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Chad Navis Date

Old Mindsets and New Opportunities:
How the Composition of Founding Teams Affects the Survival of New Ventures

By

Chad Navis
Doctor of Philosophy

Business

_____

Dr. Robert K. Kazanjian
Advisor

_____

Dr. Russell W. Coff
Committee Member

_____

Dr. Richard Makadok
Committee Member

_____

Dr. Mary Ann Glynn
Committee Member

Accepted:

_____

Lisa A. Tedesco, Ph.D. Dean of the Graduate School

_____ Date

Old Mindsets and New Opp-ortunities:
How the Composition of Founding Teams Affects the Survival of New Ventures

By

Chad Navis
M.B.A., University of Georgia, 2004
B.S., Clemson University, 1997

Robert K. Kazanjian, PhD

An abstract of
A dissertation submitted to the Faculty of the Graduate School of Emory University
in partial fulfillment of the requirements for the degree of
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Abstract

Old Mindsets and New Opportunities:
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By: Chad Navis

The organizational experience that members of the founding team bring to new ventures can influence how new business opportunities are pursued and their ultimate success; and yet, little is known about how the importance of such experience varies across entrepreneurial contexts. In this dissertation, I examine how the composition of founding teams has differential effects on new venture survival depending on the complexity of the business models entrepreneurs pursue.

My study tracks the population (n=406), over twelve years, of new local telecommunications ventures in Georgia, that resulted from Telecom Act of 1996 deregulation. This landmark legislation spawned two distinct business models within the same industry sector; the two models differed in complexity and the demands they placed on founding teams. I use these natural differences to compare, across the two models, the effects of industry, functional, and role experience in founding teams on rates of survival. I analyze these effects using a Cox proportional hazards model and supplement the quantitative evidence with qualitative insights obtained through interviews with founders and industry experts.

Findings from this research provide evidence that not all ventures are alike, revealing how several predictors of survival are contingent on differences in the complexity of the business models founders pursue. In terms of industry experience, the shifting and "rugged landscapes" of complexity appear to quickly devalue the benefits of related industry experience. In terms of functional experience, complexity amplifies the importance of functionally similar teams, enabling more effective communication, coordination, and adaptive learning. Finally, in terms of role experience, complexity reveals critical incompatibilities with the dominant logics, or "old mindsets," that can results from more embedded forms of prior experience.

More generally, this research contributes by advancing a contextualized theory of entrepreneurship that links features of evolutionary adaptation and institutional constraint to inherent differences in the complexity of new ventures. The imprinting processes that underlie these two established bodies of theory are shown to be fundamental in shaping the dynamics of founding teams; yet, their effects appear largely contingent on the unique demands that differences in complexity place on entrepreneurial ventures.

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When I look back over the years at the events that led up to this dissertation, it is striking to realize the astounding and positive impact that so many others have had on my thoughts, activities and life more generally. No justice could possibly be done in the words of this section to express my appreciation for all that others have given to me. I am deeply humbled by the care, support, and generosity of so many others who have shaped me into who I am today.

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1. INTRODUCTION

1.1 Motivation

When a new venture is formed, the individuals who comprise the founding team can be fundamental in shaping its future direction (e.g., Boeker, 1988). Their early decisions are encumbered neither by existing organizational policies or procedures, nor by the inertial tendencies of established organizations (Burton, 2001); thus, the prior experience that such founders bring to their ventures can have an enduring influence on the venture's identity and ultimate survival.

In terms of entrepreneurship, prior experience encompasses, "the set of knowledge and skills that individuals can bring to bear to create and exploit market opportunities" (Coff, 2005). Through their career histories, founders' prior experience provides them with valuable knowledge, skills, social capital and capabilities (e.g., Audia & Rider, 2005). It also socializes them with a particular approach for organizing and managing the structures, policies, and processes of their new ventures (e.g., Burton, 2001; Phillips, 2002, 2005; Simons & Roberts, 2008). Accordingly, the organizational experience of the founding team can be an important source of variance in explaining the characteristics and survival of entrepreneurial ventures (cf., Shane, 2000).

Prior research on founding team experience has tended to focus on how the experience that individuals acquire in their prior organizations can *enable* entrepreneurial pursuits. Evolutionary theorists, for instance, have explained such benefits in terms of the routines, or "genes," that individuals carry with them from one organizational setting to another, transferring with them a set of blueprints for organizing and managing in subsequent settings (Nelson & Winter, 1982). Also termed the parent-progeny transfer (Phillips, 2002), organizations are seen in this view as producing entrepreneurs who are "products" of their social settings, who amass tangible knowledge, skills, and capabilities that can be subsequently applied in their new roles as

entrepreneurs (Audia et al., 2005; Freeman, 1986). With the considerable time and resource constraints that typify entrepreneurial start-ups (Stinchcombe, 1965), such transference can lend important advantage to those organizationally experienced individuals who need not cultivate these critical resources from scratch. And yet, as much as has been demonstrated of these effects, still little remains known about how evolutionary selection mechanisms (for survival) vary by entrepreneurial context (Nelson, 1994), or when particular organizational routines transfer more or less effectively from an established organization to a new venture context.

In contrast to evolutionary perspectives, even though founders with certain organizational experiences can bring important value to their new ventures, institutional theory raises the prospect that some forms of organizational experience may actually *constrain* entrepreneurial survival, when misaligned with contextual demands. In particular, embeddedness in an organization has been linked to habitual tendencies that propel individuals to organize and manage in taken-for-granted ways according to "the way these things are done" (Berger & Luckman, 1966). Such institutionalized tendencies reflect familiar heuristics, conventional ways of doing things, and entrenched mindsets for organizing and managing. Nonetheless, less remains known about whether and when such dominant logics can enter into founding teams and have a significant influence on venture survival.

Together, the two perspectives—evolutionary and institutional—shed unique and complementary insights on the powerful imprinting effects of prior experience, which can lead individuals to organize and manage in certain ways and not others (e.g., Boeker, 1988; Stinchcombe, 1965). Thus, both also have implications for the success and ultimate survival of new ventures (e.g., Cooper, Gimeno-Gascon, & Woo, 1994; Eisenhardt & Schoonhoven, 1990; Klepper, 2002; Klepper & Simons, 2000). And, although the prior organizational experience of founding teams has explained much of the variance in new venture survival, a gap remains in what is known about *when* and *how* the importance of such experience differs across entrepreneurial contexts. This research shows that as the demands of entrepreneurial contexts

vary (Gartner, 1988), so too do the aspects of prior experience that are more or less important (Drazin & Van de Ven, 1985).

1.2 Research question

In this dissertation, I contextualize the benefits (and costs) of prior organizational experience in entrepreneurship. I do this by examining the moderating role of complexity—both in terms of reduced benefits from the evolutionary transfer of skills, knowledge, and capabilities, and increased costs from dominant institutional logics for organizing and managing. My unit of analysis is the founding team of new ventures. Within such teams, I ask whether the composition of members' industry, functional, and role experience has effects on venture survival that differ in meaningful ways with the complexity of a new venture's business model. By advancing a greater understanding of *when* founding team experience is more or less important to venture survival, my objective is to provide additional theoretical clarity around the underlying mechanisms of *how* this type of experience matters.

1.3 Contributions

This research stands to make several contributions. First, data for the tests are original to this dissertation and inclusive of several individual-level (e.g., industry, functional, and role experience), firm-level (e.g., size, geographic scope), and industry-level (e.g., munificence) measures that prior research has associated with new venture survival. Thus, they afford a more fine-grained and holistic look at the relationship between aspects of founding team prior experience and their effects on venture survival than is typically possible. Importantly, these data also allow for tests of the effects of business model selection and to investigate alternative explanations for the study's results, thus enhancing the robustness and theoretical contribution of this research.

Second, the analyses offer evidence that what predicts success in one entrepreneurial context may predict failure in another (Low & Abrahamson, 1997: 435). Accordingly, the findings highlight limitations in studying heterogeneous venture populations, where variables can compete for significance and hide underlying theoretical connections (Sandberg & Hofer, 1987: 6).

Third, this research exposes the role of complexity as a critical moderator of the relationship between founding team prior experience and new venture survival. In terms of industry experience, the shifting and "rugged landscapes" of complexity appear to quickly devalue the well accepted benefits of related industry experience. In terms of functional experience, complexity seems to amplify the importance of functionally similar teams, which can enable more effective communication, coordination, and adaptive learning. Finally, in terms of role experience, complexity creates unique challenges for teams with dominant logics, or the "old mindsets" with which founders have been socialized over time through their more embedded forms of prior experience. Together, these findings advance a broader picture of the nature of entrepreneurship: although new ventures are unencumbered by the existing policies, procedures and inertial tendencies of established organizations, their nimbleness and ability to adapt may be nonetheless tempered by the composition of the founding team.

More generally, this research begins to shed light on the underlying mechanisms that explain *how* prior experience matters. I draw on a unique sample of founding teams that pursued a common deregulatory opportunity—pursuing either of two business models—in local telecommunications. Natural differences in business model complexity across the two conditions form the bases for comparative tests of the theory presented.

1.4 Organization of the dissertation

The remainder of this dissertation is organized as follows. I begin with a review of the relevant theoretical streams and literatures that inform my study. I highlight their

interrelationships, gaps, and the key assumptions that I make. I then develop a theoretical framework with specific hypotheses that are used to test the contingent effects of founding team prior experience on new venture survival. Next, I describe my research setting and the deregulatory environment that was created with passage of the Telecom Act of 1996. I examine the population of new competitive local exchange carriers (CLECs), or local telecommunications providers, which resulted from this legislation and competed in Georgia. My focus is on the two alternative business models that were pursued by these entrepreneurs and how the two models differed along several key dimensions of complexity. I conclude with an explanation of my data and methods, the results of my empirical analyses and tests, and a discussion of the core implications and anticipated future directions of this research.

2. LITERATURE REVIEW

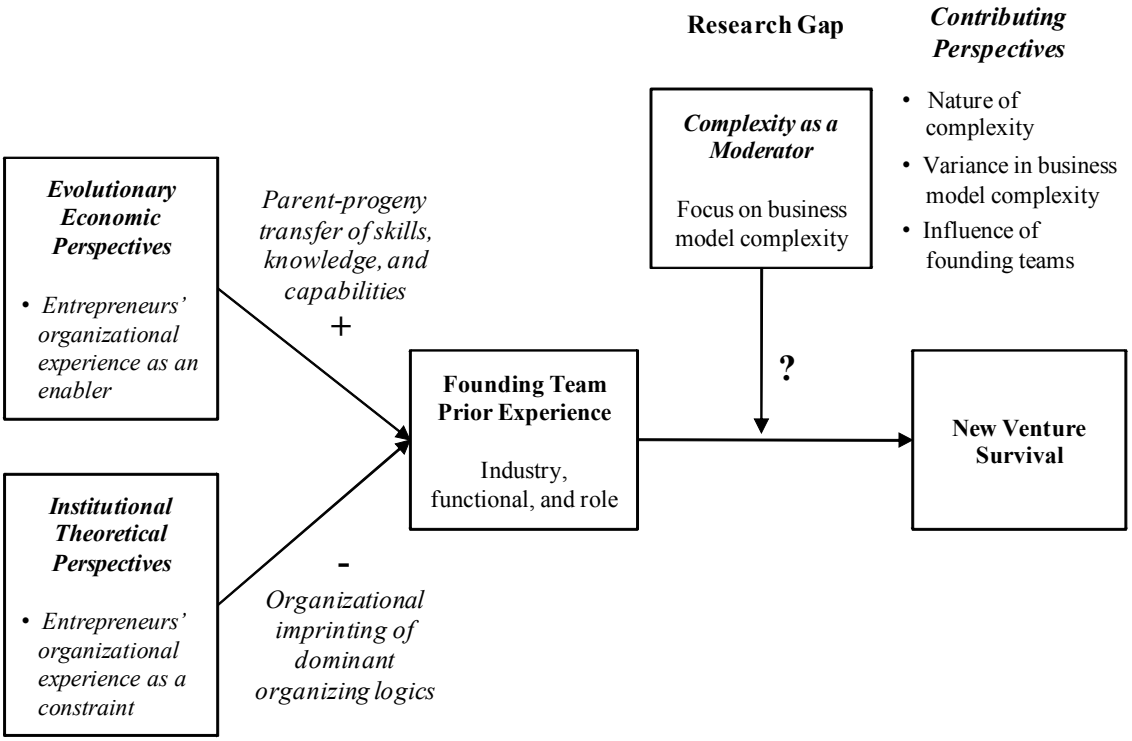
In this section, I begin by describing how two of the primary theoretical perspectives on prior organizational experience—evolutionary economics and institutional theory—have often theorized opposing effects: the former has emphasized the *enabling* role of organizations, as a source of knowledge, skills, and capabilities that can be favorably transferred from one setting to another; the latter has emphasized the *constraining* role of organizations, as a source of dominant logics that can hinder learning and adaptation. While prior applications of institutional theory to the study of entrepreneurship have largely focused on the importance of legitimacy to new venture survival (Stinchcombe, 1965), I focus instead on the role of dominant institutional logics and their potential introduction into new venture settings through the demography of founding teams. Common to both evolutionary and institutional perspectives is the insight that organizational experience can have a powerful imprinting effect: When individuals leave their organizations to form new ventures, they carry with them—for better or worse—the residue of their prior organizations.

Building on these foundational ideas, I draw on additional studies from the upper echelon and entrepreneurship literatures, which have generally lacked these theoretical underpinnings but which have investigated and inform several of the variables and dynamics of interest, to anticipate the moderating effect that complexity is likely to have on the relationship between prior organizational experience and new venture survival. I focus on three central ideas to build this argument. The first explicates the nature of complexity itself, which I separate into its demands for higher-order learning (e.g., Lant & Mezias, 1992a) and coordination (O'Reilly, Snyder, & Boothe, 1993; Weick & Roberts, 1993). The second situates these broader level concepts in terms of the business models that founding teams choose to pursue, which can differ widely in complexity, or the number of interdependent parts that need to be managed to create value (cf., Levinthal, 1997). The third rationalizes why the imprinting effects of prior organizational

experience should be especially felt in entrepreneurial settings, where the founding team and the new venture are largely one in the same. Together, my objective is to examine the unique evolutionary and institutional mechanisms that inform new venture survival when founding teams choose business models that differ in complexity.

Figure 1 conceptualizes the theoretical streams and core relationships that are the subject of the literature review that follows and of my dissertation more generally. The section concludes with a formal statement of my research question, which anticipates the hypothesis development that immediately follows.

Figure 1: Theoretical perspectives on organizational imprinting and venture survival



2.1 Evolutionary economic perspectives: Organizational experience as an enabler

At the core of evolutionary economics, is an interest in how culture and society influence economic behavior, and how macro-equilibrium conditions shift and are disrupted through the entrepreneurial activities of firms (Schumpeter, 1934). Much of this work has centered on the role of organizational routines (technology, investment, learning)—as the objects of variation, selection, and retention—in fueling evolutionary change (Nelson et al., 1982). When an organization's routines are inappropriate for the demands of a given environment, it will be selected out of the population and the more fit organizations will survive. Below, I conceptualize the central evolutionary economic tenets of variation, selection, and retention and describe their relevance to my study. From this review, I highlight two of the primary gaps that my study seeks to redress: The first is a gap in what is known about how environmental selection mechanisms vary by context, including how such differences affect the fitness of particular organizational routines; the second is a gap in what is known about the boundary conditions for when aspects of founders' prior organizational experience will transfer more or less well to affect survival in new venture settings.

Among the routines on which scholars of evolutionary economics have placed the greatest emphasis are the learning routines that make some firms more likely to disrupt and adapt to changes in equilibrium conditions than others. As shifts in macro-level equilibrium occur, organizational learning routines that enable knowledge acquisition and adaptation in more local contexts become more important. Other routines that have been the subject of evolutionary analyses are the technology routines that encompass the standard operating practices and procedures of organizations, and the investment routines that reflect an organization's relative commitments to explorative and exploitative learning (March, 1991). Central to evolutionary economic theory is the premise that the routines exhibiting the greatest fitness will vary with contextual demands.

In spite of this fundamental premise, however, less remains known about how contextual differences relate to the fitness of various organizational routines (Nelson, 1994: 124). Nelson (1994), for instance, describes the need to understand how selection mechanisms vary with unique industry sector characteristics, as with differences in the nature of competition, regulation, etc. My study redresses this gap by examining the more general linkages between routines and environmental fitness across sectors through the influence of business model complexity and the associated demands that such complexity impose on entrepreneurial ventures.

A second defining characteristic of evolutionary economic theory is the powerful imprinting effect of environmental retention. When organizations survive selection processes, the routines that are "selected-in" become reinforced and transferred across subsequent generations of managers, employees, and even the entrepreneurs who leave the organization to form their own ventures. Such routines are reinforced in part through socio-economic path dependencies. Using technology as an example, this explains how the QWERTY keyboard and VHS videocassette became technology standards once social and economic structures were rapidly built around them, in spite of the fact that both were suboptimal technologies. Within organizations, similar path dependent dynamics occur as employees build knowledge, skills, and capabilities around particular routines (e.g., for executing a particular strategy) and as they become sanctioned as appropriate by other economic actors (e.g., the value of TQM). These imprinting processes can have profound implications for entrepreneurship.

Entrepreneurship scholars drawing on evolutionary economic theory have carried through the biological analogues of the theory to describe the powerful imprinting process by which individuals carry their prior organizational experience into the new firms they found (e.g., Almeida & Kogut, 1999). Freeman (1986), for instance, famously described entrepreneurs as "products" of their prior organizations (see Audia et al., 2005 for a related review). Other researchers have portrayed entrepreneurs as being "spawned" from their "parent" organizations (Chatterji, 2009; Gompers, Lerner, & Scharfstein, 2005; Klepper, 2001). Some have spoken of

the advantages of coming from "good [parental] stock" (Burton, Sørensen, & Beckman, 2002), where capabilities are "born" (Helfat & Lieberman, 2002). And still others have spoken of the evolutionary "genes" and physical "blueprints" that explain how the norms, routines, and capabilities from one organization are transferred to another through the mobility of individuals (Nelson et al., 1982).

A central theme of this work has been the *enabling* role of prior organizational experience in the survival of new ventures, as has been demonstrated in several studies. Chatterjee (2009), for instance, showed how entrepreneurs in the medical device industry benefitted from the non-technical knowledge (e.g., regulatory procedures, marketing knowledge, opportunity awareness) of their previous industry employers. Klepper and Sleeper (2005) similarly showed how entrepreneurs in the laser industry benefited from the industry knowledge they gained and how they initially replicated the product and market focus of their previous employers. In another example, Klepper (2001) linked the survival benefits of high technology entrepreneurs with related industry experience to the routines they developed in their previous organizations and the strategies that they were more prepared to enact. Such studies vividly demonstrate the powerful imprinting effect that experience in previously "selected-in" organizations can have on individuals and the survival of their ventures; however, they say much less about the conditions when related organizational experience may apply less well.

To summarize, evolutionary economics has called attention to the importance of prior organizational experience as an important mechanism for enabling new venture survival; however, gaps remain in what is known about how mechanisms of environmental selection vary across contexts. The theory also has called attention to the powerful imprinting effect that prior organizational experience can have on individuals, and how the parent-progeny transfer of routines (Phillips, 2002) from an established organization to a new ventures can have a significant impact on the venture's survival; however, gaps nonetheless remain in what is known about when

such transfers may not be more or less effective. Later, I will return to these gaps and argue that both begin to be redressed through greater attention to the moderating role of complexity.

2.2 Institutional theoretical perspectives: Organizational experience as a constraint

As much as organizational experience can enable new venture survival, it can also constrain it. Below, I describe the central tenets of institutional theory, their relevance to this study, and the primary gap that this study seeks to redress: Inasmuch as institutional perspectives have explained much about the survival of new ventures, previous work has focused largely on the enabling effects of legitimacy; much less attention has been paid to the potential constraining effects of the dominant logics which result from founders' prior experience in deeply embedded institutional settings

Fundamentally, institutional theory explains how the influence of societal forces shapes the actions and behaviors of actors within a field (DiMaggio & Powell, 1983). Scholars of institutional theory have shown how the approach that individuals take to organizing is largely a function of their organizational experience in an institutional field, or "a community of organizations that partakes of a *common meaning system* and whose participants interact more frequently and fatefully with one another than with actors outside the field" (Scott, 1995: 56, emphasis added). In institutionalized settings, societal logics define the "rules of the game" (Thornton & Ocasio, 1999). Because of this, and because individuals have bounds on the rationality of their decision-making (Simon, 1945), legitimate typifications can emerge as having a powerful influence on the actions of individuals (Barley & Tolbert, 1997; Berger et al., 1966) and the audiences who assess the appropriateness of those actions (Johnson, Dowd, & Ridgeway, 2006).

As was noted earlier, scholars of entrepreneurship have often drawn on institutional perspectives to demonstrate the importance of legitimacy as a mechanism for helping new

ventures to overcome their liabilities of newness relative to more established firms. Legitimacy is vital to entrepreneurship (e.g., Delman & Shane, 2004; Aldrich & Fiol, 1994; Lounsbury & Glynn, 2001); it enables resource acquisition, survival, and growth (e.g., Deeds, Mang, & Frandsen, 2004; Delmar & Shane, 2004). In their quest for legitimacy, entrepreneurs often secure credibility and social fitness by aligning isomorphically with the cognitive, normative or regulative elements that have become sanctioned as institutionally appropriate (Stinchcombe, 1965). For instance, institutional tendencies have been linked to entrepreneurs' development of business plans independent of the economic value in doing so (Honig & Karlsson, 2004). Similarly, entrepreneurs' skilled use of the narrative and symbolic elements that provide accounts of their legitimacy have been linked to greater entrepreneurial acquisition of resources (Lounsbury & Glynn, 2001; Zott & Huy, 2007). But legitimacy as an institutional resource that enables new venture survival is only one way in which institutional theory can inform entrepreneurship.

A much less applied, but perhaps equally relevant, aspect of institutional theory, in terms of new venture survival, is the effect of the cognitive rigidities that individuals develop over time through the embedded industry, functional, and role experience in highly institutionalized organizational settings. Cognitive embeddedness refers to how "…symbolic representations and frameworks of meaning affect individual and corporate actors as they interpret and make sense of their world" (Dacin, Ventresca, & Beal, 1999: 327). It encompasses how actors make sense of their identities (e.g., Dutton & Dukerich, 1991), their competition (e.g., Porac, Thomas, Wilson, Paton, & Kanfer, 1995), and the relevant issues in strategy formulation (e.g., Barr, Stimpert, & Huff, 1992).

Burton (2001) explained how entrepreneurs become imprinted with dominant models (DiMaggio et al., 1983), or templates for organizing based on their prior organizational experience. These include: industry-level models, such as the network models that were used to manage advertising during the early evolution of radio (Leblebici, Salancik, Copay, & King,

1991); functional-level models, such as the employment models (e.g., the "engineering model") that Silicon Valley start-ups adopted to control and coordinate work (Burton, 2001); and, role-level models, such as the corporate models used by senior executives to practice corporate control (Fligstein, 1990). With increased exposure to such models (e.g., through tenure and central membership within a field) (Berger et al., 1966; Fligstein, 1987), managers develop their own mental models for how things should and do work; their practiced use and familiarity with such models contributes to their ongoing replication (Zucker, 1977).

Cliff, Jennings, and Greenwood (2006) demonstrated these effects empirically in their study of new law firms. They showed that founders with core organizational experience (in the dominant law firms) were more likely than those with peripheral organizational experience to imitate the prevailing organizing templates of the field (e.g. replicating governance structure, compensation practices). They attributed these isomorphic tendencies to several factors that included their familiarity and comfort with the dominant template (Ford, 1996; Perry-Smith & Shalley, 2003; Weick, 1995), and the phenomenon by which "extensive experience of a particular format can result in the development of tight cognitive frames that produce perceptual blindspots and habitual reactions" (Cliff et al., 2006: 638). Later, I will argue that such tendencies, blindspots, and habitual reactions can be especially problematic in complex new venture settings.

To summarize, although institutional perspectives have often been applied to the study of new ventures, in terms of the enabling function that institutional markers of legitimacy can have on the survival of new ventures, gaps remain in what is known the potential constraining effects of institutionalized tendencies, which have been the focus of much of this body of work; that is, less is known of whether and when the dominant logics that individuals have been shown to acquire in institutionalized settings can significantly inhibit new venture survival. This gap may well be due to the apparent paradox in examining the effects of "old mindsets" in new settings, where founders are removed from the existing constraints of established processes, procedures, and relationships, and where new ventures present both a clean slate and an impetus to do

something different; however, as I will describe next, there is reason to believe that a founders' severance from the past is not as complete as often portrayed; more than that, such imprinting may have effects that are especially detrimental to the survival of complex new ventures.

2.3 Complexity as a Moderator

Not all ventures are alike. When entrepreneurs form their new ventures, they do so amidst unique sets of social and economic conditions that can function to both enable and constrain the pursuit of entrepreneurial opportunities (cf., Dacin et al., 1999). Gartner (1985) described this diversity and its implications for entrepreneurship research:

> Entrepreneurs and their firms vary widely…the environments they operate in and respond to are equally diverse…it is not enough for researchers to seek out and focus on some concept of the "average" entrepreneur and the "typical" venture creation…this variation in new venture creation needs to be studied (citing Aldrich, 1979; Hannan & Freeman, 1977; Pfeffer & Salancik, 1978; Weick, 1979) (p. 697).

It is perhaps surprising then that, despite widespread recognition by scholars of the diversity of entrepreneurial contexts, the thrust of research in entrepreneurship has been carried out with the basic underlying assumption of homogeneity among new venture populations (Baum & Haveman, 1997: 304; Gartner, 1988).

Among the contextual differences with the greatest relevance and generality to new venture settings is the amount of complexity that founding teams must manage in order to create value. Complexity refers to the number of interrelated parts that comprise a system (Levinthal, 1997). In organizations, such "parts" can refer to the tasks and flows of work that need to be managed, the structural roles and positions of actors, organizational needs and goals, and the knowledge and expertise that must be brought together to make the entire system work (Hickson, Pugh, & Pheysey, 1969; Mohr, 1971; Thompson, 1967; Van de Ven, Delbecq, & Richard Koenig, 1976). I focus on complexity in this dissertation because of its generality across new venture

populations, and its potential—as will be the focus of the hypothesis development—to inform when prior organizational experience may function more or less as an enabler or constraint.

Here, I begin with a broad review of complexity as it has been studied in the organizations' literature. Specifically, I focus on the unique *learning* demands that complexity places on managers to be aware of and understand their current organizational systems, as well as to recognize changes that may be required to reorient their organizations when environments shift (Lant et al., 1992a; Lant, Milliken, & Batra, 1992b). I also focus on the unique *coordination* demands that complexity places on managers to manage organizational interdependencies and navigate through adaptive change. With this broader perspective on complexity as backdrop, I then situate its relevance more narrowly in terms of the unique demands that complex business models place on new ventures.

