.

METHOD

To test my hypotheses, I analyzed time series data on the founding of competitive local exchange carriers between 1997 and 2006. Competition nationwide was allowed by the federal Telecommunications Act of 1996. Because I include the dependent variable as a control, data analysis begins in 1997. Data analysis ends in 2006 as that is the last year for which I have complete founding data for the states in my sample.

Defining markets with geopolitical boundaries is often problematic. In the CLEC industry, many studies have been conducted on finer-grained areas than the state

including the local access and transport area (LATA)⁴ (Abel & Clements, 2001; Alexander & Feinberg, 2004; Zolnierok, Eisner, & Burton, 2001), city (Greenstein & Mazzeo, 2006), and even census block (Foreman, 2002). Yet previous research has been conducted at the state-level (Brown & Zimmerman, 2004), and states are a natural boundary to use for my study. My primary concern is with institutional forces that are related to barriers to entry and entrepreneurial opportunities. As explained in Chapter III, the local telephone industry historically has been regulated at the state-level, and I have posited a theory that state-level actors, policies, and beliefs continued to influence rates of entry in the era of federal deregulation. Furthermore, analysis at the state level allows me to build on recent research on federal deregulation (Russo, 2001; Sine et al., 2005).

Sample and Data

I contacted each public utility commission of the 48 continental United States to request its CLEC certification data since 1996. The method by which I received the data varied by state. Many states sent me a spreadsheet (e.g., Michigan, Oklahoma, South Carolina, Wisconsin) or hard copies (e.g., Colorado, Delaware, Minnesota) of their offline records. Other states had their complete records available online. Such data rarely existed in a single downloadable file but could be obtained by writing computer programs to crawl through the commission's webpages (e.g., Florida, Georgia, Ohio, Louisiana) or by manually searching through the site and entering information by hand (e.g., Arizona, Idaho). I obtained data on CLEC activity in Texas with an open-records request. In all, I

⁴ LATAs are geographical areas that define where local carriers can provide telecommunications services. They were created with the divestiture of AT&T in 1984 as a means for establishing horizontal boundaries between the spun-off RBOCs and vertical boundaries between the RBOCs and AT&T. RBOCs were allowed to offer intra-LATA long distance service but not inter-LATA service. The latter were the domain of long distance carriers (e.g., AT&T, MCI, Sprint, etc.) There are slightly fewer than 200 LATAs in the U.S.

received data for 35 states (see Figure 6). The remaining 13 states did not require certification of all CLECs (e.g., New Jersey), changed their procedures for certifying CLECs during the study period (e.g., North Dakota), or simply kept incomplete records (e.g., Massachusetts, New York, etc.). A Mann-Whitney U -test comparing the population of states in the sample versus those not in the sample was not significant, $U(35, 13) = 282, p=.21$. A total of 9,180 certificates were issued between 1996 and 2006 across all 35 states in my sample (see Figure 7).

Figure 6. Cartographical representation of states in the state-level analysis sample

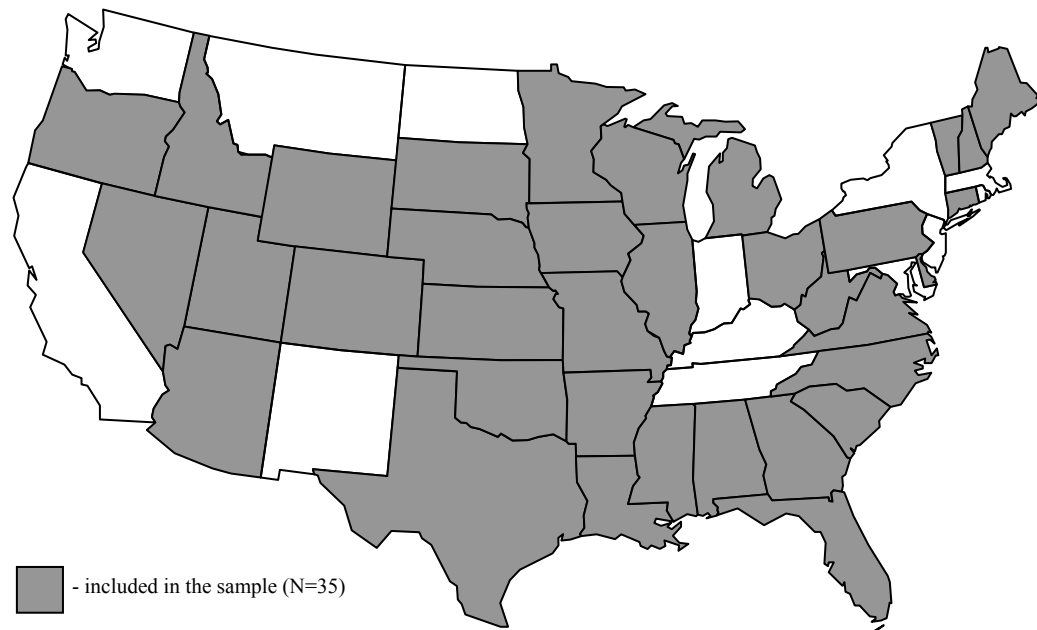
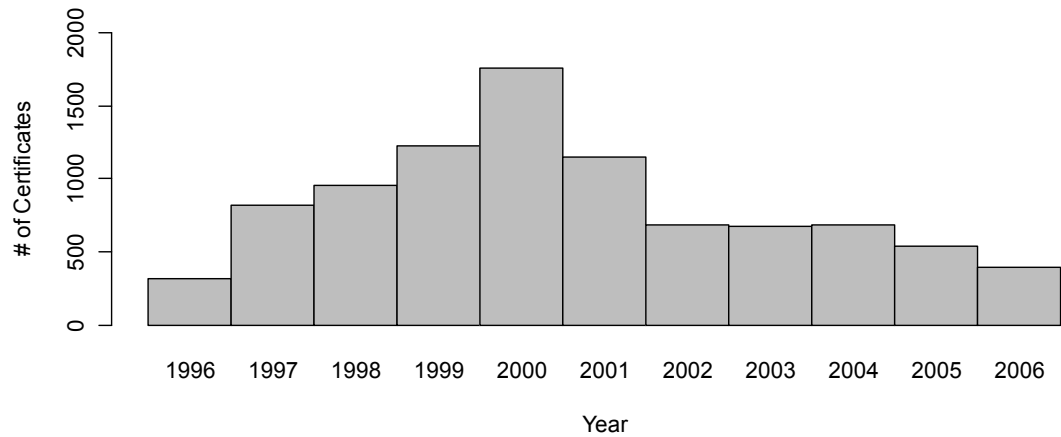


Figure 7. Total number of CLEC certificates issued across the sample of 35 states, 1996-2006



Variables

Dependent Variable

Foundings. I consider a CLEC to be founded within a state when the state issues it a certificate to provide local telephone service. Though the process varies slightly from state to state, generally firms apply for a CLEC certificate by demonstrating managerial expertise, technical expertise, and appropriate financial resources. Certificates are an imperfect measure for foundings insofar as having a certificate does not mean that the CLEC ever actually provided service within the state. Yet acquiring a certificate was not something that any firm would do. Even in states where there is no application fee for a CLEC certificate, firms usually hire attorneys or third-party firms to facilitate the process. Representatives of regulatory commissioners in Michigan and Georgia estimated that a CLEC spends approximately \$5000 to obtain a license in each of their states. On the entrepreneurial process spectrum that ranges from “discovering an opportunity” to

“performing” (Shane, 2003) this study could then be interpreted as an analysis of firms in the category “acquiring resources.”

For each state in my sample I have information on the exact date that the certificate was issued. Yet because regulatory commissions differed in how quickly they processed applications and sometimes whether they process them on an ongoing basis or in weekly or monthly batches, I aggregate the data by years. The dependent variable is therefore the number of certificates granted by the state public utility commission each year. The 35 states in my sample over 10 years yield a total N of 350.

Independent Variables

Institutional Endowment. The two measures I calculate of a state’s institutional endowment are based on the catalog developed by Abel and Clements (1998) of all state regulations of local telephone service, 1984-1998. The first measure, rate-of-return regulation, is a dummy variable indicating whether a state had been using a variant of traditional rate-of-return regulation in 1996 (1=yes, 0=no). The second, incentive regulation experience, measures how many years a state had been using incentive regulation (e.g., indexed price caps, rate freezes) prior to 1996. As discussed in Chapter III, these measures may appear to be mutually exclusive (that is, a state that was using rate-of-return regulation could not have had any experience with incentive-based regulation), but are not. Several states that had experimented with incentive-based regulation reverted back to rate-of-return regulation before 1996.

Political Ideology. I measure a state’s political ideology using the citizen ideology and government ideology measures developed by Berry and colleagues (Berry, Ringquist, Fording, & Hanson, 1998). Traditionally, views of state-level ideologies have

been that they are stable and enduring (Elazar, 1984; Wright, Erikson, & McIver, 1987). Recent studies, though, question this assumption (Page & Shapiro, 1992; Stimson, 1999). Changes in state-wide ideologies can be seen in popular press case studies such as Frank's (2004) account of the transformation of political ideology in Kansas from Progressivism to staunch conservatism. More generally, Berry and his colleagues (Berry et al., 1998) have developed two different, annual measures of ideology—citizen ideology and government ideology—to demonstrate that a state's ideologies can not only be dynamic but that differences can exist in the beliefs held by the citizens of a state and its elected government officials.

To compute a state's *citizen ideology* in a given year, Berry et al use ratings from the interest groups Americans for Democratic Action and the AFL-CIO's Committee on Political Education to identify the ideological position of each member of Congress. The citizen ideology score of each congressional district is computed as a weighted average of the ideological position of the district's incumbent and the estimated ideological position of the challenger to the incumbent. Weights are based on election results. The state's citizen ideology score is then computed as an unweighted average of its district ideology scores.

Berry et al also use those same interest group ratings of congressional members as the basis of the computation of a state's *government ideology*. The interest group ratings are used to calculate the average ideological orientation for each major party in the state in a given year, which are then assigned to five major state political actors: the governor and the two major parties in each of the state's two legislative chambers. The state's government ideology score is computed as a weighted average of these five actors'

ideological positions, where the weights are based on assumptions about the relative power that these five actors hold and the distribution of power between parties within a single legislative chamber.⁵

The data I use come from the revised 1960-2006 citizen and government ideology series, downloaded April 15, 2008, from the website of one of the original study's co-authors (http://www.uky.edu/~rford/Home_files/page0005.htm). Ideology scores are constructed such that they are bounded below by 0 (the most conservative value) and above by 100 (the most liberal value). For the years in this study, citizen ideology scores range from 9.25 to 95.97. Government ideology scores range from 0 to 96.37. The two measures are correlated at $r = 0.55$ for the states and years of this study. Though this correlation is somewhat strong, it should still be possible to observe differences between the scores in the same state and the same year.

Political Regime Change. I measure political regime change within two different areas of state government: public utility commissions and gubernatorial offices. I developed four measures for change in public utility commissions corresponding to my hypotheses. The first measure is a dummy variable indicating whether at least one *new commissioner* replaced an outgoing commissioner on the state's public utility commission in a given year (1=yes, 0=no). The second measure is also a dummy variable, this one indicating whether a *new political party controls the commission* (1=yes, 0=no). I determine which party controls a commission by measuring the political sentiment of a state's regulatory commission in each year (Abel & Clements, 2001). Political sentiment is computed by first assigning each commissioner a score according to

⁵ See the authors' original paper (Berry et al., 1998) for more details on their assumptions and calculations and for reliability and validity discussions.

his or her political party affiliation: 1=Republican, 0.5=Independent, and 0=Democrat.

The sum of these scores divided by the total number of commissioners yields the commission's political sentiment, a continuous variable ranging from 0 to 1.

Commissions with scores less than 0.5 are considered Democratic, equal to 0.5 are considered Independent, and greater than 0.5 are considered Republican. The third and fourth measures are different indicators for commissioner entrenchment. I compute both the *average tenure of each commissioner* on the commission (years) as well as the *unit tenure of the complete commission* (years). The former measure sums each commissioner's individual tenure and divides by the total number of commissioners. The latter measure tracks how many years of experience the commission has working as a single group; it resets to 0 every time a commissioner is replaced. The complete commissioner history for each state including each commissioner's years of service and political party affiliation comes from "The All Commissioners List" compiled by Janice Beecher of the Institute of Public Utilities at Michigan State University (<http://www.ipu.msu.edu/research/pdfs/All%20Commissioners%20List%20-%2007.pdf>) (Beecher, 2007). Information on commissioners' political affiliations was supplemented with searches in the Dow Jones Factiva database of news sources.

To measure change within a gubernatorial office, I use a dummy variable to indicate whether a *new governor* took office in the state in a given year (1=yes, 0=no).

Data on the gubernatorial history of each state come from the National Governors Association (<http://www.nga.org/>).

Control Variables

I controlled for a number of alternative explanations for state-level variance in CLEC foundings.

Economic Environment

Business Establishments. Many telephony and regulatory experts suggested that CLECs would be more interested in serving businesses than residential customers because (a) revenue per business access line tends to be higher than revenue per residential access line and (b) a CLEC can grow more efficiently by serving businesses rather than residential customers. I therefore include the number of business establishments within a state. Annual data on the number of business establishments within a state comes from the U.S. Census Bureau's Statistics of U.S. Businesses (<http://www.census.gov/csd/susb/susb.htm>).

Population Density. Another common explanation for CLEC location is that CLECs would be attracted to densely-populated areas. Because telephone networks are physical networks, more densely populated areas could be served more efficiently, thus resulting in higher profit opportunity. I include an annual measure of population density, which I compute as the population within a state divided by the land area of a state. Data on the average estimated state population come from the U.S. Census Bureau's Population Estimates Program (<http://www.census.gov/popest/estimates.php>).

Median Household Income. ILECs and opponents of competitive telephony legislation argued that CLECs choosing to serve residential customers would be "cream-skimmers"; that is, they would target only the most affluent neighborhoods as customers. I control for this by including the median household income of each state. Annual data

comes from the U.S. Census Bureau's Current Population Survey (<http://www.census.gov/hhes/www/income/histinc/h08a.html>).

Households without Telephone Service. Although telephone service seemed ubiquitous by 1996, over 6% of U.S. households did not have a telephone. This ranged significantly across states, from a low of 2.4% in Utah to a high of 14.6% in New Mexico. States with more households lacking telephone service could be seen as attractive to some entrepreneurs because such households represent an opportunity to gain customers without having to take them away from the incumbent. I therefore include percentage of households in a state without telephone service. Annual data for this measure come from the U.S. Census Bureau's Current Population Survey and are available from the Federal Communications Commission (<http://www.fcc.gov>).

Dot-Com Boom. The passage of the 1996 Telecommunications Act coincided with the meteoric rise in the dot-com/e-commerce industry. Demand for telephony services subsequently increased, and it was also easier to obtain financing to become a CLEC. This changed with the 2000 stock market crash as many dot-coms went bankrupt and financing sources dwindled, though telecom experts claim that the telecom industry did not begin to see a severe downturn until 2001 (Crandall, 2005). To account for this, I include a dummy variable set to "1" for 1997-2001 and "0" for 2002 -2005.

Dominant Incumbent Local Exchange Carrier. CLEC activity within a state was greatly influenced by the state's incumbent carriers. ILECs were the CLECs' source to the public switched telephone network via interconnection and/or resale agreements but were also the CLECs' main competitors. Upon the passage of the federal Telecommunications Act, the dominant ILEC in each state was one of the seven Baby

Bells (Ameritech, Bell Atlantic, BellSouth, NYNEX, Pacific Telesis, SBC, and US West), except for Connecticut, which was served by Southern New England Telephone (SNET). These ILECs did not all respond the same to the federal Telecommunications Act. As multi-state providers, each Bell, though, likely behaved consistently across states in their territory. This may have introduced autocorrelation across states. I control for this with a set of orthogonal dummy variables representing which ILEC provided service within a state. The variables are updated in each year according to when acquisition deals were announced. Because Bell Atlantic and SBC announced their acquisitions of NYNEX and Pacific Telesis in April 1996, respectively—and because my analysis does not begin until 1997—variables are not included for NYNEX and Pacific Telesis. US West (now known as Qwest) is the reference category because that is the one Baby Bell that did not acquire another Baby Bell nor was acquired by another Baby Bell during the study period.

Ecological Environment

Prior Year Foundings. Previous research in population ecology has shown that prior year foundings (i.e., rate dependence; Hannan & Freeman, 1989) tend to have an inverted U-shaped effect on current foundings (Delacroix & Carroll, 1983; Hannan & Freeman, 1989). Common arguments are that foundings from one year can serve as a signal to potential entrepreneurs of the legitimacy and opportunity for entry in the subsequent year, yet too many foundings can exhaust available resources necessary for entry (Aldrich & Ruef, 2006; Baum, 1996; Hannan & Freeman, 1989). I therefore

include both the number of certificates and number of certificates squared, lagged by one year.⁶

*Political Environment*⁷

Commission Political Party. Republicans are often labeled as the party of free markets and competition. This suggests that a commission with Republican leanings would be more likely to create conditions to encourage CLEC entry. To control for this, I include the political sentiment of the regulatory commissioners in each state. I previously described the computation for this measure when explaining my measure for *new political party controls the commission*.

Governor Political Party. Likewise, I control for whether the governor is Republican with a dummy variable noting whether the governor of a state is a Republican (1=yes, 0=no). Data come from the National Governors Association (<http://www.nga.org/>).

Elected Commissioners. States differ with respect to whether their public utility commissioners are elected or appointed. Though some states have changed their method in the past, over the course of this study the measure remained constant (11 states elected;

⁶ The literature in organizational ecology typically suggests the dominance of density over prior foundings (Carroll & Hannan, 2000). I do not include the density of existing CLECs in my models because such a measure is not available. Governments at both the state and federal levels have taken a laissez faire approach to telephone competition and only collect information when necessary. Using a running count of all actively-issued certificates would not be a valid proxy for density. As previously mentioned, having a CLEC certificate did not mean that a company was actually providing service. Furthermore, certificates are cancelled at a rate well below the rate at which firms stopped providing service. In theory states are supposed to revoke certificates from those not actively serving customers, but states are not eager to do so for political reasons; doing so might look like an attempt to squelch competition. I have reason to believe, though, that the inclusion of prior foundings is likely sufficient to capture ecological influences. Carroll and Hannan's (1989: 528) review of the literature on density dependence finds that the effect tends to hold only over extended periods of time (e.g., 100 years or more). My study of a 10-year period falls far short. Also, prior year foundings and density were likely correlated for this study. CLEC failures did not start en masse until 2000—about the time when foundings reached their peak. Several states did, though, collect extensive information from their CLECs on which firms were actively providing service along with their number of customers. In future work I will analyze founding rates on this subset of states using density.

⁷ Only included in models that test political regime change variables.

24 appointed). I control for any potential difference in states' methods of commissioner selection by including a dummy variable for whether the state's commissioners were elected (1=yes, 0=no). Data come from (Beecher, 2007).

Number of Commissioners. States vary in the size of their commission (3 to 7). Some intrastate variation exists as certain states passed legislation to change the size of their commission (e.g., Arizona) while others took lengthy periods of time to replace commissioners who resigned. I include this measure to control for any potential impact commission size may have. Data come from (Beecher, 2007).

I lag all explanatory variables that vary with time by one year to account for the time that would be necessary for the organizational structures, processes, and climate to be changed and for that change to be recognized by potential entrepreneurs.

Interaction Variables

To test the hypotheses about possible temporal effects of institutional forces (H1.5a-H1.8), I create interaction terms for each of the independent variables as well as the political regime change control variables (commission political party, Republican governor, number of commissioners, and elected commissioners). I multiply each variable by the variable *boom* in order to assess whether certain institutional effects apply only in the early stages of industry development. I follow recommendations by first centering all variables before computing the interaction term. This allows coefficients of both the main effects and the interactions to be interpretable (Aiken & West, 1991).

Model Specification

In this study, the unit of analysis is the state, and the unit of observation is the state-year. My dependent variable is a count. Count variables have several unique qualities: they take on values that are discrete, not continuous; they are bounded below by 0; and often they are not normally distributed. Attempts to model count data with ordinary least squares can result in estimates that are inefficient, inconsistent, and biased (Long, 1997: 217).

The standard model for count data is Poisson regression. For a set of panel data with observed outcomes, y_{it} , and covariates, x_{it} , Poisson regression is modeled as

$$\mu_{it} = e^{x_{it}\beta}$$
$$\Pr(Y = y_{it} | x_{it}) = \frac{e^{-\mu_{it}} \mu_{it}^{y_{it}}}{y_{it}!}$$

Poisson regression assumes that the conditional mean, $\mu_{it} = E(y_{it} | x_{it})$, is equivalent to the conditional variance, $\text{Var}(y_{it} | x_{it})$. The problem with Poisson regression is that count data tend to be overdispersed. That is, the conditional variance tends to be greater than the conditional mean. This is a common problem in founding rate analysis (e.g., Dobbin & Dowd, 1997; Russo, 2001; Swaminathan, 1995; Wade et al., 1998), and my data are no exception ($\bar{x} = 25.3$; $\sigma^2 = 405.1$). Overdispersion in Poisson regression leads to standard errors that are biased downward. A standard technique for handling overdispersion is to add an error term, ε_{it} , to the estimate of the conditional mean that is independent of x_{it} and allows the conditional variance to exceed the mean:

$$\tilde{\mu}_i = e^{x_{it}\beta + \varepsilon_{it}}$$

Assuming that $E[\varepsilon_{it}] = 0$ (or, equivalently, $E[e^{\varepsilon_{it}}] = 1$) allows for $E[\tilde{\mu}_{it}] = E[\mu_{it}]$. Letting $\delta_{it} = e^{\varepsilon_{it}}$ and assuming that δ_{it} has a gamma distribution with parameter ν_{it} provides a new probability distribution for Y :

$$\Pr(Y = y_{it} | x_{it}) = \frac{\Gamma(y_{it} + \nu_{it})}{y_{it}! \Gamma(\nu_{it})} \left(\frac{\nu_{it}}{\nu_{it} + \mu_{it}} \right)^{\nu_{it}} \left(\frac{\mu_{it}}{\nu_{it} + \mu_{it}} \right)^{y_{it}}$$

This model is referred to as the negative binomial regression model. The conditional mean remains the same (μ_{it}) and the conditional variance is now

$$\text{Var}(y_{it} | x_{it}) = \mu_{it} + \left(1 + \frac{\mu_{it}}{\nu_{it}} \right).$$

The typical assumption is that the ν 's are constant ($1/\alpha$), and the conditional variance reduces to

$$\text{Var}(y_{it} | x_{it}) = \mu_{it} + \alpha \mu_{it}^2.$$

(See Long, 1997, for a detailed derivation of this model as it pertains to cross-sectional data.) Rather than being equal to the condition mean, the conditional variance in this model is quadratic in the mean. The negative binomial regression model can be estimated with maximum likelihood.

A second modeling issue stems from the fact that my data include multiple observations for each state. This violates the assumption of independence among the observation and introduces unobserved heterogeneity. Common methods for handling this unobserved heterogeneity are to include fixed effects or random effects. Both involve adding a parameter to the model to reflect that observations within states are not independent. The models differ in the representation of that parameter. Fixed effects modeling treats it just as the name suggests—as fixed. All variability on the dependent

variable is due only to the random sampling error of the individual values (ε_{it}). Using fixed effects would assume that the states included in the study are exactly the ones that I am interested in applying the findings. A fixed-effect model is the same as including one dummy variable for each state in the study. Random effects, on the other hand, imply that variance on the dependent variable may not only be due to the noise in the values. The random effects model assumes that the sample of states contribute to the error, too, because they have been drawn from a population of states. The most common approach is to assume that the added parameter for states is drawn from a Beta distribution. (See Hilbe, 2007, for more information on negative binomial regression models with longitudinal data.)

I chose to model my data with random effects as opposed to fixed effects for four reasons. First, the fixed effects model assumes that unobserved heterogeneity across units is constant over the period of study. Because I have theorized that certain effects change over time, such an assumption seems unlikely. Second, some of my explanatory variables (e.g., the number of establishments, median household income, etc.) have little within-state temporal variation, and this gets overwhelmed when fixed effects are included. Third, I view the states in my sample as having been drawn from the larger population of states, and I wish to generalize my results to the entire population (Cameron & Trivedi, 1998: 298; Greene, 2000: 567). Finally, recent research suggests that unconditional fixed effects in negative binomial regression with a large number of groups (e.g., more than 20) can yield underestimated standard errors of the parameters. In such cases, “negative binomial predictors appear to enter the model as significant

when in fact they do not” (Hilbe, 2007: 203). This problem does not occur when treating the effects as random.

I estimate parameters using `xtnbreg` in Stata 8.0.

Summary of State-Level Hypotheses

I summarize my hypotheses and model in Table 1. For each hypothesis, I have listed the variable I use to test it along with the predicted direction of its coefficient.