Learning. One of the defining characteristics of complexity is the unique requirements that it places on managerial learning (Lant et al., 1992b). With a large number of moving and interdependent parts, not only does complexity require a high level of learning to understand how these parts fit together, but also to recognize and understand how changes to one component of the system will affect the other components. Indeed, organizations often work to curb the complexity that they must manage in order to simplify their operations. Consider the case of the fast food chain, In-N-Out Burger, which uses four "parts" as a guideline to manage complexity (and increase profits) in its business: "Four…is the point at which the number of products strikes the right balance between customer satisfaction and operational complexity. Four means simple purchasing, simple production, and simple service" (Gottfredson & Aspinall, 2005). When organizations like these are low in complexity, they can reap great benefits from *first-order* learning, or "a routine, incremental, conservative process that serves to maintain stable relations and sustain existing rules (March, 1981)" (Lant et al., 1992b: 49-50).

However, as complexity increases, so too do the demands for *second-order* learning, or "…the search for and exploration of alternative routines, rules, technologies, goals, and purposes,

rather than merely learning how to perform current routines more efficiently (Lant et al., 1992b: 49-50). Consider the Internet company, Google; although the company was formed with a relatively simple business model of providing a search engine that benefited from the sale of advertising, over time it has morphed to become far more complex, guided by the simple but extremely complex-to-execute mission "to organize the world's information and make it universally accessible and useful" (Iyer & Davenport, 2008). And, although Google has spent billions of dollars to develop a single technology platform to simplify its business (which is nonetheless internally complex), considerable complexity remains in terms of the internal and external applications that must be developed and hosted, the variety of market sectors with which these applications integrate (e.g., radio, education, real estate, GPS, cellular telephony) and how all are internally managed and interrelate in ways that can generate revenues for the business.

As Lant and Mezias explain, not only does second order learning require the search for and exploration of alternatives, but it also places unique demands on the existing cognitions of managers, such that: "...Certain experiences cannot be interpreted within the current belief system, theory-in-use (Argyris & Schon, 1978), or organizational paradigm (Brown, 1978; Pfeffer, 1981)" (Lant et al., 1992b: 50). Google attempts to curb against these "old mindsets," for instance, through a culture that rewards ideas that are determined to be of high quality, rather than an emphasis on seniority and safe bets (Iyer et al., 2008). Through exploration (March, 1988), second order learning enables new connections to be identified (Kelley, 1955) and provides new awareness of environmental threats and opportunities.

Coordination. A second defining characteristic of complexity is the unique requirements that it places on coordination, both for managing current complexities and adapting to changes. To illustrate an extreme case, consider the interdependencies that Weick and Roberts (1993) described military personnel on aircraft carriers to coordinate and manage as part of their everyday routine:

> …Imagine that it's a busy day, and you shrink San Francisco Airport to only one short runway and one ramp and one gate. Make planes take off and land at the same time, at half the present time interval, rock the runway from side to side, and require that everyone who leaves in the morning returns that same day. Make sure the equipment is so close to the edge of the envelope that it's fragile. Then turn off the radar to avoid detection, impose strict controls on radios, fuel the aircraft in place with their engines running, put an enemy in the air, and scatter live bombs and rockets around. Now wet the whole thing down with sea water and oil, and man it with 20-year-olds, half of whom have never seen an airplane close-p. Oh and by the way, try not to kill anyone (p. 357).

Simply managing such complexity clearly requires organizations to have well-developed coordination mechanisms (e.g., Galbraith & Kazanjian, 1986). Research on top management teams has pointed to team demographics as one such mechanism for enabling this, with more cohesive teams associated with improved communication and coordination (e.g., Carpenter & Fredrickson, 2001; Glick, Miller, & Huber, 1993). One of the primary benefits of team cohesion is that it facilitates the social interaction and sharing of tacit and explicit knowledge that is fundamental to the creation of new knowledge (Nonaka, 1994).

But the coordination required to manage current complexity in an organization is only one side of the coin. The other side involves the ability to coordinate adaptive change when the nature of complexity shifts. This is because with complexity, even subtle external shifts (e.g., in technology) can introduce entirely new sets of interrelationships to which organizations must adjust (Henderson & Clark, 1990; Levinthal, 1997). For instance, Henderson and Clark (1990) use the simple example of a room fan to illustrate how reducing the size of the fan changes nothing about the design components that are required to make the fan work (e.g., blades, motor), but it creates significant changes in how the components interact with one another, focusing "…attention on new types of interaction between the motor size, the blade dimensions, and the amount of air the fan could circulate…[and] between the performance of the blade and the weight of the housing" (p. 13). Thus, with architectural changes such as these, it may not be enough to apply prior related knowledge to the problem; indeed, such knowledge may be potentially harmful if it is applied in the same way as it has been in the past (Henderson et al., 1990). Rather,

coordinated change to the broader system (e.g., communication patterns, vendor relationships, etc.) is required to effectively enact and adapt to the new model.

Complex business models. Although the requirements for learning and adaptation that define complexity in such broader terms also have application to new venture settings, several features of new venture settings are unique and place unique demands on founding teams. To anticipate these differences, I begin with a definition of business model complexity and provide several familiar examples of what such models look like. Then, I describe how new venture founding teams are presented with particular challenges in terms of their limited size (and cognitive capacity) and lack of organizational layers to allow for specialization and simplification. Additionally, I describe how the nature of the interdependencies that must be managed in new ventures can frequently change as entities evolve from their formative organizing period, through market introduction, and through their rapid growth, with each potentially placing unique demands on their organizational systems.

I define business model complexity as the number of interdependent and moving parts that must be managed to create value (cf., Levinthal, 1997). It involves parts that are harbored internally within the organization (e.g., founders' knowledge, skills, and capabilities), as well as those that exist externally, but which serve as critical components in making the broader system work (e.g., partner networks); it reflects the fundamental way in which such parts configure to create value for a particular customer segment. To the extent that these interdependencies are larger in number and more difficult to manage, business model complexity is greater. Several examples of new ventures with complex business models serve to illustrate.

Consider the car-sharing start-up, Zipcar, which was founded in 1999 by Robin Chase and Antje Danielson with the premise to make it simple for individuals who did not own a car to rent, by-the-hour, vehicles on an as-needed basis. It was a business model that the founders had originally seen in Berlin, Germany, and they knew that it would require considerable logistical effort to implement in the US. Doing so required determining the appropriate fleet of cars to

purchase and where to locate them. Such decisions were highly interdependent on questions of consumer acceptance (and related pricing alternatives and requirements for marketing), consumer driving patterns, and how much scale the founders could finance and manage with available staff and information systems. In 2000, they launched their service.

> They put an American spin on it—outfitting the cars with wireless technology, creating a hassle-free reservation system and strategically placing the cars around key cities and neighborhoods. In June of 2000 the first Zipcars were on the road. The masses could now drive cars by the hour or day—on their terms. (www.zipcar.com/about)

As Zipcar has rapidly grown, the complexities of its business model have shifted over time. The company's current CEO, Scott Griffith, recently boasted: "Thirteen million people can [now] walk to a Zipcar in 10 minutes or less" (CarSharing World, 2008). Although such scale provides the needed service availability and access to make the model work, it did not come without growing pains: Zipcar added an additional layer of complexity in 2007 when it acquired its primary competitor, FlexCar, thus imposing new demands to integrate the separate parts of the two organizations.

Another example of a complex business model is found in the satellite radio ventures, XM and Sirius, which were licensed by the FCC in 1997 to develop a new satellite radio service. The complexity of the satellite radio business models derives, in large part, from the external partnerships that XM and Sirius integrated to advance their respective (and now combined) services. These include infrastructure partnerships to launch satellites into space and develop receiver technologies, manufacturing partnerships to develop satellite-ready radios, distribution partnerships to advance services availability in transportation and retail markets, and programming partnerships to provide differentiated content and a value proposition such that consumers are willing to pay for radio. From their licensing in 1997 through the end of 2005, the two satellite radio firms entered into over 200 partnerships to advance their service (Navis & Glynn, 2008). Negotiating and managing these partnerships and integrating them into their

internal organizational systems imposed complexity in terms of the interdependent structures, tasks, and communications channels that were required to manage them. Adding to these demands was the shifting nature of the interdependencies as the firms evolved from a pre-launch period of technology and infrastructure development to a post-launch period of market diffusion and rapid subscriber growth.

A final illustration of a complex business model is the (former) online grocer, WebVan, which was formed in 1999 and led by Louis Borders (of Border Books) to transform the way grocery shopping was done by allowing shoppers to order their groceries online and have these groceries delivered directly to the shoppers' homes within a specified period of time. Beyond the clearer logistical interdependencies involved in such an undertaking (e.g., managing inventory, number and design of trucks, delivery schedules, staffing, etc.), there also existed regulatory interdependencies that needed to be managed in terms of how to handle of prescription drugs and alcohol sales, and how changes in these might affect their sales, purchasing arrangements, etc. The complexity of the WebVan business model stands in stark comparison to the complexity described earlier with In-N-Out burger, and the fast food company's standard store layout and use of "four" as a decision heuristic to curb the introduction of complexity into its operations. Importantly, relative to more established organizations, managing complexity in new ventures creates unique survival challenges.

Managing complexity in new ventures. A long history of organizational scholarship has revealed important insights around the management of complexity in established organizations (Galbraith, 1973; Galbraith et al., 1986; Thompson, 1967); however, far less attention has been paid to the applicability of these findings in new venture settings, where the dynamics are very different.

For instance, Galbraith (1973) described how established organizations can overcome the cognitive constraints that individuals face in the amount of information they can process and manage (Simon, 1945) by adding hierarchical layers to manage complexity. Such layering can

allow individuals at lower levels in the organization to specialize and focus their efforts on managing lower-level task interdependencies (e.g., through use of heuristics, frameworks, and the escalation of exceptions to higher levels) and individuals at higher-levels to generalize and focus their efforts on understanding and managing the more macro-level and interdependent components of the organization (e.g., its functions, units, departments). Similarly, scholars have shown the benefits of using simplified rules and routines to guide the decisions and activities of complex established organizations (Eisenhardt & Sull, 2001). A common theme across this work is the important role of effective communication and coordination—as a mechanism for managing existing interdependencies, avoiding breakdowns within the system, and adapting to changes that may occur (Eisenhardt & Schoonhoven, 1996; Weick et al., 1993).

And yet, whereas hierarchical layers, standardization and simplification can provide valuable prescriptions for managing complexity in more established organizations, such prescriptions pose unique challenges to new ventures, where a limited number of founders are responsible for managing the complexity of the fluid organizational systems they are establishing. Such founders frequently cope with these demands by outsourcing system components when possible (e.g., payroll, accounting), and by relying on advanced information system technologies; however, they nonetheless face unique demands relative to their established organization counterparts to manage and understand the micro-level tasks and interdependencies that make their business models work.

A second characteristic that makes managing complexity in new ventures unique from managing complexity in established organizations is the propensity for the nature of complexity to change in new ventures. In new ventures, the dominant problems that founding teams face can exhibit dramatic shifts over time. For instance, Kazanjian (1988) showed in a study of new technology ventures that the dominant problems shifted through four periods: In the earliest period of conception and development, the problems centered on acquiring resources and developing technology; with commercialization, the problems shifted toward production-related

startup; when market growth began, the problems shifted again toward organizational issues and managing sales and market growth; then, with stability, the problems shifted once more toward profitability, internal controls and prospects for future growth. Along with these shifts were changes in the interdependencies that were required to be managed; similar patterns were demonstrated in the Zipcar, satellite radio (XM and Sirius), and WebVan examples described earlier.

Thus, inasmuch complexity places high demands on established organizations, the learning and adaptation that is required in new ventures may be even higher, where structural remedies (e.g., hierarchical layers) are less available, greater fluidity can exist in the interdependencies that require managing, and where the systems' demands fall more squarely on a relatively small team of founders. For these reasons, complexity has particular relevance as a contextual factor in shaping entrepreneurial dynamics.

Impact of founding teams on venture survival. The characteristics of complexity described above begin to anticipate the powerful influence that a founding team can have on their new ventures. Upper echelon research has long been premised on the assumption that organizations are reflections of their top managers (Hambrick & Mason, 1984). Nowhere is this truer than among entrepreneurial ventures, where the knowledge, skills, and capabilities that founders bring to a new venture can have an enduring effect on organizational processes and performance (Boeker, 1988). Similarly, upper echelon research has shown that when managers have high discretion in their organizations and their job demands are high, they are more likely to take mental shortcuts and fall back on dominant paradigms (Hambrick, 2007). Such high demands and discretion typify the founding teams of new ventures; thus, new venture founding teams afford an ideal setting to examine the moderating effect of business model complexity on the relationship between prior organizational experience and new venture survival.

Synthesizing the core ideas from this review, recall that perspectives from evolutionary economics leave gaps in what is known about how selection mechanisms (for new venture

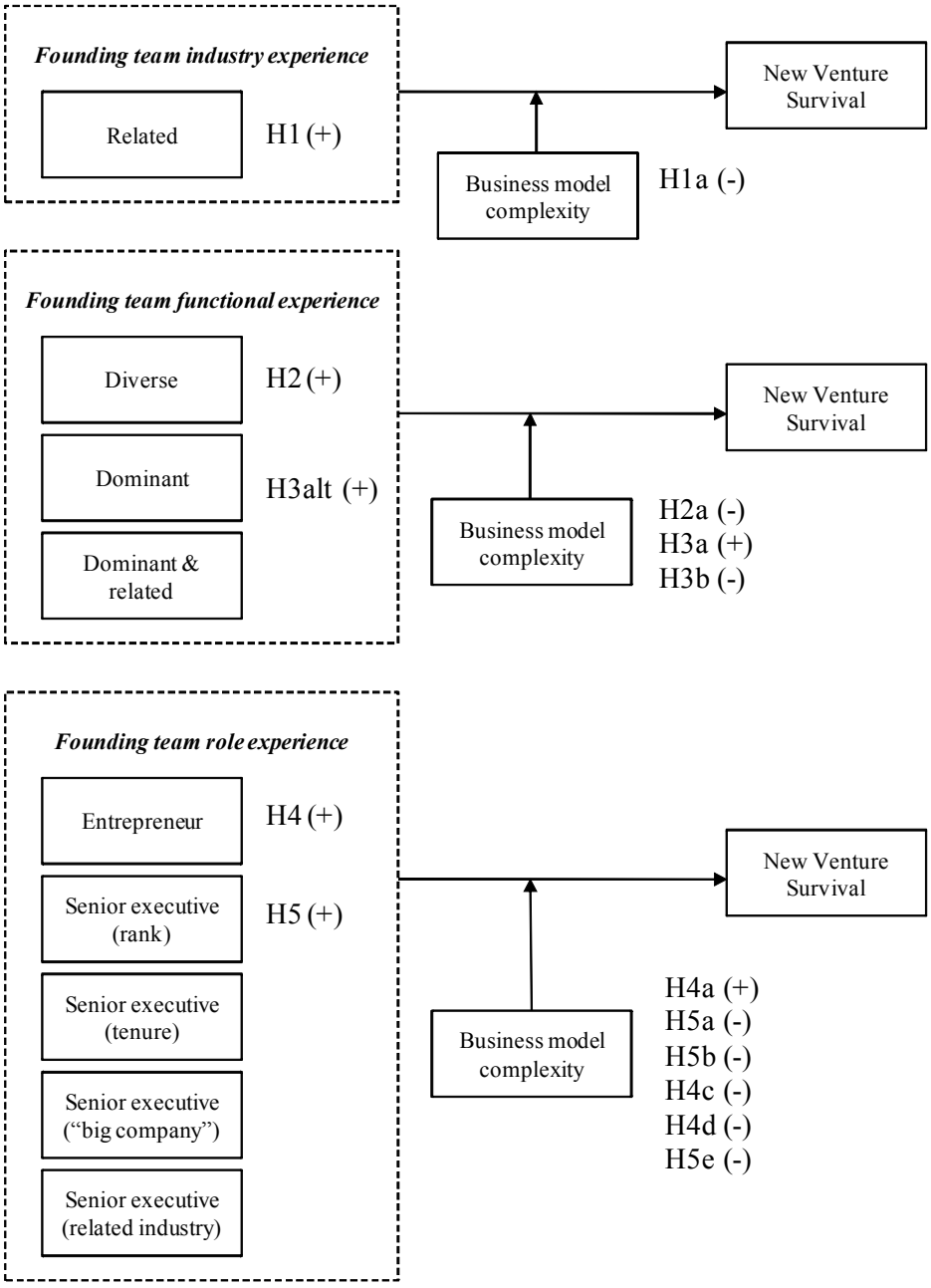
survival) vary by context, as well as when particular routines (and their associated knowledge, skills, and capabilities) transfer more or less well from an established organization to a new venture context. Similarly, recall that perspectives from institutional theory leave gaps in what is known about whether and when dominant logics enter into founding teams such that they have a significant effect on venture survival. My central thesis is that business model complexity moderates the relationship between a founding team's prior organizational experience and new venture survival, and thus begins to redress these gaps. Specifically, I propose that business model complexity will reduce the value of related experience when applied to new interdependencies, increase the importance of effective coordination, and amplify the constraining effects of "old mindsets" in founding teams. I investigate this proposition in terms of the following research question, which I elaborate in the section that follows:

> Does business model complexity moderate the relationship between the prior organizational experience of founding teams and new venture survival?
>
> a. What effect does business model complexity have on the importance of related industry experience within a team?
> b. What effect does business model complexity have on the importance of the functional experience within a team (in terms of diversity and dominance)?
> c. What effect does business model complexity have on the importance of prior role experience (in either the "less institutionally embedded" role of entrepreneur or the "more institutionally embedded" role of senior executive) within a team?

3. THEORY AND HYPOTHESES

In this section, I develop testable hypotheses around the contingencies of business model complexity for new venture survival. I organize these hypotheses in the theoretical framework shown in Figure 2. I elaborate on this framework and associated hypotheses below.

Figure 2: Contingencies of business model complexity and new venture survival



3.1 Industry experience and complexity

When founding teams have prior organizational experience in industries that are related to their new ventures, they can reap natural advantages in the reduced need to develop, from scratch, the relevant knowledge, skills and capabilities that are required to organize and manage ventures with similar demands. These advantages can include familiarity with the primary actors in the industry (e.g., buyers, suppliers, merchandisers), as well as critical knowledge of the task environment (Chandler, 1996), including where the primary threats and opportunities lie and how to best address them. Such related industry experience in the founding team not only gives new ventures survival advantages over their new venture counterparts but—through the evolutionary transfer of routines that takes place when founders are spawned from organizations in the same or a related industry—can also put new ventures on more even footing with established firms (Klepper, 2002; Stinchcombe, 1965), as several studies have demonstrated.

In a historical study of the US automobile industry, for instance, Carroll, Bigelow, Seidel, and Tsai (1996) showed that when organizations in the related industries of carriages, bicycles, and engine manufacturing diversified into automobiles, they had survival advantages relative to diversifiers from less related industries. It seemed their related industry experience transferred in ways that gave them important survival advantages. Klepper (2002) later built on this work and demonstrated its implications for entrepreneurship. He identified several *de novo* start-ups that outperformed the other automobile manufacturers in the industry—even those manufacturers' whose origins could be traced to the diversification efforts of established firms. The founders of the high-performing start-ups had either gained experienced in the leading incumbent firms of the focal industry (in this case, automobile manufacturing), or had acquired significant experience in the related industries of carriages, bicycles, wagons, and engine manufacturing. Thus, the evolutionary transfer of industry routines appeared to lend a critical survival advantage for these new ventures.

Further evidence linking related industry experience to new venture survival was demonstrated in Klepper and Simons' (2000) study of the US television industry. The authors described how many of the entrants into the early US television industry had organizational backgrounds that spanned a wide range of industries; in spite of this variance, however, the new ventures that came to dominate the television industry all had founders with prior experience producing radios: "Indeed, no non-radio producer ever captured a significant share of the television market," (Klepper et al., 2000: 998). The authors explained their findings in terms of the relatedness of the two industries: "Virtually all the major TV product and process innovations were developed by the radio producers, especially the larger ones, and this appears to have been an important element of their success" (p. 1013).

Such studies provide support for evolutionary perspectives on the transfer of routines from "parents" to "progeny" and how these genetic transfers can have powerful survival implications, as other studies have shown (Bruderl, Preisendorfer, & Ziegler, 1992; Carter, Williams, & Reynolds, 1997; Chandler, 1996; Delmar & Shane, 2004; Dowell & Swaminathan, 2006; Dyke, Fischer, & Reuber, 1992; Gimeno, Folta, Cooper, & Woo, 1997; Shane & Khurana, 2003): Through their industry experience, individuals acquire valuable knowledge, skills, and capabilities that provide important advantages when they found new ventures in similar industries. Thus, I hypothesize:

> **Hypothesis 1 (H1):** New ventures founded by teams with more related industry experience (to the new venture opportunity) will have higher rates of survival.

Although the importance of related industry experience to new venture survival is well documented, little attention has been paid to the contextual factors that help to explain when it may be more or less important. I argue that complexity will have a significant moderating effect on the relationship between related industry experience and new venture survival.

One view is that related industry experience plays an important *enabling* role in the survival of new ventures that pursue complex business models, in terms of the legitimacy that related experience signals; because uncertainty often accompanies complexity, particularly in new and not-as-of-yet-established new ventures, such proxies for quality carry high value (Podolny, 1994). When founding teams have related industry experience, it provides an indicator that they "come from good stock" (Burton et al., 2002). Thus, such founding teams may not only be able to reap the benefits of being more familiar and understandable, and thus legitimate (Suchman, 1995), they may also be able to draw on the valuable status and reputational capital of their prior organizational affiliations (e.g., Rindova, Pollock, & Hayward, 2006; Sorenson & Stuart, 2001).

And yet, as relevant as these perspectives are, they also have important application to new ventures that *lack* complexity. This is because uncertainty imposes liabilities on new ventures of all types (Stinchcombe, 1965); thus, the incremental uncertainty that complexity adds to new ventures may have little marginal impact on the value that founders with related industry experience provides as a marker of legitimacy. Moreover, when founding teams pursue complex business models, their own legitimacy may be less of the focus of audiences' assessments, as such audiences seek to understand the business model itself, including its viability and market potential (Navis et al., 2008). This can be seen in the earlier complex business model examples, where none of the founders of ZipCar, XM, Sirius, or WebVan had prior industry experience that was closely related to the new ventures they formed; it was the business models themselves that attracted investor and market attention.

An alternative view is that related industry experience plays an important *constraining* role in the survival of new ventures pursuing complex business models, in terms of the consequences that occur from the misapplication of prior experience when the nature of complexity changes. In their study of architectural innovations, for instance, Henderson and Clark (1990) drew attention to the frequency with which subtle changes in the component technologies in a complex system can result in large-scale shifts in the nature of interdependencies. Such dynamics help to explain

the difficulty that established organizations have in adapting to certain types of technology shifts; as industry technologies converge on a dominant design, organizations build their knowledge and capabilities around recurring tasks (Cyert & March, 1963; Nelson et al., 1982). Their learning gets compartmentalized and becomes focused on incremental changes that align with current processes and procedures (Henderson et al., 1990; Tushman & Anderson, 1986). The result is that managers in such organizations rarely revisit and search for alternatives to the design platforms that are already in use and being efficiently managed. These patterns can have particularly strong negative implications in new venture settings when employees replicate in their new ventures the dominant industry models with which they have been imprinted.

The problem that arises from such imprinting lies in the inability for founders with "related" industry knowledge—based on their prior routines—to understand an entire system and how each of the component parts (e.g., of an organization) work together. For instance, Henderson and Clark (1990) described how the engineers in their study were able to make accurate forecasts of how the particular component parts of a system would evolve technology-wise, yet without understanding the entire system, they were unable to see how such changes could put the survival of their firm in jeopardy. Because of the rigid nature of their routines and the taken-for-grantedness of their understandings of the world, they were unable to recognize the new threats when such threats were right under their noses. It is precisely these characteristics that make the qualities of complex systems especially consequential; unlike "radical" innovations, which are easy to see, changes in the nature of complexity are easy to miss; what seems to be the same, may have actually changed dramatically. In this way, "Much of what the firm knows is useful and needs to be applied in the new product, but some of what it knows is not only not useful but may actually handicap the firm" (Henderson et al., 1990: 13)

Such complexity dynamics can be especially consequential for new ventures: When founders leave their former organizations, they rarely bring with them knowledge of the entire system; more often they carry only partial knowledge of a limited number of component "parts." Yet,

complexity requires an integrated understanding for its effective management. Similarly, with complexity increasing the likelihood that related industry knowledge will be misapplied, the value of related knowledge rapidly decays. Taken together, I expect the positive relationship between founding teams with related industry experience and venture survival to be weaker when new ventures pursue complex business models:

> Hypothesis 1a (H1a): Business model complexity moderates the relationship between founding team related industry experience and new venture survival: When founding teams choose complex business models, the positive effect of related industry experience on venture survival will be weaker.

3.2 Functional experience and complexity

Beyond the industry experience that founding teams carry with them into their new ventures, they also carry with them organizational experience in particular functional areas (e.g., sales and marketing, operations and engineering), many of which functions have been linked to new venture outcomes (e.g., Burton et al., 2002; Chandler, 1996; Chandler & Hanks, 1998; Chandler & Jansen, 1992). For instance, in technology settings, functional experience in operations and engineering can be particularly important to new venture survival, as James Crowe, CEO of Level 3 Communications, describes:

> "Level 3, at its heart, is a technology-based company and frankly, the central technology is operations research and optimization, which I tend to think is going to revolutionize all of business over the next 20 years…I don't see how you can manage any kind of technology-based enterprise without it" (Horner, 2000: 40).

And yet, as much as different forms of functional experience have stand-alone value, perhaps more important is how such experience is configured in founding teams. Recent decades have produced an abundance of research that has demonstrated the significance of team demography on organizational outcomes. Much of this work has focused on the upper echelon managers of established firms, examining whether differences in the composition of top management teams—

and whether such teams are more or less diverse—has implications for key organizational outcomes (see Bunderson & Sutcliffe, 2002; Glick et al., 1993; Milliken & Martens, 1996 for related reviews). Of interest in these studies has been the particular effect of functional diversity on team conflict and cohesion. I draw on this body of work to first hypothesize the more general effects of founding team functional diversity on new venture survival. I then hypothesize how such effects are moderated by business model complexity.

Conflict in teams. Conflict, or "…a condition in which group members disagree about task issues, including goals, key decision areas, procedures, and the appropriate choice for action" (Pelled, Eisenhardt, & Xin, 1999: 2) tends to carry with it negative connotations; it is often portrayed as something that needs to be "resolved." However, in the organizational teams' literature, conflict has been linked to the positive outcomes of creativity and innovation, which are more often than not fostered by teams with greater functional diversity. Several studies have contributed to these findings.

Bantel and Jackson (1989), for instance, studied 199 banks and found that the banks which were headed by functionally diverse management teams produced more innovations in their administrative functions. Pelled, Eisenhardt, and Xin (1999) found similar evidence that linked the functional diversity of product development teams to innovation. Specifically, they demonstrated how task conflict (see also Knight et al., 1999) contributed favorably to cognitive task performance, defined as "performance on tasks that involve generating plans or creative ideas, solving problems, or making decisions" (Pelled et al., 1999: 1). Adding nuance to these findings, Simons, Pelled, and Smith (1999) showed that conflict without debate can generate maladaptive consequences. They examined the top management teams of 57 manufacturing companies and found that, although functionally diverse teams had significantly lower profits, sales and decision comprehensiveness, the significance of such negative effects went away after accounting for the level of team debate. Taken together, these studies show that functional

diversity can be an important enabler of creativity and innovation, particularly when conjoined with mechanisms that facilitate effective communication (Eisenhardt, 1989; Pelled et al., 1999).

Cohesion in teams. Although teams derive general benefits from their effective communication patterns, such benefits appear to be especially important when requirements for learning and adaptation are high (e.g., Ancona & Caldwell, 1992; Edmonson, Bohmer, & Pisano, 2001). Several studies have linked team cohesion to improved communication patterns. Zenger & Lawrence (1989), for instance, showed how teams of engineers from a US electronics firm exhibited better technical communication (than more diverse teams) when they were of similar age and tenure. The lack of diversity in these teams appeared to allow a cohesive bond to form between members that facilitated interactive learning. By comparison, Sutcliffe (1994) provided an illustration of the learning constraints that can result from the *lack* of such cohesion. Analyzing a sample of 65 randomly selected (from Compustat) executive teams, she demonstrated how functional diversity failed to translate to more accurate perceptions of the functionally diverse teams' environments; although such diverse executive teams were believed to have a more comprehensive set of information to make accurate assessments, they appeared to repress their interactions and engage in "shallow" communication patterns. Her study thus points to the importance of team cohesion, especially in fostering the exchange of valuable information.

Team cohesion has been linked to functionally dominant teams, or teams where the lack of team diversity is concentrated in a single functional area (Carpenter et al., 2001). Teams with functionally similar backgrounds tend to have more convergent perceptions of their environment (Dearborn & Simon, 1958). For instance, Knight et al. (1999) demonstrated how teams with functionally similar backgrounds were significantly more likely to have strategic consensus, or a shared mental model of the strategy of the firm. In new technology ventures, the greater advocacy that seems to arise from such consensus has been linked to greater capability generation (Kazanjian & Rao, 1999)

New venture demands. Although empirical evidence is lacking to inform how functional diversity and functional dominance affect the survival of new ventures, reasonable arguments can be made for the positive (and negative) effects of both types of team configurations. Given their dual qualities, I advance competing hypotheses for these main effects in the paragraphs that follow. Fundamentally, at question is whether the founding teams of new ventures benefit more from team conflict—and the creativity and innovation with which it has been associated, or team cohesiveness—and the greater coordination that it can enable.

In terms of functional diversity, the creativity and innovation that is facilitated through functional diversity can provide important benefits to new ventures in terms of the ability to differentiate product and service offerings and to improvise and solve problems (Moorman & Miner, 1998). Such capabilities are especially important as the nature of the problems that new ventures must solve shift with different terrain. Consider again the dominant problems that Kazanjian (1988) identified in the new technology ventures he studied. Looking at only two of these problems—technology development and market growth—illuminates the important role of both engineering and marketing experience in the founding team.

Moreover, functional diversity provides benefits in terms of the requisite variety it provides. With variance in the functional perspectives that founders bring to the table, not only are functionally diverse teams more likely to generate creative and innovative outcomes, they are also more likely to curb the institutionalized logics, or "old mindsets," that founders in more homogeneous teams are more likely to introduce. Thus, I hypothesize:

> **Hypothesis 2 (H2):** New ventures founded by teams with greater functional diversity will have higher rates of survival.

As much the creativity and innovation that comes with functional diversity can benefit new venture survival, the communication benefits of cohesive and socially integrated teams may outweigh these benefits. On the one hand, new ventures are themselves inherently novel, which

suppresses to some extent the need for ongoing creativity and innovation. This may be especially true in terms of the outward-facing aspects of the business, upon which audiences use their similarity and familiarity to what already exists as touchstones for assessing a venture's worth; with increased novelty also comes increased difficulty for audiences to understand new ventures, which jeopardizes their legitimacy (e.g., Stinchcombe, 1965). On the other hand, the founding teams of new ventures must engage in ongoing learning and adaptation in order to understand the necessary processes and procedures that allow them to effectively organize and manage their new ventures. Duchesneau and Gartner (1990) showed as much in their comparison of 13 successful and failed new ventures each in the fresh juice distribution industry. The new ventures that succeeded were found to be "more flexible, participative, and adaptive;" their founding teams were characterized by less conflict and better communication and coordination than those that failed. Thus, although functional dominance may impose limits on the creativity and innovation such teams generate, it supplies an important coordination mechanism that is needed to get new ventures successfully off the ground and running.

Hypothesis (H3): New ventures founded by teams with greater functional dominance will have higher rates of survival.

Building on earlier contributions by Galbraith and Kazanjian (1986), which examined how internal processes (e.g., task forces, matrix structures) could be matched to manage the interdependencies of complex systems, a small number of studies have begun to look at the contingent effects of complexity on founding team demography and its relationship to organizational outcomes (e.g., Carpenter et al., 2001; Michel & Hambrick, 1992).

Among this group is a prominent study by Carpenter and Fredrickson (2001), which examined the moderating role of complexity in terms of the global strategic posture of 300 major US firms, or "…the degree to which a firm depends on foreign markets for customers and factors of production and the geographical dispersion of these markets and factors" (p. 534). The authors

used a measure of "global strategic posture" to proxy for differences in complexity and hypothesized the contingent value of functionally diverse teams across such contexts. They found a negative and significant relationship between functional diversity and global strategic posture; they explained their results in terms of the importance of team cohesiveness when managing complexity. Similarly, O'Reilly, Snyder, and Boothe (1993) attributed the failures of several major firms, including Pan Am, Singer, and Fairchild Semiconductor, to the "increased competition, changing technology, and the greater uncertainty and complexity facing managers and organizations" (p. 148). At the core of these failures, they argued, was the inability of the less successful top management teams to adapt due to their lack of team cohesion, a view also supported in Smith, Smith, Olian, Sims, O'Bannan and Scully's (1994) study of high tech firms:

> Presumably, top management teams that work well together react faster, are more flexible, use superior problem solving techniques, and are more productive and efficient than less integrative teams. Such teams may operate as efficient clans, not needing to expend extra energy or resources on group maintenance (p. 432).

Building on this work, I expect business model complexity to place higher demands for learning and adaptation in new venture founding teams, which may be especially *constrained* by the conflict of functionally diverse teams and particularly *enabled* by the cohesion of functionally dominant teams. Such moderating effects are likely to be especially pronounced among new venture founding teams, where the individuals who comprise them have human limits in their ability to manage large sets of interdependent parts. The effect of this cognitive constraint is to amplify the need for effective team communication and coordination. And while functionally dominant teams have recognized redundancies in the knowledge they possess, the same redundancies have been linked, in complex contexts, to more effective problem solving and knowledge creation (Nonaka, 1994). They have also been linked to an increased likelihood that individuals will engage in the team and take greater responsibility for the system as a whole (Weick et al., 1993); thus, given such costs of diversity and benefits of cohesion, I hypothesize:

Hypothesis 2a (H2a): Business model complexity moderates the relationship between founding team functional diversity and new venture survival: When founding teams choose complex business models, the positive effect of functional diversity on venture survival will be weaker.

Hypothesis 3a (H3a): Business model complexity moderates the relationship between founding team functional dominance and new venture survival: When founding teams choose complex business models, the positive effect of functional dominance on venture survival will be stronger.

Hypotheses 3a posited a general effect of functional dominance; however, it did not distinguish whether such dominance was in the functional area that was related the most to the new venture opportunity. Although it seems reasonable to expect that such relatedness should have positive effects, a study conducted by Michel and Hambrick (1992) provided no evidence that it did. The authors examined 134 Fortune 500 firms to determine the effects of team demography on firms' diversification posture (an ordinal measure ranging between unrelated diversification and vertically-integrated diversification) and performance (measured as ROA). They were surprised to find that teams with greater functional dominance in the core functions of the organizations performed worse when the interdependence they were required to manage was greater. While related functional experience is clearly important to new venture survival, it appears to be less so when new ventures compete with complex business models.

A similar explanation as to what was advanced earlier, in terms of the industry experience of founding teams, also applies here. Subtle shifts in the nature of complexity render obsolete knowledge that was once much more "related." Recall the engineers in Henderson and Clark's (1990) study; their functional experience in engineering provided them with transferrable skills in terms of being able to accurately forecast technology specifications. However, such engineers were less able to apply their knowledge in the needed ways to understand the larger complex system and its interrelationships. Thus, I hypothesize:

Hypothesis 3b (H3b): Business model complexity moderates the relationship between founding team functional dominance in a related area and new venture survival: When founding teams choose complex business models, the positive effect of functional dominance in a related area on venture survival will be weaker.

3.3 Role experience and complexity

A third aspect of prior organizational experience is the prior role experience of the founding team. The two forms of role experience on which I focus are prior start-up experience as an entrepreneur and prior senior executive experience in an established organization. The two role experience types were chosen so as to provide contrasts in their levels of institutional embeddedness, with prior start-up experience on the low end and prior senior executive experience on the high end. By including both measures, comparative inferences are possible around the institutional mechanisms being tested. I begin by hypothesizing the main effect of founding team prior entrepreneur experience on new venture survival. Next, I posit how this relationship is moderated by business model complexity. Then, I follow the same sequence and hypothesize the effects of founding team senior executive experience on new venture survival. I conclude with several tests of how such experience interacts with business model complexity when measured in alternative but theoretically distinct ways.

Prior entrepreneur experience. From an internal organizing standpoint, new ventures require a set of knowledge, skills, and abilities that is very different from what is required in an established organization (e.g., Alvarez & Busenitz, 2001; Timmons, Muzyka, Stevenson, & Bygrave, 1987). Entrepreneurship exposes individuals to routines around the recruitment and training of personnel, the research and development of new product and service offerings, the establishment of internal operating and accounting systems, and the acquisition of customers and sales. Direct experience in these processes confers important advantages through the learning and awareness of the skills, knowledge, and abilities required to manage them effectively. Indeed, experience in the role of entrepreneur provides a set of unique knowledge and skills related to

starting a business, including the ability to envision what needs to be done and knowledge of the resources required (Timmons, Muzyka, Stevenson, & Bygrave, 1987). Beyond these, start-up also expands founders' social networks and provides benefits in terms of the wide range of uncertainties it resolves—professional, operational, and personal—which can otherwise delay or distract first-time founders:

> When I first considered entrepreneurship I had lots of questions: What personal qualities does it take to found a successful business and do I have them? What education and experience is the best preparation for becoming an entrepreneur? How do I find a good product idea? How do I obtain the money to start a company? Can I run a successful business, raise children, and still have a normal family life? (Hess, 2001: Ch 8.)

Taken together, the benefits of having been through start-up processes before can lend important advantages to founding teams with prior experience leading a new venture, who need not acquire this experience for the very first time (unlike their first-time founding counterparts).

From an external audience standpoint, starting a new venture requires the support of key stakeholders, which should also favor founders with prior experience starting a venture, who can use evidence of having been through the founding process before as a signal of credibility and legitimacy (Tornikoski & Newbert, 2006). Such legitimacy has been linked to more favorable investment decisions (Goslin & Barge, 1986; Macmillan, Siegel, & Narasimha, 1985; Riquelme & Rickards, 1992). To illustrative an extreme but nonetheless relevant example of this legitimacy, Lounsbury and Glynn (2001) recounted the case of Jim Clark, who started three companies with market values that exceeded $1 billion each: Silicon Graphics, Netscape, and Healtheon. Drawing from an excerpt of the bestselling book, The New New Thing (2000), the authors illustrated how: "Sand Hill Road was where the V.C.'s clustered together for safety, like ducks in a park waiting for the bread crumbs to fall. Each time Clark made this trip the ducks came out of it worse than the time before—the price of the crumbs rose, and they had to quack louder for them" (Lewis, 2000: 101).

Together, these ideas suggest that prior entrepreneur experience should provide benefits that are tied to both internal organizing activities and external audience assessments—each of which have been linked to higher performance and rates of survival (e.g., Carter et al., 1997; Delmar et al., 2004; Delmar & Shane, 2006; Klepper, 2002). Thus, I hypothesize:

> **Hypothesis 4 (H4):** New ventures founded by teams with a higher proportion of former entrepreneurs will have higher rates of survival

Although several studies have demonstrated the value of prior entrepreneur experience to new venture survival, the moderating effects of business model complexity have received far less attention. This is somewhat surprising given the characteristics of complexity and its close match with entrepreneurial learning and adaptation routines. By their very nature, prior entrepreneurs have broken away at some point from the institutionalized logics and ways of doing business of established firms; their own actions provide an indication of their acumen for shifting from the "current belief system, theory-in-use (Argyris et al., 1978), or organizational paradigm (Brown, 1978; Pfeffer, 1981)" (Lant et al., 1992b: 50). Supporting this view is Lumpkin and Dess' (1996) portrayal of entrepreneurs as having a general orientation toward autonomy, innovativeness, risk-taking, proactiveness, and competitive aggressiveness. And while autonomy can negatively influence the team coordination required for managing complexity, the propensity to break from existing frameworks, take risks, and be innovative meshes well with the learning and adaptation requirements of complex business models. Thus, I hypothesize:

> **Hypothesis 4a (H4a):** Business model complexity moderates the relationship between founding team prior entrepreneur experience and new venture survival: When founding teams choose complex business models, the positive effect of prior entrepreneur experience on venture survival will be stronger.

The second form of role experience that I examine is that of a senior executive in an established organization. My choice to focus on senior executive experience is guided in part by its relevance to the practice of entrepreneurship. Because investors often seek the leadership

skills and industry knowledge of senior executives as criteria in their funding decisions (e.g., Macmillan et al., 1985), senior executives can play an important role in new ventures and often gain widespread representation in founding teams; thus, they are a source of influence and variance meriting analytical investigation. As well, institutional perspectives on imprinting have particular relevance among senior executives, where mechanisms of organizational tenure and power (Berger et al., 1966; Hambrick et al., 1984) have been linked to greater cognitive rigidities in their organizing and management decisions (e.g., Barr et al., 1992; Brown & Eisenhardt, 1998; Tripsas & Gavetti, 2000).

Senior management experience, defined here as that which is gained by individuals in the top tiers of an established organization, has generally been viewed as favorable to entrepreneurial ventures. Much research has examined its effects on new venture outcomes. One subset of this literature has pointed to its positive influence on "getting into the game" in the first place, in terms of securing initial financing. In a study of Silicon Valley start-ups, for instance, Burton, Sørensen, and Beckman (2002) showed that founding teams with previous senior executive experience were more likely to obtain external financing. Their finding was recently duplicated in a study by Tornikoski and Newbert (2006) that used Panel Study of Entrepreneurial Dynamics (PSED) data.

Other research has highlighted how executive experience can result in well-developed social networks and enhanced opportunity awareness (Audia et al., 2005; Freeman, 1986). As senior executives in organizations, individuals gain privileged access to other leaders, financiers, and influential industry players, the networks of which remain accessible when executives leave their old organizations to form new ventures. Similarly, in their roles as senior executives, individuals gain broad perspectives of their business, which not only translate to important administrative capabilities, but can also raise greater awareness of threats and opportunities in the industry environments where they manage.

Still other studies have examined the influence of senior executive experience on new venture performance, more often than not revealing its positive effects. In a study of 1,794 German founders, for instance, Bruderl, Preisendorfer, and Ziegler (1992) showed that the prior leadership experience of founders (used here as a rough proxy for senior leadership experience) was associated with an increased the likelihood of their firms' survival. Similarly, in several studies of young manufacturing firms in Pennsylvania and *de novo* start-up ventures in Utah, Chandler with Hanks and Jackson (1996; 1994; 1998; 1992) showed that managerial expertise positively influenced both the sales and growth of firms.

Taken together, the industry knowledge, administrative capabilities, legitimacy, and social capital that senior executives develop through their organizational experience can lend important advantages to the survival of new ventures of all types, thus I hypothesize:

> **Hypothesis 5 (H5):** New ventures founded by teams with a higher proportion of former senior executives will have higher rates of survival

Despite a wide body of evidence speaking to the importance of senior executive experience to new venture founding teams, these effects are not always significant (Dyke et al., 1992), nor are they always positive (Gartner, Starr, & Bhat, 1999: 255). It seems that the effects of senior executive experience on new venture survival largely depend on the complexity that must be managed.

Beyond their more tangible knowledge, skills, and abilities, the senior executives who join founding teams bring with them a set of norms, routines, and patterns of behavior that have been shaped by their previous socialization in institutionalized organizational environments. Underlying these dynamics are the processes of learning and socialization that shape founders' approach to organizing and managing. The literature on managerial learning suggests that the capabilities that founders bring to their ventures is a function of past experiences and how these experiences have accumulated over time into a perspective on how things work: "Managerial

learning involves managers' attempts to develop an understanding of the connections between their actions and an organization's outcomes, as well as the role that an organization's environmental context plays in influencing these action-outcome linkages" (Lant et al., 1992b: 587). As senior executives make these connections and become embedded in such "givens," dominant logics form over time that shape organizing principles and practices (e.g., Friedland & Alford, 1991) and how managers recognize problems and solutions (Bartlett & Ghoshal, 1989; Cyert et al., 1963; March & Simon, 1958; Prahalad & Bettis, 1986).

As much was revealed in Barr, Stimpert, and Huff's (1992) study of the mental maps of the management of two railroad companies. The authors used letters to shareholders to examine how the mental maps of these management teams evolved in response to economic decline in the industry. They showed that one of the companies made prompt and adaptive changes, while the other—more institutionally entrenched (e.g., more organizational and industry tenure) company—did not. The authors attributed the lack of change in the one team to its ineffective learning routines. Unlike the surviving company, which engaged in ongoing processes of trial and error learning at the onset of industry decline, the failed company waited for 8 years, until it was under considerable financial duress, before it initiated change; by then it was too late and it was forced into an unfavorable acquisition by a larger railroad company.

The example provided by Barr et al. (1992) illustrates how the dominant logics that senior executives acquire through their role experience in an organization have direct implications for the learning requirements for managing complexity: Whereas senior executives may be adept at the first-order learning described by Lant and Mezias (1992a: 49-50), or "a routine, incremental, conservative process that serves to maintain stable relations and sustain existing rules (March, 1981)," they may be challenged by second-order learning, which requires shifts from the "current belief system, theory-in-use (Argyris et al., 1978), or organizational paradigm (Brown, 1978; Pfeffer, 1981)...[and which demands] the integration of new constructs into existing cognitive structures (Hedberg, 1981)" (Lant et al., 1992b: 50).

When such ideas are combined with the evidence of the powerful imprinting effect that deeply embedded organizational experience can have on individuals (DiMaggio et al., 1983), and its demonstrated transference to new venture settings (Burton, 2001; Phillips, 2005), it follows that higher levels of senior management experience in founding teams can be expected to be especially maladaptive under conditions of high complexity. With the many interdependent parts that complex systems require to be managed, the cognitive rigidities and first-order learning processes of senior executives can result in a form of constraint that has implications for the survival of new ventures; thus, I hypothesize:

> **Hypothesis 5a (H5a):** Business model complexity moderates the relationship between founding team senior executive experience and new venture survival: When founding teams choose complex business models, the positive effect of senior executive experience on venture survival will be weaker.

The previous hypothesis referred to senior executive experience in general terms; however, particular aspects of senior executive experience may have unique effects that can shed light on the underlying mechanisms that help to explain its importance. Bach and Smith (2007), for instance, called specific attention to such differences in their study of CEOs in the computer industry. They examined how different aspects of CEO experience—including prestigious educational backgrounds, more industry experience, higher rank (measured as also Chairing the Board), and greater ownership percentage—had unique effects on post-IPO survival. Of the various measures, all were significantly associated with post-IPO survival; however, only their measure of executive rank had a negative association. The authors explained the negative finding in terms of the increased conflict and reduced "diversity of counsel," or positive expression of opinions that underlies effective communication, that such rank-derived power can impose. An alternative and empirically consistent explanation lies in the increased embeddedness that derives from greater organizational influence (Berger et al., 1966), also contributing to the greater

enactment of such dominant logics. Both explanations suggest a negative effect of higher ranking senior executive experience in complex new ventures, hence:

> **Hypothesis 5b (H5b):** Business model complexity moderates the relationship between founding team high rank senior executive experience and new venture survival: When founding teams choose complex business models, the positive effect of high rank senior executive experience on venture survival will be weaker.

If the positive effects of senior executive experience are indeed weaker in complex new venture settings, then it may be possible to tease out whether these moderating effects are being driven by the power dynamics suggested by Bach and Smith (2007) or the "old mindsets" suggested by institutionalists (e.g., DiMaggio et al., 1983), by examining the effects of executive tenure, independent of rank. For instance, Kor, Mahoney, and Michael (2007) described how tenure in organizations can have the effect that managers become less perceptive of their environments and develop a form of closed-mindedness indicative of dominant logics:

> …[Senior executives] may commit psychologically to business-level and corporate-level strategies with which they are comfortable, and with each passing year, these managers may increasingly believe in the correctness of their worldview (Finkelstein & Hambrick, 1996)… Such managers may lack the agility of mind to formulate and to implement adaptive (or preemptive) changes other than incremental changes or imitative changes (p. 1196).

Phillips (2002) advanced similar ideas through an evolutionary economics perspective, noting how higher tenure is associated with an increase in the resources and routines that are transferred from prior organizations into entrepreneurial ventures.

Other scholars have advanced empirical evidence of the constraining effects of dominant logics, linking them to lower instances of adaptive change. For instance, Miller (1991) demonstrated a greater mismatch between the structures of organizations and their environments when CEOs had longer tenures, thus suggesting a difficulty or unwillingness to adapt. Grimm and Smith (1991) revealed a similar finding in their study of 855 railroad managers, showing how younger managers were more likely to shift their strategies when the environment changed.

Wiersema and Bantel (1992) found similar results in their study of Fortune 500 firm leadership, but they distinguished between tenure in the organization and tenure together in the top management team. Their results showed that organizational tenure limited adaptation, but tenure together in a team increased it. It appears these results may be due to the greater coordination that such teams, with presumably greater cohesiveness, facilitate.

Taken together, this evidence suggests that organizational tenure will contribute to the dominant logics of senior executives. Given the already-described incompatibilities with such logics and the management of complexity and the many interrelated parts of a new venture business model, I expect that the negative influence of organizational tenure will be especially strong in complex new venture settings:

> **Hypothesis 5c (H5c):** Business model complexity moderates the relationship between founding team senior executive tenure and new venture survival: When founding teams choose complex business models, the positive effect of senior executive tenure on venture survival will be weaker.

A third aspect of senior executive experience relates to the organizations where such experience is acquired. If indeed dominant logics provide an underlying explanation for the differential effects of senior executive experience, then such effects should be felt the most when executive experience derives from highly institutionalized organizational settings. Consider again the study by Cliff et al. (2006), which examined the founders of law firms. Those with experience in the dominant firms imitated the dominant industry model, but those with peripheral experience did so much less frequently. Thus, the nature of the executive experience makes a difference; as organizations become more established and dominant, their likelihood of becoming replicated as the model for organizing increases (DiMaggio et al., 1983). This is especially true when founders have experience in these dominant organizations. Gartner, Starr, and Bhat (1999) provided an example of this, and its negative implications for venture survival, when recounting the case of a furniture entrepreneur who had “big company” experience that hindered his ability

to run a start-up venture. Although such established organizations can provide important reputational and legitimacy benefits with their celebrity status (Burton et al., 2002; Rindova et al., 2006), which benefit simple and complex ventures alike, the dominant logics that they cultivate should be especially detrimental to the management of complex new ventures, thus:

> **Hypothesis 5d (H5d):** Business model complexity moderates the relationship between founding team senior executive experience in a large established firm and new venture survival: When founding teams choose complex business models, the positive effect of senior executive experience in a large established firm on venture survival will be weaker.

A final dimension of executive experience relates to the industry experience of senior executives. Borrowing from earlier ideas, industry experience can play an important *enabling* role in the survival of new ventures, in terms of the legitimacy that such experience provides; however, at the same time, there is little reason to believe that these legitimacy benefits will be significantly greater among new ventures that are pursuing complex business models. Thus, I expect that business model complexity will weaken the positive relationship between senior executive experience in a related industry and new venture survival, due to the amplified *constraining* effects of such experience in complex business models. Recall that related industry experience can act as a constraint in terms of the misapplication of such experience when the nature of complexity changes (Henderson et al., 1990); that is, when subtle changes to the component parts of the system trigger large-scale changes to the whole. The same can be expected to be true when senior executives have related industry experience. Moreover, such misapplication is likely to occur even more frequently as a result of the embedded industry and organizational logics that executives with related industry experience introduce to their founding teams. Thus, I hypothesize:

> **Hypothesis 5e (H5e):** Business model complexity moderates the relationship between founding team senior executive experience in a related industry and new venture survival: When founding teams choose complex business models, the positive effect of senior executive experience in a related industry on venture survival will be weaker.

4. RESEARCH SETTING

In this section, I describe my research setting and the characteristics that relate to the previously hypothesized theoretical relationships. My sample is the full population of entrepreneurial ventures that became certified as Competitive Local Exchange Carriers (CLECs), or providers of local telecommunications services, in Georgia, from the time when the Telecommunications Act of 1996 (Telecom Act) created this opportunity through year ending 2007. The twelve-year time frame of the study is long enough to capture a broad cycle of industry emergence, and yet short enough to allow for detailed quantitative analysis and qualitative investigation. Within this setting, founders of CLECs pursued either of two distinct business models. Differences in the complexity of the two models are described in detail and serve as the central bases for testing the hypotheses in this dissertation.

4.1 CLEC sector emergence

> *There was excitement in the air with the passage of the Telecom Act of 1996. It was felt throughout the entire telecommunications industry. Industry veterans of both the long distance and competitive access industries felt that this was the opportunity of a lifetime. This stoked the competitive juices of industry entrepreneurs who were itching to participate. This enthusiasm was infectious as both investment houses and vendors began to vie for the business of these new start-ups (McDermott III, 2002: 98).*

In the late 1990's, with the US economy on the rise and the technology sector booming, Congress sought to foster greater competition in the local telecom sector by retiring the "natural monopoly" concept and re-writing the Telecommunications Act of 1934. Out of these efforts came the landmark Telecommunications Act of 1996 (Telecom Act), which made entry into the local telecom market possible for entrepreneurs of many backgrounds and resource positions. Included in the Act's provisions were requirements for incumbent telecom providers (e.g., BellSouth, SBC, US West) to lease wholesale space on their networks so that a new breed of Competitive Local Exchange Carriers (CLECs) could resell all, or a portion of the "unbundled

network elements," of their services to local business and residential customers. In turn, for their compliance, incumbents were promised entry into the much sought after long distance market.