Table 1. Summary of hypotheses for the state-level CLEC founding rate analysis

	H #	Variable	Predicted Direction	
Main Effects	Ideology	H1.1a	Government ideology	-
		H1.1b	Citizen ideology	-
	Institutional Endowment	H1.2a	Rate-based rate-of-return local telephone regulation in 1996	-
		H1.2b	Years of experience with incentive-based local telephone regulation before 1996	+
	Political Regime Change	H1.3a	New commissioner	+
		H1.3b	New party in control of commission	+
		H1.3c	Avg tenure of commissioners	-
		H1.3d	Unit tenure of commission	-
	H1.4	New governor	+	
	Temporal Effects	Ideology	H1.5a	Government ideology × Boom
H1.5b			Citizen ideology × Boom	-
Institutional Endowment		H1.6a	Rate-based rate-of-return local telephone regulation in 1996 × Boom	-
		H1.6b	Years of experience with incentive-based local telephone regulation before 1996 × Boom	+
Political Regime Change		H1.7a	New commissioner × Boom	+
		H1.7b	New party in control of commission × Boom	+
		H1.7c	Avg tenure of commissioners × Boom	-
		H1.7d	Unit tenure of commission × Boom	-
H1.8	New governor × Boom	+		

RESULTS

Descriptive Statistics

Table 2 reports the summary statistics (mean, standard deviation, and range) for the dependent variable, independent variables, and control variables. (Note that several variables have been scaled to allow for more readable coefficients in the regression

output.) Table 3 reports the correlation matrix for all variables. Correlations among the variables of theoretical interest (i.e., (14) through (26)) tend to be small in magnitude ($|r| < .30$; less than 10 percent shared variance). Those variables that exhibit moderate levels of correlation tend to be related conceptually. As previously mentioned, the two ideology measures are correlated at $r = .55$. Yet as evidence that the two measure distinct constructs, government ideology is much more strongly correlated with states having Republican governors ($r = -.75$) and Republican-controlled utility commissions ($r = -.44$) than is citizen ideology.⁸ This provides a nice validity check for government ideology. The institutional endowment variables, rate-of-return regulation and incentive regulation experience, have a similar level of correlation ($r = -.55$). Certain variables related to change in the public utility commission also appear moderately correlated.

⁸ Negative correlations are expected here because Berry et al's ideology score ranges from 0 (pure conservatism) to 100 (pure liberalism) whereas in the other variables Republicans are coded as 1, Democrats as 0.

Table 2. Descriptive statistics for the state-level CLEC founding rate analysis

Variable	Mean	Std. Dev.	Min	Max
CLEC foundings [DV]	25.337	20.126	1	127
No. of business establishments in state / 1,000,000	0.130	0.113	0.018	0.505
State population density / 1000	0.122	0.136	0.005	0.723
% households in state without phone service	5.747	2.246	1.733	13.133
State median household income / 1000	46.549	6.456	32.495	61.757
Era of dot-com boom (1 = 1996-2001, 0 = 2002-2006)	0.500	0.501	0	1
CLEC certificates in state / 100 (t-1)	0.251	0.205	0	1.270
CLEC certificates in state / 100, squared (t-1)	0.105	0.202	0	1.613
State served by Ameritech	0.023	0.150	0	1
State served by Bell Atlantic/Verizon	0.200	0.401	0	1
State served by BellSouth	0.200	0.401	0	1
State served by SBC/AT&T	0.286	0.452	0	1
State served by SNET	0.006	0.075	0	1
Government ideology / 100	0.412	0.256	0.000	0.964
Citizen ideology / 100	0.458	0.133	0.093	0.960
State had variant of rate-of-return regulation in 1996 (1=yes, 0=no)	0.486	0.501	0	1
Yrs state had incentive regulation, pre-1996	2.000	2.708	0	9
New commissioner	0.420	0.494	0	1
New political party controls PUC	0.120	0.325	0	1
Avg tenure of commissioners	4.803	2.839	0.667	14.667
Unit tenure of current commission	1.309	1.697	0	8
New governor	0.151	0.359	0	1
Avg political sentiment on PUC	0.576	0.251	0	1
Republican governor	0.606	0.489	0	1
No. of commissioners	3.883	1.200	3	7
Elected commissioners	0.314	0.465	0	1

Table 3. Correlation matrix for the state-level CLEC founding rate analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) No. of certificates issued in state [DV]	—												
(2) No. of business establishments in state / 1,000,000	.61	—											
(3) State population density / 1000	.15	.31	—										
(4) % households in state without phone service	.18	.14	-.12	—									
(5) State median household income / 1000	.03	.06	.37	-.61	—								
(6) Era of dot-com boom (1 = 1996-2001, 0 = 2002-2006)	.42	-.03	-.03	.09	-.08	—							
(7) CLEC certificates in state / 100 (t-1)	.77	.63	.17	.16	.09	.19	—						
(8) CLEC certificates in state / 100, squared (t-1)	.61	.47	.09	.12	-.04	.20	.73	—					
(9) State served by Ameritech	.00	.14	.08	-.02	.06	.15	-.06	-.02	—				
(10) State served by Bell Atlantic/Verizon	-.15	-.17	.17	-.34	.13	.00	-.15	-.07	-.08	—			
(11) State served by BellSouth	.23	.19	.07	.46	-.39	.00	.23	.14	-.08	-.25	—		
(12) State served by SBC/AT&T	.17	.24	.13	.22	.05	-.06	.20	.05	-.10	-.32	-.32	—	
(13) State served by SNET	-.01	-.03	.31	-.05	.09	.08	-.04	-.02	-.01	-.04	-.04	-.05	—
(14) Government Ideology / 100	-.03	-.12	.17	.00	-.03	-.11	-.04	-.11	-.10	.32	.16	-.07	.03
(15) Citizen Ideology / 100	.01	.08	.36	-.30	.23	-.14	.01	-.02	.07	.43	-.23	.03	.10
(16) Yrs state had incentive regulation, pre-1996	.23	.24	.04	-.06	-.16	.00	.23	.29	.00	.24	-.11	.06	-.06
(17) State had variant of rate-of-return regulation in 1996 (1=yes, 0=no)	-.28	-.41	-.14	.09	.00	.00	-.28	-.19	-.15	-.20	.09	-.13	.08
(18) New commissioner	.07	.14	.02	-.06	.09	-.08	.08	.00	-.01	-.01	-.06	.13	.01
(19) New party controls regulatory commission	.02	-.03	-.07	.00	.05	.04	.05	.01	-.06	-.01	.04	.04	-.03
(20) Avg tenure of commissioners	-.15	-.30	-.02	.21	-.23	.02	-.15	-.07	-.07	.15	.25	-.31	-.09
(21) Yrs that current commission has been together as unit	-.07	-.19	-.06	.08	-.11	.01	-.07	-.04	-.05	.00	.09	-.15	-.04
(22) New governor	.03	-.01	-.01	.01	.04	-.10	.02	.06	-.06	.05	.03	-.02	-.03
(23) Avg political sentiment on regulatory commission (1=Repub., 0=Dem.)	.04	.17	-.07	.03	.03	-.01	.07	.05	.12	-.21	-.25	.28	.02
(24) Republican governor	.06	.11	.02	.12	-.04	.09	.05	.08	.12	-.24	-.09	.16	.06
(25) No. of commissioners	.18	.29	.45	.01	.08	.00	.17	.06	.02	-.14	.47	-.08	.07
(26) Elected commissioners (1=yes, 0=no)	-.11	-.20	-.22	.34	-.26	.00	-.11	-.11	-.10	-.18	.43	-.29	-.05

Variable	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
(14) Government Ideology / 100	—												
(15) Citizen Ideology / 100	.55	—											
(16) Yrs state had incentive regulation, pre-1996	.10	.22	—										
(17) State had variant of rate-of-return regulation in 1996 (1=yes, 0=no)	-.03	-.13	-.55	—									
(18) New commissioner	.07	.14	.01	.00	—								
(19) New party controls regulatory commission	.07	.06	-.08	.06	.42	—							
(20) Avg tenure of commissioners	.01	-.19	.02	-.02	-.46	-.17	—						
(21) Yrs that current commission has been together as unit	-.07	-.18	-.04	-.04	-.66	-.28	.67	—					
(22) New governor	.06	.04	.00	-.01	.21	.16	.00	-.09	—				
(23) Avg political sentiment on regulatory commission (1=Repub., 0=Dem.)	-.44	-.20	.04	-.06	.00	-.13	-.15	-.08	-.06	—			
(24) Republican governor	-.75	-.21	-.09	.12	-.02	-.08	.02	.05	-.05	.48	—		
(25) No. of commissioners	.17	.08	-.04	.00	.10	.07	-.08	-.18	.01	-.23	-.15	—	
(26) Elected commissioners (1=yes, 0=no)	-.17	-.44	-.23	.20	-.16	-.02	.42	.20	.06	.14	.12	.05	—

Regression Analysis

Table 4 reports the results of the regression analyses. I ran 11 models in all. First I examined a baseline model, model 1, with only economic and ecological control variables. I examined the main effects for the ideology (H1.1a-H1.1b), institutional endowment (H1.2a-H1.2b), and political regime change hypotheses (H1.3a-H1.4) by entering their corresponding variables as separate blocks in models 2-4, respectively, before including all variables from models 1-4 in model 5. In model 6, I test for potential multicollinearity effects in model 5 by removing the control variables associated with the political environment. Several of these are moderately correlated with the ideology variables ($|r| > .40$) and are themselves not statistically significant.

With models 7-9 I add interaction terms to test the temporal effects hypotheses for ideology (H1.5a-H1.5b), institutional endowment (H1.6a-H1.6b), and political regime change (H1.7a-H1.8), respectively. Model 10 contains all variables. In model 11, I again test for potential multicollinearity by removing those same political environment control variables.

Table 4. Negative binomial regression results for the state-level CLEC founding rate analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Constant	1.161** (0.313)	1.000** (0.318)	0.969** (0.329)	1.248** (0.326)	0.871* (0.358)	0.814* (0.328)	1.047** (0.322)	0.955** (0.330)	1.461** (0.331)	1.135** (0.368)	0.948** (0.332)
No. of business establishments in state / 1,000,000	2.063** (0.238)	2.071** (0.237)	1.892** (0.243)	2.124** (0.240)	2.001** (0.260)	1.969** (0.253)	2.094** (0.240)	2.073** (0.255)	2.258** (0.246)	2.125** (0.262)	2.014** (0.254)
State population density / 1000	-0.414+ (0.230)	-0.519* (0.233)	-0.405+ (0.220)	-0.355 (0.226)	-0.485* (0.227)	-0.468* (0.211)	-0.534* (0.237)	-0.441* (0.223)	-0.290 (0.227)	-0.414+ (0.224)	-0.464* (0.210)
% households in state without phone service	-0.009 (0.015)	-0.006 (0.015)	-0.002 (0.015)	-0.007 (0.015)	-0.002 (0.015)	0.001 (0.014)	-0.005 (0.015)	-0.001 (0.015)	-0.013 (0.014)	-0.003 (0.015)	0.003 (0.014)
State median household income / 1000	0.012* (0.005)	0.011* (0.005)	0.015** (0.005)	0.011* (0.005)	0.014** (0.005)	0.014** (0.005)	0.011* (0.005)	0.016** (0.005)	0.011* (0.005)	0.015** (0.005)	0.016** (0.005)
Era of dot-com boom (1 = 1996-2001, 0 = 2002-2006)	0.611** (0.046)	0.628** (0.046)	0.614** (0.046)	0.620** (0.045)	0.641** (0.045)	0.646** (0.045)	0.630** (0.045)	0.613** (0.045)	0.619** (0.045)	0.626** (0.044)	0.638** (0.044)
CLEC certificates in state / 100 (t-1)	1.401** (0.182)	1.404** (0.180)	1.397** (0.187)	1.483** (0.166)	1.420** (0.165)	1.404** (0.164)	1.382** (0.175)	1.371** (0.183)	1.456** (0.168)	1.414** (0.165)	1.403** (0.164)
CLEC certificates in state / 100, squared (t-1)	-1.040** (0.201)	-1.047** (0.199)	-1.081** (0.207)	-1.181** (0.197)	-1.174** (0.198)	-1.157** (0.196)	-1.077** (0.197)	-1.228** (0.208)	-1.275** (0.200)	-1.408** (0.205)	-1.361** (0.204)
State served by Ameritech	-0.115 (0.144)	-0.156 (0.144)	-0.141 (0.145)	-0.113 (0.140)	-0.170 (0.144)	-0.169 (0.142)	-0.199 (0.143)	-0.159 (0.145)	-0.162 (0.140)	-0.238+ (0.142)	-0.204+ (0.141)
State served by Bell Atlantic/Verizon	0.093 (0.078)	0.036 (0.080)	0.059 (0.077)	0.068 (0.072)	0.009 (0.077)	0.019 (0.075)	0.043 (0.081)	0.061 (0.078)	0.061 (0.072)	0.020 (0.076)	0.055 (0.074)
State served by BellSouth	0.388** (0.096)	0.387** (0.100)	0.390** (0.094)	0.370** (0.094)	0.374** (0.095)	0.393** (0.088)	0.414** (0.103)	0.406** (0.095)	0.428** (0.096)	0.438** (0.097)	0.444** (0.089)
State served by SBC/AT&T	0.253** (0.084)	0.229** (0.083)	0.226** (0.083)	0.223** (0.071)	0.200** (0.075)	0.204** (0.071)	0.237** (0.083)	0.229** (0.083)	0.225** (0.071)	0.177* (0.074)	0.204* (0.070)
State served by SNET	0.284 (0.291)	0.246 (0.289)	0.285 (0.290)	0.271 (0.290)	0.234 (0.288)	0.242 (0.285)	0.193 (0.287)	0.339 (0.287)	0.217 (0.287)	0.113 (0.283)	0.232 (0.282)
Government Ideology / 100		0.023 (0.100)			0.102 (0.159)	0.005 (0.096)	0.048 (0.100)			0.150 (0.163)	0.005 (0.096)
Government ideology / 100 X Boom							-0.313+ (0.179)			0.087 (0.291)	-0.318+ (0.177)
Citizen Ideology / 100		0.463+ (0.243)			0.347 (0.255)	0.433+ (0.229)	0.373 (0.251)			0.142 (0.262)	0.261 (0.236)
Citizen ideology / 100 X Boom							1.037** (0.372)			0.718 (0.457)	0.925* (0.389)
Yrs state had incentive regulation, pre-1996			0.015 (0.010)		0.016+ (0.010)	0.016+ (0.009)		0.011 (0.010)		0.015 (0.010)	0.014 (0.010)
Yrs state had incentive regulation, pre-1996 X Boom								0.044* (0.017)		0.051** (0.018)	0.046** (0.018)
State had variant of rate-of-return regulation in 1996 (1=yes, 0=no)			-0.030 (0.056)		-0.033 (0.056)	-0.021 (0.054)		-0.015 (0.058)		-0.021 (0.057)	-0.016 (0.055)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
State had variant of ROR regulation in 1996 X Boom								-0.034 (0.097)		0.028 (0.101)	0.009 (0.097)
New commissioner				0.047 (0.053)	0.037 (0.053)	0.044 (0.053)			0.004 (0.056)	-0.003 (0.055)	0.011 (0.055)
New commissioner X Boom									0.233* (0.112)	0.220* (0.112)	0.195+ (0.110)
New party controls regulatory commission				-0.006 (0.065)	-0.004 (0.064)	-0.001 (0.064)			-0.021 (0.068)	-0.035 (0.067)	-0.028 (0.066)
New party controls regulatory commission X Boom									0.060 (0.137)	0.062 (0.135)	0.028 (0.132)
Avg tenure of commissioners				-0.007 (0.012)	-0.010 (0.012)	-0.010 (0.012)			-0.012 (0.013)	-0.020 (0.013)	-0.020 (0.012)
Avg tenure of commissioners X Boom									0.025 (0.024)	0.011 (0.024)	0.007 (0.021)
Yrs that current commission has been together as unit				0.033+ (0.019)	0.035+ (0.019)	0.038* (0.018)			0.028 (0.021)	0.029 (0.021)	0.033 (0.020)
Unit tenure of commission X Boom									0.049 (0.041)	0.056 (0.041)	0.039 (0.040)
New governor				0.132* (0.054)	0.130* (0.054)	0.132* (0.053)			0.133* (0.055)	0.134* (0.053)	0.137* (0.053)
New governor X Boom									0.106 (0.110)	0.119 (0.107)	0.112 (0.107)
Avg political sentiment on regulatory commission (1=Repub., 0=Dem.)				-0.105 (0.099)	-0.102 (0.099)				-0.148 (0.108)	-0.105 (0.107)	
Avg political sentiment on commission X Boom									0.360+ (0.204)	0.291 (0.204)	
Republican governor				0.010 (0.048)	0.073 (0.077)				0.018 (0.051)	0.104 (0.078)	
Republican governor X Boom									0.066 (0.105)	0.166 (0.150)	
No. of commissioners				-0.010 (0.022)	-0.003 (0.022)				-0.032 (0.023)	-0.023 (0.023)	
No. of commissioners X Boom									0.063+ (0.035)	0.062+ (0.035)	
Elected commissioners (1=yes, 0=no)				-0.030 (0.063)	0.014 (0.066)				0.003 (0.067)	0.004 (0.068)	
Elected commissioners X Boom									-0.208+ (0.110)	-0.038 (0.122)	
Observations	350	350	350	350	350	350	350	350	350	350	350
Number of group(state)	35	35	35	35	35	35	35	35	35	35	35
Standard errors in parentheses											
+ significant at 10%; * significant at 5%; ** significant at 1%											

The effects of some of the control variables merit attention. Consistent with previous findings (e.g., Abel & Clements, 2001; Alexander & Feinberg, 2004; Foreman, 2002), CLEC foundings were higher in states with more businesses and with higher median household incomes. Population density, though, had a consistently—and in most models significantly—negative affect on a state’s CLEC founding rate. I would expect that this is because this study is at the state level of analysis. Population density likely plays a role at more granular levels of analysis, such as the Metropolitan Statistical Area or Local Access and Transport Area (LATA). In light of the distribution of certification dates (Figure 7), it is not surprising that prior foundings follow an inverted-U shape. Estimates for the coefficients of all controls remained quite stable across all models.

Main Effects

Model 2 examines the effect that a state’s political ideology, among both its elected officials (H1.1a) and its citizens (H1.1b), had on making the state attractive to CLEC entrepreneurs. The estimated coefficient for citizen ideology was significant, but neither it nor the estimated coefficient for government ideology was in the expected direction. This indicates that founding rates of CLECs were higher in states with more liberal government officials and a more liberal electorate and fails to support H1.1a and H1.1b.

Model 3 tests H1.2a and H1.2b—whether a state’s regulatory experience leading up to federally-mandated competition had any influence on the rate at which CLECs enter the state. Results are in the predicted direction (states with more incentive regulation experience had higher founding rates while those transitioning to competition directly from traditional regulation had lower founding rates) but are not significant.

Model 4 tests the impact that changes in the political order had on a state's CLEC founding rate, H1.3a-H1.4. Changes within the public utility commission had little effect on a state's founding rate. The effect that a new commissioner (H1.3a) had was, as predicted, positive but was not significant. Contrary to my hypothesis, when a new political party took control of the commission (H1.3b), the founding rate subsequently decreased, albeit a very small, non-significant amount. The two measures of commission tenure had opposite effects. States with longer serving commissioners (H1.3c) saw a non-significant decrease their founding rates. States whose commissions had more experience serving together (H1.3d), though, had subsequently higher founding rates—the opposite of what I had hypothesized.

In contrast to my hypotheses about the commission, my hypothesis about a change in governorship (H1.4) is supported. Following a change in governor, the founding rate within the state increased significantly.

Model 5 is the full model that includes all explanatory variables, both control and substantive. All coefficients remained the same sign, and most were of the same magnitude as before. One difference was with years of incentive-based regulation experience. In the presence of other variables its coefficient and its standard error change just enough for the coefficient to be statistically significant at $\alpha = .10$. This provides some support for H1.2b. The other difference worth noting was the change in coefficients for the ideology variables. Government ideology remained non-significant but with a much larger coefficient. The coefficient for citizen ideology, on the hand, fell by 25% and below statistical significance. Although neither coefficient is in my predicted direction, these abrupt changes signal that multicollinearity may be present.

As I mentioned previously, my first test for multicollinearity was to remove the political environment control variables. The result is model 6. Most coefficients remained stable relative to their previous estimates. The coefficient for years of incentive-based regulation experience is still significant, providing further support for H1.2b. The coefficients for the ideology variables are much closer to their original model 2 estimates. Citizen ideology is once again significantly positive, and government ideology is closer to 0. This suggests that at least slight levels of multicollinearity were present in model 5, although it does not appear to have had any bearing on tests of my main effects hypotheses.⁹

Temporal Effects

Model 7 tests whether the effect of ideology varied with time (H1.5a-H1.5b). In support of these hypotheses, I expected negative coefficients on my ideology interaction terms because the lower conservative scores are associated with more conservative ideologies and because the boom variable is coded as “1” in the early years of the study and “0” in the later years. The interaction of government ideology and boom is significant and is in the hypothesized direction. During the dot-com boom, CLECs were started more often in states with conservative elected officials than they were after the boom. This supports H1.5a. The interaction for citizen ideology is also significant but is in the opposite direction as the hypothesis. Entrepreneurs started more CLECs in states with *liberal* electorates during the early years of the study. Thus, the data fail to support H1.5b.

⁹ I analyzed one more model where in addition to removing the political environment controls, I also removed the variable for percent of households without telephone service. This variable, whose coefficients were not significant in any model, is a potential source of collinearity because it is correlated with citizen ideology at $r = -.30$. Removing the variable, though, produced estimated coefficients that were virtually identical to those in model 6. For the sake of brevity, I do not include it in this results section.

Model 8 shows mixed results for the impact of time on institutional endowment. As before, the type of regulation from which states were transitioning had little effect on CLEC development. States that were using rate-of-return regulation when the federal Telecommunications Act was passed did have lower founding rates during the first half of the study (the *rate-of-return regulation in 1996* \times *boom* coefficient is negative), though the effect is not significant. H1.6a is not supported. The amount of time, though, that states had been experimenting away from traditional regulation was period-contingent. States that had more experience with incentive-based regulation leading up to 1996 had subsequently higher founding rates during the first half of this study. This supports H6b.

Model 9 includes measures of the political environment and their interactions with boom. The strongest finding among the commission variables is that the effect of getting a new commissioner is period-specific. States with new commissioners had significantly higher CLEC founding rates in the first half of the study period relative to the second half, which supports H1.7a. None of the other measures of commission change were significantly conditional upon the boom period effect (H1.7b-H1.7d are not supported). In contrast to getting a new commissioner, the main effect that a new governor has on a state's CLEC founding rate remains strong but is not contingent upon time. The *new governor* \times *boom* coefficient is positive but not significant. H1.8 is therefore not supported.

Model 10 is the full model with all main effects and interactions included. Most findings hold, but the ideology variables once again show the greatest change in their estimated coefficients. The citizen ideology coefficients decreased while the government

ideology coefficients increased. Especially of concern is that the government ideology \times boom interaction went from a significant, negative coefficient (and in support of H1.5a) to a positive coefficient. As with the main effects analysis, this hints of multicollinearity. I therefore investigated this by removing the political environment controls and re-running the model. The result is model 11. Most coefficients remained unchanged, and the ideology coefficients returned to the level of their model 7 estimates. This includes the time-contingent effect of government ideology, in support of H1.5a.

Diagnostics

When discussing the correlation matrix, I pointed out several instances where variables were moderately to highly correlated. These were especially prevalent among the conceptually-related variables of ideology, institutional endowment, and political regime change. Other variables with strong linear associations include government ideology and the political party measures for the state commission and governor. One reason to be concerned about correlated variables is that they can lead to multicollinearity. Symptoms of multicollinearity include wild swings in coefficients in both magnitude and sign across similar models. Although multicollinearity does not affect the overall model fit, it does hamper a researcher's ability to detect significant effects in individual coefficients, which is typically the main goal of hypothesis testing.

As I mentioned in the preceding analysis, there were some mild signs of multicollinearity in the regression models, most involving the ideology variables. The ideology coefficients—both main effects and interactions—changed noticeably from the ideology-only model to the full model. Re-running the full model after removing several

control variables that were correlated with the ideology variables yielded ideology coefficients that were much closer to the initial estimates.

Here I take another approach to looking for hints of collinearity as I compute variance inflation factors (VIF). VIFs are one measure for assessing how much the variances of individual coefficients are inflated by collinearity as compared to the situation where the variables are linearly independent. If R_i^2 represents the proportion of variance in variable i that is attributable to the other explanatory variables in the model, then VIF_i is defined as

$$VIF_i = \frac{1}{1 - R_i^2}$$

If variable i is strongly correlated with other variables in the model, R_i^2 will approach 1, the denominator of the above expression will approach 0, and VIF_i will be a large number. How large is too large? The most common rule-of-thumb is that a VIF of greater than 10 suggests evidence of multicollinearity (see Neter, Kutner, Nachtsheim, & Wasserman, 1996; StataCorp, 2001; but see O'Brien, 2007 for a cautionary discussion about the potential pitfalls of blindly following this rule).

Table 5 reports the VIFs for all variables in the regression models from Table 4. The table reports four VIF scores—two each for the analysis of main effects and of temporal effects. Each set of VIFs includes those for the full model and again for the model in which the political environment controls were removed. (Columns have been labeled to match the appropriate model in Table 4.) According to the rule-of-thumb, multicollinearity should not be a problem. The largest VIF in both full models was well less than 10 (5.44 and 6.09), and VIF_{mean} was 2.53 in the main effects analysis and 2.58 when interaction terms were added. Yet there are indicators that several variables were

sharing a substantial amount of variance. Removing just those four controls does lower the VIFs considerably. The largest VIF falls to 3.66 and 3.77 for the main effects and temporal effects, respectively. VIF_{mean} (2.21 and 2.17) also decreases rather substantially.

A closer look at the variables that were symptomatic of multicollinearity and that were removed from the analysis reveals a plausible explanation. What I have reported here was not simply the act of taking away any variables whose high correlations may have been due to chance. The fluctuating coefficients had been only with ideology variables, and in each of the full models government ideology had the largest VIF. Government ideology measures elected officials on a conservative-to-liberal continuum, and two of the variables removed were measures of the political affiliation of government officials. It is not surprising that these variables would be strongly correlated with government ideology, which in turn is moderately correlated with citizen ideology. Removing the control variables attenuated the collinearity problem. Thus, this analysis, in conjunction with the regression analysis I reported previously, leads me to conclude that some (slight) multicollinearity issues contributed to the abrupt changes in the coefficients of the ideology variables when estimated in the presence of other variables. I am confident that I have taken the appropriate steps to illustrate the support that these data can give to this study's hypotheses.

Table 5. Variance inflation factors (VIFs) for the state-level CLEC founding rate analysis

Variable	Model 5	Model 6	Model 10	Model 11
No. of business establishments in state / 1,000,000	2.91	2.76	3.13	2.89
State population density / 1000	2.61	2.18	2.75	2.23
% households in state without phone service	2.97	2.71	3.14	2.83
State median household income / 1000	2.75	2.69	3.05	2.94
Era of dot-com boom (1 = 1996-2001, 0 = 2002-2006)	1.29	1.26	1.31	1.28
CLEC certificates in state / 100 (t-1)	3.68	3.66	3.88	3.77
CLEC certificates in state / 100, squared (t-1)	2.55	2.50	2.85	2.76
State served by Ameritech	1.34	1.30	1.48	1.41
State served by Bell Atlantic/Verizon	2.26	2.16	2.35	2.22
State served by BellSouth	4.02	3.26	4.37	3.53
State served by SBC/AT&T	2.81	2.59	2.92	2.69
State served by SNET	1.29	1.27	1.40	1.34
Government Ideology / 100	5.44	1.95	6.09	2.03
Government ideology / 100 X Boom			4.51	1.64
Citizen Ideology / 100	3.02	2.34	3.20	2.45
Citizen ideology / 100 X Boom			2.38	1.74
State had variant of rate-of-return reg. in 1996 (1=yes, 0=no)	2.04	1.95	2.12	1.99
State had variant of ROR regulation in 1996 X Boom			1.73	1.62
Yrs state had incentive regulation, pre-1996	1.86	1.84	1.99	1.95
Yrs state had incentive regulation, pre-1996 X Boom			1.79	1.74
New commissioner	2.12	2.08	2.17	2.10
New commissioner X Boom			2.18	2.10
New party controls regulatory commission	1.31	1.29	1.37	1.34
New party controls regulatory commission X Boom			1.39	1.34
Avg tenure of commissioners	2.94	2.73	3.40	3.04
Avg tenure of commissioners X Boom			3.02	2.23
Yrs that current commission has been together as unit	2.88	2.75	3.03	2.83
Unit tenure of commission X Boom			3.02	2.78
New governor	1.11	1.10	1.18	1.17
New governor X Boom			1.19	1.18
Avg political sentiment on reg. commission (1=Rep., 0=Dem.)	1.85		1.98	
Avg political sentiment on commission X Boom			1.86	
Republican governor	3.88		4.31	
Republican governor X Boom			3.74	
No. of commissioners	2.10		2.22	
No. of commissioners X Boom			1.26	
Elected commissioners (1=yes, 0=no)	2.18		2.34	
Elected commissioners X Boom			1.89	
Mean VIF	2.53	2.21	2.58	2.17

DISCUSSION

The purpose of this study was to examine how certain institutional conditions of the political environment—namely political ideology of a state’s elected officials and its electorate; a state’s regulatory history, which endowed the state with certain capabilities for adapting to federal deregulation; and changes in a state’s political regime—affected entrepreneurial opportunities following deregulation. The specific context here was the

development of the competitive local telephone service industry following the federal Telecommunications Act of 1996. Findings from this study support the idea that such institutional conditions can indeed matter, though support for certain predictions was somewhat mixed. A summary of the results and their support for the hypotheses is presented in Table 6.

Table 6. Summary of results for the state-level CLEC founding rate analysis

	H #	Variable	Predicted Direction	Results	
Main Effects	Ideology	H1.1a	Government ideology	-	Not supported
		H1.1b	Citizen ideology	-	Not supported
	Institutional Endowment	H1.2a	Rate-based rate-of-return local telephone regulation in 1996	-	Not supported
		H1.2b	Years of experience with incentive-based local telephone regulation before 1996	+	Partially supported
	Political Regime Change	H1.3a	New commissioner	+	Not supported
		H1.3b	New party in control of commission	+	Not supported
		H1.3c	Avg tenure of commissioners	-	Not supported
		H1.3d	Unit tenure of commission	-	Not supported
	H1.4	New governor	+	Supported	
	Temporal Effects	Ideology	H1.5a	Government ideology × Boom	-
H1.5b			Citizen ideology × Boom	-	Not supported
Institutional Endowment		H1.6a	Rate-based rate-of-return local telephone regulation in 1996 × Boom	-	Not supported
		H1.6b	Years of experience with incentive-based local telephone regulation before 1996 × Boom	+	Supported
Political Regime Change		H1.7a	New commissioner × Boom	+	Supported
		H1.7b	New party in control of commission × Boom	+	Not supported
		H1.7c	Avg tenure of commissioners × Boom	-	Not supported
		H1.7d	Unit tenure of commission × Boom	-	Not supported
H1.8	New governor × Boom	+	Not supported		

My predictions about the effect of political ideology on CLEC founding rates received the least support. I had theorized that states with more conservative ideologies would have been more likely to support free market approaches and would therefore have been more likely to see higher rates of CLEC foundings. The results, though, suggest that the opposite tended to occur. In the main effect analysis, states with more liberal ideologies—both government officials and citizens—had higher CLEC founding rates. The effect of citizen ideology was even marginally significant. An examination of these

effects over time shows that liberal citizen ideology had an even stronger effect during the dot-com boom period. The only evidence in support of my hypotheses about political ideology was the finding that in the first half of the study period, CLEC founding rates were marginally higher in states whose government officials held more conservative ideologies.

Rather than consider an explanation for how these findings can be simultaneously true, the findings may be indicating something else. One possibility is that the relationship between political sentiment and the effects of deregulation was more complicated than I initially thought. Although Republicans (that is, those that hold a conservative ideology) are often labeled as the party of free markets and competition, they are also known to support big business, and businesses do not get much bigger than the Baby Bells. Simple party affiliations may therefore be poor predictors of the actions that politicians will take when competing interests are stake.¹⁰ A second reason to interpret these ideology results with caution is more methodological in nature. The results suggested some signs of multicollinearity, all of which appeared to be related to the ideology variables. Although I attempted to address this by dropping certain variables from the full model, I would need to investigate this more before stating any conclusive results for the ideology hypotheses. Better measures, and ones that address my previous comment about the complexity of political party affiliations, would be those that tap directly into a free market ideology. The political ideology variables in this study are likely mixing economic conservatism with social conservatism. Such free market

¹⁰ An excellent example of this is the within-party divide on how to proceed with the antitrust lawsuit against AT&T that eventually led to its divestiture. Early in the Reagan administration, tensions were high between William Baxter, the head of the Department of Justice's Antitrust Division, and members of Reagan's cabinet over whether to pursue the lawsuit or to drop it (Coll, 1986).

ideology measures were not readily available otherwise I would have used them in this study, yet it will be something to consider for future work.

For institutional endowment, the results show that the initial conditions under which policy is applied did make a difference, but the specific starting point did not. States that were using traditional rate-of-return regulation—which experts on regulatory policy claimed was the furthest from deregulation—exhibited no statistical difference from states that were using incentive regulation. Yet the more experience states had with incentive-based regulation, the higher their CLEC founding rates, particularly in the early years of competition. At least two reasons could explain this. One explanation is that the experience of using incentive-based regulation did indeed endow a state with the institutional necessities (structures, processes, cultures, etc.) for transitioning from regulated monopolies to regulated competition. The more time a state had to develop these necessities, the more prepared it was for implementing pro-competition policy and the higher its CLEC founding rates. A different explanation is that the differences were the result of the institutionalization of incentive regulation across states. Much like the non-mandated adoption of civil service procedures by cities (Tolbert & Zucker, 1983) or the spread of TQM in U.S. hospitals (Westphal et al., 1997), states that were the first to adopt incentive-based regulation may simply have been making different decisions from those who adopted such regulation later and those that did not adopt it at all. The states that were early adopters may have still been institutionally endowed with qualities that led them to create conditions for CLEC opportunities more quickly than other states, but perhaps it was not the incentive-based regulation experience per se that provided the boost. It remains an open question why incentive-based regulation mattered, though it

may be possible to answer it by collecting data on specific actions that states were taking before 1996. Nevertheless, the findings here relate to our understanding of the role that institutions and starting conditions play in transitioning economies (e.g., Nee, 1996; Stark, 1996).

Policy, of course, does not create itself. Politicians and bureaucrats write, interpret, and enforce legislation. I had argued that change in a state's political regime would increase opportunities for CLEC entrepreneurs within that state because new leaders might bring with them new ideas and might also weaken relationships between state actors and incumbent providers. The findings support this notion. New governors had a significant, positive effect on CLEC founding rates throughout the study period. CLEC founding rates also were higher in states that had elected or appointed a new commissioner, but only in the early period of deregulation. Together the findings support the idea that that policy—even deregulatory policy—is developed and implemented by state actors with ideological interests (Vogel, 1996) and that new leaders can serve as a punctuating moment in industry development (Tushman & Romanelli, 1985). As for why the two types of leadership change differ in their effect over time, I believe that it is due in part to differences in the objectives that each type of leader had. As the direct overseers of the telecommunications industry, the objectives of commissioners were to create conditions to allow for competition, not necessarily with any of competition's broader economic effects. A successful mission for them was to fulfill the federal mandates and create the opportunities for competition to arise. Doing so should be facilitated by an ability to conceive of competitive local telephony. For longtime commissioners enculturated within a system that for decades had assumed that local

telephone service *had* to be regulated as a monopoly, this transition was likely difficult. Relative to commissioners of this era, new commissioners were bringing with them more pro-competition insights. As more and more commissioners were replaced, however, the effect of adding new commissioners diminished. The main effect I find with governors, on the other hand, is in line with the notion that their concerns about the industry related to state economic development. Because governors had not been involved with the day-to-day oversight of the telecommunications industry, whatever mental models they had of the industry likely were irrelevant to their aims. Compared with commissioners, governors were concerned solely with issues of the economy and entrepreneurship. If anything, governors have become more attuned to economic and entrepreneurial issues since 1996, which is one possible explanation for why this effect has not abated. In all, the findings on political regime change support Selznick's (1957) belief that leaders play a crucial role in the institutionalization process.

CHAPTER VI: FIRM-LEVEL GROWTH ACROSS STATES

INTRODUCTION

In this chapter, I present analysis that tests my hypotheses about CLECs' decisions to expand their service into additional states. I first describe my sample of CLECs and data along with all variables and their data sources. Subsequently, I provide a detailed specification of the regression model I use. Next, I present descriptive statistics of my data followed by results from the regression analyses. Following some diagnostic checks of the model, I then run a second set of analyses to distinguish between legacy policy and geographic proximity. I conclude with a discussion of my results, including a summary of which hypotheses received support.

METHOD

To test my hypotheses, I analyzed time-series data on the expansion of facilities-based CLECs into new markets between 1997 and 2005. Competition across the U.S. was allowed by the federal Telecommunications Act of 1996. Because expansion must be measured relative to a firm's initial market, data analysis begins one year later in 1997. The end year is determined by the availability of my dependent variable.

As with the previous study, I define markets as states. I believe that this is the most appropriate level to test my theoretical questions, all of which are related to state-level institutional forces.

Dependent Variable Data Source

The data for this study come from market reports¹¹ on the CLEC industry authored by New Paradigm Resources Group (NPRG). NPRG's reports are recognized within the telecommunications industry as the most comprehensive source of information on facilities-based CLECs and have served as a data source for several academic studies of the CLEC industry (Greenstein & Mazzeo, 2006; Hauge, Jamison, & Gentry, 2008; Hu & Huang, 2006). NPRG has produced reports since its founding in 1993. For the duration of my study the reports were released annually except from 2000 to 2002 when they were released semi-annually. Data for this study come from reports listed in Table 7. Reports are based on information from the previous calendar year. For example, the 1997 report covers CLEC activity in 1996.

Table 7. Market research reports from New Paradigm Resources Group (NPRG) comprising the data for this study

Year Published	Edition	Year Covered
1997	8	1996
1998	9	1997
1999	10	1998
2000	11	1999
2001	13	2000
2002	15	2001
2003	17	2002
2004	18	2003
2005	19	2004
2006	20	2005

CLECs vary by type of ownership. Some are, or were, publicly traded, but the majority of CLECs have been privately held. Information that CLECs make publicly available thus varies widely, and such variation is reflected in the NPRG reports. At a minimum, the reports include each CLEC's name, contact information (physical address,

¹¹ The reports have appeared under a variety of titles: Annual Report on Local Telephone Competition (1997 to 1999), CLEC Report (2000 to 2001), CLEC Report: Competitive Last Mile Providers (2002 to 2005), and Competitive Carrier Report (2006).

phone number, e-mail address, and website address), and areas served (cities and states) along with a brief summary of the CLEC's history. When available, the reports include the CLEC's officers, directors, revenues (past and projected), number of employees, services offered, individual network information (e.g., size of network, type of equipment used and where equipment is located, etc.), state certifications, interconnection agreements, strategy, and NPRG's analysis of the CLEC. For the purposes of this study, I use the information reported on states served by each CLEC.

Sample and Data

Cumulatively, the NPRG reports covered 281 CLECs. Assessing geographic growth requires that I have data from at least two reports: one report to establish an initial geographic footprint, and at least one additional report to measure any market expansion. I therefore exclude from analysis 93 CLECs that only appeared in one report. I further exclude two companies that were not headquartered in the continental United States: Global Crossed Ltd. (Bermuda) and General Communications, Inc. (Alaska). This yields a total sample of 186 firms. Of these, 150 firms (81%) eventually operated in multiple states while the remaining 36 firms only operated within their headquarters state. (A complete list of CLECs in this study appears in the Appendix.)

Left-censoring is present within this sample. Of the 150 multi-state firms, 117 (78%) were reported as operating in multiple states during the first year that they appeared in an NPRG report.¹² This, however, does not appear to be a consequence of the fact that I begin this study with the 1997 report. Of the 32 multi-state firms that first

¹² This level of censoring is similar to the study of international expansion of Japanese manufacturers by Hensiz and Delios (2001: 450), who report that 77% of their sample had already made at least one international investment prior to their study period.

appeared in the 1997 report, 24 (75.0%) were listed as operating in multiple states in 1997. Similarly, 89 of the 118 firms (75.4%) whose profiles began after 1997 also were listed as operating in multiple states the very first time they were profiled. Another possible explanation is that NPRG did not begin to cover firms until they were sufficiently large. I believe that this is unlikely. The reports include many small, nascent firms, and NPRG's incentives are to include every firm possible. Large firms are already well-known by many within the industry, so much of the value of NPRG's information to its customers comes from reporting on companies of all sizes.

The most plausible explanation is that these particular firms likely had an initial plan to launch their service in multiple markets. In future work I can attempt to find more fine-grained data on when such firms entered each specific market. In this dissertation I will control for each CLEC's initial market size as well as its market size at each decision point in its history.

Though the level of initial multi-state entry was high, most initial footprints were small. Table 8 displays a frequency table of initial market size. Among the 186 CLECs in my sample the median initial market size is 2, and nearly three-fourths of the sample started in five or fewer states. Less than 10% of the CLECs were operating in 10 or more states the first time they were profiled by NPRG.¹³

¹³ The majority of the CLECs that began with large initial markets already had a national infrastructure or sales force that allowed them to offer local telephone service to a widespread area. This included long distance carriers (AT&T, 29 states; MCI, 25 states), competitive access providers (Teleport Communications Group, 26 states), and cellular providers (WinStar, 28 states). The largest firms had other reasons for getting so big, so fast. Advanced Radio Telecom Corp. (43 states) offered its services wirelessly using point-to-point microwave transmissions. This service did not have the capacity nor the robustness that fiber networks provide, but they were faster and cheaper to deploy. Advanced Radio Telecom eventually ran out of financing and filed for bankruptcy 2001. NETtel (46 states) entered the industry at its peak with a plan to deploy service nationwide. Like many other facilities-based CLECs, the company received financing from venture capital firms and from equipment vendors. In 2000 its money

Table 8. Frequency distribution of the initial market sizes for the CLECs in the sample

Initial Market Size (# of states)	# of CLECs	Pct of all CLECs	Cumulative # of CLECs	Cumulative Pct
1	68	36.6%	68	36.6%
2	29	15.6%	97	52.2%
3	15	8.1%	112	60.2%
4	13	7.0%	125	67.2%
5	13	7.0%	138	74.2%
6	10	5.4%	148	79.6%
7	10	5.4%	158	84.9%
8	3	1.6%	161	86.6%
9	4	2.2%	165	88.7%
10	4	2.2%	169	90.9%
11	1	0.5%	170	91.4%
12	1	0.5%	171	91.9%
13	1	0.5%	172	92.5%
15	1	0.5%	173	93.0%
16	1	0.5%	174	93.5%
17	1	0.5%	175	94.1%
19	1	0.5%	176	94.6%
23	1	0.5%	177	95.2%
24	1	0.5%	178	95.7%
25	1	0.5%	179	96.2%
26	2	1.1%	181	97.3%
28	1	0.5%	182	97.8%
29	1	0.5%	183	98.4%
32	1	0.5%	184	98.9%
43	1	0.5%	185	99.5%
46	1	0.5%	186	100.0%

Unlike other studies on market expansion which treat entry as a repeatable event (Haveman & Nonnemaker, 2000; Henisz & Delios, 2001), I treat it as a non-repeatable event. I do this in part for practical reasons. Seldom did a CLEC begin operating in a state, leave the state, and then re-enter the state.¹⁴ There are also theoretical reasons for treating entry as non-repeatable. My concern is with how state-level institutional forces raised or lowered barriers to entry. This is best answered by looking at a CLEC’s initial entry into a state. Though it is true that entry into a particular state does not constitute

woes reached the breaking point. Within a span of mere months, it withdrew its IPO, filed for bankruptcy, and liquidated its assets.

¹⁴ To use a gaming analogy, the thrifths in Haveman’s study are like chess players, constantly shuffling their (relatively) fixed assets as they defend against and attack their competitors. CLECs in the era of this study were more akin to Texas Hold ’Em poker players. As soon as CLEC owners saw an advantage, they gambled big by moving “all in” in an effort to knock out their competitors.

complete coverage of that state by the CLEC—and thus a firm could enter Cleveland one year, Columbus the next, and Cincinnati some time after that—examining such entry patterns would answer a research question different from mine.

By defining market entry as a non-repeatable event, I can now define a CLEC's risk set in a given year as those states into which the CLEC had not already entered at the beginning of the year.

As stated previously, my sample consists of 186 firms. My unit of analysis is the firm-state, and there are 8,005 distinct firm-states in my data. The data take the form of one observation per CLEC per state-at-risk-of-entry per year, thus making the firm-state-year my unit of observation. My data consist of $N = 26,267$ observations, of which 936 correspond to market entries.

Variables

Dependent Variable

The dependent variable is the conditional probability—or hazard—that a CLEC entered a state in a given year given that it had not already entered the state prior to that year. For CLEC i , state j , and year k , this can be stated mathematically:

$$h(t_{ijk}) = \Pr(T_{ij} = k \mid T_{ij} \geq k)$$

CLEC i 's decision regarding entry into state j in year k is measured with an indicator variable, E_{ijk} . E_{ijk} equals 1 if i entered j in k ; otherwise it equals 0.

Independent Variables

Several of the independent variables in this chapter were described in the previous chapter on state-level founding rates. When appropriate, I make reference to my description of these variables found there.

Founding Conditions. I constructed variables for measuring a target state's similarity to the focal CLEC's headquarter state on two dimensions: regulatory history and political ideology. Both are derived from measures used in the previous chapter on state-level founding rates. For regulatory history, I calculate:

$$| \textit{incentive regulation experience}_i - \textit{incentive regulation experience}_j |$$

$$| \textit{rate-of-return regulation}_i - \textit{rate-of-return regulation}_j |$$

where *incentive regulation experience* is the number of years a state had been using incentive regulation (e.g., indexed price caps, rate freezes) prior to 1996, *rate-of-return regulation* is a dummy variable indicating whether a state had been using a variant of traditional rate-of-return regulation (often referred to as cost-plus regulation) in 1996 (1=yes, 0=no), *i* is the headquarter state of the focal CLEC, and *j* is the target state. I include the actual measures for the target state *j*'s *incentive regulation experience* and *rate-of-return regulation* as controls.

For political ideology, I calculate:

$$| \textit{government ideology}_{ik} - \textit{government ideology}_{jk} |$$

$$| \textit{citizen ideology}_{ik} - \textit{citizen ideology}_{jk} |$$

where *government ideology* is a measure of a state's political leaders on a conservative-to-liberal continuum, *citizen ideology* is a measure of a state's electorate on a conservative-to-liberal continuum, *i* is the headquarter state of the focal CLEC, *j* is the target state, and *k* is the year being studied. I include the actual measures for the target state *j*'s *government ideology* and *citizen ideology* as controls.

Please see the previous chapter for more details on the computation and data sources of *incentive regulation experience*, *rate-of-return regulation*, *citizen ideology*, and *government ideology*.

Legacy Policy. I measure whether a CLEC had a pre-existing relationship with the RBOC territory of a target state in two different ways. The first measure indicates whether the state is in the *same RBOC territory as the focal CLEC's headquarters state*. The second indicates whether the state is not in the same RBOC territory as the focal CLEC's headquarter state but is in the *same RBOC territory as a different state in the CLEC's service area*. The two measures are included as dummy variables.

Political Regime Change. As in the previous chapter, I measure political regime change within two different areas of state government: public utility commissions and gubernatorial offices. I include the same four variables for change in public utility commissions: (1) whether at least one *new commissioner* replaced an outgoing commissioner on the state's public utility commission (1=yes, 0=no); (2) whether a *new political party controls the commission* (1=yes, 0=no); (3) the *average tenure of each commissioner* on the commission (years); and (4) the *unit tenure of the complete commission* (years). Data on public utility commissions come from "The All Commissioners List" compiled by Janice Beecher of the Institute of Public Utilities at Michigan State University (<http://www.ipu.msu.edu/research/pdfs/All%20Commissioners%20List%20-%202007.pdf>) (Beecher, 2007). Information on commissioners' political affiliations was supplemented with searches in the Dow Jones Factiva database of news sources.

My measure for change within a gubernatorial office remains the same: whether a *new governor* took office in the state in a given year (1=yes, 0=no). Data on the gubernatorial history of each state come from the National Governors Association (<http://www.nga.org/>).

Control Variables

I controlled for a number of alternative explanations for state-level variance in CLEC foundings. Many of them were described in the previous chapter on state-level founding rates. I describe them again here for completeness.

Firm Expansion History

States in Home RBOC Territory. Though I posit a theory for why a CLEC is likely to expand into states within its home RBOC territory, that can only be true if the CLEC has not already expanded into those states. I therefore include the number of states in the focal CLEC's home RBOC territory that remain in the CLEC's risk set.

Number of States Already Entered. The likelihood that a CLEC enters any state could vary according to the number of states the CLEC has already entered. For example, it is plausible that the smaller a CLEC's risk set, the more likely it is that a CLEC has established its market base and will not expand further. I therefore include a count of the number of states the focal CLEC has already entered prior to the current period of analysis.

Physical Proximity

Adjacency. Common sense would suggest that firms are more likely to expand to neighboring states. This especially should be true for an industry based on physical

networks, such as the telephone system. I consider physical proximity with three different levels of adjacency: (1) states that are directly adjacent to the focal CLEC's headquarters state, (2) states that are not adjacent to the focal CLEC's headquarter state but that are adjacent to at least one state in which the CLEC is presently operating, and (3) all other states (i.e., non-adjacency). I include dummy variables for the first two conditions: adjacency to the focal CLEC's headquarter state and adjacency to any non-headquarter state that is already in the focal CLEC's service area.

Economic Environment

Business Establishments. Many telephony and regulatory experts suggested that CLECs would be more interested in serving businesses than residential customers because (a) revenue per business access line tends to be higher than revenue per residential access line and (b) a CLEC can grow more efficiently by serving businesses rather than residential customers. I therefore include the number of business establishments within a state. Annual data on the number of business establishments within a state comes from the U.S. Census Bureau's Statistics of U.S. Businesses (<http://www.census.gov/csd/susb/susb.htm>).

Population Density. Another common explanation for CLEC location is that CLECs would be attracted to densely-populated areas. Because telephone networks are physical networks, more densely populated areas could be served more efficiently, thus resulting in higher profit opportunity. I include an annual measure of population density, which I compute as the population within a state divided by the land area of a state. Data on the average estimated state population come from the U.S. Census Bureau's Population Estimates Program (<http://www.census.gov/popest/estimates.php>).

Median Household Income. ILECs and opponents of competitive telephony legislation argued that CLECs choosing to serve residential customers would be “cream-skimmers”; that is, they would target only the most affluent neighborhoods as customers. I control for this by including the median household income of each state. Annual data comes from the U.S. Census Bureau’s Current Population Survey (<http://www.census.gov/hhes/www/income/histinc/h08a.html>).