The entrepreneurs who became CLECs differed considerably in terms of their individual and firm backgrounds. Although many founders were seasoned telecom professionals, many others were "outside" players, including used car salesmen, members of the clergy, and professional athletes. Many of the ventures were formed as *de novo* start-ups (56%), which included venture capital-backed firms and traditional "mom and pop" ventures like "Home Phone Service, Inc." and "Latin American Telephone Company." Others were spawned from large established firms (40%). Still others were formed by local utilities and municipalities (4%); these have been excluded from this study due to their unique organizational structure and their disproportionately high survival rates, which appear to bias the results.

My research setting is the population of entrepreneurial ventures that became certified as CLECs, in Georgia, from the time when the Telecom Act created this opportunity through year ending 2007. Georgia offers a representative window into the national sample of CLECs in terms of operators per zip code, share of total telecom lines, and national presence.

4.2 CLEC business models

To become a CLEC, entrepreneurs required certification with the Public Service Commission (PSC) in each state where they operated. Certification required clear designation by founders of the business models that they would be pursuing with their ventures. The selection led to separation of the ventures into two qualitatively different models. One was a "resale-only" model, which was less complex and involved leasing the entirety of a CLEC's services from the incumbent provider and reselling them to end users; these CLECs owned no portion of their own facilities. The other was a "facilities-based" model, which was more complex and involved owning at least a portion of a CLEC's own facilities (e.g., a fiber network, switching capacity).

The vast majority of facilities-based CLECs (90%) also had a resale component to their business that complemented their facilities (e.g., to reach markets where they did not have facilities); thus, not only were they required to understand the resale business, which was largely oriented around the administrative processes of sales, ordering, and billing management, they also required an understanding of the complexities of owning and constructing their own facilities. Each model had its own unique challenges and opportunities. Founding teams with similar background characteristics pursued both models, and both exhibited similar ex-post success rates, with approximately half of all CLECs surviving their first five years of operation.

Low Complexity: Resale Only CLECs. As pure resellers, CLECs were not required to own any of their own facilities; they purchased the incumbents' service offerings at a wholesale rate and then resold the same incumbents' services to their end customers. This model appealed to many aspiring CLEC entrepreneurs with its low entry barriers. Fewer than 2% of all applications for PSC certification were denied. As one founder I interviewed explained, "If you had any industry knowledge, any business background, knew how to work with the regulatory agencies, knew how to talk "Bell," and then had money to put the deposits in, it was pretty low to get into the market." The wholesale discount was determined by the state commissions where CLECs were certified and was designed to be compensatory for the costs (e.g., sales, administrative, billing) that CLECs assumed by servicing customers in lieu of the incumbents; discounts were approximately 17% off the retail rate (McDermott III, 2002: 55).

Several of the resale-only CLECs were formed to target credit-risk customers who were underserved by the incumbents; this required pre-paid service arrangements that placed an additional financial burden on CLECs in the form of the escrow deposits they were required to pay to the PSC. The money in escrow helped to ensure that CLECs offering pre-paid services had customers who were protected if they did not receive the services they paid for in advance. Many of these resellers saw opportunities to service niche ethnic markets better than the incumbents. For instance, one entrepreneur described opportunities in the Hispanic market:

> When you call BellSouth, they want to do a credit check and they say, "Have you had service with us before?" and the answer is "no," and then they want your social security number, and you don't have one, or a valid one, and you don't have a lot of credit history, so they require a deposit…With us, you just go into a Hispanic store. You sign up at a Hispanic store. Our customers are just much more comfortable doing that… They are much more relationship-oriented. And they want to go pay in cash. They don't want to use money orders. In Mexico, you don't pay anything in the mail. I mean, you just don't. It's not how you do it. So we try to set up all our procedures that way.

But the resale-only model also left little room for product differentiation; the core telecommunications offerings were bounded by what local incumbents made available. To effectively differentiate on price, operational costs required streamlining and a broad customer base to spread these costs over. To effectively differentiate on service, the organizational support functions (e.g., operations, billing, and customer service) provided the best possibilities. Although this model placed certain constraints on resellers, it also limited the complexity that required managing.

High Complexity: Facilities-Based CLECs. By comparison, the facilities-based model demanded high capital requirements. As one founder explained, "…to even contemplate fiber, you've got to have some serious money, some juice, there's no doubt about it." The funding was applied to the construction of complex network infrastructures, both in their planning and execution: To deploy their services, facilities-based CLECs required the support and interdependent coordination of many field actors, including municipalities, landlords (generally of large commercial complexes), and other telecom providers. As well, compared to their residential-focused counterparts, facilities providers more often targeted sophisticated business customers, which had higher demands for quality and service, and thus more complex service offerings. As a differentiator, however, the facilities-based CLECs benefitted from greater independence from the incumbent local telecommunications providers. As well, they frequently distinguished their offerings in ways that could command greater margins (e.g., advanced digital

offerings). As one entrepreneur asserted, "You can just add so much value when you have your own facilities." But to do so required ongoing learning and adaptation to new technologies, legislation, and markets, thus adding to the complexity of the facilities-based model.

4.3 Summary of research setting

As this overview of the research setting illustrates, the Telecom Act deregulation spawned two clearly designated and distinct CLEC business models, both of which had clear differences in the complexity required to manage them. Both models were pursued in roughly equal number; both were pursued by founding teams that varied much in their prior experience; and, both translated to roughly equal success rates, with the facilities model edging slightly higher. These within- and across-business model comparisons form the bases for the hypotheses tested in this dissertation. I next turn to the data and methods that are used to test the contingent effects of founding team experience on new venture survival when founders pursue business model that differ in complexity

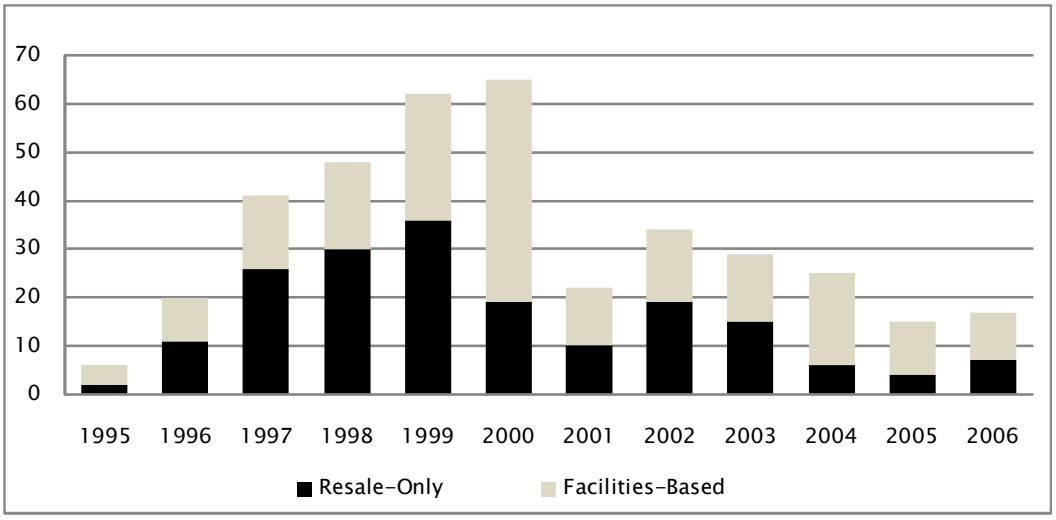
5. DATA AND METHODS

In this section, I describe and justify basic decisions about my research design and methodology that translate the previously stated hypotheses into empirical tests. I also discuss sampling issues, sources of the data, and collection procedures. A section on measurement follows. The section closes by identifying the statistical techniques used in the analysis.

5.1 Research design

The CLEC research setting afforded several features that advantage my study. First, there existed rich data on the founding conditions of each CLEC venture. Much of these data originated from firms' applications for certification, which were required to be filed in each of the states where CLECs operated; these data allowed me to investigate and control for several alternative explanations for firm survival. Second, there was a high level of within-condition variance in venture founding characteristics, including founding team prior experience and outcomes, thus satisfying important statistical conditions. As well, the setting exhibited important natural features. One is that the industry space originated from a common and known starting point, demarcated by federal legislation. Thus, entry dynamics are clearly traceable and there exists a window into the full population of entrants and aspiring entrants who initiated but did not complete the certification process. This is an improvement over many other studies of new venture survival, where sampling on only those firms that have already survived early organizing efforts, can introduce important left censoring biases (Gartner, 1985). These entry patterns are presented in Figure 3.

Figure 3: CLEC entry in Georgia by business model



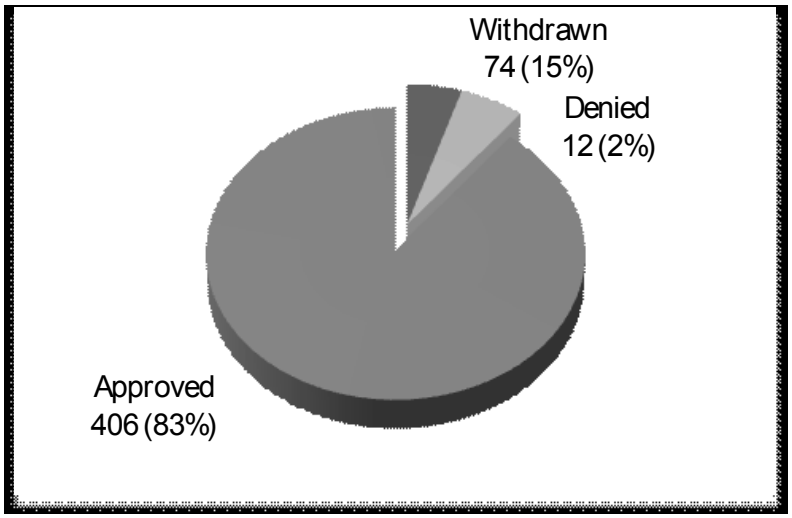
Another design feature is that the CLEC opportunity was defined in the same way for all participants. Although such narrowness sacrifices a degree of generality, it limits sources of variance that would otherwise be related to the idiosyncrasies of diverse contexts and not to the variable relationships of interest. Finally, because CLECs clearly designated one of two distinctive business models as part of their certification process, unique comparative insights are possible. Few other industries exist where two separate models exist that can be distinguished as clearly. I explore selection effects associated with this designation in tests described later.

5.2 Population and sampling

The deregulation of local telecommunication began at the state level before it was mandated nationally with the Telecom Act; in Georgia, it began in 1995, which is the first year of my sampling timeframe. Figure 4 shows that between 1995 and 2007, 492 entrepreneurs initiated the CLEC certification process in Georgia, as measured by their submitting paperwork to the PSC. Of these 492, 74 (15%) voluntarily withdrew their application prior to its approval by the PSC. Only 12 of the 492 (2%) had their application denied. Thus, unlike many studies of

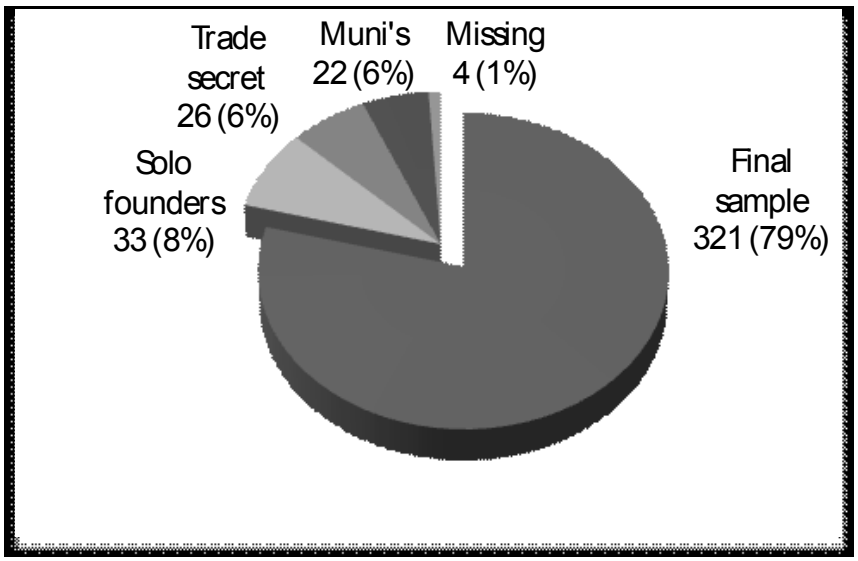
entrepreneurship, there appears to be little left truncation of individuals who desired to become CLECs but did not show up in the data set. The remaining 406 firms (83%) comprise the sample population of CLECs that became certified in Georgia during the sample timeframe.

Figure 4: Outcomes of 492 requests initiated for CLEC certification in Georgia



Of the 406 ventures that became certified as CLECs in Georgia, 80% of these, or 321 are the primary focus of my analysis. This excludes from the sample 22 local municipalities that formed CLEC entities (6%); as noted before, such organizations have features that are atypical to new ventures. As well, analyses revealed only one failure among the entire sample of municipalities which, together with their unique structural features, could bias the results. I also excluded 33 solo founders (8%), which could misrepresent the team effects in which I was interested. Later robustness tests evaluate tests of the hypotheses results when solo founders are included; such tests show their exclusion to have minimal influence on the final results. As well, I was unable to use the data on an additional 30 firms; 26 of these founders (6%) filed their financials as Trade Secret, such that I had no measures of their initial startup capital. The other 4 firms (1%) had missing data on the experience of the founding team. Figure 5 illustrates this breakdown. Of the 321 new CLEC ventures that comprise the primary sample population for hypothesis testing (79%), 167 were resellers (52%) and 142 were facilities-based providers (48%).

Figure 5: Exclusions of certified CLECs (n=406) from final sample



Although CLECs required certification in each state where they operated, not all state-by-state data were comparable. I therefore limited my focus to CLECs operating in Georgia, which offers a representative window into the national sample of CLECs and has unique characteristics that advantage my study. First, there are proximity benefits that allowed me to have frequent and in-person access to the Public Service Commission and the major local incumbent provider; thus, I was able to glean personal insights and a deep understanding of the industry sector, which may not have been possible elsewhere. Second, Georgia provided unique demographic characteristics, with its balance of urban, suburban, and rural areas of competition; thus, I could examine how such characteristics may have unique survival implications. Third, the Georgia Public Service commission was among the most advanced commissions in the region; it provided comprehensive data on the CLEC entrants and handled the regulatory approval and management processes in-house and under a central roof. By comparison, many other state commissions outsourced these processes to consultants. To confirm the generalizability of the CLEC population in Georgia to the population of CLECs as a whole, I analyzed two key historic trends. One revealed that number of CLEC operators per zip code in Georgia was similar to the national distribution. Figure 6 illustrated this for the year 2006, which shows that east of the Mississippi River, most

geographic areas had at least 7 CLECs in operation. Another revealed that CLECs in Georgia had a proportional share of all telecommunications lines that mirrored the historic national average. Figure 7 illustrates this for years 2000-2006, which covers the timeframe when such data were tracked in relation to my study.

Figure 6: National distribution of CLEC operations by zip code (2006)

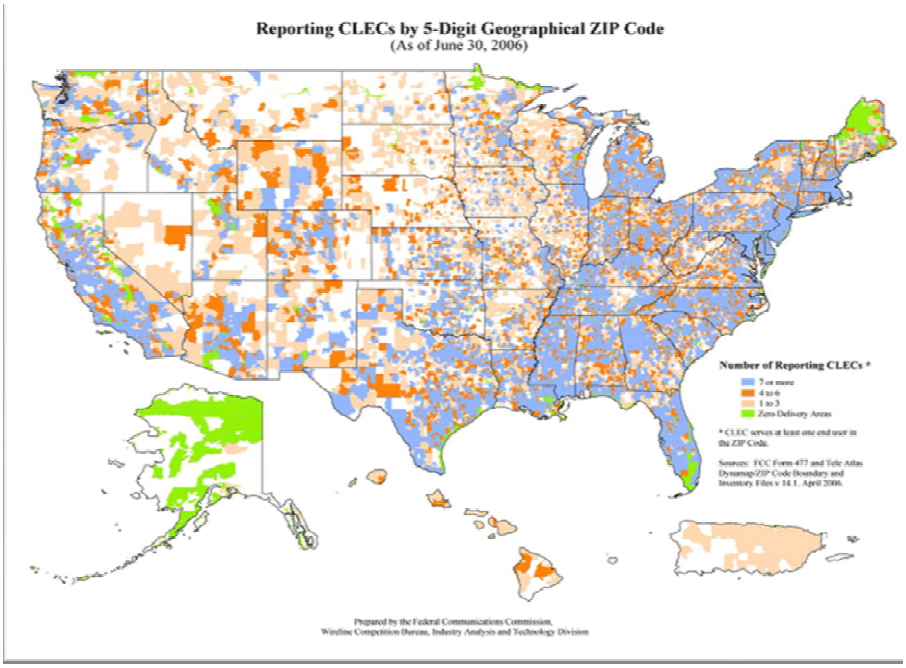
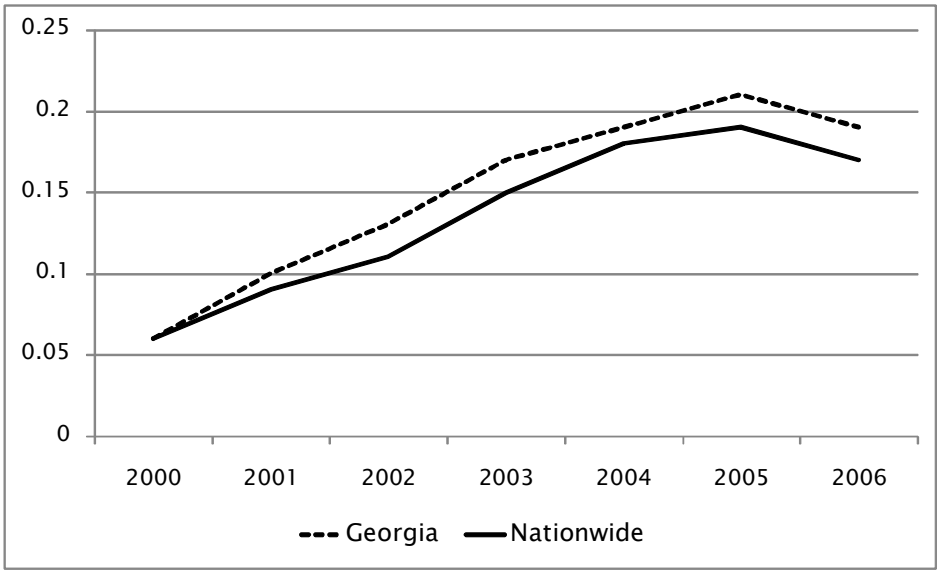


Figure 7: CLEC share of telecom lines—Georgia and nationwide



5.3 Data sources and collection

To begin to develop an understanding of the CLEC research setting, I engaged in interviews with several of the primary industry actors. These included managers from the incumbent local telecommunications providers who were responsible for interfacing with the CLECs, the Public Service Commission personnel who oversaw the CLEC certification and regulation processes, a venture capital investor of several CLECs, the EVP of a major national telecommunications' research group, and several founders and current executives from multiple facilities-based and resale-only CLECs. Whenever possible, I attempted to meet onsite with the interviewees at their place of business. I did this for their convenience and to gain a fuller appreciation of their organizations. A portion of the interviews were conducted at restaurants and over the phone. Interviews conducted in person were audio recorded and transcribed. When audio recording was not possible, notes were taken to document the interviews. A listing of preliminary interviews conducted, with the names of the individuals removed, is provided in Table 1.

Table 1: Examples of Interviews Conducted

Organization	Position(s)	Interview type (Duration)	Date
BST CLEC Collections	Manager	Phone Call (1 hour)	2/20/06
CLEC (Facilities)	Founder	Onsite Meeting (1 hour)	3/13/07
CLEC (Resale)	Founder	Offsite Meeting (1.5 hours)	3/14/07
Georgia PSC	Director of Telecom	Onsite Meeting (1 hour)	8/22/07
Georgia PSC	CLEC Oversight Group	Onsite Meeting (1 hour)	8/22/07
Georgia PSC	Manager – CLEC Revenue (UAF)	Onsite Meeting (1 hour)	10/9/07
BST CLEC Collections	Manager	Phone Call (1/2 hour)	6/16/08
CLEC (Resale)	Founder	Offsite Meeting (1.5 hours)	6/23/08
CLEC (Facilities)	Founder	Offsite Meeting (1.5 hours)	6/23/08
CLEC (Resale)	Manager (Former BellSouth)	Phone Call (1 hour)	6/25/08
CLEC (Facilities)	President & CEO	Phone Call (1/2 hour)	6/25/08
CLEC (Facilities)	President & CEO	Onsite Meeting (1 hour)	7/1/08
VC (Funded several CLECs)	Partner	Phone Call (1/2 hour – TBC)	7/10/08
CLEC (Facilities)	Head of Legal & Reg. Affairs	Onsite Meeting (1.5 hours)	7/11/08
CLEC (Resale)	Founder	Onsite Meeting (2 hours)	7/14/08
Industry research group	EVP & COO	Webinar (1 hour)	10/30/08

In addition to the interviews documented in Table 1, several interviewees were contacted multiple times, particularly those from the Georgia PSC. The focus of early interviews was to gain a deeper understanding of the research setting, determine the feasibility and merits of the study, and identify and validate relevant measures. The focus of later interviews shifted toward interpreting the findings of the study. Although these interviews reached a broad subset of relevant industry actors, they were modest in number and have not been subjected to a formal qualitative analysis; thus, they are not intended to provide empirical evidence, but rather to supplement and inform the quantitative analysis.

The CLEC dataset used to test the hypotheses of this dissertation was developed as original to this research effort and stems from several sources. The primary data sources are the Georgia Public Service Commission (PSC), which manages CLEC data in several of its divisions, and qualitative interviews with founders (again, not formally analyzed as part of this dissertation). Within the Georgia PSC, the primary source of data is the CLEC docket records, which include

each CLEC's application for state certification, records of transfers of ownership, disconnect notices from incumbent telecommunications providers, and bankruptcy records, among other items. The CLEC applications include contact information, business model designations (resale or facilities-based), financial statements, business plan assumptions, and founders' managerial and technical qualifications. Transfers of ownership records provide a history of the dates and the structure of any merger and acquisition activity that may have occurred. Disconnect notices serve as an indication of high levels of operational distress.

Collection efforts for these data required me to first acquire open records access and then make a choice between recording data from these records into a spreadsheet while on location at the Georgia PSC, or creating duplicate records for my personal use. I chose the latter alternative in order to have the benefit of greater flexibility in the coding effort, allowing me to code either different data elements, or the same data in different ways, without requiring multiple trips to the Georgia PSC to make these modifications. Moreover, these data are harbored in hundreds of large binder dockets that require sifting through (and Georgia PSC personnel to gather) to extract the appropriate information. For these reasons, data duplication for local access seemed like an appropriate choice. These data were scanned with the use of a high-speed scanner.

Corporate records maintained by the Georgia Secretary of State were used to assess the origination of the organizations (as corporate entities) that pursued the CLEC opportunity, as well as their discontinuance, and they were an important source in triangulating several data from the Georgia PSC. The vast majority of CLECs were formed as a legal entity requiring a corporate charter; only 2 were not. Because I assess CLEC survival in terms of Georgia operations, the Georgia corporate records provided a critical source to validate the survival outcomes. These data are accessible through the Georgia Secretary of State website and include the date of charter, any transfers of ownership (through mergers and acquisitions), corporate renewals, and current status in Georgia. I triangulated records of discontinuance from the Secretary of State with those from the PSC and found them to track very closely together. When merger and acquisition

activity occurred, these dates and details were also available for evaluation and cross-validated. A comparison of multiple Secretary of State and Georgia PSC records revealed that the former's "withdrawal" and related discontinuance measures paralleled closely with the latter's "cancellation" (of CLEC certification) status.

5.4 Data and measures

Data for this study span multiple levels of analysis, including team-level measures of founders' prior experience (e.g., industry, functional, and role), firm-level measures of start-up resources and activity (e.g., initial capital, geographic scope, heritage, funding source), and industry-level measures of munificence. The full codebook is provided in Appendix A. There, I describe in greater detail the variables I coded and their sources and coding rules. For parsimony, these data are described in a more summarized form in the following sections.

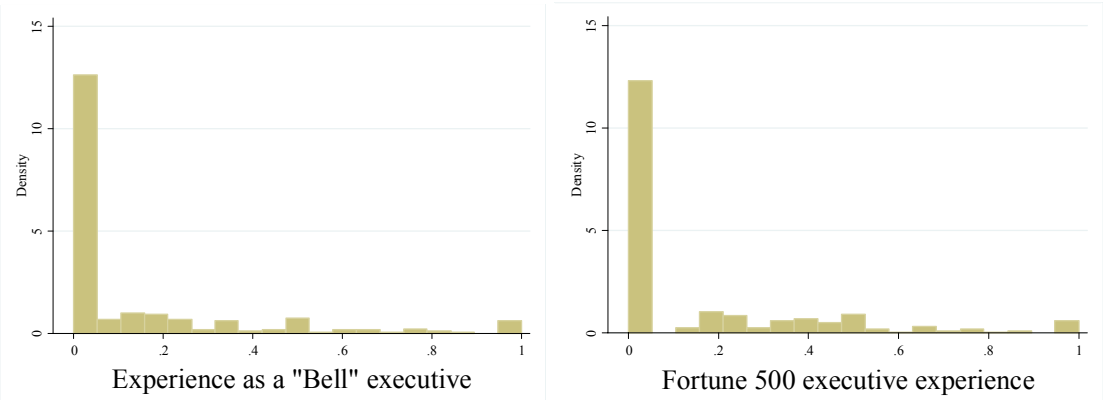
Dependent variable: *New venture survival* was coded as a dichotomous measure according to a decision rule that treated the first instance of: 1) bankruptcy, 2) a notice from an upstream service provider of the intent to disconnect services for prolonged non-payment, or 3) an unfavorable acquisition, as an instance of failure. All three outcomes indicate a severe level of operational distress, such that the informants I interviewed equated each with failure. Acquisitions were coded as favorable when they were described in positive terms in published announcements, were free of mentions of the target's financial distress, and where at least one executive from the acquired firm remained with the acquirer. Assessments of acquisition favorability were cross-validated with PSC officials and industry experts. Among the set of CLECs that did not end their life either in bankruptcy, with their services pending disconnection, or acquired, the final day of their operations was measured as when they stopped renewing their corporate license with the Georgia Secretary of State office (whether withdrawn or revoked), or when their PSC certification was ended (whether cancelled or revoked), whichever occurred first. The window for evaluating survival was measured in days from a CLEC's certification.

Independent variables. The independent variables in the study included various forms of industry, functional, and role experience that were coded in the same way and measured at the team level. Drawing on data from the résumés of each founding team member, codes were assigned to capture the prior experience of each individual on a founding team. Codes of "1" were assigned for the presence of an experience type and codes of "0" were assigned for the absence. Using these individual coding assignments, team-level measures were then calculated to reflect an average of the individual assignments for each experience type (thus, team-level measures ranged between 0 and 1); the team-level measures are what are used to test the hypotheses. At times, the resultant team measures were distributed in a highly skewed, or bimodal or multimodal fashion. Such measures were transformed into either dichotomous or ordinal measures as described.