Dot-Com Boom. The passage of the 1996 Telecommunications Act coincided with the meteoric rise in the dot-com/e-commerce industry. Demand for telephony services subsequently increased, and it was also easier to obtain financing to become a CLEC. This changed with the 2000 stock market crash as many dot-coms went bankrupt and financing sources dwindled, though telecom experts claim that the telecom industry did not begin to see a severe downturn until 2001 (Crandall, 2005). To account for this, I include a dummy variable set to “1” for 1997-2001 and “0” for 2002 -2005.

Ecological Environment

CLEC Density. Organizational ecologists commonly model population dynamics with density dependence (Hannan & Freeman, 1989). The argument for including a quadratic representation of density—that is, the lagged number of firms in the population and its square—in one’s model is that a population’s vital rates are related to the size of the population by two processes: legitimation and competition (Carroll & Hannan, 1989). When an industry is in its nascent state, more firms within it provide the industry with greater legitimacy. Increased legitimacy, in turn, attracts even more firms and the industry grows. A point is eventually reached, however, when too many firms have entered the industry than can be supported by existing resources. Competition for

resources leads to the failure of some firms and discourages new firms from entering the industry. Critics may question the interpretation of the mechanisms behind the phenomenon (cf. Zucker, 1989), but the effect itself has received strong empirical support (for a review, see Carroll & Hannan, 2000).

The initial formulation of density dependence concerned founding and failure rates. Since then it has been extended to the growth of firms entering new niches (Barron, West, & Hannan, 1994; Greve, 2000; Haveman, 1993). As Carroll and Hannan note, “Any process that makes it easier for entrepreneurs to mobilize resources ought also to make it easier for existing organizations to grow” (2000: 218). I control for density dependence in my model by including the number of CLECs operating within the target state and its square, both lagged one year.

*Political Environment*¹⁵

Commission Political Party. Republicans are often labeled as the party of free markets and competition. This suggests that a commission with Republican leanings would be more likely to create conditions to encourage CLEC entry. To control for this, include the political sentiment of the regulatory commissioners in each state. I previously described the computation for this measure when explaining my measure for *new political party controls the commission*.

Governor Political Party. Likewise, I control for whether the governor is Republican with a dummy variable noting whether the governor of a state is a Republican (1=yes, 0=no). Data come from the National Governors Association (<http://www.nga.org/>).

¹⁵ Only included in models that test political regime change variables.

Elected Commissioners. States differ with respect to whether their public utility commissioners are elected or appointed. Though some states have changed their method in the past, over the course of this study the measure remained constant (11 states elected; 24 appointed). I control for any potential difference in states' methods of commissioner selection by including a dummy variable for whether the state's commissioners were elected (1=yes, 0=no). Data come from (Beecher, 2007).

Number of Commissioners. States vary in the size of their commission (3 to 7). Some intrastate variation exists as certain states passed legislation to change the size of their commission (e.g., Arizona) while others took lengthy periods of time to replace commissioners who resigned. I include this measure to control for any potential impact commission size may have. Data come from (Beecher, 2007).

I lag all explanatory variables that vary with time by one year to account for the time that would be necessary for the organizational structures, processes, and climate to be changed and for that change to be recognized by potential entrepreneurs.

Interaction Variables

To test the hypotheses about possible temporal effects of institutional forces (H2.6a-H2.10), I create interaction terms for each of the independent variables as well as the political regime change control variables (commission political party, Republican governor, number of commissioners, and elected commissioners). I multiply each variable by the variable *boom* in order to assess whether certain institutional effects apply only in the early stages of industry development. I decided to use *boom* rather than the firm-specific "event time" (described in the Model Specification and Estimation, below) for three reasons. First, the degree of left-censoring in the study raises questions about

how well an event time clock captures a firm's true history. For some firms, the clock may start when the first begins operations. For others, it may be their second or even third year as a CLEC, though their first year being covered by NPRG. Second, and equally important, I believe that any conditional effects on my argument will be due to historical time, not individual firm time. That is, the bigger conditional effect will be contextual (e.g., Was venture capital widely available? Were pressures high to file for IPO?) rather than firm-specific (e.g., Is the firm in its third year of operation or its sixth?). In future studies I can attempt to tease out the differences, but for now I just use the dummy variable for the dot-com boom and maintain consistency with the previous chapter. It is worth noting that the two measures are strongly correlated ($r = -.74$) because most CLECs were started during the dot-com boom.

As in the previous chapter, I center all variables before computing the interaction term. This allows coefficients of both the main effects and the interactions to be interpretable (Aiken & West, 1991).

Model Specification

I analyze my data with a discrete-time event history model¹⁶ (Allison, 1984; Cox, 1972; Singer & Willett, 2003). Event history analysis is appropriate when the object studied is *when* an event occurred, not just *that* an event occurred. In other words, event history models analyze duration. These models are extremely useful because they handle right-censoring. Right-censoring occurs when the duration for an event is unknown because the event never occurs. For this study, all states that were not entered by a

¹⁶ Event history analysis is a term commonly used in the social and behavioral sciences. Other disciplines refer to these models as survival analysis (medicine) and failure time analysis (engineering), among other names (e.g., duration analysis, reliability analysis). Hazard modeling is a general term used across many disciplines. On occasion I will use hazard modeling as a synonym for event history analysis.

CLEC when the CLEC was removed from the sample due to bankruptcy or acquisition or at the end of the study are right-censored.

Discrete Time vs. Continuous Time

Although social scientists rarely work with continuous-time data, continuous-time methods can be used to model event history data provided that time is measured with sufficient granularity and there are few ties in the data (Allison, 1982; Yamaguchi, 1991). That is not the case for this study. I have chosen a discrete-time model because the information I have on CLEC market entries comes from annual market reports. And because of the discrete nature in which time is measured, ties are pervasive; CLECs can enter states at one of only nine different times. Discrete-time models are very powerful because they can easily accommodate time-varying covariates and can be analyzed with standard statistical functions.

Link Function

As with standard regression, discrete-time event history models involve regressing a dependent variable onto a linear function of explanatory variables. Problems arise when trying to regress the hazard itself onto the covariates. Assuming we have time-invariant covariates \mathbf{x}_1 and time-varying covariates \mathbf{x}_2 , we would have

$$h(t) = \alpha(t) + \beta_1 \mathbf{x}_1 + \beta_2 \mathbf{x}_2(t)$$

where β_1 is the vector of coefficients for \mathbf{x}_1 , β_2 is the vector of coefficients for \mathbf{x}_2 , and α is a function only of time. The hazard, or probability of event occurrence, must lie between 0 and 1, but the right-hand side of the equation is not held to these same constraints. A common solution is to transform the hazard into its log-odds, commonly called the *logit*. The result is the standard logistic regression model:

$$\ln\left(\frac{h(t)}{1-h(t)}\right) = \alpha(t) + \beta_1 x_1 + \beta_2 x_2(t)$$

In a logit model, each coefficient estimates the change in the *log-odds* for a one-unit increase of its respective covariate. Exponentiating the coefficient provides the estimated odds for that one-unit increase. For example, a dummy variable with a coefficient of 0.324 would indicate that the odds of an event occurring are estimated to be $e^{0.324} = 1.383$ times higher for instances where the variable equals 1 than when it equals 0.

Logistic regression is not the only method available for transforming the hazard into an unbounded variable. Prentice and Gloeckler (1978) proposed an alternative transformation of the probability, the complementary log-log (clog-log) link function:

$$\ln(-\ln(1-h(t))) = \alpha(t) + \beta_1 x_1 + \beta_2 x_2(t)$$

Whereas exponentiating the coefficient from a logit model provides an *odds ratio*, exponentiating a coefficient of a clog-log model yields a *hazard ratio*. A coefficient of 0.324 would indicate that the hazard, or probability, of an event occurring are estimated to be $e^{0.324} = 1.383$ times higher for instances where the variable equals 1 than when it equals 0.

When the hazard rate is low, as it is in this study, hazard and odds are very similar. For example, a hazard of 0.20 is equivalent to an odds of 0.25. A hazard of .10 equals odds of .11. At the limit, they are identical: $\lim_{h(t) \rightarrow 0} \frac{h(t)}{h(t)/1-h(t)} = 1$. Logit models

and clog-log models therefore tend to be similar for small hazards.

Some analysts prefer to use clog-log regression because it is the discrete-time analog to the Cox proportional hazard model, the most popular technique for continuous-time event history analysis. It also has advantages when one believes that the underlying

basis of time is truly continuous and measurement is the only reason the values are discrete. Otherwise, neither holds an advantage over the other (Singer & Willett, 2003).

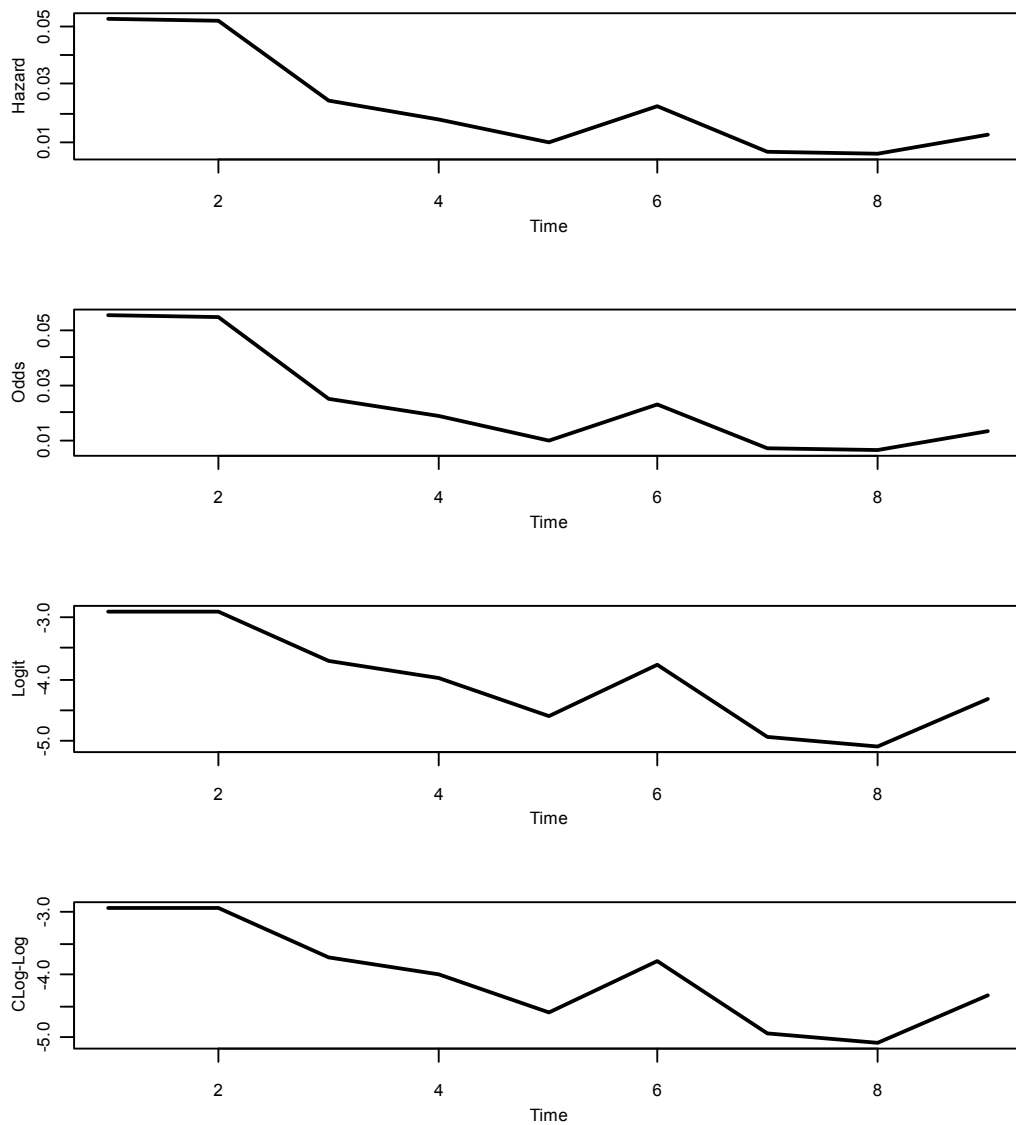
In this dissertation I report results from both models for the sake of completeness. Results are substantively similar across the methods. Except where there are differences, I will typically discuss estimates only from the logit model because that method is more commonly found within the organization theory literature. Both models are estimated with maximum likelihood using standard statistical functions. My analyses are all conducted within Stata 8.0 using `xtlogit` for logistic regression and `xtcloglog` for complementary-log-log regression.

Treatment of Time

The discrete-time model includes one observation per unit of time that a CLEC is at risk of entering a particular state. This “event time” starts at 0 and ends with entry or right-censoring. How to incorporate event time into a discrete-time model is an analytic decision each researcher must make and reflects one’s assumptions, theoretical or empirical, about how the baseline hazard function will vary with time. Time can be omitted from the model if one believes that the baseline hazard remains constant. (That is, at any given point in the study, a CLEC is equally likely to enter a state.) Yet typically the hazard that an event occurs will vary the longer it is at risk. For the discrete-time model, Allison (1984) suggests modeling time with a series of dummy variables, one for each time period. This creates the best fitting model, but not necessarily the one that is most parsimonious. Certain period-to-period fluctuations may be nothing more than sampling error.

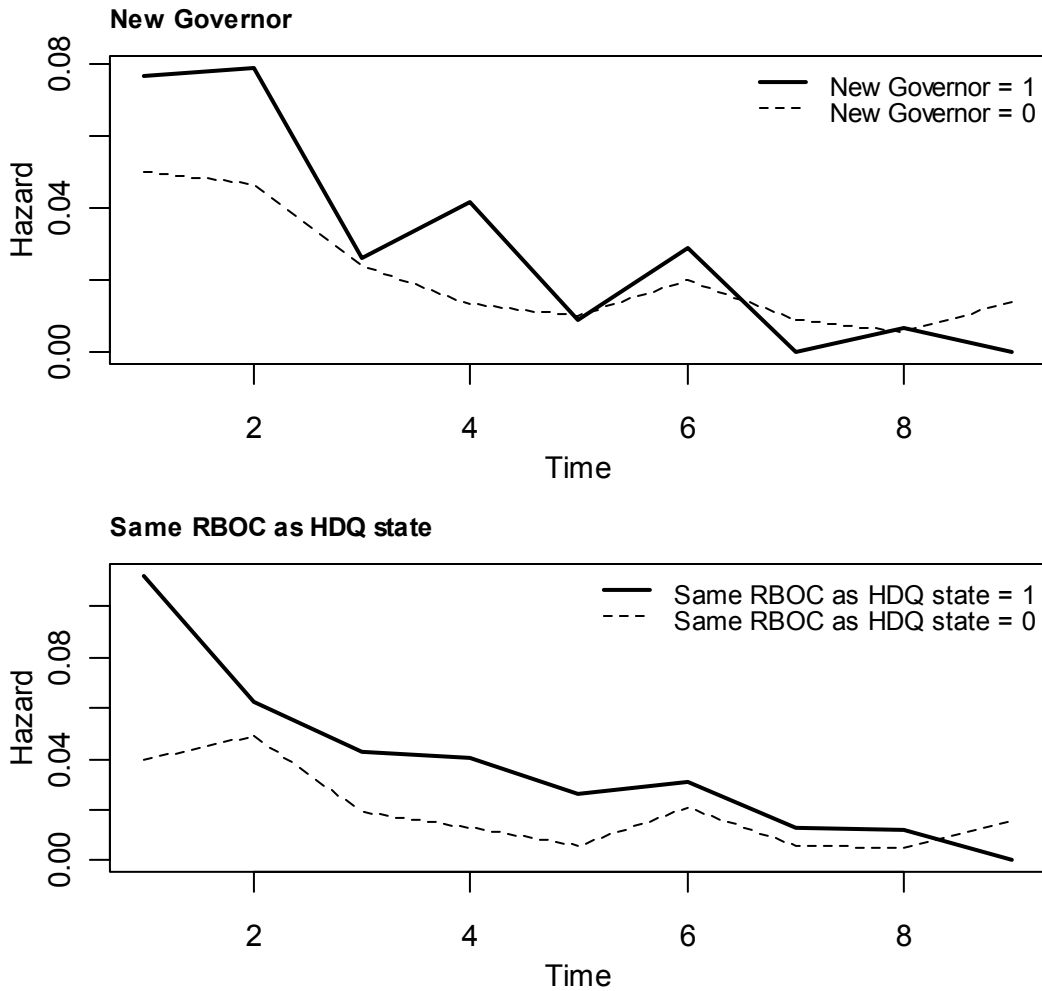
To determine the best representation of time for this analysis, I followed Singer and Willett (2003) and estimated the hazard function at each point in time across all data. This is equivalent to constructing a life-table with no substantive predictors. Figure 8 plots the estimated hazard, odds, logit, and clog-log. Except for jumps in years 6 and 9, both the logit and the clog-log of the hazard appear to be decreasing in roughly linear fashion.

Figure 8. Estimated hazard, odds, logit, and clog-log functions



As an additional check, I estimated within-group hazard functions for two of my independent variables: (1) whether a state received a new governor and (2) whether a state resides in the same RBOC territory as the focal CLEC’s headquarter state. The results are graphed in Figure 9. As with the estimated baseline, the hazards appear to be decreasing linearly for both groups.

Figure 9. Estimated hazard functions for the effect of two predictor variables



A decreasing hazard makes sense within this context. Many CLECs followed the “get big, fast” strategy of quickly expanding their market territories in order to establish

market dominance and take advantage of economies of scale. In some cases, companies grew as quickly as possible because large customer bases made them attractive acquisition targets.

For these reasons, I choose to treat year linearly.

Unobserved Heterogeneity

A typical discrete-time event history model studies a social actor under observation; recidivism, survival after cancer diagnosis, and business failure are all focused on persons or individual organizations. My study is different. My unit of analysis is the CLEC-state dyad. That means that each CLEC and each state are appearing multiple times for each time period in the study. This poses an estimation problem: unobserved heterogeneity, or “frailty.”¹⁷

I assume that all target-state-level heterogeneity is observed because I am including many state-level independent and control variables. I address firm-level unobserved heterogeneity with random effects, which is the typical method for addressing unobserved heterogeneity in event history analysis (Cleves et al., 2002; Therneau & Grambsch, 2000). I do not use fixed effects because fixed effects models can only be applied when there is variance across the predictor variables within each fixed group. For CLECs, this would require each CLEC to appear in a minimum of three reports and would reduce my sample of CLECs from 186 to 112. As a check, however, I ran my final model with firm fixed effects and then ran a random-effects model on the same subsample of 112 firms. The results were substantively similar.

¹⁷ The term “frailty” is most often used in the biostatistics and engineering literatures, where the event studied is typically death or failure. Researchers there are concerned that some individuals or components are inherently more frail –and thus more susceptible to death or failure –than others in the study. Specifically of interest here is the situation commonly called “shared frailty” (Cleves, Gould, & Gutierrez, 2002).

One additional concern is that CLECs founded in the same state may behave similarly. In other words, perhaps all New York-based CLECs expand to the same set of states, all New Mexico-based CLECs expand to the same set of states, etc. To test for this, I ran a my final model with fixed effects on CLEC founding state. The results were substantively similar to the models I will present in the next section.

Summary of Firm-Level Hypotheses

I summarize my hypotheses and model in Table 9. For each hypothesis, I have listed the variable(s) I use to test it along with the predicted direction of its coefficient.

Table 9. Summary of hypotheses for the firm-level expansion analysis

	H #	Variable	Predicted Direction	
Main Effects	Founding Conditions: Ideology	H2.1a	Distance from HDQ state on government ideology	-
		H2.1b	Distance from HDQ state on citizen ideology	-
	Founding Conditions: Regulatory History	H2.2a	Same 1996 local telephone regulation as HDQ state	+
		H2.2b	Distance from HDQ state on incentive-based regulation experience	-
	Legacy Policy	H2.3-1	Same RBOC as HDQ state	+
		H2.3-2	Same RBOC as other state(s) in CLEC's market	+
	Political Regime Change	H2.4a	New commissioner	+
		H2.4b	New party in control of commission	+
		H2.4c	Avg tenure of commissioners	-
		H2.4d	Unit tenure of commission	-
H2.5		New governor	+	
Temporal Effects	Founding Conditions: Ideology	H2.6a	Distance from HDQ state on government ideology × Boom	-
		H2.6b	Distance from HDQ state on citizen ideology × Boom	-
	Founding Conditions: Regulatory History	H2.7a	Same 1996 local telephone regulation as HDQ state × Boom	+
		H2.7b	Distance from HDQ state on incentive-based regulation experience × Boom	-
	Legacy Policy	H2.8-1	Same RBOC as HDQ state × Boom	+
		H2.8-2	Same RBOC as other state(s) in CLEC's market × Boom	+
	Political Regime Change	H2.9a	New commissioner × Boom	+
		H2.9b	New party in control of commission × Boom	+
		H2.9c	Avg tenure of commissioners × Boom	-
		H2.9d	Unit tenure of commission × Boom	-
H2.10		New governor × Boom	+	

RESULTS

Descriptive Statistics

Table 10 reports the summary statistics (mean, standard deviation, and range) for the dependent variable, independent variables, and control variables. (Note that several variables have been scaled to allow for more readable coefficients in the regression output.) Table 11 reports the correlation matrix for all variables. As in the previous chapter, correlations among the variables of theoretical interest (i.e., (13) through (31)) tend to be small in magnitude ($|r| < .30$; less than 10 percent shared variance), and once again those variables that exhibit moderate levels of correlation tend to be related conceptually. This is especially true for ideology, regulatory history, and changes in the public utility commission. As an additional validity check for government ideology, it remains much more strongly correlated with states having Republican governors ($r = -.69$) and Republican-controlled utility commissions ($r = -.40$) when compared with citizen ideology. Overall, it appears unlikely that the estimates in my models will be biased due to multicollinearity, especially across subsets of variables. Still, I will estimate coefficients for subsets of theoretically similar variables before estimating all variables simultaneously. I will also revisit potential multicollinearity issues when reviewing the full model.