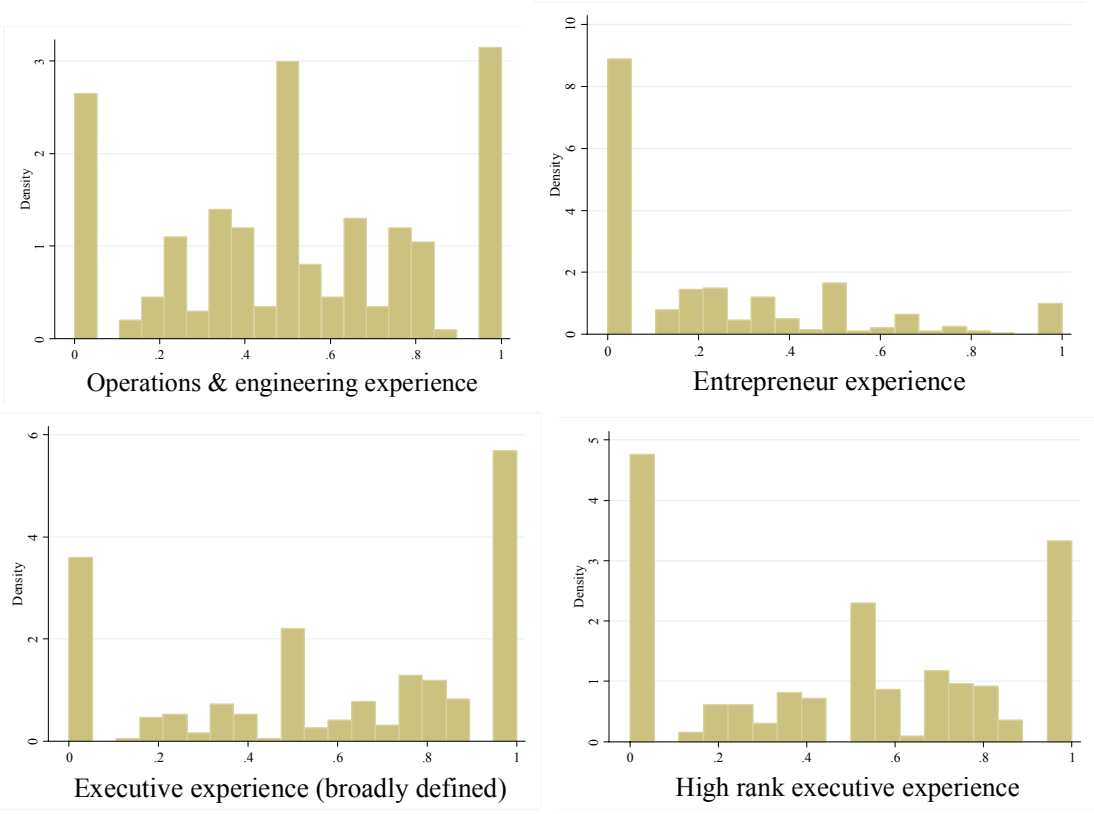
Given the importance *Related industry experience* to venture survival (e.g., Klepper, 2002; Klepper et al., 2000), I included a measure that captured when founders had previous experience in one of the Regional Bell Operating Companies. Such "Bell" experience has very close relation to the telecommunications activity that underlies both CLEC business models. Because the distribution of this experience at the team level took on a skewed form (see Figure 8), with most

Figure 8: Histograms of team experience distributions

Illustrative right skewed distributions transformed into dichotomous measures (0,1)



Illustrative multimodal distributions transformed into ordinal measures (0,1,2)



teams having no Bell experience, the team level measure was transformed into a dichotomous measure of whether or not any founder on the team had such experience.

Other research has pointed to the importance of various types of functional experience in new venture settings (e.g., Kazanjian, 1988), including experience in *Operations and Engineering* (Boeker, 1988; Keeley & Roure, 1990), *Sales and Marketing* (Boeker, 1988; Gartner et al., 1999; Keeley et al., 1990; Stuart & Abetti, 1990), *Finance and Accounting* (Keeley et al., 1990; Stuart et al., 1990), and *Legal and Regulatory*. Although these variables are not directly included in the final models used to test the hypotheses, they form the basis for three of the aggregate measures tested: 1) functional diversity; 2) functional dominance; and, 3) functional difference. *Operations and Engineering* was coded as experience in the operations, network management, engineering, industrial management, logistics, and related production and manufacturing functions of

organizations. *Sales and Marketing* was coded as experience in the sales and marketing function, including the activities of business and market development. *Finance and Accounting* was coded as experience in the financial management, accounting, and debt and equity funding-related functions. *Legal and Regulatory* was coded as experience in public (telecommunications) policy, legislative matters, regulatory support, and related functions; it is included here to account for possible idiosyncrasies associated with the deregulatory environment under study.

The measure of *Functional Diversity* that I use is a variant on Bunderson and Sutcliffe's (2002) measure, which expands on the Herfindal-Hirschman index (cf., Blau, 1977; Scherer, 1980) to better capture the mechanism of information sharing within teams, which is presumed to be highest when the functional diversity is high at both the individual (intra-personal) and team levels. Their measure, thus, is calculated by first determining a measure of intra-personal functional diversity. To do this, the career history of each individual is examined such that percentages of time worked in each of a set of functional areas can be distributed across their career history. These terms are then squared such that their sum, subtracted from one, reflects an intra-personal diversity score; next, these sums of squares are then averaged across all members of the team to derive a team-level measure. The measure I use is very similar, but it is modified to reflect the data constraint that I have in not knowing the percentage of time that each founder spent in each functional area—only that they listed such experience on their résumé. Thus for the four functional areas described above, I examined in how many of these areas each founder described having experience. As a parallel to Bunderson and Sutcliffe (2002) measure, I assume equal career "time" in each of the designated functional areas. When founders indicated no previous functional experience, or experience in just one functional area, I assigned a score of zero (reflecting no experience or diversity); when they had experience in two functional areas, I assigned a score of 0.5 [1-((0.25*0.25) + (0.25*0.25))]; when they had experience in three functional areas, I assigned a score of 0.67 [1-(((0.33*0.33) + (0.33*0.33) + (0.33*0.33)))]; and, when they had experience in all four functional areas, I assigned a score of 0.75 [1-((((0.25*0.25) + (0.25*0.25) + (0.25*0.25) + (0.25*0.25))))]. I averaged the scores of each individual on the

founding team across all the team members to derive a functional diversity score for the team. This resulted in team-level measures that ranged from 0 to 0.75.

The measure of *Functional Dominance* that I use is a difference score measure that uses the squared difference between the team level proportion of experience in operations and engineering and sales and marketing. These two functional areas were chosen for their primary relevance to this research setting. Similarly, the *Functional Difference* measure is the non-squared difference between these two scores, which is intended to isolate whether any significance could be attributable to either of these particular functions. Such measures are similar to those that have been used to examine functional dominance in other settings (e.g., Bantel et al., 1989; Carpenter et al., 2001; Hambrick, Cho, & Chen, 1996; Knight et al., 1999; Murray, 1989; Pelled et al., 1999). Thus, unlike functional diversity, which is a measure of the team level average of diversity in individuals, functional dominance is a measure of the representation (or limited lack thereof) of functions in the team more generally.

The form of role experience that I examine is that of *Senior Executive* experience, which I code in several different ways to attempt to identify the underlying mechanisms that help to explain its effects on venture survival. The first measure, *Senior Executive (Broadly Defined),* examines the effects of senior executive experience when its definitional boundaries are rather broad. For this measure, I coded founders as having senior executive experience when they claimed organizational experience, prior to their becoming a CLEC, as a chief-, senior-, or director-level executive of an established corporation. It also includes the roles of President and Vice President (e.g., Boeker, 1997; Keck & Tushman, 1993; Sutcliffe, 1994), and General Manager and Partner. The criteria previously used by researchers to measure senior executive experience have varied considerably (Carpenter et al., 2001). Although there is precedent in the upper echelon literature to focus on the top two hierarchical levels of an organization (e.g., Wiersema et al., 1992), given the challenge in determining these levels for each of the different organizations from which the executives in my study originated, this measure errs on the side of inclusion, coding as low as director-level experience.

As Figure 8 illustrated, the distribution of team level measures that resulted for this variable, and for the "High Rank" variable that I will describe next, appeared to be tri-modal in nature, with many teams having no members with previous senior executive experience, many with all members having previous senior executive experience, and a grouping of teams that lay midway between these two extremes. Based on this distribution, I translated the original continuous measures into ordinal measures by assigning the value of '0' when teams had less than or equal to 1/3 of their team with senior executive experience, a value of '1' when teams had between 1/3 and 2/3 of their team with such experience, and a value of '2' when teams had more than 2/3 of their team with such experience. These groupings appeared to reflect qualitatively different categorizations that merited their segmentation as such.

A second measure of senior executive experience, *Senior Executive (High Rank),* examines the effects of senior executive experience when its definitional boundaries are narrower, focusing only on the very top hierarchy of an organization. To qualify for this measure founders needed to have prior organizational experience as either a CEO or President of a corporation. Thus, while all the individuals coded as senior executives based on these criteria would also qualify for the former measure (and are thus nested within it), many fewer of the individuals who qualify for the former measure would qualify for this one.

A third measure of senior executive experience, *Senior Executive (Tenure)* is a continuous measure of years of senior executive experience on the team. To assess tenure, I look at it in both ways as has been done in prior studies of management teams: As a total of the years of executive experience (e.g., Henderson, Miller, & Hambrick, 2006) and as an average of this total across all team members (e.g., Finkelstein & Hambrick, 1990; Grimm et al., 1991; Hambrick et al., 1996; Wiersema et al., 1992). For both measures, the broadest measure of senior executive experience is used as the criteria for determining whether a founder has previous executive experience. In this way, the more general effects of organizational tenure are likely to be captured with this measure (i.e., the longer an individual is in an organization, the greater is the likelihood that he or she will ascend into this lower executive level role).

A fourth measure of senior executive experience, *Senior Executive (Large established firm)* experience, examines the effects of executive experience when it is acquired in a large established firm, where institutionalized norms, routines, beliefs, and values about how to organize are likely to be stronger (Cliff et al., 2006). I coded executive experience in a large established firm based on a firm's membership on the Fortune 500 rankings. Although such experience can be reliably coded and provides a useful and common measure for the type of firms in which I am interested, there are recognized limitations in Fortune's exclusion of other large and private firms that do not meet its criteria, and in its exclusion of large international firms, such as Cable and Wireless (UK) and France Telekom, which rarely but occasionally showed up in the CLEC sample (estimated at less than three percent of the overall sample). Given that a portion of the CLEC founders had large established firm experience that fell outside the Fortune 500 criteria, the use of the Fortune 500 rankings should result in a conservative test. To code this measure, I gathered Fortune 500 rankings from 1995-2007, which spanned the sample period, and determined the population of firms that made the rankings at any point during that time period. When founders had prior executive experience in any such firms, I coded this as '1' and '0' otherwise, and then derived team level measures that averaged the presence of such experience across all members of the team. As Figure 8 illustrated, the distribution of this measures was highly skewed, with the vast majority of teams having no Fortune 500 executive experience and no clear groupings beyond that. Thus, it appeared the simple presence or not of such experience on the team appeared to be qualitatively different states; accordingly, I transformed this into a dichotomous measure. For these same reasons, I transformed the measure of executive experience in a related industry, which I describe next, in the same way

A final measure of senior executive experience, *Senior Executive (Related "Bell" Industry)* experience, examines the effects of senior executive experience in one of the regional incumbent local telecommunications firms, or "Baby Bells," (or their current manifestations). I coded related industry experience in the same way as was described earlier for the measure that applied to non-executive team members as well.

Finally, I include a measure of *Entrepreneur experience* on the team. To code this variable, I designate founders as having prior entrepreneur experience, '1,' when they have been previously involved, either as the lead founder or a co-founder, in the formation of a new venture created to pursue an entrepreneurial opportunity. All other founders are coded as not having this experience, '0.'

Control variables. Other variables have been included in the study as industry-, firm- and team-levels controls.

At the industry level, I control for timing of entry. In new industry sectors, entrepreneurial ventures are confronted with unique demands for "sector building" (Aldrich & Fiol, 1994; Navis & Glynn, 2007; Suchman, 1995), or developing the shared structures of economic exchange and shared meanings that define the new field (Scott, 1995: 56). Such demands intensify the liabilities of newness that they confront relative to established firms (Stinchcombe, 1965). Moreover, in new technology industries, early entry can increase the likelihood that new ventures will miss on the designs and practices that will come to dominate the industry (Dowell et al., 2006). In spite of these risks, however, entering a new sector in its formative period can have important benefits in terms of early-mover advantages; such advantages can be sustainable even when the barriers to entry into an industry are low (Makadok, 1998). To control for the effects of *Industry entry timing* on survival, I included an indicator variable designating CLEC entry in the early period of initial establishment (1995-2000) or the later period (2001-2005) of early growth. Designation of the two periods was informed by a historical industry narrative (McDermott III, 2002). Alternative specifications of this measure, with the initial period narrowed to a smaller time period following inception, had no substantive impact on the final results.

Also at the industry level, I control for macro-economic variations in munificence at founding (e.g., Tushman et al., 1986), which are intended to account for the market downturn between years 2001-2003 in the telecommunications sector. The measure I use is the total annual capital expenditures (*CapEx*) in the CLEC market during the year when a CLEC was founded. To calculate these values, I chose industry classification measures that were consistent with FCC

reporting on the CLEC sector. Thus, for 1995 through 1997, data were calculated based on Standard Industrial Classification (SIC) industries' 481, 482, and 489. Starting in 1998, data were calculated based on the North American Industry Classification System (NAICS). The corresponding NAICS Codes are 51331 for Wireline, 51332 for Wireless, and 51333, 51334 and 51339 for others. For 2004 they are 5171, 5172, and 5173, 5174, and 5179, respectively. The CapEx measures were highly correlated (0.76) with the Bureau of Economic Analysis supply-side measure of industry investment; the latter was not used because it lacks data for each year of the sample period. I take the log transformation in my analyses, which optimized the functional form of these data.

At the firm level, I control for two separate aspects of a CLEC's business, of which the differences in focus can have an natural influence new venture survival (Sandberg et al., 1987). The first is the *Business model*, which is a dichotomous indicator of whether a CLEC is certified as a resale-only CLEC, '0,' or as a facilities-based CLEC, '1.' The main effect of the business model indicator is included in each of the empirical models because it forms the basis for all the interaction terms used to examine the moderating effect of complexity. I also coded for the dichotomous absence, '0,' or presence '1,' of a *Prepaid* certification, to account for the unique niche in which such CLECs competed (Freeman & Hannan, 1983; Podolny, Stuart, & Hannan, 1996; Rindova & Fombrun, 2001). Prepaid providers typically served credit risk or credit-challenged customers and were required to maintain a large balance of funds in escrow.

Another firm-level control is the heritage of the new venture, which is measured in two ways. The first captures whether the new venture was formed as a *de novo* entity—with no legal ties to another established firm, '0,' or as a parent company firm, '1' (e.g., Helfat et al., 2002). The second captures the "age" of the new venture, using the log age of parent-companies and the log of '1' for *de novo* entities. Both measures were included to distinguish the positive survival effects of simply having a parent company (Carroll et al., 1996; Chatterji, 2009; Klepper, 2002; Klepper et al., 2000; Klepper et al., 2005), from those that may derive more closely from the increased familiarity and reputation of an older parent company firm (Burton et al., 2002).

Two firm-level controls are included to account for firm-specific differences in the source and nature of initial financing. The first of these, start-up capital, has been shown to have an important influence on the likelihood of new venture survival (Cooper & Gimeno-Gascon, 1992). Inadequate start-up capital exposes ventures to greater risk from unanticipated variations in performance (Lussier, 2001). By comparison, higher levels can provide strategic flexibility, greater product potential, and a longer time period to advance through the new venture learning curve (Cooper et al., 1994). To control for these effects, start-up capital is measured as the natural log of the *Total assets* of new ventures at their founding. The second of these, *VC-funding*, is a measure of the nature of financing, indicating whether new ventures were funded by venture capitalists '1,' or otherwise, '0.' Venture capitalists can provide important benefits to new ventures through their expertise (Gompers & Lerner, 1999) and elaborate social networks (Fischer & Pollock, 2004), but they can also constrain new ventures in terms of policies for rapid growth that may be incompatible with founders' intentions or market conditions. Given such an influence on important venture outcomes, I control for the effects of VC-funding on survival.

The final firm-level control that I include is the *Geographic Scope* of CLECs, which has been linked to survival outcomes in new ventures (Bruderl et al., 1992; Stearns, Carter, Reynolds, & Williams, 1995). *Geographic scope* is a dichotomous measure of the market span of CLECs, whether local (including state and regional) or national. It is coded based on the states where CLECs indicated that they either had pending or previous certifications when they applied for certification in Georgia. Analyses with the state, regional, and national categories separated provided less explanatory power than those where the state and regional categories were combined.

At the team-level, I control for *Team size*, the importance of which has been argued by scholars studying organizational leadership (see Carpenter, Geletkanycz, & Sanders, 2004; Finkelstein et al., 1996 for reviews). Larger teams may have the benefit of greater access to information, whether through their own expertise or through their external networks, but they may also be increasingly challenged to make swift and coordinated decisions due to the greater

prevalence of opinions. Both are likely to have an important influence on new venture survival, where swift and accurate decision making can be central combatants to the liabilities of newness that confront new ventures (Stinchcombe, 1965). The measure of team size that I use is a simple count of the number of individuals on the founding team, as designated on CLECs' application for certification.

5.5 Methods and procedures

A Cox proportional-hazards survival model was used to test the hypotheses. This method analyzes the relationship between covariates and rates of success based on the rank-order longevity of firms with particular characteristics in the sample population. It does not require pre-specified survival windows, which adds generalizability when the temporal dynamics of different industries are less comparable. The time measure used to assess survival was days until a failure event occurs—if one occurred at all, measured from the date when a CLEC first becomes certified. An important aspect of hazards models is their handling of censored events, or those events where cases are lost. One form of censoring is left censoring, which describes when failures occur before entering the sample. Because the sampling procedure I followed identified CLECs at initiation of their PSC certification, and ultimately included all CLECs that were certified, left censoring has been minimized—both in terms of its role as an antecedent to the operations under study, and due to the minimal requirements for interested applicants to become successfully certified. Another form of censoring is right censoring, which occurs when firms do not experience a failure event during the observation period. When firms did not experience a failure event during the sample timeframe, they were coded as censored cases.

Proportionality Assumption. For a Cox proportional-hazards model to be appropriate, the assumption of proportionality must be satisfied. This means that the relative hazard of failure across groups must be constant across time (Collett, 2003 p. 46-7). In other words, if one firm has twice the risk of failing as another on day one, this relative failure risk must remain constant

over all points in time. To test whether the proportionality assumption was satisfied among covariates in my data set, I ran a regression of the primary covariates in my study and saved the scaled Schoenfeld residuals. Then, I tested whether any covariate significantly deviated from proportionality. Two of the original covariates, "prepaid services" and "gender diversity" failed to satisfy the proportionality assumption. Analyses showed these measures to contribute little explanatory power to the model, even when their effects were examined over the shorter discrete time periods in which the proportionality assumption was satisfied; they were thus dropped from the reported analyses. For all other covariates, there was insignificant evidence to reject the proportionality assumption. Details of these tests are reported in Table 2. In addition, plots of the residuals for each covariate are included in Appendix B.

Table 2: Test of Proportional-Hazards Assumption

Time: Log(t)

Plot	Covariate	rho	chi2	df	Prob>chi2	Pass?
1	Industry entry timing (early vs. later)	-0.13000	2.39	1	0.1220	√
2	Industry annual CLEC capital expenditures (ln)	-0.11994	2.43	1	0.1189	√
3	Firm business model (resale or facilities)	0.03025	0.13	1	0.7170	√
4	*Firm sub-model (prepaid services) (Removed)*	*0.25443*	*10.57*	*1*	*0.0012*	*No*
5	Firm heritage (parent company firm)	-0.01506	0.03	1	0.8534	√
6	Firm start-up capital: Total assets (ln)	0.04717	0.29	1	0.5924	√
7	Firm venture capital (VC) funding	-0.05262	0.44	1	0.5050	√
8	Firm geographic scope	0.02627	0.09	1	0.7619	√
9	*Team gender diversity (male) (Removed)*	*-0.17848*	*5.81*	*1*	*0.0160*	*No*
10	Team size	-0.15425	3.26	1	0.0711	√
11	Team related "Bell" telecom experience	0.06795	0.63	1	0.4289	√
12	Team functional diversity	0.13444	2.94	1	0.0862	√
13	Team functional dominance	0.04053	0.30	1	0.5863	√
14	Team operations & engineering depth	-0.08151	1.27	1	0.2596	√
15	Team sales & marketing depth	0.08157	1.42	1	0.2333	√
16	Team entrepreneur experience	-0.13096	2.90	1	0.0885	√
17	Team executive experience (broadly defined)	0.01513	0.04	1	0.8484	√
18	Team executive tenure (total years)	0.07521	0.66	1	0.4148	√
19	Team executive tenure (average years)	-0.04811	0.31	1	0.5799	√
20	Team executive experience (high rank)	0.00277	0.00	1	0.9727	√
21	Team Fortune 500 executive experience	-0.4121	0.26	1	0.6110	√
22	Team "Bell" executive experience	-0.02908	0.11	1	0.7404	√
	Global test		22.77	20	0.3003	√

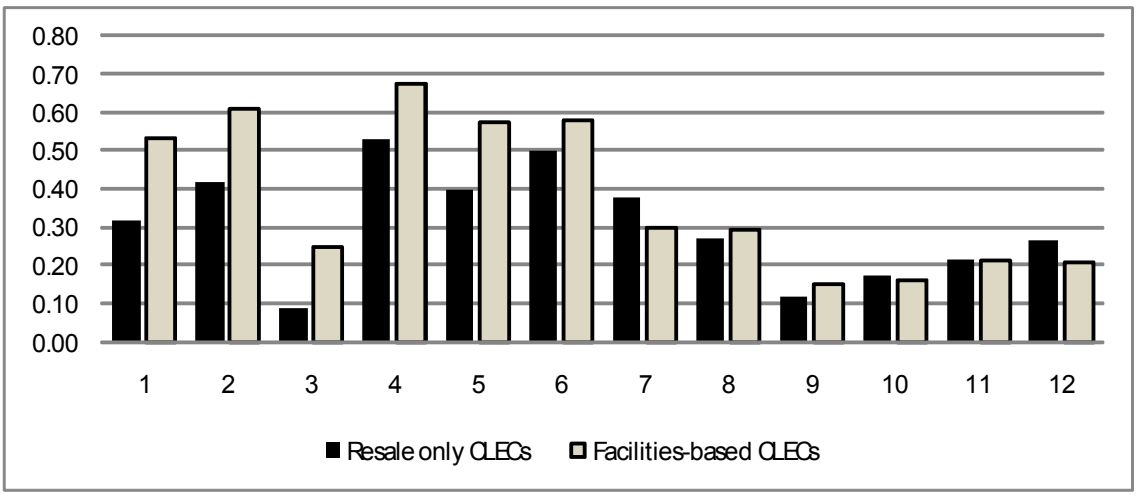
6. RESULTS

This section presents the results of my analyses and empirical tests. I begin with results that describe the sample population, including variable correlations and descriptive characteristics of the resale and facilities founding teams. Then, I present results of the hypothesis testing. In cases where it helps to inform theory, I supplement the statistical results with graphical patterns of the average time-to-failure estimates for stratifications of select variables. I conclude with analytical procedures that examine the robustness of these results across sample populations and which examine the potential selection effects associated with the choice of a particular business model.

6.1 Descriptive results

Analyses of the descriptive statistics of the resale and facilities CLECs reveals differences in the firm and founding team characteristics. For dichotomous and proportional measures that fit a common 0 to 1 interval scale, comparative descriptives are presented graphically in Figure 9.

Figure 9: Mean characteristics of CLECs and their founding teams



1	Parent company firm	5	Sr. executive (high rank)	9	Legal & regulatory exp.
2	Geographic scope	6	Operations & eng. exp.	10	Functional diversity
3	VC funded ventures	7	Sales & marketing exp.	11	Functional dominance
4	Sr. executive (broad def)	8	Finance & accounting exp.	12	Entrepreneur exp.

At the firm level, one of the primary differences across the two models was the start-up capital that associated with them; the median start-up capital (measured as total assets) of facilities CLECs was $21,509,000, which was much more than the $636,026 of resale CLECs. There was also a difference in the heritage of facilities and resale CLECs, with a higher mean proportion of facilities-based providers having a parent company (0.53) than pure resellers (0.32). Of the CLECs with parent companies, facilities-providers had younger parents (12.50 years) on average than did resellers (16.59 years). Similarly, facilities CLECs tended to more have a broader geographic footprint (0.61) than did resale CLECs (0.42), and they were more often funded by venture capitalists (0.25) than were their resale counterparts (0.09).

At the team level, differences in the CLEC business models tended to be less pronounced. Two exceptions to this rule were in the size of the founding teams and the presence and nature of senior executive experience. Facilities teams tended to be larger on average with 4.72 members compared to 3.40 members among resellers; both were similarly dominated by males, with the mean proportion slightly higher among facilities teams (0.91) than resale teams (0.86). Similarly, facilities teams tended to have a higher mean proportion of founders with prior organizational experience as a senior executive (0.57) than did resellers (0.40). In terms of the total number of years of executive experience on the teams, the means were higher among the facilities (37.28) than the resale (19.04) teams; similarly, in terms of the average number of years executive experience across the entire team, the same pattern held, with a higher average number of years among facilities (7.56) than resale (4.93) teams.

Figure 7 also shows that facilities-based providers had a higher mean proportion of operations and engineering experience (0.58) than did resellers (0.50), but a lower mean proportion of sales and marketing experience (0.30) than did resellers (0.38). Both CLEC business models had similar team compositions of members with finance and accounting experience and with legal and regulatory experience, with such means ranging between 0.12 and 0.18. As well, both models were similar in terms of the mean scores for team functional diversity and dominance.

Finally, entrepreneurs were disproportionately represented among the reseller teams (0.27) compared to facilities-based teams (0.21).

Multicollinearity. To examine whether multicollinearity was a problem in the data, I examined the Variance Inflation Factor (VIF) score for each of the primary variables in the study when entered together in a regression; the results of this diagnostic test are presented in Table 3.

Table 3: Multicollinearity Diagnostics

Measures	VIF	1/VIF
Team functional diversity	4.34	0.23
Team ops. & eng. exp.	3.04	0.33
Team sales & mktg. exp.	2.50	0.40
Industry entry timing	2.28	0.44
Industry CapEx	2.21	0.45
Firm start-up capital	1.98	0.50
Team functional dominance	1.83	0.55
Team finance & acctg. Exp.	1.74	0.58
Team sr. executive exp.	1.56	0.64
Team size	1.50	0.67
Firm geographic scope	1.42	0.71
Team legal & reg. exp.	1.40	0.71
Firm parent company	1.38	0.72
Firm business model	1.30	0.77
Team entrepreneur exp.	1.21	0.83
Firm VC funding	1.18	0.85
Team industry "Bell" exp.	1.16	0.86
MEAN VIF	1.88	

The variables included in this model are intended as a "strong" test. Each type of functional experience variable is included simultaneously with the functional dominance and diversity measures. Also included are the highly correlated (-0.69) industry entry timing and capital expenditure variables, as shown in Table 4. Thus, if multicollinearity was a problem, it should be revealed in this diagnostic test; however, all VIF scores were satisfactory, with the scores often falling well below the threshold of initial concern (generally accepted as over 5).

Table 4: Correlations among Variables

Variables	Mean	s.d.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Industry entry timing	0.36	0.48	0.00	1.00																
2. Industry CapEx (ln)	10.90	0.38	10.22	11.38	-0.69															
3. Firm business model	0.50	0.50	0.00	1.00	-0.05	0.14														
4. Firm parent company	0.41	0.49	0.00	1.00	0.09	-0.10	0.22													
5. Firm start-up capital (ln) *	15.49	3.58	8.13	25.57	-0.07	0.07	0.34	0.44												
6. Firm VC funding	0.17	0.38	0.00	1.00	-0.21	0.15	0.22	0.12	0.23											
7. Firm geographic scope	0.54	0.50	0.00	1.00	0.02	-0.02	0.16	0.27	0.46	0.13										
8. Team size	4.33	1.65	2.00	8.00	-0.11	0.05	0.30	0.23	0.43	0.17	0.31									
9. Team industry "Bell" exp.	0.18	0.29	0.00	1.00	-0.06	0.04	0.09	0.19	0.14	0.11	-0.04	0.14								
10. Team functional diversity	0.17	0.14	0.00	0.63	-0.11	-0.07	-0.05	-0.08	-0.04	0.13	0.03	-0.14	-0.08							
11. Team functional dominance	0.18	0.26	0.00	1.00	0.13	-0.07	0.05	-0.10	-0.22	-0.08	-0.22	-0.28	0.03	-0.07						
12. Team ops & eng. exp.	0.53	0.29	0.00	1.00	0.02	-0.16	0.07	-0.10	-0.13	0.06	-0.12	-0.14	0.09	0.45	0.49					
13. Team sales & mktg. exp.	0.32	0.27	0.00	1.00	-0.12	-0.10	-0.11	0.00	0.04	0.11	0.08	-0.01	-0.03	0.60	-0.30	0.10				
14. Team fin. & acctg. exp.	0.28	0.24	0.00	1.00	-0.06	0.04	0.04	0.04	0.13	0.06	0.12	0.04	-0.07	0.21	-0.16	-0.27	-0.11			
15. Legal & regulatory exp.	0.14	0.18	0.00	1.00	0.04	-0.02	0.06	0.05	0.18	0.12	0.08	0.05	0.07	0.32	-0.07	0.00	0.06	0.07		
16. Team entrepreneur exp.	0.76	0.77	0.00	2.00	-0.16	0.05	-0.11	-0.18	-0.10	0.06	-0.01	-0.07	-0.16	0.14	-0.19	-0.15	0.19	0.02	0.08	
17. Team sr. executive exp.	1.24	0.84	0.00	2.00	0.10	-0.06	0.21	0.15	0.44	0.10	0.39	0.31	0.04	0.11	-0.21	-0.15	0.07	0.26	0.09	0.06

* Median start-up capital: $2,474,176

Table 4 reveals low correlations among most the variables, however several relationships are worth noting. One is that the measures of functional diversity and dominance tend to be highly correlated with the individual measures of functional experience in operations and engineering, sales and marketing, finance and accounting, and legal and regulatory. This is not unexpected, as the diversity and dominance measures are based on these data. This suggests a tradeoff in the way the models are run, including either the diversity and dominance measures (which are not highly correlated with one another) or the individual functional experience variables. Given the greater precedent in the literature and theoretical interest in the composite measures (Bunderson et al., 2002), the models used to test the hypotheses include only the diversity and dominance measures.

6.2 Tests of hypotheses

Table 5 models new venture survival and reports the results of the hypothesis testing. The initial model provides a baseline test of the core industry, firm, and team effects of interest (H1-H5). These core tests are thus repeated as the business model interactions associated with each of the sub-hypotheses are introduced in Models 2-11. Separate models for each interaction sub-hypotheses were run to address concerns with multicollinearity. Because the reported results are based on a Cox hazards regression, the z-score coefficients are in the opposite direction of what would be reported in standard regressions; this is because negative coefficients correspond with a *reduced* hazard rate (or a positive effect on venture survival) and positive coefficients correspond with an *increased* hazard rate (or a negative effect on venture survival).

Table 5: Tests of Hypotheses

All CLECs; single founders excluded (n=321; 150 failures) [a]	Model 1 (H1-H4) Prob>χ^2=0.0009		Model 2 (H1a) Prob>χ^2=0.0015		Model 3 (H2a) Prob>χ^2=0.0014	
Predictors of new venture survival	Haz.	z	Haz.	z	Haz.	z
MAIN EFFECTS						
Industry entry timing	1.15	0.56	1.15	0.577	1.15	0.56
Industry CapEx	1.78	1.83	1.79	1.85	1.79	1.84
Firm business model	0.71	-1.82	0.71	-1.79	0.63	-1.66
Firm heritage (parent co.)	0.60	-2.51**	0.61	-2.34*	0.61	-2.48**
Firm start-up capital (assets)	1.01	0.32	1.01	0.33	1.01	0.27
Firm VC funding	0.96	-0.18	0.94	-0.24	0.93	-0.27
Firm geog. scope	0.88	-0.65	0.88	-0.67	0.87	-0.69
Tm. size	0.97	-0.48	0.97	-0.53	0.97	-0.44
Tm. ind."Bell" exp. (H1)	0.40	-2.70**	0.56	-0.61	0.41	-2.66**
Tm. fncl. diversity (H2)	0.37	-1.51	0.66	-0.36	0.30	-1.58
Tm. fncl. dominance (H3)	0.89	-0.35	0.37	-1.52	2.14	0.59
Tm. ent.exp. (H4)	0.91	-0.82	0.89	-0.33	0.91	-0.27
Tm. sr. exec. exp. (broad) (H5)	1.05	0.38	0.91	-0.81	0.91	-0.85
Tm. fncl. Difference						
Tm. exec. high rank						
Tm. exec. total tnr.						
Tm. exec. avg. tnr						
Tm. F500 exec. Exp						
Tm. ind. "Bell" exec. exp.						
BUS. MODEL INTERACTIONS						
Tm. ind. "Bell" exp. (H1a)			1.05	0.39		
Tm. fncl. diversity (H2a)					1.05	0.40
Tm. fncl. dominance (H3a)						
Tm. fncl. difference (H3b)						
Tm. ent. exp (H4a)						
Tm. exec. (broad) (H5a)						
Tm. exec. high rank (H5b)						
Tm. exec. total tnr. (H5c)						
Tm. exec. avg. tnr. (H5c)						
Tm. F500 exec. exp. (H5d)						
Tm. ind. "Bell' exec. exp. (H5e)						

a. * p < .05; ** p < .01; *** p < .001

Table 5: Tests of Hypotheses (Continued)

All CLECs; single founders excluded (n=321; 150 failures) [a]	Model 4 (H3a) Prob>χ^2=0.0002		Model 5 (H3b) Prob>χ^2=0.0014		Model 6 (H4a) Prob>χ^2=0.0000	
Predictors of new venture survival	Haz.	z	Haz.	z	Haz.	z
MAIN EFFECTS						
Industry entry timing	1.23	0.84	1.17	0.63	1.38	1.27
Industry CapEx	1.92	2.06*	1.79	1.84	1.92	2.04*
Firm business model	0.92	-0.38	1.53	0.72	0.11	-5.12***
Firm heritage (parent co.)	0.60	-2.51**	0.60	-2.52**	0.66	-2.05*
Firm start-up capital (assets)	1.02	0.51	1.01	0.40	1.00	0.00
Firm VC funding	0.90	-0.41	0.94	-0.24	0.79	-0.94
Firm geog. scope	0.87	-0.72	0.88	-0.67	0.90	-0.56
Tm. size	0.97	-0.41	0.97	-0.42	0.97	-0.54
Tm. ind."Bell" exp. (H1)	0.41	-2.64**	0.41	-2.61**	0.39	-2.64**
Tm. fncl. diversity (H2)	0.36	-1.56	0.37	-1.53	0.45	-1.23
Tm. fncl. dominance (H3)	1.61	1.20	1.12	0.29	1.03	0.10
Tm. ent.exp. (H4)	0.90	-0.90	0.90	-0.92	0.89	-0.99
Tm. sr. exec. exp. (broad) (H5)	1.02	0.19	1.04	0.30	0.63	-3.02**
Tm. fncl. Difference			1.06	0.20		
Tm. exec. high rank						
Tm. exec. total tnr.						
Tm. exec. avg. tnr						
Tm. F500 exec. Exp						
Tm. ind. "Bell" exec. exp.						
BUS. MODEL INTERACTIONS						
Tm. ind. "Bell" exp. (H1a)						
Tm. fncl. diversity (H2a)						
Tm. fncl. dominance (H3a)	0.22	-2.24*				
Tm. fncl. difference (H3b)			0.53	-1.35		
Tm. ent. exp (H4a)					0.88	-0.55
Tm. exec. (broad) (H5a)					4.38	5.60***
Tm. exec. high rank (H5b)						
Tm. exec. total tnr. (H5c)						
Tm. exec. avg. tnr. (H5c)						
Tm. F500 exec. exp. (H5d)						
Tm. ind. "Bell' exec. exp. (H5e)						

a. * p < .05; ** p < .01; *** p < .001

Table 5: Tests of Hypotheses (Continued)

All CLECs; single founders excluded (n=321; 150 failures) [a]	Model 7 (H4b) Prob>χ^2=0.0000		Model 8 (H4c) Prob>χ^2=0.0000		Model 9 (H4c) Prob>χ^2=0.0000	
Predictors of new venture survival	Haz.	z	Haz.	z	Haz.	z
MAIN EFFECTS						
Industry entry timing	1.24	0.85	1.23	0.84	1.34	1.15
Industry CapEx	1.87	1.92	1.94	2.06*	2.11	2.31*
Firm business model	0.20	-5.23***	0.15	-5.99***	0.09	-5.66***
Firm heritage (parent co.)	0.63	-2.29**	0.59	-2.59**	0.64	-2.25*
Firm start-up capital (assets)	1.01	0.40	1.01	0.30	1.00	0.05
Firm VC funding	0.78	-1.01	0.74	-1.19	0.83	-0.74
Firm geog. scope	0.97	-0.13	0.93	-0.36	0.80	-1.10
Tm. size	0.98	-0.28	1.02	0.27	1.00	-0.01
Tm. ind."Bell" exp. (H1)	0.39	-2.77**	0.40	-2.68**	0.43	-2.46**
Tm. fncl. diversity (H2)	0.40	-1.46	0.37	-1.53	0.39	-1.46
Tm. fncl. dominance (H3)	1.08	0.23	1.25	0.66	0.91	-0.26
Tm. ent.exp. (H4)	0.88	-1.08	0.90	-0.91	0.86	-1.30
Tm. sr. exec. exp. (broad) (H5)						
Tm. fncl. Difference						
Tm. exec. high rank	0.71	-3.01**				
Tm. exec. total tnr.			0.98	-2.92**		
Tm. exec. avg. tnr					0.89	-3.72***
Tm. F500 exec. Exp						
Tm. ind. "Bell" exec. exp.						
BUS. MODEL INTERACTIONS						
Tm. ind. "Bell" exp. (H1a)						
Tm. fncl. diversity (H2a)						
Tm. fncl. dominance (H3a)						
Tm. fncl. difference (H3b)						
Tm. ent. exp (H4a)						
Tm. exec. (broad) (H5a)						
Tm. exec. high rank (H5b)	3.07	6.17***				
Tm. exec. total tnr. (H5c)			1.05	5.43***		
Tm. exec. avg. tnr. (H5c)					1.28	6.61***
Tm. F500 exec. exp. (H5d)						
Tm. ind. "Bell' exec. exp. (H5e)						

a. * p < .05; ** p < .01; *** p < .001

Table 5: Tests of Hypotheses (Continued)

All CLECs; single founders excluded (n=321; 150 failures) [a]	Model 10 (H4e) Prob>χ^2=0.0000		Model 11 (H4e) Prob>χ^2=0.0012		
Predictors of new venture survival	Haz.	z	Haz.	z	
MAIN EFFECTS					
Industry entry timing	1.24	0.86	1.30	1.06	
Industry CapEx	1.77	1.80	2.01	2.17*	
Firm business model	0.32	-3.96***	0.56	-2.62**	
Firm heritage (parent co.)	0.57	-2.77**	0.53	-3.24***	
Firm start-up capital (assets)	0.99	-0.20	1.02	0.62	
Firm VC funding	0.71	-1.35	0.92	-0.32	
Firm geog. scope	0.88	-0.65	1.03	0.15	
Tm. size	0.97	-0.51	0.97	-0.57	
Tm. ind."Bell" exp. (H1)	0.43	-2.47*			
Tm. fncl. diversity (H2)	0.34	-1.69	0.48	-1.15	
Tm. fncl. dominance (H3)	1.00	0.00	0.97	-0.10	
Tm. ent.exp. (H4)	0.94	-0.58	0.97	-0.29	
Tm. sr. exec. exp. (broad) (H5)					
Tm. fncl. Difference					
Tm. exec. high rank					
Tm. exec. total tnr.					
Tm. exec. avg. tnr					
Tm. F500 exec. Exp	0.74	-1.14			
Tm. ind. "Bell" exec. exp.			0.49	-2.56**	
BUS. MODEL INTERACTIONS					
Tm. ind. "Bell" exp. (H1a)					
Tm. fncl. diversity (H2a)					
Tm. fncl. dominance (H3a)					
Tm. fncl. difference (H3b)					
Tm. ent. exp (H4a)					
Tm. exec. (broad) (H5a)					
Tm. exec. high rank (H5b)					
Tm. exec. total tnr. (H5c)					
Tm. exec. avg. tnr. (H5c)					
Tm. F500 exec. exp. (H5d)	5.87	4.48***			
Tm. ind. "Bell' exec. exp. (H5e)			2.59	2.44*	

a. * p < .05; ** p < .01; *** p < .001

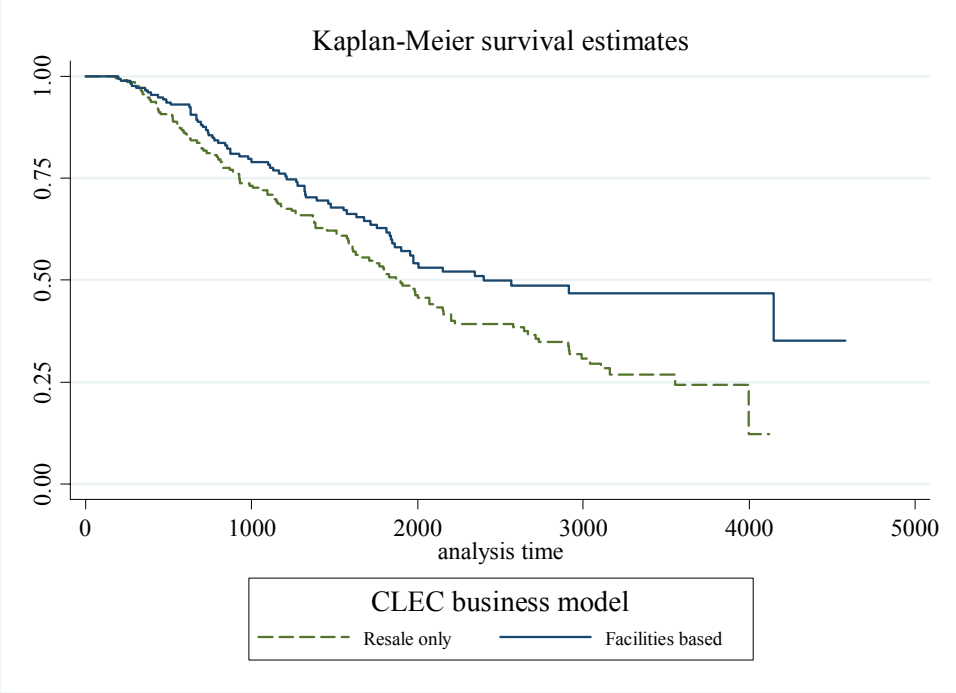
Two of the control variables in the model had significant effects on venture survival in all or many of the models. One was being a parent company venture, which was shown to significantly increase rates of survival in all of the models, generally at $p<0.01$ significance. This is consistent with and provides further support for research on the survival advantages of parent company ventures (Carroll et al., 1996; Chatterji, 2009; Klepper, 2002; Klepper et al., 2000; Klepper et al., 2005). The other was the effect of industry conditions, as measured by the industry capital expenditure variable, which had a negative effect on venture survival in approximately half the models ($p<0.05$). This finding offers a more nuanced understanding of the macro-economic downturn that the telecommunications' industry faced around 2001, which has been linked in the popular press and industry narratives to an increased rate of failure in the industry (McDermott III, 2002); it seems that entrants at the peak of the bubble fared worse than the earliest entrants and post-bust entrants did better. A possible explanation is that the former had the opportunity to become established before the bust hit and the latter benefitted from the failure of others through discounted firm and facilities acquisition activity.

Another key variable in the model is that of the chosen business model, the interaction of which with the other variables is of central is of interest. Models 1-5 tested the interaction effects of the (complex facilities) business model with various forms of industry and functional experience. As shown in Table 5, the business model variable was not significant in these models. By comparison, when the interaction effects of the business model were tested in Models 6-11 with various forms of senior executive experience, the results of these models reveal strong main effects. In each of the supporting models, significance levels were at $p<0.01$ or greater (generally $p<0.001$) and in the expected direction. Thus, once the within-business model effects of senior executive experience were accounted for, facilities-based CLECs exhibited higher rates of survival.

These effects can be seen graphically in Figure 10, which illustrates a simple comparison of the average time to failure estimates for facilities and resale CLECs using a curve of plotted

Kaplan-Meier survival estimates. From this figure, the higher survival rates of facilities-based CLECs are reflected in the less steep time-to-failure curve for this business model. In part, this may be explained by the greater investment required in the facilities model, which may naturally contribute to ventures with longer longevity. Translated to words, and using the 2000 days analysis time point on the 'x' axis as a reference point, this curve can be read as approximately 50 percent of CLECs surviving (slightly higher for facilities CLECs and lower for resale CLECs) their first 2000 days, equating to approximately 5½ years.

Figure 10: Survival estimates by business model



When both the resale and facilities populations were analyzed together, the results showed that 25% of CLECs overall failed within their first three years (1,093 days), 50% failed within their first 5½ years (1,987 days), and 75% failed within their first 11+ years (4,150 days).

Model 2 tests the first hypothesis (H1), which posits that founding teams with a higher proportion of members with related industry experience (to the new venture opportunity) will have higher rates of survival, but that such positive effects will be weaker in the presence of complex business models (H1a). Consistent with much evolutionary research on the importance

of related industry experience (Carroll et al., 1996; Klepper, 2002; Klepper et al., 2000), the main effect of this variable is significant in all models, generally at $p<0.01$, supporting H1. However, when related industry experience is interacted with the presence of a complex business model in Model 2, its main effect loses significance and the interaction term is positive but insignificant. This suggests that the significant effects of related industry experience in the main effect models may be largely being driven by its positive effects among resellers. Subsequent analyses of within-business model effects, which are reported later in Table 6, lend support for this view and reveal the high significance of related industry experience among resellers ($p<0.01$); thus, although H1a is in the hypothesized direction, it is not supported.

Model 3 tests the second hypothesis (H2), which posits that founding teams with more functional diversity will have higher rates of venture survival, but that these positive effects will be weaker in the presence of complex business models (H2a). Although the main effect for functional diversity approaches significance in the expected direction, it never reaches significance, thus failing to support H2. Similarly, although the interaction effect (Model 3) points toward an increased likelihood of failure among facilities CLECs, consistent with expectations in H2a, it also fails to reach statistical significance.

Model 4 tests the third hypothesis (H3), which posits that founding teams with greater functional dominance will have higher rates of venture survival, and that these positive effects will be stronger in the presence of complex business models (H3a). Interestingly, the main effect of functional dominance is insignificant in all the models and is suggestive of an increased likelihood of failure, failing to support H3; however, once the interaction with the complex business model is included in Model 4, the interaction term reveals significance in the expected direction ($p<0.05$). Thus, H3a is supported and the positive effect of functional dominance in teams appears to be closely linked to the unique demands of complex business models.

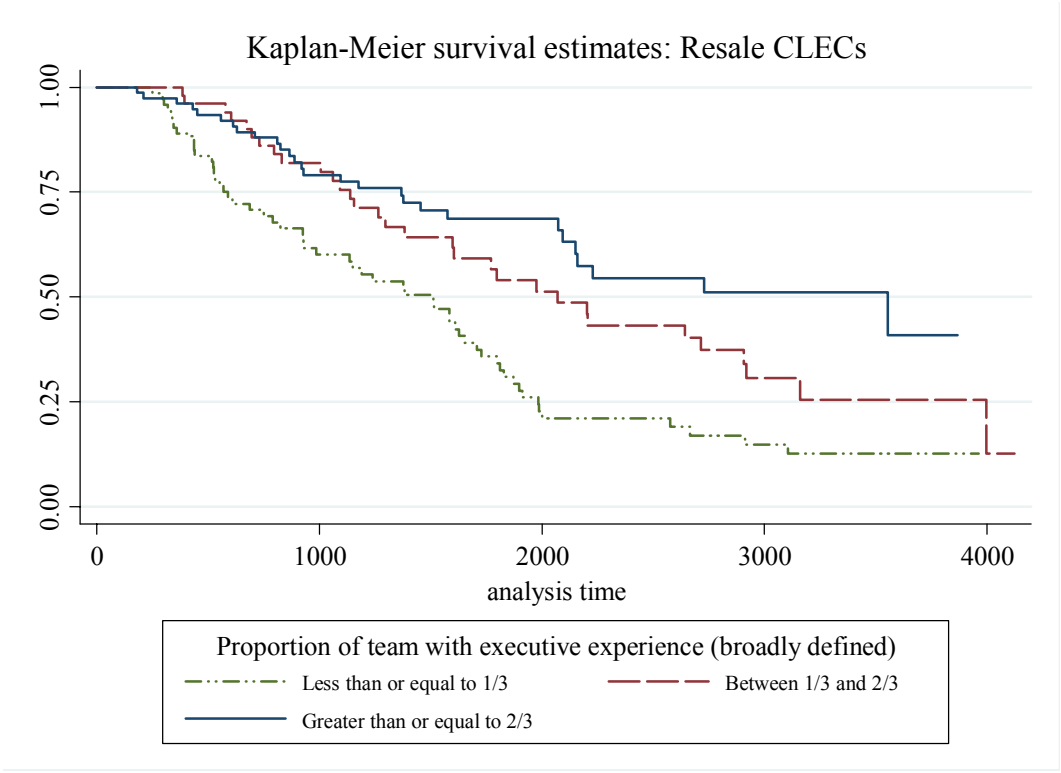
Model 5 tests whether business model complexity moderates the relationship between founding team functional dominance in a related area and new venture survival, as predicted in

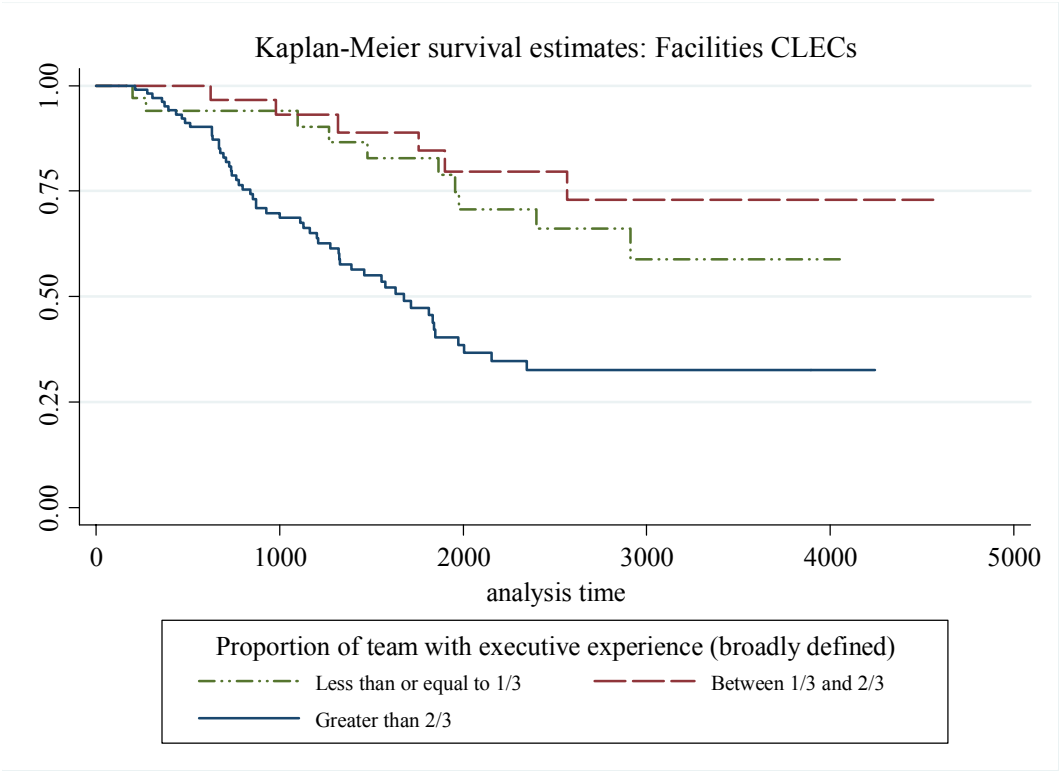
H3b. Specifically, it tests whether the positive effect of functional dominance in a related area on venture survival is weaker when founding teams choose complex business models. Although this interaction approaches significance in the expected direction, it fails to do so in support of H3b; thus, it appears the positive influence of functional dominance among new ventures with complex business models may be less about the particular function that dominates than the presence of a form of dominance itself.

Model 6 tests the fourth hypothesis (H4), which posits that founding teams with a higher proportion of members with prior entrepreneur experience will have higher rates of survival, and that these positive effects will be stronger in the presence of complex business models (H4a). Neither of these hypotheses received support. Model 6 also tests the fifth hypothesis (H5), which posits that founding teams with a higher proportion of member with senior executive experience (broadly defined) will have higher rates of survival, but that such positive effects will be weaker in the presence of complex business models (H5a). The main effect of senior executive experience are not supported in any of the main models, failing to support H5; however, when the interaction is included in Model 6, the interaction term takes on high significance, providing support for H5a. It seems that the effects of senior executive experience are fundamentally contingent on the complexity of the business models where it is applied.