Table 10. Descriptive statistics for the firm-level expansion analysis

Variable	Mean	Std. Dev.	Min	Max
Market Entry [DV] (1=yes, 0=no)	0.036	0.185	0	1
State is adjacent to CLEC's HDQ state	0.074	0.262	0	1
State is adjacent to non-HDQ state in CLEC's market	0.199	0.400	0	1
No. of business establishments in state/ 1,000,000	0.131	0.136	0.018	0.842
State population density / 1000	0.172	0.244	0.005	1.170
State median household income / 1000	46.726	6.898	32.495	63.511
CLECs in state / 100	0.000	0.134	-0.169	0.541
CLECs in state / 100, squared	0.018	0.031	0.000	0.293
No. of states within CLEC's hdq RBOC territory that CLEC is not serving	8.213	3.613	0	14
No. of states in which CLEC is operating	6.797	7.445	1	47
Time period (0-indexed to 1)	1.978	2.004	0	8
Era of dot-com boom (1 = Yr <= 2001, 0 = Yr > 2001)	0.690	0.463	0	1
Government ideology / 100	0.430	0.260	0.000	0.979
Citizen ideology / 100	0.478	0.146	0.084	0.960
Difference between government ideologies of state and CLEC's hdq state	-3.324	35.003	-95.417	90.500
Difference between citizen ideologies of state and CLEC's hdq state	-4.085	19.334	-72.465	68.657
State had variant of rate-of-return regulation in 1996 (1=yes, 0=no)	0.475	0.499	0	1
Yrs state had incentive regulation, pre-1996	2.176	2.781	0	9
Difference between yrs of incentive regulation of state and CLEC's hdq state	2.999	2.664	0	9
State and CLEC's hdq state had same type of regulation in 1996 (1=yes, 0=no)	0.500	0.500	0	1
State in same RBOC territory as CLEC's hdq state	0.193	0.394	0	1
State in same RBOC territory as a non-HDQ state in CLEC's market	0.227	0.419	0	1
New commissioner	0.407	0.491	0	1
New party controls regulatory commission	0.119	0.324	0	1
Avg tenure of commissioners	4.797	3.310	0	22
Yrs that current commission has been together as unit	1.297	1.657	0	8
New governor	0.144	0.351	0	1
Avg political sentiment on regulatory commission (1=Repub., 0=Dem.)	0.543	0.265	0	1
Republican governor	0.627	0.483	0	1
No. of commissioners	3.784	1.185	0	7
Elected commissioners (1=yes, 0=no)	0.325	0.468	0	1

Table 11. Correlation matrix for the firm-level expansion analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) Market Entry [DV] (1=yes, 0=no)	—															
(2) State is adjacent to CLEC's HDQ state	.07	—														
(3) State is adjacent to non-HDQ state in CLEC's market	.09	-.14	—													
(4) No. of business establishments in state/ 1,000,000	.07	-.03	-.08	—												
(5) State population density / 1000	.03	-.02	.00	.21	—											
(6) State median household income / 1000	.03	-.05	-.04	.22	.49	—										
(7) CLECs in state / 100	.07	-.03	-.06	.66	.25	.39	—									
(8) CLECs in state / 100, squared	.02	-.02	-.06	.45	.05	.04	.65	—								
(9) No. of states within CLEC's hdq RBOC territory that CLEC is not serving	-.01	.06	-.20	.05	.02	.03	.13	.08	—							
(10) No. of states in which CLEC is operating	-.05	.00	.52	-.14	-.05	-.05	-.14	-.06	-.45	—						
(11) Time period (0-indexed to 1)	-.09	-.02	.18	-.02	.00	.05	-.08	-.07	-.12	.37	—					
(12) Era of dot-com boom (1 = Yr <= 2001, 0 = Yr > 2001)	.09	.02	-.09	.00	-.01	-.04	.15	.14	.07	-.21	-.74	—				
(13) Government ideology / 100	.01	.00	.03	.08	.31	.19	.10	-.05	.01	-.02	.07	-.08	—			
(14) Citizen ideology / 100	.01	-.03	-.02	.15	.55	.31	.12	.08	.00	.00	.05	-.07	.54	—		
(15) Difference between government ideologies of state and CLEC's hdq state	.00	.02	.00	.06	.23	.14	.09	-.02	.06	-.05	.05	-.04	.75	.39	—	
(16) Difference between citizen ideologies of state and CLEC's hdq state	.01	.00	-.01	.12	.45	.26	.11	.09	-.07	.00	.02	-.04	.41	.77	.42	—
(17) State had variant of rate-of-return reg. in 1996 (1=yes, 0=no)	-.03	.00	-.01	-.34	-.25	-.08	-.19	-.22	-.01	.03	.01	.00	-.04	-.20	-.02	-.16
(18) Yrs state had incentive reg., pre-1996	.00	.01	-.01	.21	.21	.02	.00	.15	.00	.01	.00	.00	.09	.27	.06	.21
(19) Difference between yrs of incentive reg. of state and CLEC's hdq state	-.01	.00	-.02	.05	.08	.00	-.04	.04	.01	-.02	-.01	.00	-.01	.05	.03	.04
(20) State and CLEC's hdq state had same type of reg. in 1996 (1=yes, 0=no)	-.01	-.01	.00	-.15	-.10	-.03	-.08	-.09	-.01	.03	.00	.00	-.02	-.08	-.01	-.05
(21) State in same RBOC territory as CLEC's hdq state	.07	.32	.05	-.02	.02	.02	-.02	.00	.18	.01	.00	.00	.02	.05	.03	.03
(22) State in same RBOC territory as a non-HDQ state in CLEC's market	.06	-.07	.47	-.05	-.04	-.03	-.06	-.05	-.19	.49	.18	-.11	-.02	-.04	-.04	-.04
(23) New commissioner	.03	-.01	.00	.17	.06	.07	.14	.06	.02	-.04	-.01	-.05	.09	.12	.07	.09
(24) New party controls regulatory commission	.00	-.01	-.01	-.03	-.04	-.03	-.03	-.04	.00	.00	-.02	.03	.04	.01	.03	.01
(25) Avg tenure of commissioners	-.04	-.03	.01	-.29	-.12	-.21	-.29	-.06	-.01	.07	-.01	.04	-.11	-.03	-.08	-.02
(26) Yrs that current commission has been together as unit	-.02	-.01	.01	-.19	-.08	-.08	-.15	-.06	-.01	.04	.00	.03	-.16	-.10	-.11	-.07
(27) New governor	.02	-.02	.00	.06	.01	.06	.06	.05	.04	.01	.12	-.12	.08	.06	.06	.03
(28) Avg political sentiment on regulatory commission (1=Repub., 0=Dem.)	.01	.02	-.02	.11	.00	.03	.11	.12	.01	-.01	.00	.00	-.40	-.05	-.30	-.04
(29) Republican governor	.00	.00	-.03	.03	.08	-.17	.00	.09	.00	-.01	-.07	.07	-.69	-.07	-.52	-.05
(30) No. of commissioners	.03	-.01	-.02	.26	.14	.15	.27	.10	.04	-.06	.00	-.02	.22	.07	.16	.05
(31) Elected commissioners (1=yes, 0=no)	-.02	.01	-.01	-.26	-.31	-.41	-.17	-.10	.00	.03	.01	-.01	-.29	-.37	-.21	-.30

Variable	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)
(17) State had variant of rate-of-return reg. in 1996 (1=yes, 0=no)	—														
(18) Yrs state had incentive reg., pre-1996	-.53	—													
(19) Difference between yrs of incentive reg. of state and CLEC's hdq state	-.10	.35	—												
(20) State and CLEC's hdq state had same type of reg. in 1996 (1=yes, 0=no)	.43	-.24	.14	—											
(21) State in same RBOC territory as CLEC's hdq state	-.03	.04	.01	-.10	—										
(22) State in same RBOC territory as a non-HDQ state in CLEC's market	.00	-.01	.00	.02	-.26	—									
(23) New commissioner	-.03	-.04	-.03	-.01	.00	-.01	—								
(24) New party controls regulatory commission	.13	-.08	.00	.06	.00	.00	.36	—							
(25) Avg tenure of commissioners	-.11	.22	.07	-.06	.01	.02	-.38	-.16	—						
(26) Yrs that current commission has been together as unit	-.06	.08	.03	-.03	.00	.01	-.65	-.27	.66	—					
(27) New governor	-.03	.01	.01	-.02	.00	.01	.22	.19	.00	-.10	—				
(28) Avg political sentiment on regulatory commission (1=Repub., 0=Dem.)	-.16	.13	.05	-.06	.01	.01	.02	-.07	.00	-.01	-.01	—			
(29) Republican governor	.04	-.06	.01	.02	.00	.00	-.04	-.03	.03	.07	-.07	—			
(30) No. of commissioners	.01	-.08	-.02	.00	-.03	-.03	.21	.02	-.12	-.23	.06	-.21	—		
(31) Elected commissioners (1=yes, 0=no)	.28	-.22	-.02	.12	-.05	.01	-.16	.03	.32	.21	.02	.23	-.01	—	

CLECs appear, on average, in 4.634 reports ($\sigma=2.481$), ranging from 2 reports to 10. Because a CLEC's initial footprint is established by its first appearance in the reports, that first appearance is not analyzed. CLECs therefore are in my dataset for an average of 3.634 years. At their peak, CLECs operated in an average of 10.296 states ($\sigma=2.481$), with a minimum of 1 and a maximum of 47. Figure 10 displays the average CLEC geographic footprint, in terms of number of states, over time.¹⁸ The drop between 1996 and 1997 suggests that many new, small CLECs were started in 1997 and that the CLECs launched in 1996 tended to have larger initial market sizes than those starting in 1997. The rise in the average market size between 1997 and 2000 is likely due to CLECs expanding over time because few CLECs failed during this era. The plateau in size from 2000 to 2005 could be because (a) CLECs stopped expanding, (b) a CLEC's failure was not related to its geographic footprint, or (c) few CLECs were started in these years. Empirical analysis would be necessary to further investigate these possibilities.

¹⁸ For consistency, the graph is created using only the CLECs in the sample, not the entire population of CLECs in the NPRG reports. A graph of the entire population shows an almost identical trend.

Figure 10. Average number of states per CLEC per year, 1996-2005¹⁹

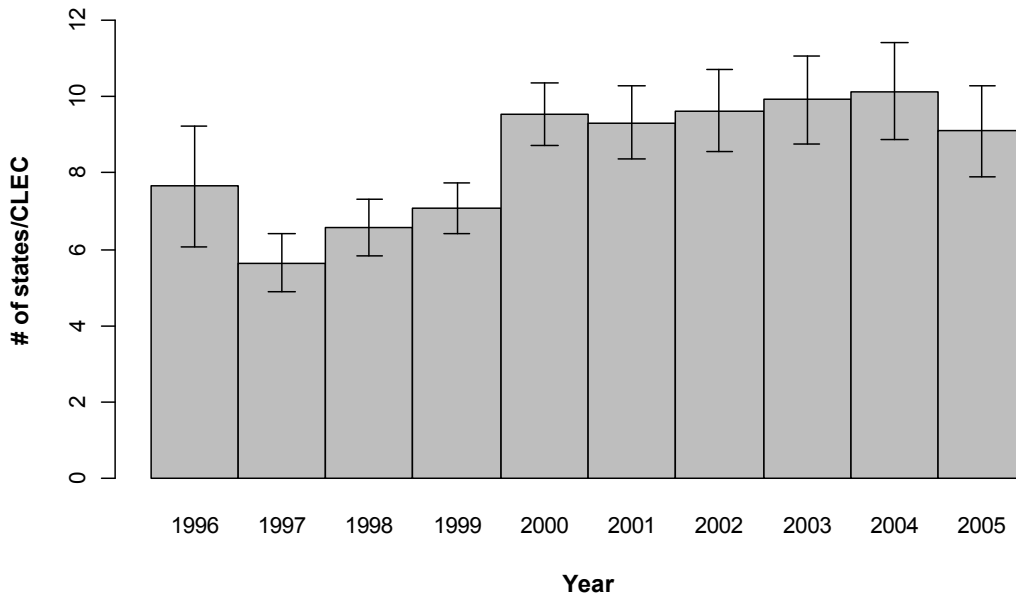
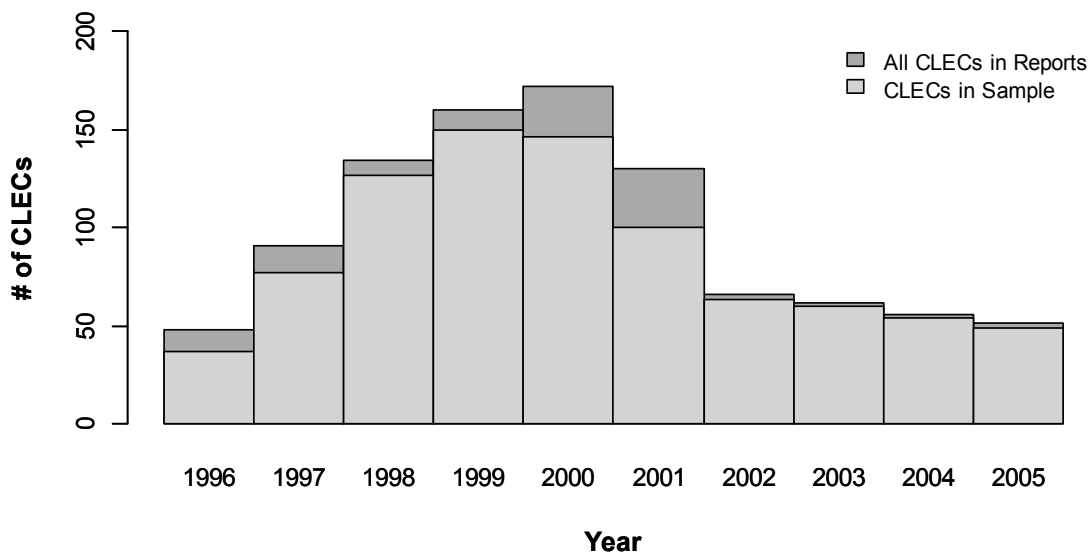


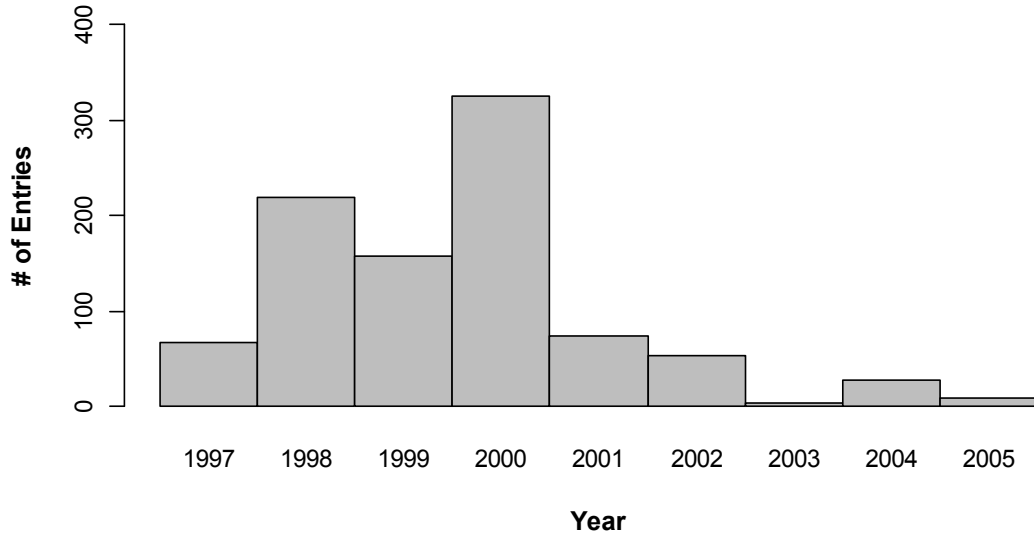
Figure 11 shows density of all CLECs in the NPRG reports (dark bars) and of just the CLECs in this study's sample (light bars). As a population, CLECs grew steadily from 1996 to their peak density in about 2000, then quickly dropped after the dot-com bubble burst. Market entries, shown by year in Figure 12, mirror this trend.

Figure 11. CLEC density across all states, 1996-2005



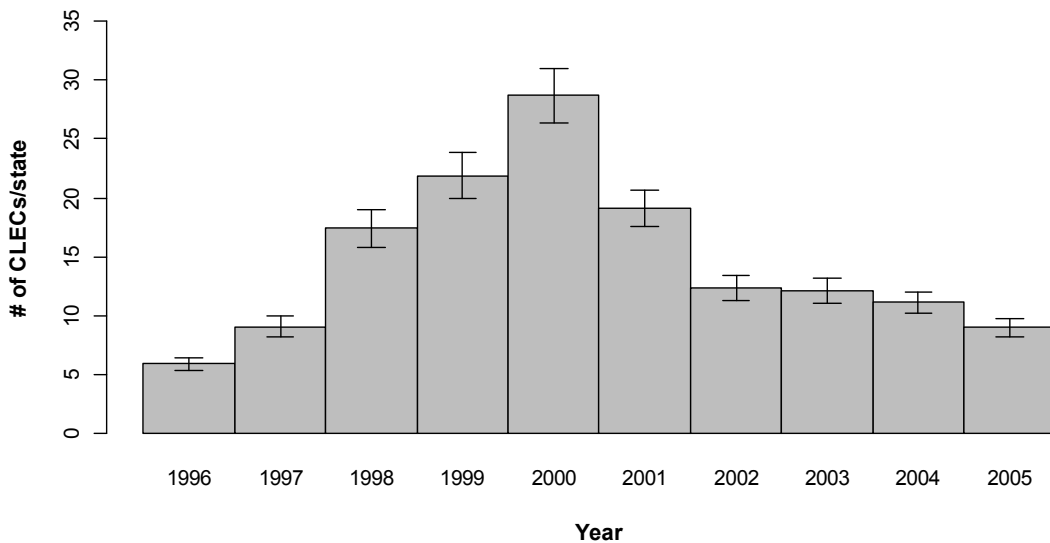
¹⁹ Analysis is only of those CLECs in this study's sample. Error bars indicate +/- 1 standard error.

Figure 12. Number of market entries by all CLECs across all states, 1997-2005



Based on this sample, the average number of CLECs per year within a state is 14.671 ($\sigma=11.594$), ranging from 0 to 62. The average state density per year is displayed in Figure 13. The trend is similar to the overall population density in Figure 11, though slightly less skewed. Thus on average, the typical state experienced peak competition of 28.688 CLECs in 2000.

Figure 13. Average state-level CLEC density, 1996-2005²⁰



²⁰ Error bars indicate +/- 1 standard error.

Regression Analysis

Main Effects

Table 12 and Table 13 report the results of the regression analyses of the main effects. Table 12 contains the logistic regression estimates; Table 13 contains the complementary-log-log estimates. There are 8 models in each table. Model 1 presents a baseline model with only control variables. Models 2-4 test the hypotheses for the effect of a CLEC's founding conditions. Model 2 examines just the ideology variables, model 3 examines the regulatory variables, and model 4 includes both sets of variables. Models 5 and 6 contain blocks of variables for examining the main effects of legacy policy and political regime change, respectively. Model 7 includes variables across the first 6 models. In model 8, I test the sensitivity of the analysis in model 7 by removing control variables that are possibly collinear with the ideology variables ($|r| \geq .20$) and whose estimates had not been significantly different from 0 in any of the previous models. The lone exception is "number of commissioners." Its coefficient was significant in model 7, but I removed it because it was not significant in model 6 and I believed it made sense to remove it when removing the rest of the control variables for political regime change.

Table 12. Logistic regression results for the firm-level main effects CLEC expansion analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State is adjacent to CLEC's HDQ state	1.967** (0.120)	1.943** (0.118)	2.034** (0.120)	1.938** (0.118)	1.457** (0.127)	2.044** (0.120)	1.544** (0.131)	1.466** (0.127)
State is adjacent to non-HDQ state in CLEC's market	1.363** (0.103)	1.332** (0.103)	1.355** (0.105)	1.324** (0.103)	1.008** (0.109)	1.351** (0.105)	1.019** (0.112)	1.041** (0.111)
No. of business establishments in state/ 1,000,000	1.976** (0.311)	2.035** (0.308)	1.667** (0.345)	2.073** (0.336)	1.772** (0.319)	1.520** (0.334)	1.607** (0.396)	1.666** (0.359)
State population density / 1000	-0.016 (0.177)	-0.072 (0.208)	-0.051 (0.185)	-0.062 (0.214)	-0.017 (0.179)	0.000 (0.189)	0.183 (0.248)	
State median household income / 1000	0.008 (0.007)	0.008 (0.007)	0.011 (0.007)	0.008 (0.007)	0.008 (0.007)	0.006 (0.008)	0.002 (0.009)	
CLECs in state / 100	6.852** (0.542)	6.871** (0.536)	8.181** (0.590)	6.774** (0.560)	7.618** (0.558)	7.921** (0.605)	7.717** (0.660)	7.358** (0.546)
CLECs in state / 100, squared	-15.141** (1.819)	-15.554** (1.846)	-17.343** (1.894)	-15.415** (1.874)	-16.668** (1.875)	-17.238** (1.944)	-17.056** (2.024)	-16.649** (1.867)
No. of states within CLEC's hdq RBOC territory that CLEC is not serving	0.090** (0.015)	0.020 (0.013)	0.034* (0.014)	0.020 (0.013)	-0.014 (0.014)	0.028+ (0.015)	-0.106** (0.017)	-0.030* (0.014)
No. of states in which CLEC is operating	-0.087** (0.008)	-0.091** (0.008)	-0.080** (0.008)	-0.091** (0.008)	-0.091** (0.008)	-0.081** (0.009)	-0.147** (0.010)	-0.099** (0.008)
Time period (0-indexed to 1)	-0.026 (0.044)	-0.132** (0.039)	-0.215** (0.041)	-0.131** (0.040)	-0.232** (0.039)	-0.218** (0.043)	-0.020 (0.044)	-0.221** (0.040)
Era of dot-com boom (1 = Yr <= 2001, 0 = Yr > 2001)	0.626** (0.162)	0.413** (0.154)	0.051 (0.160)	0.420** (0.155)	0.195 (0.160)	0.152 (0.163)	0.932** (0.172)	0.308+ (0.169)
Government ideology / 100		-0.980** (0.277)		-0.976** (0.277)			-0.397 (0.458)	-0.754** (0.287)
Citizen ideology / 100		-0.972+ (0.554)		-0.987+ (0.557)			6.641** (0.836)	-0.214 (0.633)
Difference between government ideologies of state and CLEC's hdq state		0.011** (0.002)		0.011** (0.002)			0.002 (0.003)	0.008** (0.002)
Difference between citizen ideologies of state and CLEC's hdq state		0.010* (0.004)		0.010* (0.004)			-0.068** (0.007)	0.002 (0.006)
State had variant of rate-of-return regulation in 1996 (1=yes, 0=no)			0.025 (0.102)	-0.010 (0.101)			-0.053 (0.110)	-0.022 (0.104)
Yrs state had incentive regulation, pre-1996			0.004 (0.020)	-0.011 (0.020)			-0.001 (0.022)	-0.009 (0.021)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State and CLEC's hdq state had same type of regulation in 1996 (1=yes, 0=no)			-0.121 (0.084)	-0.097 (0.083)			0.031 (0.087)	-0.016 (0.085)
Difference between yrs of incentive regulation of state and CLEC's hdq state			-0.018 (0.017)	-0.001 (0.017)			-0.016 (0.019)	0.001 (0.017)
State in same RBOC territory as CLEC's hdq state					1.307** (0.112)		1.401** (0.117)	1.323** (0.114)
State in same RBOC territory as a non-HDQ state in CLEC's market					0.841** (0.117)		0.946** (0.123)	0.844** (0.118)
New commissioner						0.107 (0.110)	0.122 (0.114)	0.165 (0.110)
New party controls regulatory commission						0.032 (0.130)	0.034 (0.134)	-0.066 (0.130)
Avg tenure of commissioners						-0.039+ (0.020)	-0.064** (0.022)	-0.055** (0.020)
Yrs that current commission has been together as unit						0.070+ (0.041)	0.104* (0.042)	0.080* (0.040)
New governor						0.611** (0.109)	0.538** (0.112)	0.609** (0.109)
Avg political sentiment on regulatory commission (1=Repub., 0=Dem.)						0.035 (0.176)	-0.050 (0.183)	
Republican governor						-0.023 (0.104)	-0.072 (0.180)	
No. of commissioners						0.055 (0.036)	0.078* (0.038)	
Elected commissioners (1=yes, 0=no)						-0.028 (0.107)	0.038 (0.120)	
Constant	-5.334** (0.425)	-3.977** (0.449)	-4.457** (0.425)	-3.937** (0.454)	-4.610** (0.424)	-4.608** (0.513)	-8.436** (0.668)	-3.829** (0.363)
Observations	26267	26267	26267	26267	26267	26267	26267	26267
Number of groups	186	186	186	186	186	186	186	186

Standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 13. Complementary log-log regression results for the firm-level main effects CLEC expansion analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State is adjacent to CLEC's HDQ state	1.741** (0.104)	1.748** (0.104)	1.741** (0.104)	1.747** (0.104)	1.277** (0.111)	1.743** (0.104)	1.277** (0.112)	1.275** (0.111)
State is adjacent to non-HDQ state in CLEC's market	1.180** (0.095)	1.186** (0.095)	1.174** (0.096)	1.180** (0.096)	0.875** (0.100)	1.169** (0.095)	0.870** (0.101)	0.869** (0.100)
No. of business establishments in state/ 1,000,000	1.662** (0.289)	1.600** (0.291)	1.699** (0.322)	1.630** (0.323)	1.523** (0.291)	1.550** (0.303)	1.430** (0.348)	1.427** (0.334)
State population density / 1000	-0.081 (0.160)	-0.084 (0.188)	-0.074 (0.167)	-0.075 (0.195)	-0.055 (0.160)	-0.024 (0.169)	0.068 (0.218)	
State median household income / 1000	0.011 (0.007)	0.010 (0.007)	0.011 (0.007)	0.011 (0.007)	0.006 (0.007)	0.007 (0.007)	0.003 (0.008)	
CLECs in state / 100	7.107** (0.561)	7.094** (0.559)	6.986** (0.596)	6.974** (0.594)	7.805** (0.572)	6.699** (0.602)	7.085** (0.626)	7.429** (0.583)
CLECs in state / 100, squared	-15.235** (1.732)	-14.596** (1.761)	-15.073** (1.764)	-14.422** (1.792)	-16.906** (1.772)	-14.906** (1.808)	-15.389** (1.860)	-16.086** (1.776)
No. of states within CLEC's hdq RBOC territory that CLEC is not serving	0.048* (0.023)	0.031 (0.024)	0.049* (0.023)	0.032 (0.024)	0.017 (0.024)	0.043+ (0.023)	-0.000 (0.024)	-0.001 (0.024)
No. of states in which CLEC is operating	-0.091** (0.011)	-0.097** (0.011)	-0.090** (0.011)	-0.096** (0.011)	-0.105** (0.011)	-0.088** (0.011)	-0.106** (0.011)	-0.107** (0.011)
Time period (0-indexed to 1)	-0.010 (0.055)	0.003 (0.057)	-0.007 (0.056)	0.006 (0.057)	-0.036 (0.056)	-0.013 (0.056)	-0.025 (0.058)	-0.027 (0.058)
Era of dot-com boom (1 = Yr <= 2001, 0 = Yr > 2001)	0.613** (0.216)	0.699** (0.224)	0.627** (0.218)	0.711** (0.225)	0.507* (0.215)	0.711** (0.221)	0.689** (0.227)	0.651** (0.226)
Government ideology / 100		-0.308 (0.355)		-0.296 (0.355)			-0.718 (0.443)	-0.391 (0.358)
Citizen ideology / 100		5.412** (1.095)		5.355** (1.096)			5.134** (1.140)	4.877** (1.087)
Difference between government ideologies of state and CLEC's hdq state		0.005 (0.003)		0.004 (0.003)			0.005 (0.003)	0.005 (0.003)
Difference between citizen ideologies of state and CLEC's hdq state		-0.055** (0.011)		-0.055** (0.011)			-0.050** (0.011)	-0.050** (0.011)
State had variant of rate-of-return regulation in 1996 (1=yes, 0=no)			-0.021 (0.092)	-0.028 (0.092)			-0.083 (0.098)	-0.065 (0.095)
Yrs state had incentive regulation, pre-1996			-0.009 (0.019)	-0.010 (0.019)			-0.005 (0.021)	-0.010 (0.020)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State and CLEC's hdq state had same type of regulation in 1996 (1=yes, 0=no)			-0.115 (0.077)	-0.109 (0.077)			0.017 (0.079)	0.011 (0.079)
Difference between yrs of incentive regulation of state and CLEC's hdq state			-0.005 (0.018)	-0.003 (0.019)			-0.010 (0.019)	-0.008 (0.019)
State in same RBOC territory as CLEC's hdq state					1.158** (0.101)		1.169** (0.102)	1.153** (0.102)
State in same RBOC territory as a non-HDQ state in CLEC's market					0.752** (0.112)		0.740** (0.113)	0.727** (0.112)
New commissioner						0.125 (0.099)	0.077 (0.101)	0.091 (0.100)
New party controls regulatory commission						-0.044 (0.116)	-0.034 (0.119)	-0.050 (0.117)
Avg tenure of commissioners						-0.040* (0.019)	-0.053** (0.020)	-0.040* (0.018)
Yrs that current commission has been together as unit						0.059 (0.036)	0.069+ (0.037)	0.051 (0.035)
New governor						0.498** (0.097)	0.411** (0.097)	0.403** (0.096)
Avg political sentiment on regulatory commission (1=Repub., 0=Dem.)						0.014 (0.157)	-0.082 (0.162)	
Republican governor						-0.037 (0.092)	-0.103 (0.158)	
No. of commissioners						0.054+ (0.032)	0.079* (0.033)	
Elected commissioners (1=yes, 0=no)						-0.017 (0.095)	0.054 (0.105)	
Constant	-6.273** (0.487)	-8.907** (0.737)	-6.228** (0.491)	-8.845** (0.741)	-5.964** (0.489)	-6.330** (0.556)	-8.293** (0.803)	-7.933** (0.681)
Observations	26267	26267	26267	26267	26267	26267	26267	26267
Number of group(clec_name)	186	186	186	186	186	186	186	186

Standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Many control variables confirm prior research or assumptions. As with the previous study, CLECs consistently were drawn to states with more businesses. Density dependence was also strongly supported. The model 1 coefficients in both methods suggest a similar peak density: 22.627 CLECs for logit and 23.325 CLECs for clog-log. These estimates are within the range of CLECs observed in states (0 to 62) and a little less than the largest average density recorded: 28.688 CLECs in 2000. Adjacency strongly increases the likelihood of entry. Relative to states that are not adjacent to the focal CLEC's current service area, the odds of a CLEC entering a state that is adjacent to its current market territory are nearly 4 times higher and are over 7 times higher when the target state is adjacent to the CLEC's headquarters state. These estimates become slightly lower when the legacy policy variables are introduced to the model. This is not surprising because there is a bit of overlap between these measures. I will provide a more detailed examination of the effect of adjacency later in this results section. The coefficient for median household income is once again positive, but unlike the previous chapter it is not significantly different from 0. The non-significant coefficient for population density is especially striking because I only analyze the behavior of facilities-based CLECs in this study, and they are the carriers that should benefit the most from a dense population.

The only significant differences between the logit model and the clog-log model are with variables related to time. For the event time (that is, the ordinal year that the firm is in the model), both models tend to estimate negative coefficients. This seems to confirm my initial analysis that the hazard of entering a state decreased with time, though the coefficients were not always significant. The event time coefficient was statistically

significantly different from 0 in six of the logit models but in none of the clog-log models. The methods also differed in their estimates of the coefficient for the dummy variable capturing the dot-com boom era. Both models estimated positive coefficients, though the logit models varied in magnitude and in significance. Boom coefficients estimated for the clog-log model were consistent in size and significant in each model. It is possible that these time discrepancies signify some fundamental difference between the two methods in their ability to model this data. Yet because the methods seldom differ in their estimates of my substantive variables, I do not dwell on this further.

Model 2 tests H2.1a and H2.1b—whether CLECs are more likely to expand into states that are ideologically similar to their headquarters state. Among all substantive variables, the biggest differences between the logit and clog-log models are here. According to the logit model, CLECs are likely to expand into states with conservative government leaders and a conservative citizen populous. The difference variables—the ones that tests the two hypotheses—are significant. The positive sign of their coefficients, however, means CLECs were significantly more likely to expand into states that were *different* from their founding state. This is completely opposite the predictions of H2.1a and H2.1b.

The results of the clog-log models are different. They suggest that CLECs were more likely to expand into states with a liberal citizen ideology and that the effect of government ideology was not significant. Of the two difference scores, only the citizen ideology measure was significant. The negative coefficient here suggests that CLECs were significantly *less* likely to expand into states whose citizen ideologies differed from their founding states. This model provides support for H2.1b but not for H2.1a.

This, of course, begs the question: which method is correct? Or, perhaps better asked, is one method better than the other for this particular dataset? It is unlikely that I can definitively answer this question in this study, yet I will revisit these questions when discussing other models that have these ideology variables as well as other substantive variables.

One other point is worth making here. The high value for citizen ideology in the clog-log model could be misleading. The raw ideology scores have been divided by 100 to make the estimates more readable in the output (that is, to keep from reporting a coefficient of .000 with a standard error of .000 and leaving the reader to guess whether it is or is not significant). Therefore, a 1-unit increase in the variable is actually a 100-point increase—the entire range of the ideology scale. So rather than thinking that a 1-unit increase in citizen ideology increases the hazard ratio over 200 times ($e^{5.412} = 224.079$), a 1-unit increase actually increases it $e^{.01 \times 5.412} = 1.056$ times. This is still a large increase, but it is much more plausible.

Model 3 tests the other pair of founding condition hypotheses, H2.2a and H2.2b—whether CLECs are more likely to expand into states with similar regulatory histories as their headquarters state. This time the logit and clog-log methods produce more similar results. There are still some discrepancies. Specifically, the estimated coefficients for whether the target state was using traditional regulation in 1996 and for its years of experience with incentive-based regulation have different signs in the two models: positive for the logit model, negative for the clog-log. In neither model are the coefficients significant. The difference variables *do* have consistent signs. Both variables in both models are negative, suggesting that CLECs are likely to enter states

whose regulatory signature is similar to its own founding state's regulatory signature. Yet none of the coefficients reach significance, failing to support H2.2a and H2.2b.

In model 4 both sets of founding condition variables are included. The only difference is that the estimated coefficients for whether the target state was using traditional regulation in 1996 and for its years of experience with incentive-based regulation are now negative in the logit model, just as they continue to be in the clog-log model. This, then, does little to address the question about between-method differences in the ideology variables.

Model 5 examines H2.3, the effect that legacy policy has had on CLECs' expansion patterns. Both variables that I include for testing this—whether the target state is in the same RBOC territory as the focal CLEC's headquarters state or whether the target state is in a different RBOC territory presently served by the CLEC—have estimated coefficients that are positive and significant in the logit and clog-log methods. Compared with states that are in an RBOC territory outside the focal CLEC's current service area, the odds of a CLEC entering a state in its home RBOC territory are $e^{1.323} = 3.755$ times higher, while the odds of entering a state in a different RBOC territory that the CLEC already serves are $e^{0.844} = 2.326$ times higher. This provides strong support for H2.3. Yet as mentioned previously, these variables are moderately correlated with the adjacency variables and, in fact, the presence of the legacy policy variables in the model lowers the effect of adjacency. Later I will revisit this issue to ensure that my analysis is indeed capturing the effects of legacy policy and supporting H2.3.

Model 6 tests the political regime change variables, H2.4a-H2.4d and H2.5. The estimates of the theoretical variables are consistent between the logit and clog-log

methods. The only meaningful difference is that the estimated coefficient for unit commission tenure is significant in the logit model but not in the clog-log model. Neither model's coefficient is in the predicted direction, however. The only two estimated coefficients that are significant and in the predicted direction are those for the average commissioner tenure and for a state having a new governor. A one-year decrease in average tenure increases the odds of a CLEC entering the state by $e^{0.039} = 1.040$ times (4.0%); a one-standard deviation decrease (3.310 years) increases the odds by 13.8%. New governors prove to be an even greater attractor of CLECs. The odds of a CLEC entering a state are $e^{0.611} = 1.842$ times (84.2%) higher in the year after the state has elected a new governor. Overall, this model provides no support for H2.4a, H2.4b, and H2.4d but strong support for H2.4c and H2.5.

Model 7 is the full model that includes all explanatory variables, both control and substantive. The coefficients of most substantive variables did not change appreciably in this model, and prior interpretations hold. The exception is the ideology variables in the logistic regression model. The estimated coefficient for citizen ideology has changed signs, and not just slightly. Whereas the interpretation from model 2 was that CLECs expanded into more conservative states, this model suggests that CLECs were much more likely to expand into liberal states. This new coefficient is now similar to the coefficient in the clog-log model. Not surprisingly, this dramatic change is paired with a substantial change in the difference variable for citizen ideology. A significant, positive coefficient has given way to a significant, negative coefficient—which is now in the predicted direction of H2.1b. Estimated coefficients for the government ideology variables also have changed, but not as sharply. The coefficient for the government ideology of the

target state remains negative (CLECs are more likely to enter conservative states) but no longer significant. The coefficient of the government ideology difference variable is also no longer significant but remains positive, which is not the predicted direction of H2.1a.

Wild swings in coefficient estimates (i.e., “bouncing betas”) such as that found in the logit model typically suggest the presence of multicollinearity. I later investigate this concern more systematically, but as a first step I discuss model 8. As explained previously, in this model I removed control variables that showed even minimal signs of collinearity with the ideology variables ($|r| \geq .20$) and whose estimates had not been significantly different from 0 in any of the previous models. Coefficients for the clog-log model remain very stable. For the most part, the coefficients for the logit model remained stable, too. The one exception was, not surprisingly, the ideology variables. The estimate for the citizen ideology coefficient swung back to negative, though it was not statistically significant. The coefficient for the citizen ideology difference score flipped sign to positive. This also was not significant, and it was not in the predicted direction of H2.1b. The estimates for the government ideology variables returned to levels observed in models 2 and 4.

Temporal Effects

Table 14 and Table 15 report the results of the logit and clog-clog regression analyses, respectively, of the temporal effects. Each table contains 6 models. Model 1 presents a baseline model with only control variables. It is the same as model 1 in the main effects analyses. Model 2 tests the hypotheses for the temporal effect of a CLEC’s founding conditions. Model 3 examines just the legacy policy variables as a block, and model 4 does the same for the political regime change variables. Model 5 includes all

variables simultaneously, while in model 6 I remove the same variables that I did in the final model of the main effects analysis. Although I computed the interaction terms with centered main effect variables, I use the non-centered (“raw”) main effect variables in these models. Because centered and raw variables only differ by a constant (specifically, the mean of the raw variable), their estimates are exactly the same. All that is different is the coefficient of the intercept.

Model 2 tests the temporal effect of all the founding condition variables simultaneously—the ideology variables (H2.6a and H2.6b) and the regulatory history variables (H2.7a and H2.7b). First, the ideology variables. With slight differences, the logit and clog-log methods produced estimates that were similar in magnitude, size, and significance. The variables that correspond to the hypotheses are the difference between the ideology scores of the target state and the focal CLEC’s headquarters state interacted with boom for both government ideology (H2.6a) and citizen ideology (H2.6b). For the interaction hypothesis to be supported, the effect of similarity should be stronger during the boom period (boom=1) than afterward (boom=0). Because the difference scores are Euclidean distances of similarity—that is, more similar states have lower difference scores—support for these hypotheses should be given with significant, negative coefficients on the interaction terms. This is what I find for citizen ideology in both the logit and clog-log models (H2.6b supported) but not for government ideology (H2.6a not supported). The interaction between the government ideology difference score and boom is significantly positive, meaning that CLECs were more likely to expand into states with government ideologies that were *different* from those of its founding state and that this effect was stronger during the boom period.

Table 14. Logistic regression results for the firm-level temporal effects CLEC expansion analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)
State is adjacent to CLEC's HDQ state	1.967** (0.120)	2.070** (0.123)	1.458** (0.132)	1.979** (0.120)	1.437** (0.128)	1.440** (0.127)
State is adjacent to non-HDQ state in CLEC's market	1.363** (0.103)	1.415** (0.105)	1.030** (0.110)	1.356** (0.103)	1.033** (0.110)	1.034** (0.110)
No. of business establishments in state/ 1,000,000	1.976** (0.311)	2.256** (0.349)	1.743** (0.323)	1.808** (0.334)	1.974** (0.382)	2.033** (0.363)
State population density / 1000	-0.016 (0.177)	-0.055 (0.219)	-0.022 (0.180)	0.027 (0.191)	0.042 (0.248)	
State median household income / 1000	0.008 (0.007)	0.010 (0.008)	0.008 (0.007)	0.004 (0.008)	0.003 (0.009)	
CLECs in state / 100	6.852** (0.542)	6.570** (0.593)	7.770** (1.192)	6.452** (0.578)	6.450** (0.601)	6.715** (0.546)
CLECs in state / 100, squared	-15.141** (1.819)	-15.453** (1.899)	-17.075** (3.286)	-14.654** (1.898)	-15.705** (1.973)	-16.188** (1.880)
No. of states within CLEC's hdq RBOC territory that CLEC is not serving	0.090** (0.015)	-0.034* (0.015)	-0.014 (0.024)	0.087** (0.015)	-0.022 (0.014)	-0.022 (0.014)
No. of states in which CLEC is operating	-0.087** (0.008)	-0.125** (0.009)	-0.099 (0.000)	-0.085** (0.008)	-0.107** (0.008)	-0.107** (0.008)
Time period (0-indexed to 1)	-0.026 (0.044)	0.033 (0.043)	-0.219** (0.041)	-0.036 (0.044)	-0.116** (0.041)	-0.115** (0.041)
Era of dot-com boom (1 = Yr <= 2001, 0 = Yr > 2001)	0.626** (0.162)	1.129** (0.195)	0.116 (0.190)	0.651** (0.176)	0.630** (0.214)	0.635** (0.210)
Government ideology / 100		-0.525 (0.342)			-0.849+ (0.436)	-0.750* (0.314)
Government ideology / 100 X Boom		-2.453** (0.827)			-3.352** (1.015)	-2.715** (0.795)
Citizen ideology / 100		3.116** (0.669)			-1.657* (0.720)	-1.734** (0.601)
Citizen ideology / 100 X Boom		3.699* (1.558)			5.142** (1.714)	4.547** (1.541)
Difference between government ideologies of state and CLEC's hdq state		0.007* (0.003)			0.008** (0.002)	0.008** (0.002)
Difference between government ideologies of state and CLEC's hdq state X Boom		0.022** (0.006)			0.025** (0.006)	0.025** (0.006)
Difference between citizen ideologies of state and CLEC's hdq state		-0.032** (0.005)			0.015** (0.005)	0.015** (0.005)
Difference between citizen ideologies of state and CLEC's hdq state X Boom		-0.028* (0.012)			-0.033** (0.012)	-0.033** (0.011)
State had variant of rate-of-return regulation in 1996 (1=yes, 0=no)		0.045 (0.121)			0.020 (0.131)	0.061 (0.123)
State had variant of ROR regulation in 1996 X Boom		-0.178 (0.310)			-0.244 (0.336)	-0.287 (0.317)
Yrs state had incentive regulation, pre-1996		-0.009 (0.023)			-0.003 (0.025)	-0.007 (0.024)
Yrs state had incentive regulation, pre-1996 X Boom		0.009 (0.059)			0.047 (0.062)	0.030 (0.061)
State and CLEC's hdq state had same type of regulation in 1996 (1=yes, 0=no)		-0.288** (0.104)			-0.151 (0.104)	-0.153 (0.104)
State and CLEC's hdq state had same type of regulation in 1996 (1=yes, 0=no) X B		0.839** (0.284)			0.917** (0.285)	0.904** (0.284)
Difference between yrs of incentive regulation of state and CLEC's hdq state		-0.016 (0.021)			-0.014 (0.020)	-0.012 (0.020)
Difference between yrs of incentive regulation of state and CLEC's hdq state X B		0.013 (0.055)			-0.001 (0.054)	0.001 (0.054)
State in same RBOC territory as CLEC's hdq state			1.249** (0.131)		1.225** (0.132)	1.214** (0.132)
State in same RBOC territory as CLEC's hdq state X Boom			0.347 (0.321)		0.527 (0.327)	0.502 (0.326)
State in same RBOC territory as a non-HDQ state in CLEC's market			0.809** (0.165)		0.712** (0.130)	0.708** (0.130)
State in same RBOC territory as a non-HDQ state in CLEC's market X Boom			0.209 (0.311)		0.197 (0.306)	0.180 (0.305)
New commissioner				0.152 (0.137)	0.115 (0.141)	0.130 (0.139)

Variable	(1)	(2)	(3)	(4)	(5)	(6)
New commissioner X Boom				0.131 (0.376)	0.228 (0.390)	0.256 (0.379)
New party controls regulatory commission				0.014 (0.147)	-0.020 (0.150)	-0.029 (0.148)
New party controls regulatory commission X Boom				-0.294 (0.386)	-0.369 (0.394)	-0.422 (0.385)
Avg tenure of commissioners				-0.033 (0.026)	-0.062* (0.027)	-0.050* (0.025)
Avg tenure of commissioners X Boom				-0.082 (0.071)	-0.082 (0.074)	-0.075 (0.066)
Yrs that current commission has been together as unit				0.068 (0.050)	0.071 (0.051)	0.064 (0.049)
Unit tenure of commission X Boom				0.104 (0.135)	0.144 (0.139)	0.114 (0.134)
New governor				0.570** (0.115)	0.636** (0.119)	0.635** (0.118)
New governor X Boom				-0.018 (0.285)	-0.068 (0.299)	-0.087 (0.295)
Avg political sentiment on regulatory commission (1=Repub., 0=Dem.)				0.010 (0.198)	-0.028 (0.204)	
Avg political sentiment on commission X Boom				-0.006 (0.524)	-0.127 (0.537)	
Republican governor				0.004 (0.117)	0.003 (0.183)	
Republican governor X Boom				-0.035 (0.304)	-0.240 (0.408)	
No. of commissioners				0.057 (0.042)	0.061 (0.044)	
No. of commissioners X Boom				0.019 (0.110)	0.098 (0.114)	
Elected commissioners (1=yes, 0=no)				-0.027 (0.127)	0.085 (0.143)	
Elected commissioners X Boom				0.006 (0.315)	0.037 (0.376)	
Constant	-5.334** (0.425)	-6.415** (0.507)	-4.471** (0.424)	-5.431** (0.554)	-3.797** (0.648)	-3.484** (0.410)
Observations	26267	26267	26267	26267	26267	26267
Number of group(clec_name)	186	186	186	186	186	186
Standard errors in parentheses						
+ significant at 10%; * significant at 5%; ** significant at 1%						

Table 15. Complementary log-log regression results for the firm-level temporal effects CLEC expansion analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)
State is adjacent to CLEC's HDQ state	1.967** (0.120)	2.070** (0.123)	1.458** (0.132)	1.979** (0.120)	1.437** (0.128)	1.440** (0.127)
State is adjacent to non-HDQ state in CLEC's market	1.363** (0.103)	1.415** (0.105)	1.030** (0.110)	1.356** (0.103)	1.033** (0.110)	1.034** (0.110)
No. of business establishments in state/ 1,000,000	1.976** (0.311)	2.256** (0.349)	1.743** (0.323)	1.808** (0.334)	1.974** (0.382)	2.033** (0.363)
State population density / 1000	-0.016 (0.177)	-0.055 (0.219)	-0.022 (0.180)	0.027 (0.191)	0.042 (0.248)	
State median household income / 1000	0.008 (0.007)	0.010 (0.008)	0.008 (0.007)	0.004 (0.008)	0.003 (0.009)	
CLECs in state / 100	6.852** (0.542)	6.570** (0.593)	7.770** (1.192)	6.452** (0.578)	6.450** (0.601)	6.715** (0.546)
CLECs in state / 100, squared	-15.141** (1.819)	-15.453** (1.899)	-17.075** (3.286)	-14.654** (1.898)	-15.705** (1.973)	-16.188** (1.880)
No. of states within CLEC's hdq RBOC territory that CLEC is not serving	0.090** (0.015)	-0.034* (0.015)	-0.014 (0.024)	0.087** (0.015)	-0.022 (0.014)	-0.022 (0.014)
No. of states in which CLEC is operating	-0.087** (0.008)	-0.125** (0.009)	-0.099 (0.000)	-0.085** (0.008)	-0.107** (0.008)	-0.107** (0.008)
Time period (0-indexed to 1)	-0.026 (0.044)	0.033 (0.043)	-0.219** (0.041)	-0.036 (0.044)	-0.116** (0.041)	-0.115** (0.041)
Era of dot-com boom (1 = Yr <= 2001, 0 = Yr > 2001)	0.626** (0.162)	1.129** (0.195)	0.116 (0.190)	0.651** (0.176)	0.630** (0.214)	0.635** (0.210)
Government ideology / 100		-0.525 (0.342)			-0.849+ (0.436)	-0.750* (0.314)
Government ideology / 100 X Boom		-2.453** (0.827)			-3.352** (1.015)	-2.715** (0.795)
Citizen ideology / 100		3.116** (0.669)			-1.657* (0.720)	-1.734** (0.601)
Citizen ideology / 100 X Boom		3.699* (1.558)			5.142** (1.714)	4.547** (1.541)
Difference between government ideologies of state and CLEC's hdq state		0.007* (0.003)			0.008** (0.002)	0.008** (0.002)
Difference between government ideologies of state and CLEC's hdq state X Boom		0.022** (0.006)			0.025** (0.006)	0.025** (0.006)
Difference between citizen ideologies of state and CLEC's hdq state		-0.032** (0.005)			0.015** (0.005)	0.015** (0.005)
Difference between citizen ideologies of state and CLEC's hdq state X Boom		-0.028* (0.012)			-0.033** (0.012)	-0.033** (0.011)
State had variant of rate-of-return regulation in 1996 (1=yes, 0=no)		0.045 (0.121)			0.020 (0.131)	0.061 (0.123)
State had variant of ROR regulation in 1996 X Boom		-0.178 (0.310)			-0.244 (0.336)	-0.287 (0.317)
Yrs state had incentive regulation, pre-1996		-0.009 (0.023)			-0.003 (0.025)	-0.007 (0.024)
Yrs state had incentive regulation, pre-1996 X Boom		0.009 (0.059)			0.047 (0.062)	0.030 (0.061)
State and CLEC's hdq state had same type of regulation in 1996 (1=yes, 0=no)		-0.288** (0.104)			-0.151 (0.104)	-0.153 (0.104)
State and CLEC's hdq state had same type of regulation in 1996 (1=yes, 0=no) X B		0.839** (0.284)			0.917** (0.285)	0.904** (0.284)
Difference between yrs of incentive regulation of state and CLEC's hdq state		-0.016 (0.021)			-0.014 (0.020)	-0.012 (0.020)
Difference between yrs of incentive regulation of state and CLEC's hdq state X B		0.013 (0.055)			-0.001 (0.054)	0.001 (0.054)
State in same RBOC territory as CLEC's hdq state			1.249** (0.131)		1.225** (0.132)	1.214** (0.132)
State in same RBOC territory as CLEC's hdq state X Boom			0.347 (0.321)		0.527 (0.327)	0.502 (0.326)
State in same RBOC territory as a non-HDQ state in CLEC's market			0.809** (0.165)		0.712** (0.130)	0.708** (0.130)
State in same RBOC territory as a non-HDQ state in CLEC's market X Boom			0.209 (0.311)		0.197 (0.306)	0.180 (0.305)
New commissioner				0.152 (0.137)	0.115 (0.141)	0.130 (0.139)

Variable	(1)	(2)	(3)	(4)	(5)	(6)
New commissioner X Boom				0.131 (0.376)	0.228 (0.390)	0.256 (0.379)
New party controls regulatory commission				0.014 (0.147)	-0.020 (0.150)	-0.029 (0.148)
New party controls regulatory commission X Boom				-0.294 (0.386)	-0.369 (0.394)	-0.422 (0.385)
Avg tenure of commissioners				-0.033 (0.026)	-0.062* (0.027)	-0.050* (0.025)
Avg tenure of commissioners X Boom				-0.082 (0.071)	-0.082 (0.074)	-0.075 (0.066)
Yrs that current commission has been together as unit				0.068 (0.050)	0.071 (0.051)	0.064 (0.049)
Unit tenure of commission X Boom				0.104 (0.135)	0.144 (0.139)	0.114 (0.134)
New governor				0.570** (0.115)	0.636** (0.119)	0.635** (0.118)
New governor X Boom				-0.018 (0.285)	-0.068 (0.299)	-0.087 (0.295)
Avg political sentiment on regulatory commission (1=Repub., 0=Dem.)				0.010 (0.198)	-0.028 (0.204)	
Avg political sentiment on commission X Boom				-0.006 (0.524)	-0.127 (0.537)	
Republican governor				0.004 (0.117)	0.003 (0.183)	
Republican governor X Boom				-0.035 (0.304)	-0.240 (0.408)	
No. of commissioners				0.057 (0.042)	0.061 (0.044)	
No. of commissioners X Boom				0.019 (0.110)	0.098 (0.114)	
Elected commissioners (1=yes, 0=no)				-0.027 (0.127)	0.085 (0.143)	
Elected commissioners X Boom				0.006 (0.315)	0.037 (0.376)	
Constant	-5.334** (0.425)	-6.415** (0.507)	-4.471** (0.424)	-5.431** (0.554)	-3.797** (0.648)	-3.484** (0.410)
Observations	26267	26267	26267	26267	26267	26267
Number of groups	186	186	186	186	186	186
Standard errors in parentheses						
+ significant at 10%; * significant at 5%; ** significant at 1%						

The estimates for the regulatory history coefficients are also similar across the logit and clog-log models. The variables that correspond to the hypotheses are whether the target state and the focal CLEC's headquarters state used the same regulation in 1996 interacted with boom (H2.7a) and the difference between incentive regulation experience of the target state and the focal CLEC's headquarters state interacted with boom (H2.7b). To support H2.7a, the coefficient for the interaction term should be positive as the effect of having the same regulation should be amplified during the boom period compared with afterward. This is indeed the case, and H2.7a is supported. The interaction term for similarity of incentive experience, however, is not significant and H2.7b is not supported.