These effects can be seen more clearly in plots of the Kaplan-Meier survival estimates of senior executive experience within and across both business models. Figure 11 shows these plots stratified by the effects of teams with different compositions of senior executive experience. In the resale case presented first, teams that are composed of more than 2/3 membership with prior senior executive experience have the highest survival rates of any subcategory. By comparison, teams with less than or equal to ½ of such members have the lowest survival rates. Thus, the resale condition reveals a truly linear relationship between founding teams with a higher

Figure 11: Survival estimates by team composition of executives (broadly defined)



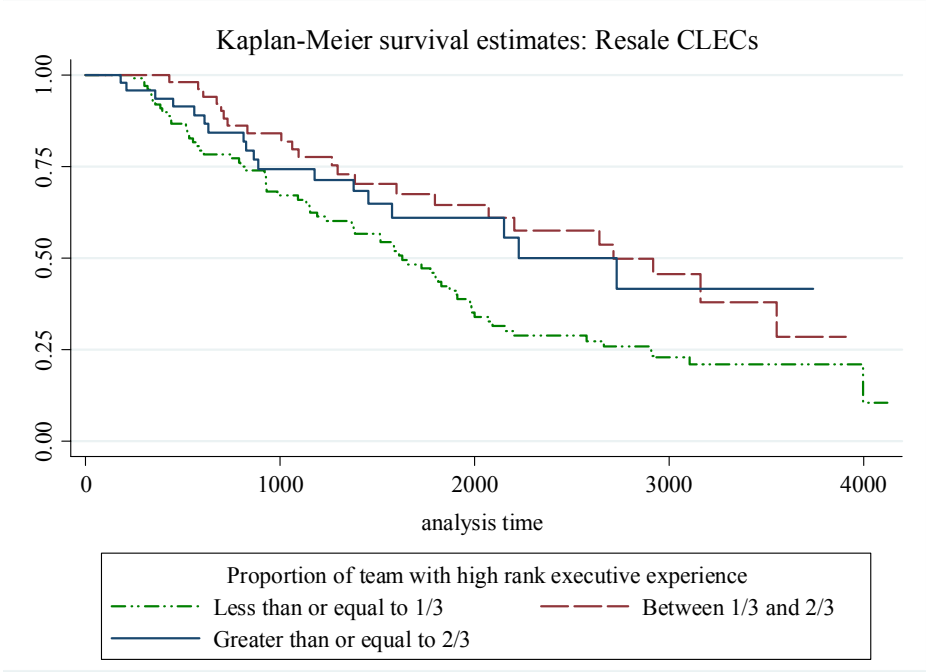


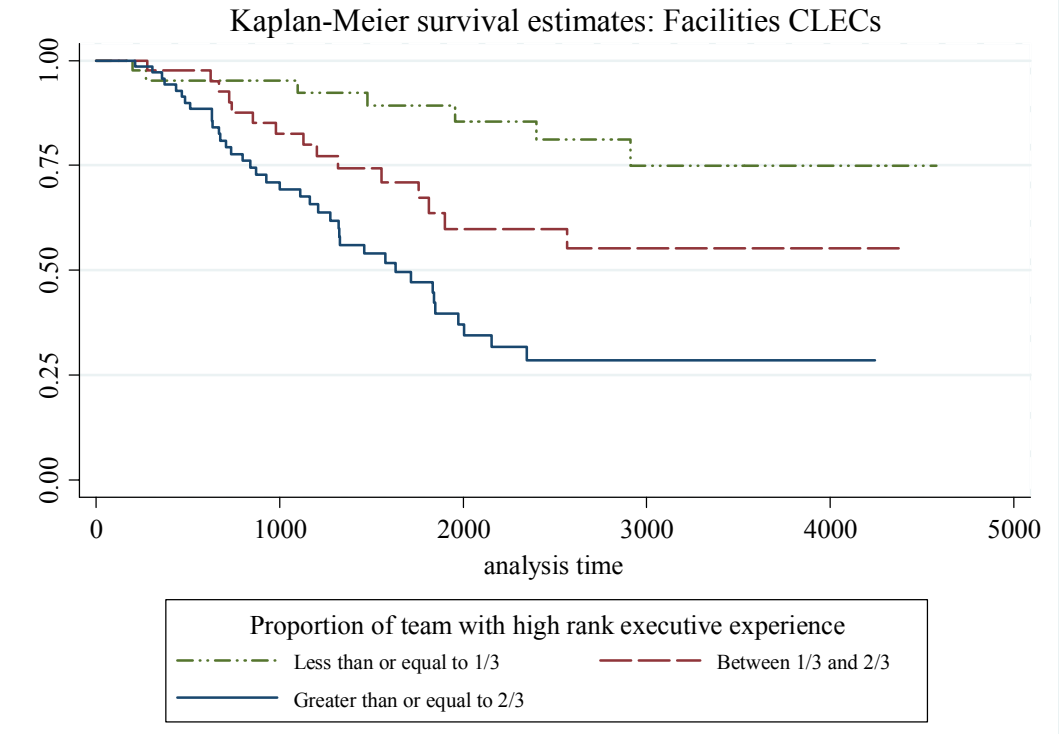
proportion of members with prior senior executive experience and rates of success. When the resale patterns are contrasted with the facilities case, the most striking difference is found in terms of the teams with the highest proportion of members with senior executive experience (greater than 2/3 of the team). Whereas such teams have the highest survival rates among resellers, they have the lowest survival rates among facilities providers. Again, these results are suggestive of the unique contingencies of business model complexity in producing such effects.

Model 7 tests the effects of senior executive experience in terms of hierarchical rank in a previous organization, examining the interaction between founding teams with higher proportions of members with *high rank* senior executive experience and business model complexity (H5b). Unlike the previous measure of senior executive experience (broadly defined), the main effect of rank has a significant positive effect on venture survival ($p<0.01$), when its interaction with business model complexity is taken into account. By comparison, the interaction term reveals the opposite effect of such experience; facilities teams with higher proportions of members with high rank senior executive experience, had significantly higher venture failure rates ($p<0.001$), thus providing support for H5b.

As before, these statistical effects can often be seen more clearly in Kaplan-Meier plots of survival estimates. Figure 12 shows these plots stratified by the effects of teams with different compositions of high rank senior executive experience. In the resale case presented first, teams composed of more than 1/3 of members (encompassing the category with more than 2/3 membership) with high rank senior executive experience have much higher survival rates than do those with less than or equal to 1/3 membership. In contrast, the facilities case shows the opposite pattern. Among the facilities teams, those with the highest proportion of members with high rank senior executive experience have much higher failure rates, whereas those with the lowest proportion of members with such experience have much lower failure rates. Teams with moderate levels of such experience (between 1/3 and 2/3) fall in the middle of these two plots.

Figure 12: Survival estimates by team composition of high rank executives



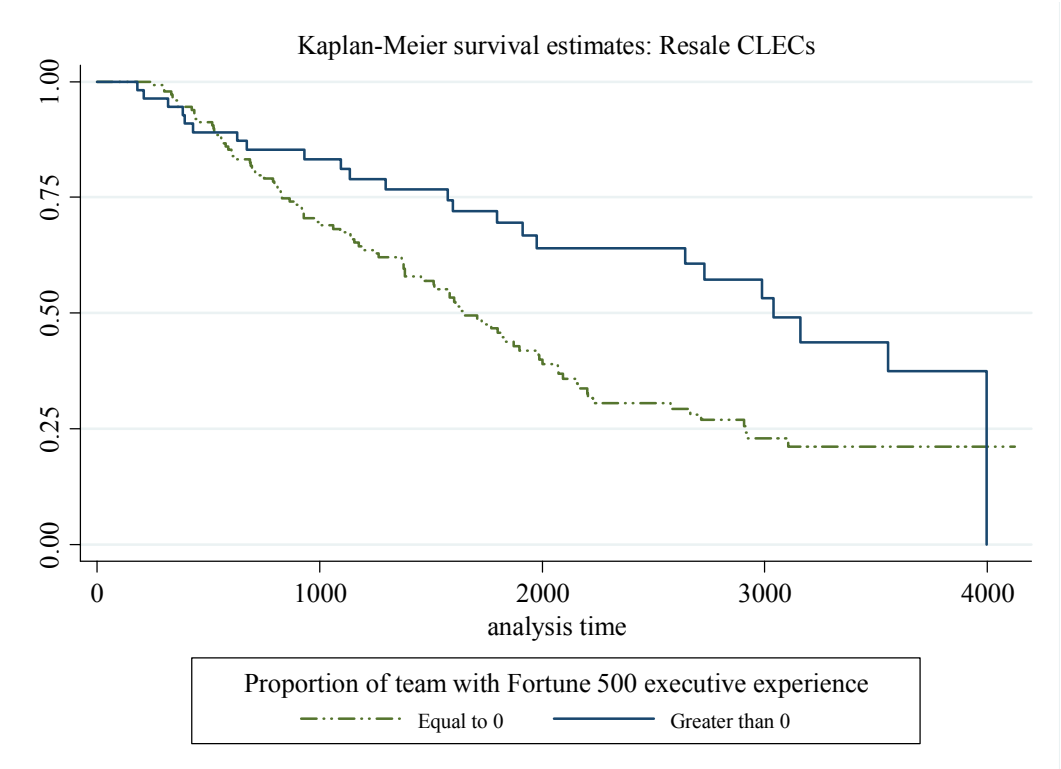


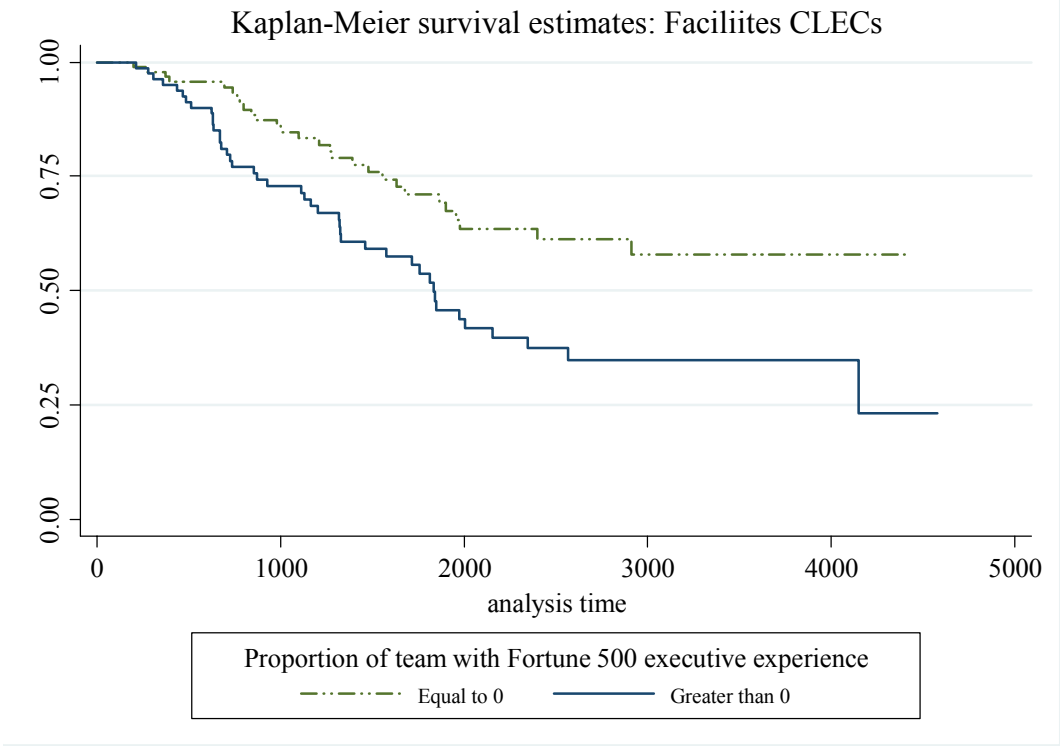
Models 8 and 9 test, using two alternative measures, the effects of senior executive tenure, examining the respective interactions between the *total* number of years of founding team senior executive experience (H5c) and the *average* number of years of founding team senior executive experience (H5c) and business model complexity. In both models the main effects of tenure have a significant positive effect on venture survival ($p<0.01$ and $p<0.001$, respectively), when the interaction with business model complexity is taken into account. However, their interaction terms reveal the opposite effect; facilities teams with higher levels of senior executive tenure (whether in total or averaged across the team) had significantly higher venture failure rates ($p<0.001$), thus providing support for H5c.

Model 10 tests the effects of senior executive experience in terms of the organization where the experience was acquired, examining the interaction between senior executive experience in a Fortune 500 organization and business model complexity (H5d). Although the main effect of Fortune 500 executive experience (as a proportion of the founding team) is not supported, the interaction term is highly significant, thus providing support for H4d. It seems that the effects of Fortune 500 senior executive experience are fundamentally contingent on the complexity of the business models where it is applied.

Again, I turn to the Kaplan-Meier plots to illustrate these effects. Figure 13 shows these plots stratified by whether teams have no executives with prior Fortune 500 experience or have at least some of this experience. In the resale case presented first, teams with at least one Fortune 500 executive fare much better, in terms of their venture survival rates, than do those with no such executives. By contrast, the facilities case shows the opposite pattern. Among the facilities teams, those with Fortune 500 senior executive experience have much higher failure rates than do those that lack this experience. Thus, the directionality of these effects is once again contingent on the complexity of the business model where they are observed.

Figure 13: Survival estimates by team composition of Fortune 500 executives

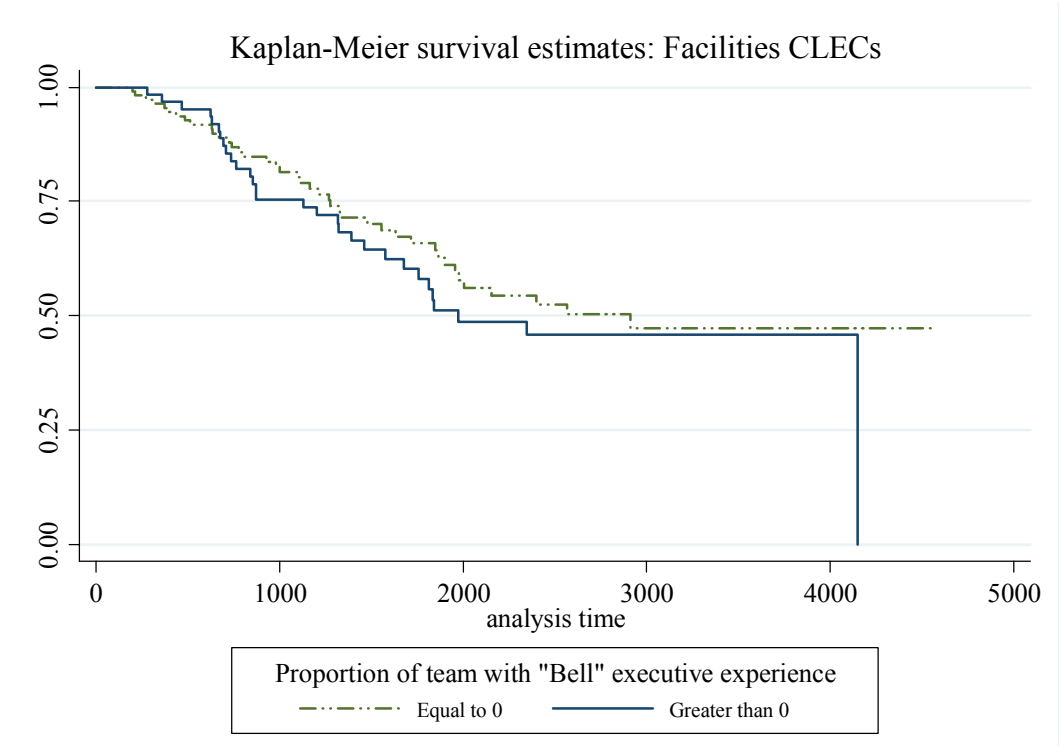


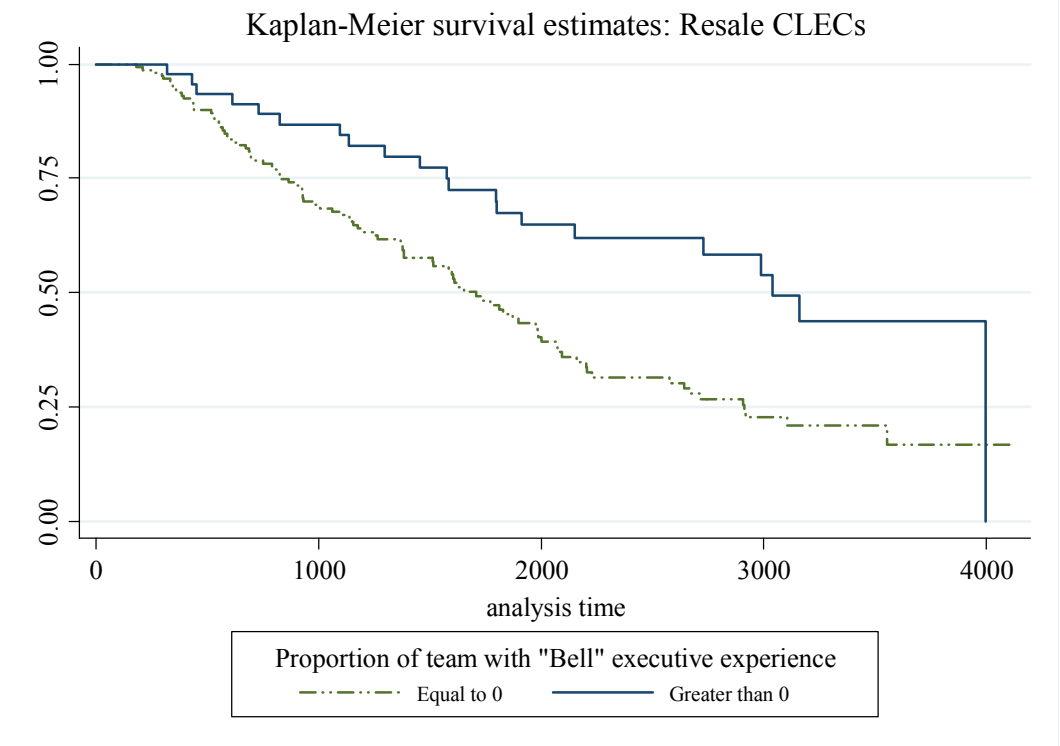


The final model (Model 11) tested the effects of senior executive experience in terms of the industry where founders acquired their executive experience and the relatedness of that industry to the new venture opportunity, examining the interaction between senior executive experience in one of the "Baby Bell" companies and business model complexity (H5e). The results show the main effect of related industry experience to have a significant positive effect on venture survival ($p<0.001$) when the interaction with business model complexity is taken into account. However, the interaction term reveals the opposite effect; facilities teams with higher proportions of members with high rank senior executive experience have significantly higher venture failure rates ($p<0.05$), thus providing support for H5e.

Kaplan-Meier plots are once again used to illustrate these effects. Figure 14 shows these plots stratified by whether teams have no executives with prior Bell experience or have at least some of this experience. In the resale case presented first, teams with at least one Bell executive fare much better, in terms of their venture survival rates, than do those with no such executives. By contrast, the facilities case reveals the opposite patterns. Among the facilities teams, those with senior executive experience in a related industry have higher failure rates than do those that lack this experience. This contrast in effects is especially pronounced in the resale environment, where the relatedness of founders' senior executive experience in a related industry has its greatest impact on venture survival.

Figure 14: Survival estimates by team composition of "Bell" executives





6.3 Within and across treatment effect comparisons

With the exception of the Kaplan-Meier plots, the results presented thus far have examined the interaction of business model complexity with predictor variables across the entire CLEC population. An alternative approach is to split the sample population by business model and conduct separate analyses of "within-treatment" effects. Table 6 shows the results of tests based on this latter strategy; it includes the "combined" population results as a comparative reference.

Table 6: Comparison of Across- and Within-Model Effects by CLEC Business Model

Resale: (n=167; 91 failures) Facilities: (n=154; 59 failures) [a]	Combined Prob>χ^2=0.0009		Resale-Only CLECs Prob>χ^2=0.0000		Facilities-Based CLECs Prob>χ^2=0.0000	
Predictors of new venture survival	Haz.	z	Haz.	z	Haz.	z
MAIN EFFECTS (1st RUN REPORTED)						
Industry entry timing	1.15	0.56	1.33	0.78	1.93	1.58
Industry CapEx	1.78	1.83	1.18	0.33	5.19	3.38***
Firm heritage (parent co.)	0.60	-2.51**	0.59	-1.80	0.88	-0.38
Firm start-up capital (assets)	1.01	0.32	1.06	1.31	0.91	-1.58
Firm VC funding	0.96	-0.18	0.75	-0.72	0.75	-0.88
Firm geog. scope	0.88	-0.65	0.51	-2.28*	1.68	1.52
Tm. size	0.97	-0.48	1.05	0.56	0.89	-1.08
Tm. ent.exp.	0.91	-0.82	0.94	-0.43	0.94	-0.29
Tm. ind."Bell" exp. (H1)	0.40	-2.70**	0.26	-2.66**	0.67	-0.68
Tm. fncl. diversity (H2)	0.37	-1.51	0.34	-1.01	0.05	-1.83
Tm. fncl. dominance (H3)	0.89	-0.35	1.29	0.54	0.12	-2.08*
Tm. ent. Exp. (H4)	0.91	-0.82	0.92	-0.58	0.84	-0.77
EXECUTIVE EXPERIENCE EFFECTS [b]						
Tm. sr. exec. exp. (broad) (H5)	1.05	0.38	0.61	-2.89**	3.16	4.21***
Tm. exec. Total tnr.			0.97	-3.61***	1.02	4.47***
Tm. exec. Avg. tnr			0.88	-3.82***	1.12	4.53***
Tm. exec. High rank			0.68	-3.01**	2.31	4.72***
Tm. F500 exec. Exp			0.71	-1.18	4.02	4.01***
Tm. ind. "Bell" exec. Exp.			1.25	0.52	1.61	1.15

a. * p < .05; ** p < .01; *** p < .001

b. Covariates designated as "Main Effects" were included in each model that was run; however, only those for the first are shown for reporting parsimony. Reported in the "Executive Experience Effects" section are the effects of different forms of senior executive experience and controls within each model.

Table 6 demonstrates results that are consistent with those presented in Table 5. It also illustrates more clearly the striking contrast in the directionality of the effects of senior executive experience across the two business models. Not only is senior executive experience associated with *higher* failure rates among facilities-based CLECs and *lower* failure rates among their resale counterparts, but these effects are highly significant in both cases. Had the effects of the business model not been explicitly modeled as part of the empirical strategy, the high and contextualized significance of these variables would have gone unrecognized.

6.4 Robustness of results across populations

Six additional tests of the robustness of these findings merit attention. Recall that the sample population that was used to test the hypotheses excluded solo founders and included CLECs that ultimately became acquired. Thus, the first two tests examine the robustness of the findings to sample populations that include solo founders, and where acquisitions are excluded, respectively. In the case of acquisitions, those determined to be a success were coded as censored, and those that were determined to be unsuccessful (acquired under duress) were coded as failures. As Table 7 shows, the results of these tests demonstrate no substantive differences from those reported with the hypothesis tests.

A third test has been included to examine the robustness of the findings when outlier observations are excluded from the sample population. To examine whether outlier observations may have biased the results through their pronounced influence, I calculated Martingale residuals from the Cox regression. Martingale residuals are deviance scores that reflect the observed failures in the regression minus the expected failures over time (Therneau, Grambach, & Fleming, 1990). Figure 15 plots the Martingale residuals and identifies a set of CLECs that lie outside two standard deviations from the mean. As Table 7 shows, the removal of these outliers had no substantive impact on the reported results.

Figure 15: Identification of outliers using Martingale residuals plot

A fourth and fifth test have been included to test for the possibility that CLEC certification, as an indicator of new venture formation, may have characteristics that contribute to biased results. Specifically, the tests examine the possibility that some firms may have viewed CLEC certification—with its relatively low barriers to entry—as a real option for entering the industry sector at some point in the future, but which were not actively engaged in new venture formation (e.g., Coff & Laverty, 2001). In this scenario, subsequent decisions by such firms to not "strike" the option should not be counted as a failure at all, though they would be based on the current measures of failure.

Table 7: Robustness of Results across Population Samples

Robustness tests [a]	Single Founders Included (n=392) Prob>χ^2=0.0003		Acquired CLECs Removed (n=300) Prob>χ^2=0.0009		Diagnosed Outliers Removed (n=312) Prob>χ^2=0.0006	
Predictors of new venture survival	Haz.	Z	Haz.	Z	Haz.	Z
MAIN EFFECTS (1st RUN REPORTED)						
Industry entry timing	1.24	0.94	1.26	0.98	1.01	0.02
Industry CapEx	1.62	1.60	1.94	2.13*	1.80	1.73
Firm business model	0.72	-1.82	0.79	-1.26	0.74	-1.57
Firm heritage (parent co.)	0.57	-2.93**	0.55	-3.07**	0.55	-2.88**
Firm start-up capital (assets)	1.02	0.58	1.00	0.11	1.01	0.34
Firm VC funding	0.95	-0.23	0.99	-0.02	0.94	-0.26
Firm geog. Scope	0.94	-0.31	1.07	0.36	0.85	-0.82
Tm. size	0.90	-1.91	0.88	-2.16	0.93	-1.16
Tm. ind."Bell" exp. (H1)	0.54	-2.11*	0.62	-1.62	0.42	-2.48**
Tm. fncl. diversity (H2)	0.45	-1.11	0.51	-0.94	0.19	-1.92
Tm. fncl. dominance (H3)	0.54	-1.81	0.57	-1.70	0.63	-1.04
Tm. ent. exp. (H4)	0.92	-0.79	0.94	-0.52	0.90	-0.82
Tm. sr. exec exp. (H5)	0.97	-0.31	1.03	0.27	1.09	0.68
SEPARATE INTERACTION RUNS [b]						
Tm. ind. "Bell" exp. (H1a)	2.16	0.74	3.06	1.04	0.71	-0.28
Tm. fncl. diversity (H2a)	0.99	-0.01	1.17	0.13	3.62	0.97
Tm. fncl. dominance (H3a)	0.37	-1.64	0.35	-1.74	0.14	-2.75**
Tm. fncl. difference (H3b)	0.53	-1.38	0.62	-1.01	0.43	-1.77
Tm. ent. exp. (H4a)						
Tm. exec. (broad) (H5a)	3.51	5.28***	3.33	4.95***	5.57	6.11***
Tm. exec. high rank (H5b)	2.36	5.36***	2.18	4.86***	4.15	6.86***
Tm. exec. total tnr. (H5c)	1.04	5.49***	1.04	5.21***	1.05	5.72***
Tm. exec. avg. tnr. (H5c)	1.24	6.21***	1.23	5.85***	1.31	6.89***
Tm. F500 exec. exp. (H5d)	6.30	4.80***	6.56	4.74***	7.98	4.98***
Tm. ind. "Bell' exec. exp. (H5e)	2.00	2.29**	2.34	2.62**	2.04	2.22**

a. * $p < .05$; ** $p < .01$; *** $p < .001$

b. Covariates were entered into the model in the same way as in Table 5. For reporting parsimony, the controls and main effects that correspond with each interaction term are not shown; only those of Model 1.