Model 3 examines H2.8—whether the effect of legacy policy is conditional on time. In both the logit and clog-log models, the main effects of the two legacy policy variables remain significant, but their interactions with boom are not. This fails to support H2.8.

Model 4 tests the political regime change variables for the commission (H2.9a-H2.9d) and governor (H2.10). The only significant coefficient in either model is for the main effect of states having a new governor. None of the interaction terms differ significantly from 0; H2.9a-H2.9d and H2.10 are not supported.

Model 5 is the full model with all explanatory variables from the first four models. Results for the variables related to the hypotheses of this section remain consistent. The coefficients for the interaction variables of citizen ideology difference scores and same regulation in 1996 remain significant and in their predicted respective directions, which strengthens support for H2.6b and H2.7a.

As with the main effect analysis, I ran one additional analysis—model 6 here—where I removed several control variables from the full model as one way of assessing whether the results were due to multicollinearity. This had no impact on any of the coefficients, let alone the coefficients of interest.

Diagnostics

As with the previous study, this study showed signs of potential multicollinearity. Overall the estimated coefficients remained stable in the logit and clog-log models, but certain variables, particularly those related to ideology, exhibited potential effects of multicollinearity (e.g., large changes in value, sign changes). I addressed this in the analysis by re-running the full models after removing several control variables that were correlated with substantive predictors. Yet to be consistent with the previous chapter, I examined potential collinearity further by computing variance inflation factors (VIF).

Table 16 and Table 17 report the VIFs for all variables in the main effects analysis and the temporal effects analysis, respectively. Each table reports two VIF scores per variable. The first is for the full model with all variables (model 7 in Table 12 and Table 13; model 5 in Table 14 and Table 15), and the second is for the reduced model with several control variables removed. According to the rule-of-thumb that multicollinearity is not a problem if the maximum VIF is less than 10, these models should be collinearity-free. In the main effects analysis (Table 16), the largest VIF in the full model was 6.18 with $VIF_{\text{mean}} = 2.26$ and the largest VIF in the full model was 6.75 with $VIF_{\text{mean}} = 2.29$. Yet once again there are indicators that several variables were sharing a substantial amount of variance. After removing several control variables, the largest VIF was reduced to 3.26 (citizen ideology) with $VIF_{\text{mean}} = 2.01$. Results are

similar in the temporal effects models (Table 17). Removing the control variables reduced VIF_{mean} to 2.03 with the citizen ideology \times boom variable having the largest VIF, 3.50.

The same explanation from the previous chapter for why multicollinearity symptoms appeared in the full model but were attenuated in the reduced model applies here. Government ideology was again the variable with the highest VIF in both full models, and the control variables that I removed included the political party affiliation of the governor and the regulatory commission. Compared with the full model, the reduced model provides a better sense of the degree to which these data can support this study's hypotheses.

Table 16. Variance inflation factors (VIFs) for the firm-level main effects expansion analysis

Variable	Model 7	Model 8
State is adjacent to CLEC's HDQ state	1.18	1.17
State is adjacent to non-HDQ state in CLEC's market	1.63	1.62
No. of business establishments in state/ 1,000,000	2.27	2.14
State population density / 1000	2.27	
State median household income / 1000	2.17	
CLECs in state / 100	3.81	2.96
CLECs in state / 100, squared	2.20	1.94
No. of states within CLEC's hdq RBOC territory that CLEC is not serving	1.38	1.38
No. of states in which CLEC is operating	2.14	2.14
Time period (0-indexed to 1)	2.54	2.54
Era of dot-com boom (1 = Yr <= 2001, 0 = Yr > 2001)	2.43	2.41
New commissioner	2.01	1.98
New party controls regulatory commission	1.23	1.21
Avg tenure of commissioners	2.46	2.16
Yrs that current commission has been together as unit	2.84	2.75
New governor	1.12	1.11
Avg political sentiment on regulatory commission (1=Repub., 0=Dem.)	1.52	
Republican governor	4.07	
No. of commissioners	1.32	
Elected commissioners (1=yes, 0=no)	1.76	
State in same RBOC territory as CLEC's hdq state	1.36	1.36
State in same RBOC territory as a non-HDQ state in CLEC's market	1.66	1.66
Government ideology / 100	6.18	2.99
Citizen ideology / 100	4.25	3.26
Difference between government ideologies of state and CLEC's hdq state	2.57	2.57
Difference between citizen ideologies of state and CLEC's hdq state	2.80	2.79
State had variant of rate-of-return regulation in 1996 (1=yes, 0=no)	1.96	1.87
Yrs state had incentive regulation, pre-1996	1.99	1.81
State and CLEC's hdq state had same type of regulation in 1996 (1=yes, 0=no)	1.24	1.23
Difference between yrs of incentive regulation of state and CLEC's hdq state	1.32	1.31
Mean VIF	2.26	2.01

Table 17. Variance inflation factors (VIFs) for the firm-level temporal effects expansion analysis

Variable	Model 5	Model 6
State is adjacent to CLEC's HDQ state	1.18	1.18
State is adjacent to non-HDQ state in CLEC's market	1.64	1.63
No. of business establishments in state/ 1,000,000	2.34	2.19
State population density / 1000	2.38	
State median household income / 1000	2.37	
CLECs in state / 100	3.87	3.01
CLECs in state / 100, squared	2.26	1.98
No. of states within CLEC's hdq RBOC territory that CLEC is not serving	1.38	1.38
No. of states in which CLEC is operating	2.15	2.15
Time period (0-indexed to 1)	2.59	2.58
Era of dot-com boom (1 = Yr <= 2001, 0 = Yr > 2001)	2.49	2.45
Government ideology / 100	6.75	3.04
Government ideology / 100 X Boom	5.36	2.94
Citizen ideology / 100	4.55	3.32
Citizen ideology / 100 X Boom	4.29	3.50
Difference between government ideologies of state and CLEC's hdq state	2.61	2.61
Difference between government ideologies of state and CLEC's hdq state X Boom	2.55	2.55
Difference between citizen ideologies of state and CLEC's hdq state	2.81	2.80
Difference between citizen ideologies of state and CLEC's hdq state X Boom	2.93	2.92
State had variant of rate-of-return regulation in 1996 (1=yes, 0=no)	2.06	1.85
State had variant of ROR regulation in 1996 X Boom	1.96	1.81
Yrs state had incentive regulation, pre-1996	2.04	1.93
Yrs state had incentive regulation, pre-1996 X Boom	1.86	1.82
State and CLEC's hdq state had same type of regulation in 1996 (1=yes, 0=no)	1.33	1.33
State and CLEC's hdq state had same type of regulation in 1996 (1=yes, 0=no) X Boom	1.40	1.40
Difference between yrs of incentive regulation of state and CLEC's hdq state	1.25	1.24
Difference between yrs of incentive regulation of state and CLEC's hdq state X Boom	1.25	1.24
State in same RBOC territory as CLEC's hdq state	1.37	1.36
State in same RBOC territory as CLEC's hdq state X Boom	1.12	1.12
State in same RBOC territory as a non-HDQ state in CLEC's market	1.69	1.68
State in same RBOC territory as a non-HDQ state in CLEC's market X Boom	1.13	1.13
New commissioner	2.11	2.05
New commissioner X Boom	2.24	2.18
New party controls regulatory commission	1.28	1.23
New party controls regulatory commission X Boom	1.28	1.22
Avg tenure of commissioners	2.68	2.29
Avg tenure of commissioners X Boom	2.43	1.92
Yrs that current commission has been together as unit	2.98	2.81
Unit tenure of commission X Boom	2.99	2.78
New governor	1.20	1.18
New governor X Boom	1.22	1.20
Avg political sentiment on regulatory commission (1=Repub., 0=Dem.)	1.55	
Avg political sentiment on commission X Boom	1.57	
Republican governor	4.52	
Republican governor X Boom	3.08	
No. of commissioners	1.37	
No. of commissioners X Boom	1.17	
Elected commissioners (1=yes, 0=no)	1.85	
Elected commissioners X Boom	1.67	
Mean VIF	2.29	2.03

Secondary Analysis

Previous analysis noted that coefficients for the legacy policy variables and the control variables for adjacency were both significant. I also noted that the estimated effect of adjacency on entry declined only in the presence of the legacy policy variables. I mentioned that this was not surprising because the two sets of variables are somewhat related. Specifically, RBOCs were constructed as contiguous blocks of states. The correlations between the measures are far from perfect (correlations between RBOC relationship and adjacency are $r = .32$ and $r = .47$ with respect to the focal CLEC's headquarter state and the rest of the CLEC's service area, respectively), but given the degree to which I have argued that policy shapes entrepreneurship and industry development, I find it prudent to tease out the separate effects of the two arguments.

To do so, I constructed a set of dummy variables that serve as mutually exclusive and exhaustive legacy policy \times adjacency categories. Recall that I created two dummy variables for legacy policy: (1) whether the target state is in the same RBOC territory as the focal CLEC's headquarter state, and (2) whether the target state is in a different RBOC territory in the CLEC's service area. Implicit, then, is a third possible dummy variable: (3) whether the state is not in *any* RBOC territory in which the focal CLEC's currently operates. For the 48 states in the continental U.S., these form a mutually exclusive and exhaustive set for determining a target state's connection to a focal CLEC through the CLEC's pre-existing RBOC relationships. For adjacency, I consider two possibilities: (1) a state is adjacent to a state in the CLEC's current market or (2) it is not. Cross-multiplying these categories, legacy policy \times adjacency, provides a set of six mutually exclusive and exhaustive dummy variables:

1. Target state is in same RBOC as CLEC's headquarter state and is adjacent to the CLEC's service area
2. Target state is in same RBOC as CLEC's headquarter state but is not adjacent to the CLEC's service area
3. Target state is in same RBOC as a non-headquarter state in CLEC's market and is adjacent to the CLEC's service area
4. Target state is in same RBOC as a non-headquarter state in CLEC's market but is not adjacent to the CLEC's service area
5. Target state is in RBOC outside the CLEC's current market but is adjacent to the CLEC's service area
6. Target state is in RBOC outside the CLEC's current market and is not adjacent to the CLEC's service area

Figure 14 provides a tabular representation for this set of variables.

Figure 14. The mutually exclusive and exhaustive legacy policy × adjacency categories

		Target state is adjacent to CLEC market	
		Yes	No
Target state is within RBOC territory of...	Focal CLEC's Headquarter RBOC	1	2
	Other RBOC in focal CLEC's territory	3	4
Target state is not in an RBOC territory currently served by focal CLEC		5	6

I can clarify this further with an example. Suppose that in 1997 a Michigan-based CLEC also operated in North Carolina. At the time, Michigan was in the Ameritech territory, and North Carolina was served by BellSouth. When creating this hypothetical CLEC’s risk set for entry in 1998, each target state’s values for these six variables are determined by the state’s RBOC and its physical proximity to either Michigan or North Carolina. Table 18 displays the values of these the variables using one representative state per variable: Ohio, Illinois, Georgia, Florida, Virginia, and Iowa.

Table 18. Example values for the mutually exclusive and exhaustive legacy policy × adjacency variables

Target State	Same RBOC as HDQ state; adjacent	Same RBOC as HDQ state; not adjacent	Same RBOC as non-HDQ state; adjacent	Same RBOC as non-HDQ state; not adjacent	In RBOC outside CLEC’s market; adjacent	In RBOC outside CLEC’s market; not adjacent
Ohio	1	0	0	0	0	0
Illinois	0	1	0	0	0	0
Georgia	0	0	1	0	0	0
Florida	0	0	0	1	0	0
Virginia	0	0	0	0	1	0
Iowa	0	0	0	0	0	1

Ohio is in Michigan’s home RBOC, Ameritech, and is also adjacent to Michigan. Illinois is another Ameritech state, but it is not adjacent to Michigan. Georgia is part of BellSouth territory and is adjacent to North Carolina. Florida is a BellSouth state that is not adjacent to North Carolina. Virginia is not in Ameritech or BellSouth territory. In 1997 it was served by Bell Atlantic. It is, though, adjacent to North Carolina. Iowa is neither in the same RBOC territory as Michigan or North Carolina nor is it adjacent to either state.

I re-ran the main effects analysis—both the logit and clog-log models—by replacing the adjacency and legacy policy measures with this set of dummy variables. These variables comprise an orthogonal set, so I cannot include all variables simultaneously. I elected to omit the category where the target state is in the focal CLEC’s home RBOC but is not adjacent to the CLEC’s current service area. This

decision was driven by my theory. I am interested in assessing the extent to which expansion decisions are guided by the pre-existing relationships a CLEC has with the incumbent carriers. What happens when the focal CLEC has a pre-existing relationship with the RBOC of a target state but does not have a state in its service area presently adjacent to that target state? How does that compare to situations where there is no pre-existing RBOC relationship and only adjacency applies? As for the different types of relationships, does it make any difference if the state is in the CLEC's home RBOC rather than a different RBOC in the CLEC's market?

I ran two models: one with these variables and the reduced set of controls and one where I have added the other substantive variables. Results are in Table 19. Results for the control variables and the other independent variables are similar to those in the main effects analysis. In regard to the legacy policy \times adjacency variables, no major between-method differences appear. The only within-method difference I observed is for the category where the target state is adjacent to the focal CLEC's service area and is served by an RBOC with whom the CLEC already has a relationship, albeit not the RBOC of the CLEC's home state. In model 1 the coefficient for this variable is positive, but in model 2 it is negative. Because it happens with both methods, none of the estimated coefficients for this variable are significant, and VIF scores are all very low²¹, I am not concerned with this.

²¹ VIF analysis shows little sign of multicollinearity. For the full model, the largest VIF is 3.26 (citizen ideology) with $VIF_{\text{mean}} = 2.01$.

Table 19. Regression results for the secondary analysis of firm-level CLEC expansion

Variable	Logit		Cloglog	
	(1)	(2)	(1)	(2)
No. of business establishments in state/ 1,000,000	1.608** (0.315)	1.565** (0.355)	1.131** (0.267)	1.419** (0.305)
CLECs in state / 100	8.170** (0.543)	7.069** (0.537)	8.320** (0.474)	6.789** (0.481)
CLECs in state / 100, squared	-18.952** (1.844)	-16.396** (1.875)	-18.102** (1.681)	-15.485** (1.688)
No. of states within CLEC's hdq RBOC territory that CLEC is not serving	-0.026 (0.016)	-0.015 (0.014)	0.002 (0.014)	0.022 (0.014)
No. of states in which CLEC is operating	-0.097** (0.009)	-0.088** (0.008)	-0.063** (0.009)	-0.079** (0.007)
Time period (0-indexed to 1)	-0.078+ (0.044)	-0.138** (0.040)	-0.213** (0.040)	-0.013 (0.038)
Era of dot-com boom (1 = Yr <= 2001, 0 = Yr > 2001)	0.733** (0.175)	0.493** (0.160)	0.059 (0.149)	0.707** (0.143)
In same RBOC as hdq state, adjacent	1.076** (0.151)	0.988** (0.148)	0.937** (0.128)	0.964** (0.126)
In same RBOC as a non-hdq state, adjacent	0.122 (0.314)	-0.062 (0.306)	0.211 (0.280)	-0.044 (0.276)
In same RBOC as a non-hdq state, not adjacent	-0.260* (0.122)	-0.360** (0.115)	-0.201+ (0.104)	-0.200+ (0.103)
In RBOC outside CLEC's market, adjacent	0.056 (0.245)	0.058 (0.242)	0.095 (0.211)	0.008 (0.209)
In RBOC outside CLEC's market, not adjacent	-1.587** (0.122)	-1.577** (0.120)	-1.392** (0.106)	-1.374** (0.106)
Government ideology / 100		-1.014** (0.294)		-0.618* (0.268)
Citizen ideology / 100		-0.616 (0.535)		3.205** (0.477)
Difference between government ideologies of state and CLEC's hdq state		0.012** (0.002)		0.008** (0.002)
Difference between citizen ideologies of state and CLEC's hdq state		0.003 (0.004)		-0.033** (0.004)
Yrs state had incentive regulation, pre-1996		-0.016 (0.020)		-0.012 (0.018)
State had variant of rate-of-return regulation in 1996 (1=yes, 0=no)		-0.105 (0.104)		-0.097 (0.093)
Difference between yrs of incentive regulation of state and CLEC's hdq state		-0.005 (0.017)		-0.033* (0.015)
State and CLEC's hdq state had same type of regulation in 1996 (1=yes, 0=no)		0.014 (0.085)		0.060 (0.077)
New commissioner		0.229* (0.110)		0.162 (0.098)
New party controls regulatory commission		-0.103 (0.129)		-0.098 (0.116)
Avg tenure of commissioners		-0.063** (0.020)		-0.050** (0.018)
Yrs that current commission has been together as unit		0.105** (0.040)		0.079* (0.035)
New governor		0.549** (0.109)		0.408** (0.095)
Constant	-2.985** (0.273)	-2.063** (0.357)	-2.615** (0.239)	-5.218** (0.369)
Observations	26267	26267	26267	26267
Number of groups	186	186	186	186
Standard errors in parentheses				
+ significant at 10%; * significant at 5%; ** significant at 1%				

The models suggest that while adjacency is important, a pre-existing relationship with the RBOC of a state has a strong—and perhaps equal—effect on a CLEC’s expansion decision. As one would expect, among states in their home RBOC territory, CLECs were more likely to expand into adjacent states than into non-adjacent states. Using coefficients from logit model 2, the odds of expanding into adjacent states were $e^{0.988} = 2.686$ times higher. Also as one would expect, among non-adjacent states, CLECs were more likely to expand into states within the RBOC territories that they were currently serving. The effect was strongest for states within a CLEC’s home RBOC territory. Compared with those states, CLECs were 30% ($e^{-0.360} = 0.698$) less likely to enter a non-adjacent state in a different, non-home RBOC territory and 79% ($e^{-1.577} = 0.207$) less likely to enter a non-adjacent state that is not in an RBOC territory currently served by the CLEC. This provides strong support for H3.

Yet the findings suggest that RBOC boundaries may have an even stronger effect on a CLEC’s expansion decisions than initially hypothesized. Interestingly, there is no statistical difference between states in the CLEC’s home RBOC territory that are not adjacent to any state in the CLEC’s current service area and states that are outside the CLEC’s home RBOC territory but *are* adjacent to at least one state in the CLEC’s footprint. That is, CLECs are as likely to enter states in the RBOC territory of their headquarters state despite not being adjacent to them as they are to enter states that are adjacent to other states they already serve but that are in other RBOC territories that they serve ($\beta = -0.062$) or are in RBOC territories entirely outside their market ($\beta = 0.058$). This suggests that in certain cases the effects of legacy policy are no different from the effects of adjacency.

DISCUSSION

The purpose of this study was to examine how certain institutional conditions of the political environment—namely, a firm’s founding conditions with respect to the political ideology and regulatory history of its headquarters state; lingering effects of legacy policy; and changes in a state’s political regime—affected which states new competitive local telephone service providers elected to enter when they decided to expand their services beyond their home states. Findings from this study support the idea that such institutional conditions can indeed matter, though as with the state-level analysis support for certain predictions was somewhat mixed. A summary of the results and their support for the hypotheses is presented in Table 20.

Regarding the effect of founding conditions, my theory was that the political environment of a CLEC’s founding state would cause the CLEC to develop certain qualities or strengths that would make entry into similar states more likely. I examined this on two dimensions: political ideology and regulatory history. According to the results, a CLEC was more likely to expand into states with citizen ideologies similar to its headquarters state, and this effect was attenuated over time. The similarity between the target states’ government ideologies and that of the CLECs’ headquarters state was significantly opposite my prediction. CLECs were more likely to expand into states whose government officials held different political ideologies than the government officials in the headquarters state, an effect that also attenuated over time.

Table 20. Summary of results for the firm-level CLEC expansion analysis

	H #	Variable	Predicted Direction	Result	
Main Effects	Founding Conditions: Ideology	H2.1a	Distance from HDQ state on government ideology	-	Not supported
		H2.1b	Distance from HDQ state on citizen ideology	-	Partially supported
	Founding Conditions: Regulatory History	H2.2a	Same 1996 local telephone regulation as HDQ state	+	Not supported
		H2.2b	Distance from HDQ state on incentive-based regulation experience	-	Not supported
	Legacy Policy	H2.3-1	Same RBOC as HDQ state	+	Supported
		H2.3-2	Same RBOC as other state(s) in CLEC's market	+	Supported
	Political Regime Change	H2.4a	New commissioner	+	Not supported
		H2.4b	New party in control of commission	+	Not supported
		H2.4c	Avg tenure of commissioners	-	Supported
		H2.4d	Unit tenure of commission	-	Not supported
H2.5		New governor	+	Supported	
Temporal Effects	Founding Conditions: Ideology	H2.6a	Distance from HDQ state on government ideology × Boom	-	Not supported
		H2.6b	Distance from HDQ state on citizen ideology × Boom	-	Supported
	Founding Conditions: Regulatory History	H2.7a	Same 1996 local telephone regulation as HDQ state × Boom	+	Supported
		H2.7b	Distance from HDQ state on incentive-based regulation experience × Boom	-	Not supported
	Legacy Policy	H2.8-1	Same RBOC as HDQ state × Boom	+	Not supported
		H2.8-2	Same RBOC as other state(s) in CLEC's market × Boom	+	Not supported
	Political Regime Change	H2.9a	New commissioner × Boom	+	Not supported
		H2.9b	New party in control of commission × Boom	+	Not supported
		H2.9c	Avg tenure of commissioners × Boom	-	Not supported
		H2.9d	Unit tenure of commission × Boom	-	Not supported
H2.10		New governor × Boom	+	Not supported	

Yet as with the state-level study, the results for the ideology variables should be interpreted with caution. The use of similarity scores eliminates the debate over whether Republicans or Democrats are more likely to prefer deregulation of the local telephone industry provided the preferences remain consistent across the party. As I discussed with the last study, this is likely not the case. The issue of measurement also remains. Not only are the political ideology variables likely conflating economic conservatism with social conservatism, but evidence of multicollinearity was slightly worse in this study

compared to the state-level analysis. Once again the ideology variables appeared to be driving this.

The regulatory history variables have a similar split finding regarding any imprinting effect they may have had. CLECs were indeed more likely to expand into states that were using the same type of local telephone regulation in 1996 as was used in the CLECs' headquarters states, though only early in the industry development. The amount of experience a target state had using incentive-based regulation appears to have had no statistical impact on influencing whether a CLEC entered it when considered relative to a CLEC's founding state.

Perhaps the strongest effects of this study were those for legacy policy. The results show that when CLECs expanded their service territory to other states, they were much more likely to choose states that fell within the geographical boundaries of the RBOCs, even though those boundaries neither pertain to the CLECs nor remain in effect for the RBOCs. Subsequent analysis showed that this finding held even when separating out the effects of legacy policy from those of adjacency. One could even argue that the forces of the RBOC boundaries are substitutable with the effect of adjacency. CLECs were as likely to enter non-adjacent states that were within the same RBOC boundaries as their headquarters state as they were to enter states that were adjacent to their current geographic footprint but were in an RBOC territory outside their current market. Though I have documented the relationship with this study, I am unable to state the exact mechanism for this behavior. I have, though, raised two possibilities. One is through reduced transaction costs. Part of the process of beginning operations in a new state includes reaching an agreement that lets the CLEC interconnect its network with the

incumbents' network. By expanding into a state whose incumbent carrier is an RBOC with whom the CLEC already has done business, the CLEC could save on its search costs and legal costs. A second possibility is that the RBOC boundaries provided implicit definition for local telephone markets. Over the 12-year period between the divestiture of AT&T in 1984 and the Telecommunications Act of 1996, these boundaries may have taken on additional significance than just one way of evenly splitting up AT&T's local telephone business. As each RBOC came to be seen less as a company and more as a market territory, their boundaries may eventually have come to serve as psychological barriers to expansion for CLECs. Additional research would be necessary to distinguish between these two possibilities.

Changes in a state's political regime once again influenced the growth of its CLEC industry. As with the state-level analysis, new governors had a significant, positive effect on the likelihood that a CLEC would expand into a target state. This effect held through the entire study period. Changes in the regulatory commissions had some influence. As the average tenure of commissioners within a state declined—that is, as commissions saw more turnover in their leadership—CLECs became more likely to enter. This effect, too, did not vary over time.

Finally, a word on model specification. I analyzed my data with a discrete time event history model, and I reported results using both logistic regression and complementary log-log regression. For the most part, the two models provided extremely similar results. This was not surprising because when the hazard rate of an event is low, the odds ratio and the hazard ratio are almost identical. Yet there were differences. Ignoring any differences in coefficient values, the clog-log results tended to be more

stable than the logit results. This was especially true for the ideology variables, which, as I pointed out, exhibited “bouncing betas” in the logit models but not in the clog-log models. Does this mean that the clog-log models are preferable to the logit models? Perhaps, though not necessarily. I would need to conduct more in-depth analysis to assess whether the data are on a better fit for the proportional-odds assumption of logistic regression or the proportional-hazard assumption of the complementary log-log regression.

CHAPTER VII: CONCLUSION

INTRODUCTION

In Chapter I, I noted that this dissertation was motivated by a particular question: How does deregulation lead to competition? I pointed out that the popular conception that deregulation equates to the lifting of all government influence was typically inaccurate because deregulation remained very much under the control of the government. At least until new entrants can be firmly established, deregulation typically involves a shift in how regulation takes place: from monopolies to competition. Entrepreneurial opportunities still arise in this type of deregulation, but rather than a Field of Dreams notion of deregulation and entrepreneurship (“If you deregulate it, entrepreneurs will come!”), I argued that the process remains a political one complete with individual state actors, potentially competing interests, and path dependence.

To study this relationship between deregulation and entrepreneurship, I chose to examine the competitive local telephone service industry, which had been created as part of the federal Telecommunications Act of 1996. Regulators within state governments had historically played a large role in governing the industry and continued to be the primary level of government to oversee and implement the federal deregulatory policy. The main purpose of this dissertation, then, was to analyze how the competitive local telephone service industry developed differently across states as a function of state political environments. To do so, I studied the growth of the competitive local telephone

service industry at two different levels of analysis: the state and the firm. Across both levels of analysis, I was particularly interested in the effect of a state's political ideology, regulatory history, and turnover among its government leaders. I also had an interest in examining whether these effects, if present, remained constant over time or became attenuated as the industry developed and moved closer to a "true" deregulated state.

I conclude this dissertation by reviewing my findings, highlighting key contributions, pointing out the limitations of my analysis, and mentioning future work that can fit into this research stream.

SUMMARY OF RESULTS

In Chapter V, I examined variation in state-level founding rates of CLECs between 1997 and 2006. I found that states with more experience with incentive-based regulation had higher CLEC founding rates and that this effect was stronger in the early years of deregulation. Interestingly, though, the particular policy that states were using at the time of deregulation did not matter. CLEC founding rates were also higher for states with new governors throughout the study and for states with new commissioners early in the study period. Though not all hypotheses were supported, these findings do support my arguments that a state's regulatory history provides an institutional endowment upon which future policy is built and that a change in political leadership can serve as a punctuating moment that can spur deregulation and industry development.

In Chapter VI, I examined variation in firm-level expansion decisions made by CLECs between 1997 and 2005. I found that over the first part of the study period, CLECs were more likely to enter states that were similar to their founding state on dimensions of the political ideology of its electorate and that employed the same type of

local telephone regulation in 1996. This suggests that a firm's "founding conditions" may play a greater role when its industry is still developing and before regional experimentation has converged to a more stable equilibrium. New governors and newer commissioners (on average) also significantly contributed to the growth of the CLEC industry by making such states more attractive expansion targets. These results again support my argument that political regime change can serve as a punctuating moment by disrupting ties between regulators and incumbents or by stimulating a region's economy in general. Finally, states exhibited a strong tendency to grow within the boundaries of the dominant incumbent carrier's territory. In many respects, this effect was as strong as the effect of adjacency. Even after one policy has been preempted by a second policy, the effects of the first policy can be seen.

Together the studies support my argument that political environments and institutional conditions matter in stimulating entrepreneurship following deregulation. Though a number of hypotheses were not supported, the findings provide a basis upon which future research on the relationship between political environments and entrepreneurship can build.

CONTRIBUTIONS TO THEORY

By focusing on contextual factors that create entrepreneurial opportunities, this dissertation contributes to the literatures of organization theory and entrepreneurship. One way of doing so was to expand upon the usual conception of political environments as simply the effects of current policy. I have attempted to provide a richer, more realistic view of what constitutes the political environment of an industry and its firms. As I have argued and as my results have shown, policy such as deregulation must be

studied as a process. This process starts with the conditions that had been in place and can traverse across multiple levels of government (here, the state and federal levels). Furthermore, policy does not legislate or implement itself. State actors, who may have been part of the previous policy era, bring with them their own unique histories, capabilities, and ideologies. For this reason, change in the political regime may be the necessary punctuating moments to break the links to old conceptions and help institutionalize the new policy.

At a higher level of abstraction, many of these aspects of the political process can be generalized to contribute to our understanding of institutional change. Institutions may become endowed by elements from a previous era and, much like pre-deregulation policy did in this study, create lingering effects well after the change event has taken place. Transition moments such as new leadership can be helpful in dissolving ties to the past. A separate way that this study explicitly considered institutional change was to investigate whether forces driving the change varied over time. In this way, I placed the attention on the dynamic process of institutionalization rather than on static institutions.

CONTRIBUTIONS TO POLICY

I opened this dissertation with a discussion about neoliberal policy since 1980 and its push toward market-based control of business activity. Yet this dissertation has chronicled how deregulation of the local telephone service industry was not a removal of governmental control so much as it was a shift in what the government would be controlling. Deregulation therefore remained very much influenced by state actors in the present condition along with their previous decisions.

The need for regulator involvement in the deregulation process is typically portrayed as a necessity for leveling the playing field between incumbents and new entrants. What this dissertation suggests is that (1) rather than a single playing field, there are typically multiple playing fields; and (2) previous policy efforts and state regulators themselves may represent bumps on the field that need to be smoothed out. These issues are more difficult to address with additional policy. One alternative would be to remove all regulation and oversight entirely—that is, to create “true” deregulation. Given the start-up costs for constructing a local telephone network and network externalities, it is difficult to imagine new entrants standing a chance against enormous incumbents without some third-party intervention. Yet if our conception of telephone service is broadened to include cellular service, which has fewer infrastructure requirements and does not require of a physical connection into each residence and business, this idea becomes more viable. A second option that builds on the findings from this study is to transition the oversight of deregulation from exclusively the domain of the state regulatory agency to a different entity served by multiple interests, such as the government, industry, and consumers. Though this could create political gridlock, it should generate an influx of new perspectives that could steer deregulatory effects beyond the blind spots of the past.

LIMITATIONS

As with any study, this dissertation has its limitations. Aspects of the context may make it difficult to generalize from the findings. I study only U.S. firms in a single sector at a very unique period of business history. The early part of the industry took place amidst the dot-com boom when venture capital financing was widely available. (Of

course, some of these “limitations” are the very issues that help make this study interesting!) And as a study about deregulation with lots of continuing government oversight, it is an open question regarding which findings would still hold in industries that are not so closely tied to the government. Yet even as a study that just applies to industries that develop from deregulatory policy, I believe this has much to offer.

There are methodologically limitations to each study, too. Though I have data for the state-level analysis from almost three-quarters of my population (N=35), it is indeed a sample. And because my states were not selected at random but instead according to data availability, one should exercise caution before inferring the findings to the entire United States. Also, I use only one measure (certification) for my dependent variable.

Triangulation across other measures (e.g., interconnection agreements, billing code registrations) could address any unobserved heterogeneity with the certification process, though doing so might move this from being a study about nascent entrepreneurship (those beginning the process of becoming a CLEC) to one about established entrepreneurship (those providing CLEC service).

The firm-level analysis may be limited by having only examined facilities-based carriers. Facilities-based carriers required more money to start up, making them riskier investments than resellers or hybrid carriers. Financiers, perhaps sensing an opportunity early on to gain market share, may have grown facilities-based carriers more rapidly than resellers. And because facilities-based carriers actually build physical telephone networks, they would be more likely to construct their networks in an adjacent fashion. In some ways, though, that makes the finding that aspects of policy can offset adjacency that much more compelling.

As I addressed in each study's discussion section, the measures of political ideology could be improved with those that tap more directly into each state's sense of a belief in free markets. Yet despite using different samples for each study and acknowledging the limitations of each, it is worth noting that some of the same patterns of results, such as the strong effect of new governors and the influence of regulatory history, hold across both studies.

FUTURE RESEARCH

In the course of this dissertation, I have pointed out a number of studies I could conduct that would extend or clarify my findings: more precise measures for free market ideology, triangulating across data sources for CLEC foundings and expansions, testing whether the effects of political environments hold in different settings, critically testing different possible mechanisms for the statistical relationships I have observed, etc. Yet using this same data, I will briefly mention two additional studies that I plan to conduct, both of which fall within my established research stream of entrepreneurship, industry development, and institutional change.

On a number of occasions, I have noted that the CLEC industry began amidst a very unique period when financing was widely available and when the dot-com industry was starting to develop. In future work, I will examine the role this context played in the evolution of CLECs. Regarding financing, to what extent did the availability of capital contribute to geographical heterogeneity of foundings? Did CLECs grow differently according to whether their funding was coming from venture capitalists, IPOs, or equipment vendors? Regarding dot-coms, how did their role as a symbiotic industry (they were major customers of CLECs and they also increased the popularity of the

Internet and hence the demand for telecommunications services) shape where and when CLECs appeared? Finally, there is the likelihood of an interaction between these two ideas. Some media accounts suggest that financiers saw CLECs as the “next dot-coms”? Did financiers of CLECs therefore apply business models from the dot-com industry? If so, was this done experientially by those who had had success doing so with dot-coms or vicariously by financiers who felt they missed out on dot-com opportunities and did not want to miss the next big thing? Such a study could contribute our knowledge of how strategy, financing, and learning influence industry development and entrepreneurial opportunities.

My second idea concerns the heterogeneity of headquarters. As the firm-level expansion analysis in this dissertation made clear, CLEC competition within a state came both from CLECs whose headquarters were based in the state and from those whose headquarters were outside the state. Firms that are local to a state should have certain advantages over those coming from outside the state. Local firms should have a better sense of the market conditions and customer opportunities, and they should understand the political environment better because they are likely more deeply embedded into the state’s social structure. Being a “local company” could be an overt marketing ploy for firms, too. Outside firms, though, may be able to bring with them legitimacy and name recognition built up in surrounding areas. They may also bring with them experience that enables them to provide better service than the local firms that are just getting into the industry. Among the questions that this raises are: Did it make a difference whether a CLEC added to a population had headquarters inside or outside the state? Did it matter in some states but not in others? Did it matter more early in the industry’s development or

later? The purpose of this study would be to draw on aspects of community ecology, institutional theory, and networks to build a theory about the ecology of ownership.

APPENDIX: CLECS IN FIRM-LEVEL ANALYSIS FROM CHAPTER VI

CLEC Name	Start Year	End Year	Founding State
21ST CENTURY	1998	2000	IL
2ND CENTURY	1999	2001	FL
@LINK (f/k/a DAKOTA SERVICES, INC.)	1999	2001	WI
ACC NATIONAL TELECOM CORP.	1997	1998	NY
ACTEL INTEGRATED COMMUNICATIONS	2000	2001	AL
ADVANCED COMMUNICATIONS GROUP, INC.	1998	2000	MO
ADVANCED RADIO TELECOM CORP.	1997	2001	WA
ADVANCED TELCOM GROUP, INC.	1999	2004	CA
ALLEGIANCE TELECOM, INC.	1998	2004	TX
ALLTEL COMMUNICATIONS, INC.	2001	2002	AR
AMC COMMUNICATIONS (f/k/a AMERICAN METROCOMM CORPORATION)	1997	2001	LA
AMERICAN TELCO, INC.	1997	1998	TX
AT&T CORP.	1999	2006	NY
ATLANTIC TELECOMMUNICATIONS SYSTEMS, INC. (f/k/a ATLANTIC TELECOM, INC.)	1998	2000	FL
ATLANTIC.NET BROADBAND, INC.	2000	2001	FL
ATS TELECOMMUNICATIONS, INC.	2000	2001	TX
AVANA COMMUNICATIONS (f/k/a AVANA INTERNET)	2000	2001	GA
AVISTA COMMUNICATIONS	1999	2001	WA
BAYRING COMMUNICATIONS	2001	2006	NH
BEAVER CREEK COOPERATIVE TELEPHONE COMPANY	1999	2000	OR
BIRCH TELECOM, INC.	1998	2006	MO
BLACK HILLS FIBERCOM, L.L.C.	2000	2001	SD
BLUESTAR COMMUNICATIONS, INC.	2000	2001	TN
BRE COMMUNICATIONS, D/B/A PHONE MICHIGAN	1997	1998	MI
BRESNAN COMMUNICATIONS, INC.	1999	2000	NY
BRIDGEBAND COMMUNICATIONS, INC.	2000	2002	MT
BROADSLATE NETWORKS, INC.	2001	2002	VA
BROADVIEW NETWORKS, INC. (f/k/a COMMUNITY NETWORKS, INC.)	1999	2006	NY
BROADWING COMMUNICATIONS	2005	2006	TX
BROOKS FIBER PROPERTIES, INC.	1997	1998	MO
BTI TELECOM CORP. (f/k/a FIBERSOUTH, INC.)	1997	2003	NC
BUCKEYE TELESYSTEM	1999	2006	OH
C-SYSTEMS	1999	2001	ID
CALTECH INTERNATIONAL TELECOM CORP.	1998	2000	CA
CAPROCK COMMUNICATIONS CORP.	1999	2001	TX
CAVALIER TELEPHONE CORP.	1999	2006	VA
CBeyond COMMUNICATIONS, L.L.C.	2002	2006	GA
CHOICE ONE COMMUNICATIONS, INC.	1999	2006	NY
CINERGY COMMUNICATIONS (f/k/a COMMUNITY TELEPHONE)	2001	2006	IN
COAST TO COAST TELECOMMUNICATIONS, INC.	1998	2001	MI
COLDWATER TELECOMMUNICATIONS UTILITY	1999	2001	MI
COLUMBIA TELECOMMUNICATIONS, INC., D/B/A AXESSA	1998	2001	FL
COMAV TELCO, INC.	1998	2000	MA
COMCAST BUSINESS COMMUNICATIONS	2002	2005	NJ
COMCAST COMMUNICATIONS (f/k/a JONES COMMUNICATIONS, INC.)	1997	2001	CO
COMMUNICATIONS OPTIONS, INC.	1999	2001	OH

CLEC Name	Start Year	End Year	Founding State
COMPUTER BUSINESS SCIENCES D/B/A CBS	1999	2001	NY
CONECTIV COMMUNICATIONS, INC.	1999	2001	DE
CONVERGENT COMMUNICATIONS, INC.	1998	2001	CO
CONVERSENT COMMUNICATIONS, INC.	2000	2006	MA
CORECOMM, LTD.	1999	2005	OH
COVAD COMMUNICATIONS COMPANY	1998	2002	CA
COX COMMUNICATIONS, INC.	1998	2006	GA
CTC COMMUNICATIONS CORP.	1999	2006	MA
CTC EXCHANGE SERVICES, INC.	2001	2002	NC
CTS TELECOM D/B/A CLIMAX TELEPHONE CO.	1997	2002	MI
CTSI, INC. (f/k/a COMMONWEALTH TELEPHONE CO.)	1998	2002	NJ
DIGITAL TELEPORT, INC.	1997	2001	MO
DSL.NET, INC. (f/k/a DSLNET COMMUNICATIONS, L.L.C.)	2000	2002	CT
DURO COMMUNICATIONS, INC.	2001	2002	FL
DYNTEL (DYNAMIC TELCO SERVICES, L.L.C.)	1999	2000	VA
E.SPIRE COMMUNICATIONS, INC. (f/k/a AMERICAN COMMUNICATIONS SERVICES, INC.)	1997	2002	MD
EAGLE COMMUNICATIONS, INC.	1998	2005	NY
ELECTRIC LIGHTWAVE, INC.	1997	2001	WA
ESCHELON TELECOM, INC. (f/k/a ADVANCED TELECOMMUNICATIONS, INC., D/B/A ATI)	2000	2006	MN
EVEREST CONNECTIONS CORP.	2001	2006	MO
EXOP OF MISSOURI, INC.	1999	2001	MO
FAIRPOINT COMMUNICATIONS CORP.	1999	2002	NC
FDN COMMUNICATIONS (f/k/a FLORIDA DIGITAL NETWORK)	1999	2006	FL
FIBER SERVICES, INC. D/B/A SMART CONNECT	1999	2001	VA
FIBERNET TELECOM GROUP, INC. (f/k/a LOCAL FIBER, LLC)	1998	2001	NY
FIRST REGIONAL TELECOM, L.L.C.	1998	2001	VA
FOCAL COMMUNICATIONS CORP.	1998	2004	IL
FOREST CITY TELECOM, INC.	1998	2002	IA
GLOBAL NAPS	1999	2006	MA
GLOBALCOM, INC.	1999	2006	IL
GOLDFIELD ACCESS NETWORK (f/k/a GOLDFIELD TELEPHONE COMPANY)	1999	2002	IA
GRANDE COMMUNICATIONS NETWORK, INC.	2001	2006	TX
GREAT LAKES COMNET, INC. (f/k/a MICHIGAN INDEPENDENT NETWORK INC.)	1998	2000	MI
GST TELECOMMUNICATIONS, INC.	1997	2000	WA
HARVARDNET	1999	2001	MA
HICKORYTECH (f/k/a CRYSTAL COMMUNICATIONS, INC.)	1999	2002	MN
HOMETOWN SOLUTIONS, L.L.C.	2001	2002	MN
ICG COMMUNICATIONS, INC.	1997	2006	CO
IDT/WINSTAR COMMUNICATIONS (f/k/a WINSTAR COMMUNICATIONS, INC.)	1997	2004	NY
INDIGITAL TELECOM	1999	2000	IN
INFOTEL COMMUNICATIONS, L.L.C. (f/k/a INFOTELCOM, LLC)	1998	1999	MN
INTEGRA TELECOM	1999	2006	OR
INTERACCESS CO.	1999	2000	IL
INTERMEDIA COMMUNICATIONS, INC.	1997	2002	FL
IONEX TELECOMMUNICATIONS, INC.	2001	2003	TX
IP COMMUNICATIONS CORP.	2001	2002	TX
ITC^DELTACOM, INC.	1998	2006	GA
JAGUAR COMMUNICATIONS, INC.	2003	2006	MN
JATO COMMUNICATIONS	1999	2001	CO
KANSAS CITY FIBERNET	1997	1998	MO
KMC TELECOM, INC.	1997	2004	NJ
KNOLOGY BROADBAND (f/k/a KNOLOGY HOLDINGS, INC.)	1998	2006	GA
LECSTAR COMMUNICATIONS	2001	2002	GA
LEVEL 3 COMMUNICATIONS	1999	2001	NE
LIGHTSHIP TELECOM	2000	2005	NH

CLEC Name	Start Year	End Year	Founding State
LOG ON AMERICA, INC.	2000	2002	RI
LOGIX COMMUNICATIONS ENTERPRISES, INC.	1998	2006	OK
MADISON RIVER COMMUNICATIONS	2001	2002	NC
MARATHON COMMUNICATIONS, INC. (f/k/a MARATHON METRO, INC.)	1998	2000	WA
MARIETTA FIBERNET	1999	2001	GA
MCI (f/k/a MCIMETRO)	1997	2006	VA
MCLEODUSA, INC. (f/k/a MCLEOD, INC.)	1997	2006	IA
MEDIAONE TELECOMMUNICATIONS, INC. (f/k/a MEDIAONE, INC.)	1997	2000	GA
METROMEDIA FIBER NETWORK, INC. (f/k/a NATIONAL FIBER NETWORK, INC.)	1997	2001	NY
MFS-WORLDCOM, INC. (f/k/a MFS)	1997	1998	NE
MH LIGHTNET, INC.	1997	2001	NJ
MICHTEL, INC. (f/k/a US MIDTEL CORPORATION)	1999	2002	MI
MID-MAINE COMMUNICATIONS	2001	2002	ME
MP TELECOM (f/k/a MINNESOTA POWER TELECOM)	1999	2001	MN
MPOWER COMMUNICATIONS CORP. (f/k/a NEVTEL)	1997	2006	NV
NECLEC, L.L.C.	2001	2002	MA
NEON OPTICA, INC. (f/k/a FIVECOM, INC.)	1997	2001	MA
NET2000 COMMUNICATIONS, INC.	1999	2002	VA
NETSTREAM, INC. (f/k/a FIBER COMMUNICATIONS (D.B.A. NETFONE))	2000	2001	CA
NETTEL COMMUNICATIONS	1999	2001	VA
NETWORK ACCESS SOLUTIONS, INC.	1999	2002	VA
NETWORK PLUS CORP.	2000	2002	MA
NETWORK TELEPHONE, INC.	2000	2004	FL
NEW EDGE NETWORKS, INC.	2001	2002	WA
NEWSOUTH COMMUNICATIONS CORP.	1998	2004	SC
NORTH AMERICAN TELECOMMUNICATIONS, INC.	1999	2001	NY
NORTHLAND COMMUNICATIONS GROUP (f/k/a NORTHLAND NETWORK, LTD.)	2000	2002	NY
NORTHPOINT COMMUNICATIONS	1998	2001	CA
NTELOS, INC (f/k/a CFW TELEPHONE INC.)	1998	2002	VA
NTS COMMUNICATIONS, INC.	2000	2006	TX
NUVOX COMMUNICATIONS (f/k/a GABRIEL COMMUNICATIONS, INC.)	1999	2006	MO
OMNIPLEX COMMUNICATIONS GROUP, L.L.C.	2000	2001	MO
ONVOY (f/k/a MEANS (MINNESOTA EQUAL ACCESS NETWORK SERVICES))	1998	2001	MN
OPTEL, INC. (f/k/a OPTEL TELECOM, INC.)	1998	2001	TX
OPTIMUM LIGHTPATH (f/k/a CABLEVISION LIGHTPATH)	1997	2006	NY
ORLANDO TELEPHONE COMPANY	1999	2006	FL
OTTER TAIL, INC.	1999	2002	MN
OVATION COMMUNICATIONS (f/k/a OCI COMMUNICATIONS, INC.)	1998	1999	MN
P.V. TELECOMMUNICATIONS, L.L.C.	1999	2000	TN
PAC-WEST TELECOMM, INC.	1999	2006	CA
PAETEC COMMUNICATIONS, INC.	1999	2006	NY
PARKER FIBERNET, L.L.C.	1999	2001	GA
POINTE COMMUNICATIONS	1999	2000	TX
PONTIO COMMUNICATIONS (f/k/a WALLER CREEK COMMUNICATIONS)	1998	2001	TX
PRIMARY NETWORK COMMUNICATIONS, INC. (f/k/a BROADSPAN COMMUNICATIONS)	1999	2000	MO
PRISM COMMUNICATION SERVICES, INC.	2000	2001	NY
PROSPEED.NET	2001	2002	MA
QWEST COMMUNICATIONS INTERNATIONAL (f/k/a QWEST COMMUNICATIONS CORP.)	2000	2006	CO
RCN CORP.	1997	2006	NJ
REACH COMMUNICATIONS	1999	2002	NY
RHYTHMS NETCONNECTIONS, INC.	1999	2001	CO
RIO COMMUNICATIONS	1998	2006	OR
RNK TELECOM (f/k/a RNK, INC.)	1999	2006	MA
SBC TELECOM	2000	2006	TX

CLEC Name	Start Year	End Year	Founding State
SHARON TELEPHONE COMPANY	1999	2002	WI
SIGECOM-CLEC (f/k/a SIGECOM)	2000	2006	IN
SPHERA OPTICAL NETWORKS, N.A., INC. (f/k/a MILLENNIUM OPTICAL NETWORKS, INC.)	2000	2002	NY
STRATUSWAVE COMMUNICATIONS	2002	2006	WV
SUNWEST COMMUNICATIONS (f/k/a KING'S DEER TELEPHONE COMPANY)	1998	2005	CO
SUPRA TELECOMMUNICATIONS & INFORMATION SYSTEMS, INC.	1998	2001	FL
TCI TELEPHONY SERVICES, INC.	1997	1998	CO
TDS METROCOM (f/k/a TDS DATACOM, INC.)	1997	2002	WI
TELCOVE (f/k/a HYPERION TELECOM)	1997	2006	PA
TELEPACIFIC COMMUNICATIONS (f/k/a U.S. TELEPACIFIC D/B/A TELEPACIFIC)	1999	2006	CA
TELEPHONE PLUS	1999	2000	WA
TELEPORT COMMUNICATIONS GROUP, INC.	1997	1998	NY
TELERGY, INC.	2000	2001	NY
TELIGENT, INC.	1998	2002	VA
TELNET WORLDWIDE	2000	2006	MI
TIME WARNER TELECOM, INC. (f/k/a TIME WARNER COMMUNICATIONS)	1997	2006	CO
TRIVERGENT COMMUNICATIONS (f/k/a STATE COMMUNICATIONS)	1999	2000	SC
US LEC CORP.	1998	2006	NC
US LINK, INC.	1998	2000	MN
US ONLINE COMMUNICATIONS, INC.	1999	2001	TX
US XCHANGE, L.L.C.	1998	2000	MI
USN COMMUNICATIONS, INC.	1997	1998	IL
VANION, INC.	2001	2003	CO
VERADO HOLDINGS, INC. (f/k/a SPECTRANET)	1998	2002	CA
VERIZON	2002	2006	TX
VILLAGE TELEPHONE	1998	2000	WA
VITTS CORPORATIONS D/B/A VITTS NETWORKS, INC.	1998	2001	NH
XCOM TECHNOLOGIES, INC.	1997	1998	MA
XIT COMMUNICATIONS	1999	2002	TX
XO COMMUNICATIONS (f/k/a NEXTLINK)	1997	2006	WA
XSPEDIUS CORPORATION (f/k/a US UNWIRED)	1999	2006	LA

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