Table 8: Robustness of Results across Population Samples

Robustness tests [a]	GA UAF Revenue Reported (n=84) Prob>χ^2=0.5806		Failed First Year Excluded (n=306) Prob>χ^2=0.0129		Trade Secret Included (n=347) Prob>χ^2=0.0002	
Predictors of new venture survival	Haz.	Z	Haz.	Z	Haz.	Z
MAIN EFFECTS (1st RUN REPORTED)						
Industry entry timing	0.43	-0.76	1.00	0.02	1.06	0.23
Industry CapEx	1.25	0.25	1.66	1.49	1.84	2.00*
Firm business model	0.84	-0.40	0.74	-1.49	0.71	-1.96*
Firm heritage (parent co.)	0.43	-1.69	0.62	-2.25*	0.59	-2.82**
Firm start-up capital (assets)	1.06	0.95	1.00	0.07		
Firm VC funding	0.79	-0.50	0.94	-0.26	1.01	0.04
Firm geog. Scope	1.18	0.35	0.87	-0.70	0.97	-0.14
Tm. size	0.97	-0.22	0.97	-0.39	0.99	-0.17
Tm. ind."Bell" exp. (H1)	1.40	0.54	0.45	-2.31*	0.41	-2.68**
Tm. fncl. diversity (H2)	0.44	-0.61	0.54	-0.90	0.34	-1.69
Tm. fncl. dominance (H3)	0.44	-0.80	0.90	-0.28	0.98	-0.08
Tm. ent. exp. (H4)	0.58	-1.80	0.92	-0.72	0.93	-0.67
Tm. sr. exec exp. (H5)	0.74	-0.91	1.13	0.95	1.06	0.53
SEPARATE INTERACTION RUNS [b]						
Tm. ind. "Bell" exp. (H1a)	3.69	0.60	0.60	-0.43	0.65	-0.38
Tm. fncl. diversity (H2a)	1.29	0.09	3.11	0.84	1.07	0.06
Tm. fncl. dominance (H3a)	1.47	0.19	0.21	-2.07*	0.31	-1.96*
Tm. fncl. difference (H3b)	0.33	-0.80	0.53	-1.52	0.62	-1.04
Tm. ent. exp. (H4a)	1.66	0.88	0.90	-0.45	1.06	0.54
Tm. exec. (broad) (H5a)	2.11	1.26	4.45	5.25***	4.24	5.73***
Tm. exec. high rank (H5b)	2.63	2.24*	3.02	5.77***	3.02	6.22***
Tm. exec. total tnr. (H5c)	1.03	1.96*	1.04	5.19***	1.04	5.43***
Tm. exec. avg. tnr. (H5c)	1.18	2.31*	1.28	6.21***	1.28	6.60***
Tm. F500 exec. exp. (H5d)	4.93	1.76	5.90	4.32***	5.41	4.44***
Tm. ind. "Bell' exec. exp. (H5e)	0.82	-0.13	9.78	2.45**	13.17	2.84**

a. * p < .05; ** p < .01; *** p < .001

b. Covariates were entered into the model in the same way as in Table 5. For reporting parsimony, the controls and main effects that correspond with each interaction term are not shown; only those of Model 1.

One way in which I attempted to address this possibility is to limit the sample population to only those CLECs which *unequivocally* provided services in Georgia. It is possible to determine which CLECs had active operations in Georgia, during at least a portion of the sample period, based on records of their contributions to the Universal Access Fund (UAF). The UAF is an account managed by the Georgia PSC that subsidizes local telecom operators providing services to more costly rural customers. At different points during the sample period, CLECs were required to contribute to this fund (generally at 0.05% of their total revenues) if they provided services to retail customers and had quarterly revenues exceeding $50,000. From these data, I identified a subset of 84 CLECs that recorded revenues in Georgia with certainty. Due to the incompleteness of the UAF data, this number is unfortunately low with respect to the entire population of CLECs; several periods of data were unavailable from the Georgia PSC, including from 2000-2003 and from 2005 onward, when requirements for CLECs to contribute to the UAF were put on hold. Nonetheless, this sample is useful for testing the robustness of the findings among this smaller population of known operators. As the results in Table 7 show, there is no substantive change in the results from those reported with the hypothesis tests, while the reduced significance is likely due to the much smaller sample that was the subject of this analysis.

A second way that I attempted to address the real option possibility is to exclude from the population those firms that failed in their first year. Although this approach does not fully address the alternative explanation around options, which could reasonably be "held" for longer periods of time, it presumably limits the sample population to more "serious" CLECs. The notable drawback of such an approach is that it simultaneously introduces survival bias into the analysis. Again, the reported results were robust to this procedure.

A sixth and final robustness test has been included to examine whether the results change with the inclusion of data on CLECs which filed their financial data as "Trade Secret." If such CLECs are systematically different from the remaining population, their exclusion may bias the generalizability of the results. To conduct this test, I ran the full model but excluded the "Total

Assets" variable, for which data on these firms was missing. While this procedure had no effect on the hypothesized relationships, the previously insignificant Capital Expenditure and Business Model variables became significant at $p<0.05$.

6.5 Analysis of business model selection effects

Because survival may be a function of unobservable characteristics pertaining to the type of founders that select into one business model versus the other, sample selection is an important consideration. If systematic differences exist between the founders who chose the resale versus the facilities model, there may be a sample selection bias in the results. In other words, the factors affecting the choice of business model may be correlated with those that affect venture survival. Two common approaches have been used to address this concern. One is a two-stage Heckman model (1976) procedure where, in the case of a binary selection equation (e.g., predicting business model choice), a probit regression is first used to derive parameter estimates for calculating the inverse Mills ratio for each observation. The inverse Mills ratio vector is then included in the second-stage equation that predicts survival, thereby controlling for the probability that an observation will be selected in the sample (Shaver, 1998). A second approach that has gained favor due to the additional computational capabilities of modern computers, which enable its more common use, is a maximum likelihood procedure that estimates the coefficient of the correlation between the error terms of the two equations, which is then added to the log likelihood equation that is used to estimate the parameters of selection for the full model (Van den Ven & Van den Praag, 1981). The latter is the approach that I follow.

I employed a probit model with selection which incorporated both the business model selection and survival outcome variables into the estimation procedure. The dependent variable for the test was a survival measure that followed the decision criteria (e.g., bankruptcy) used to identify failure events in the Cox procedure, but which evaluated survival after a five-year

window, as others have done (e.g., Shaver, 1998). I removed right censoring issues by limiting the sample to entrants through 2001 (n=243); this was the largest CLEC population that I could sample and still have a full five-year window of data. Thus, the results of this test are intended as a diagnostic and may not fully generalize across later entrants.

To improve the model's identification, I sought an instrument that was correlated with the choice of business model and the experience variable of interest, but not with the survival outcome. Because facilities based CLECs may be more likely to locate in areas where there are high levels of specialized business activity, I used a measure that examined, for every zip code where a CLEC was headquartered, the proportion of all firms that fell in the "Professional, scientific, and technical service" category. To code this measure, I used U.S. Census Bureau data from the CENSTATS data base. This measure was significantly correlated with both senior executive experience (0.23; $p<0.00$) and business model choice (0.18; $p<0.00$), but not with business survival (-0.07; ns).

To analyze selection effects, I conducted separate analyses of predicted selection and survival effects for the resale and facilities business models. I also ran separate analyses that corresponded with the particular variables that were included in the models used to test the hypotheses. For parsimony in reporting, I have integrated the results of these separate analyses in Table 8. The model fit statistics and tests of independence pertain only to the selection test results when the variables from Model 1 in Table 5 are entered.

Results in Table 8 shed light on the determinants of business model selection; selection into the facilities model (rather than the resale model) is positively associated with industry capital expenditures, available start-up capital, venture capital funding, and executive tenure and Fortune 500 experience in the founding teams. As well, the results suggest that the reported hypothesis test results are largely independent of business model selection. This is evident by looking at *rho*, the coefficient for the correlation between the error terms of both equations (selection and survival), which is insignificant. The results however, do provide some suggestion that, among

facilities CLECs, the lower survival rates of ventures founded by members with high executive tenure and Fortune 500 experience may be influenced by selection processes. The significance of these measures goes away when selection is accounted for. As well, the results distinguish high rank senior executive experience and high executive tenure (averaged across the team) as particularly problematic for the survival of facilities CLECs, relative to other measures of senior executive experience. Again, however, caution should be noted in interpreting these results due to limitations in the population sample on which they could be conducted.

Table 9: Results of Probit Model with Selection

Probit Model with Selection [a]	Selection and Survival Predictors	Resale Selection		Facilities Selection	
Observations: n=243		coef.	z	coef.	z
BUSINESS MODEL SELECTION	Professional service firm conc.	-0.00	-2.04*	0.00	1.83
	Industry CapEx	-1.36	-3.24***	1.37	3.24***
Resale Model Fit:	Firm heritage (parent co.)	-0.30	-1.47	0.28	1.38
Log Likelihood=-207.37	Firm start-up capital (assets)	-0.08	-2.37*	0.08	2.55**
Wald X^2=31.04	Firm VC funding	-0.56	-2.49**	0.55	2.48**
*prob> X^2=0.002***	Firm geog. scope	-0.01	0.04	-0.00	-0.00
	Tm. ind."Bell" exp.	0.01	0.03	-0.03	-0.10
	Tm. ent. exp.	-0.02	-0.18	0.02	0.19
Facilities Model Fit:	Tm. sr. exec. exp. (broad) [b]	-0.17	-1.50	0.17	1.52
Log Likelihood=-197.94	Tm. exec. high rank [b]	-0.08	-1.02	0.08	1.05
Wald X^2=14.66	Tm. exec. total tnr. [b]	-0.01	-3.27***	0.15	3.81***
prob> X^2=0.261	Tm. exec. avg. tnr. [b]	-0.04	-2.09*	0.05	2.48**
	Tm. F500 exec exp. [b]	-0.32	-1.58	0.51	3.56***
	Tm. Ind "Bell" exec. exp. [b]	0.09	0.16	-0.07	-0.12
	Constant	17.04	3.58***	-17.10	-3.58***
SURVIVAL	Industry entry timing	0.16	0.27	-0.56	-1.14
	Industry CapEx	-0.60	-0.69	-0.41	-0.45
Likelihood ratio tests of	Firm heritage (parent co.)	0.84	2.74**	0.24	0.75
independent equations	Firm start-up capital (assets)	-0.14	-1.92	0.11	1.95*
(rho=0)	Firm VC funding	0.44	1.07	0.41	1.30
	Firm geog. Scope	0.55	1.60	-0.43	-1.22
Resale Model Equations:	Tm. size	0.13	0.15	-0.04	-0.44
X^2(1) = 0.28	Tm. ind."Bell" exp.	0.59	1.26	-0.10	-0.21
prob> X^2=0.60	Tm. fncl. diversity	0.91	0.25	0.88	0.77
	Tm. fncl. dominance	-0.05	-0.13	-0.06	-0.10
	Tm. Fncl. difference	-0.68	-2.24*	-0.49	-0.72
Facilities Model Equations:	Tm. ent. exp.	0.07	0.43	-0.16	-0.80
X^2(1) = 0.43	Tm. sr. exec. exp. (broad) [b]	0.54	3.32***	-0.65	-1.75
prob> X^2=0.51	Tm. exec. high rank [b]	0.32	2.60**	-0.59	-2.20*
	Tm. exec. total tnr. [b]	0.03	3.20***	-0.01	-1.28
	Tm. exec. avg. tnr. [b]	0.14	3.70***	-0.04	-2.10*
	Tm. F500 exec exp. [b]	0.74	2.28*	-0.08	-0.53
	Tm. Ind "Bell" exec. exp. [b]	2.69	2.49*	080	0.83
	Constant	7.62	0.76	4.03	0.36
RHO	Coef. of error term correlation	-0.37	-0.54	0.61	0.70

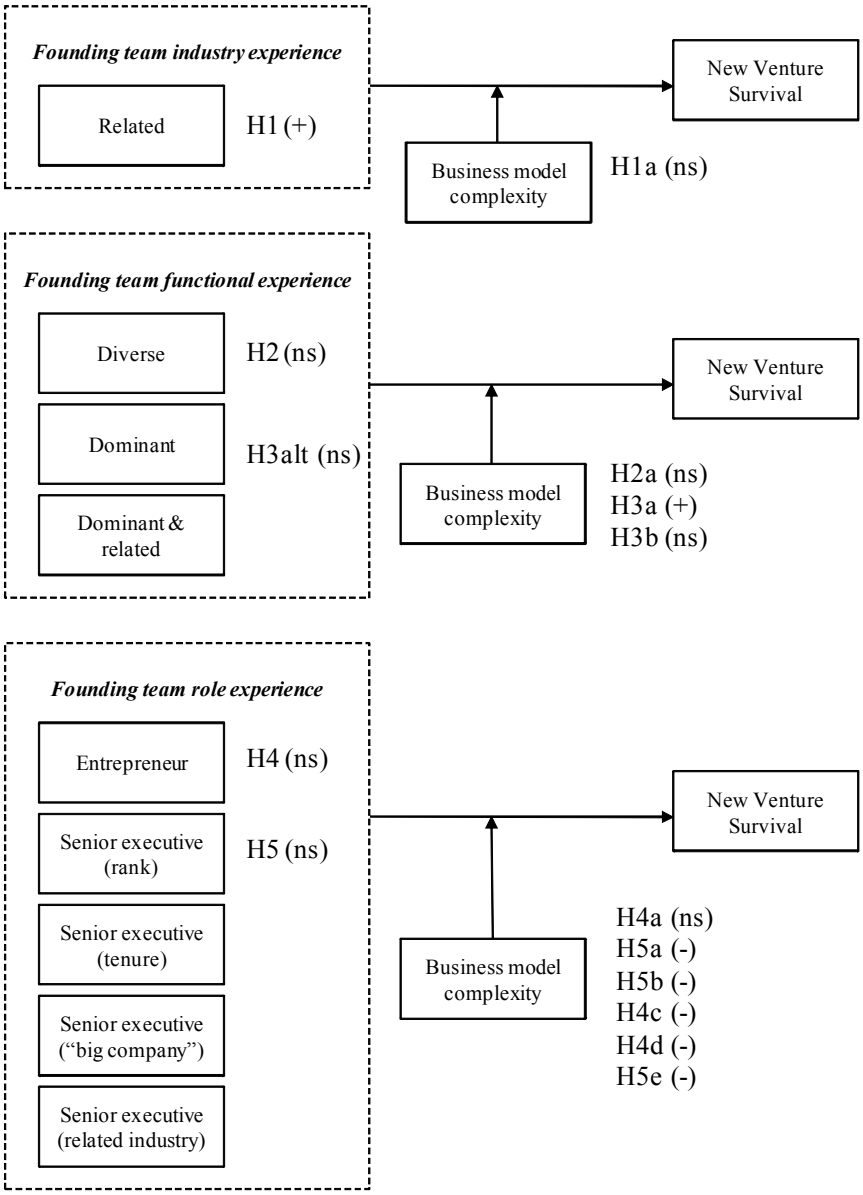
a. * p < .05; ** p < .01; *** p < .001

b. Note: Separate models were run for each of these effects to align with the hypothesis testing models.

6.6 Summary of results

Figure 16 summarizes the results of the hypothesis tests in terms of the original theoretical framework. A discussion of how these results inform the research question of this dissertation, as well as their extensions of evolutionary and institutional theories and their broader implications, follows:

Figure 16: Theoretical framework with results of tested hypotheses [a]



a. Where sign is indicated, all tests significant at $p < .05$ or greater

7. DISCUSSION AND CONCLUSION

This dissertation began by introducing a set of gaps from evolutionary economics in what is known about how selection mechanisms (for new venture survival) vary by context, as well as when particular routines (and the associated knowledge, skills, and capabilities) transfer more or less well from an established organization to a new venture context. Gaps were also identified from institutional theory in what is known about whether and when dominant logics enter into founding teams such that they have a significant effect on venture survival. I argued that business model complexity is an integral aspect of entrepreneurial context that moderates the relationship between a founding team's prior organizational experience and new venture survival, and thus begins to redress these gaps. Evidence from tests of the hypotheses supports this view. Attention to business model complexity revealed contingent effects that spanned the industry, functional, and role measures of industry experience. Specifically, business model complexity was shown to reduce the value of related experience when applied to new interdependencies, increase the importance of effective coordination, and amplify the constraining effects of "old mindsets" in founding teams.

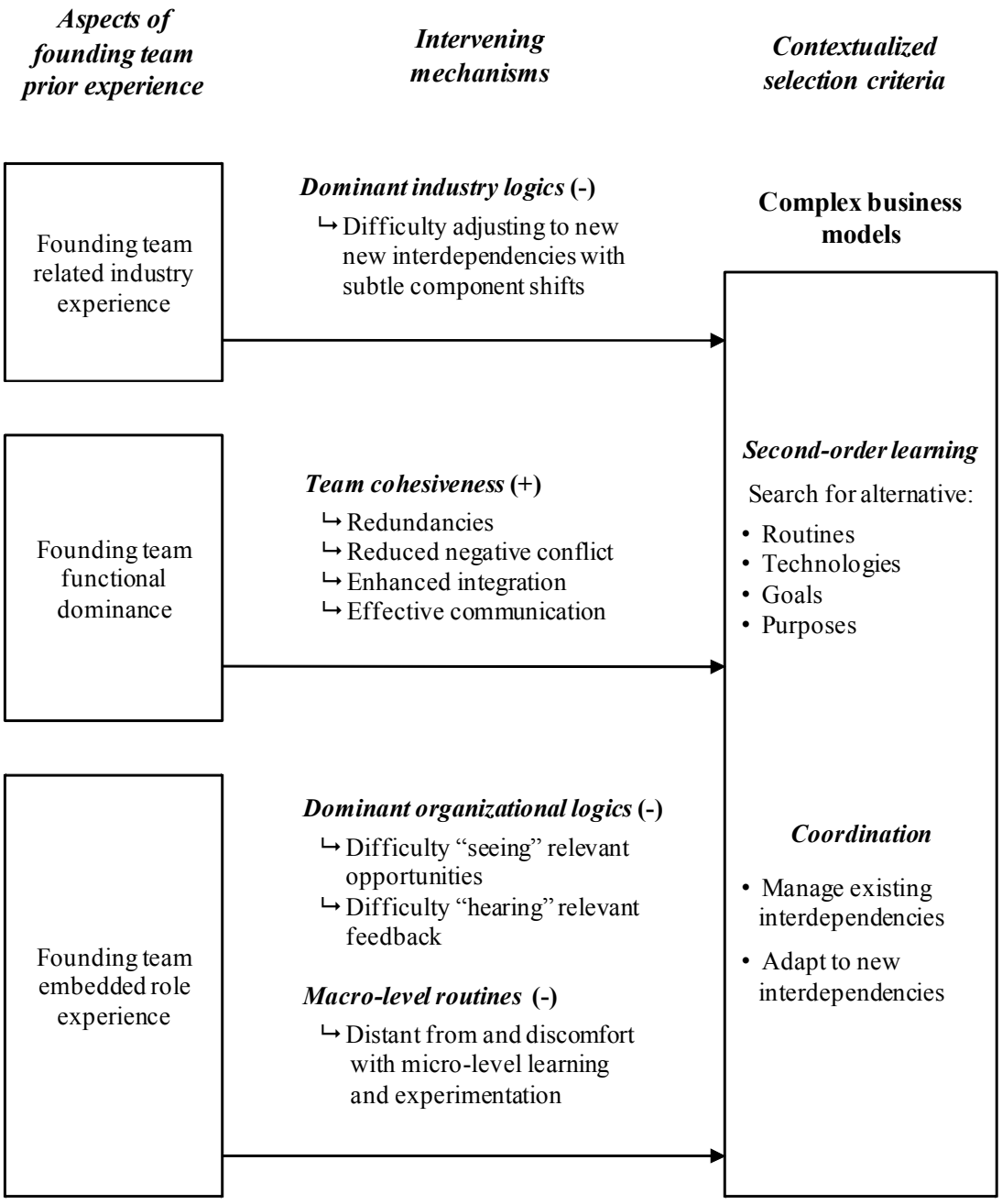
In this section, I synthesize these findings and their contribution to extant evolutionary and institutional theoretical perspectives, as well as their contribution to understanding the theoretical mechanisms that explain why such contingencies were observed and their generalizability to other settings. I also address some of the limitations of this research and the new questions and potentially fruitful opportunities for future research that this research exposes.

7.1 Theoretical synthesis

Findings from this research demonstrate the significant moderating effect of business model complexity on the relationship between the prior organizational experience of founding teams and the survival of their ventures. Across various aspects of industry, functional, and role experience,

business model complexity appeared to place increased demands on the second-order learning and coordination mechanisms that can facilitate adaptation and ongoing reorientation in response to shifts in the entrepreneurial landscape. Figure 17 synthesizes a model of these findings; the specified relationships and mechanisms are elaborated in the sections that follow.

Figure 17: Mechanisms of new venture survival in complex business models



One of the primary variables that was investigated was the importance of related industry experience, which prior research has often linked to venture survival (e.g., Carroll et al., 1996; Klepper, 2002). This research builds on such work by showing that the effects of related industry experience can have important contingencies that are tied to the complexity of the business models that entrepreneurs pursue with their new ventures. Specifically, related industry experience was found to be less valuable among the more complex facilities-based CLECs, where it appeared to transfer less well to the unique demands of such ventures. This was evidenced by the positive effects of related industry experience going away in the only model where it was interacted with the complex business model (Model 2). It appears that the "rugged landscapes" (Levinthal, 1997) of complex models problematize the "genetic transfer" often described by evolutionary theorists when speaking of related industry experience; rather than such experience readily transferring and having an enabling effect on survival, it can instead have a constraining effect in terms of the dominant industry logics often theorized by institutionalists, where founders may be more likely to misapply the taken-for-granted norms, routines, and patterns of behavior from their prior organizational setting to managing of the new complexities.

Recall again Henderson and Clark's (1990) engineers; they were industry specialists, yet they were unable to recognize and adjust to subtle shifts in the interdependencies of the component parts with which they were so familiar. Similarly, in the CLEC setting, founding teams with industry experience with the incumbent telecom providers were endowed with important advantages in terms of their knowledge of the industry vernacular, its regulations, and its various functional components (e.g., ordering, billing, provisioning). They also benefitted from their familiarity with the routines to manage these parts. However, when these industry insiders formed CLECs, the interdependencies they were required to manage were very different. As facilities-based CLECs, for instance, no longer did managing network operations involve optimizing efficiencies (as was the focus in the incumbent firms); rather, it required the more explorative activity of planning and developing new networks altogether. Corresponding with

this shift in interdependencies were shifts in the routines, technologies, goals, and purposes of their new organizations. Together, these dynamics amplify the importance of second-order learning while rendering the application of previous industry logics more problematic.

Tests of functional experience also revealed contingencies that were tied to business model complexity. Specifically, when founding teams pursued complex business models, functionally dominant teams were more positively associated with rates of survival than were functionally diversity teams. Interestingly, the nature of the functional dominance did not appear to matter as much as the presence of dominance itself. These results once again speak to the unique and inherent nature of complexity, and the requirements for new ventures to be able to rapidly learn, understand, and manage it. The results also call attention to the role of team dynamics, and how such dynamics are hinged to configurations of founders' prior experience, as important mechanisms for managing complexity. Functionally dominant teams have been linked to greater cohesiveness (Bantel et al., 1989), which enables the integrative (Smith et al., 1994), and effective communication (e.g., Ancona et al., 1992; Edmonson et al., 2001; Zenger et al., 1989) that appears integral to managing complex interrelationships. Functionally dominant teams are also more redundant teams, which can naturally come at the cost of more unique and diverse information, but which can also generate benefits in terms of the collective "mindfulness" needed to manage complex and integrative organizational systems (Weick et al., 1993).

Beyond such team dynamics, functional dominance can also be valuable in terms of the more coherent strategies that result. Because functionally dominant teams tend to have more convergent perceptions of their environment (Dearborn et al., 1958) and shared mental models for the strategy of the firm (Knight et al., 1999), they present a united front for generating important new venture capabilities (Kazanjian et al., 1999). Such a focus may be particularly important in new ventures where resources are limited and the need to understand what the venture is "about" are central to survival (Stinchcombe, 1965). Moreover, particularly with complex business

models, strategic coherence can be an important aspect of limiting the interdependencies that founding teams are required to manage.

Perhaps the most significant findings from this research (certainly in empirical terms), were those that related to the effects of prior organizational experience as a senior executive. It appears that founders with such experience brought with them "old mindsets" that made it difficult to adapt to the new and complex demands of being a facilities-based CLEC. The same was not true of the less institutionally embedded founders with prior entrepreneur experience. Interviews with founders and industry experts, although not formally analyzed, revealed patterns of themes that shed light on the senior executive effects.

The CLEC founders I interviewed described telecommunications as a career where "most people are in it their whole lives," and where there is oftentimes a fast-track to senior executive positions. As a result, senior executives—even those with telecommunications experience—rarely gained an appreciation for the complexity inherent in various functions (e.g., billing systems), regulatory guidelines (e.g., tariffs), and technology alternatives (e.g., network backbones) that must be brought together to make the business work. Making matters worse, as one informant claimed, many of these executives believed they understood telecommunications—after all, they had been in it their whole life—but the devil was in the details, and they were less wired to "get down and dirty" to understand what was necessary at the micro-level to make their businesses successful. They faced new complexities as a CLEC, which needed to be understood for them to survive.

> Telecommunications is extremely complex, but having the opportunity to look in from both sides, I can see what the Bell system didn't understand and what CLECs didn't understand—and the latter outweighs the former by quite a bit.

Among facilities-based CLECs, these complexities were amplified. When they formed CLECs, founders with senior executive experience could rely far less on specialists to meet these critical knowledge demands, as they often could in their previous organizations; instead, the onus

fell squarely on them. Thus, their ability to learn and adapt played an important role in the survival of their ventures. Yet, managing second-order learning and experimentation appeared to be less comfortable for the senior executives who had become more distanced from this role throughout their careers (Amburgey, Kelly, & Barnett, 1993). As one facilities-based manager described, broad strategic frameworks are a useful starting point, but "…you need to have someone who can really get down in the muck. A lot of this stuff is really down in the muck." Avoidance of "the muck," or at least not embracing the necessary knowledge and understandings that resided within it, appeared especially problematic for the survival of facilities-based CLECs.

Other informants explained that the senior executives who entered this space brought with them dominant logics, or certain mindsets, that were rigid and difficult to sway in the face of new information. Even when these executives had access to the detailed knowledge they required, they were more likely to disregard it when it did not fit their preconceived notions of what should happen. As one CLEC manager described:

> Senior management only wants to hear what they want to hear, and you don't want to be the messenger that gets shot. If they're heading down the track with one approach, but people on the ground know full-well that the bridge is out in front of them—and that they'll be in for disaster if they don't change course, they still won't listen to you. They'll just find someone else who will tell them the bridge is just fine.

Beyond not "hearing" relevant feedback, many of these executives appeared to have greater difficulty "seeing" relevant opportunities to maximize their potential as a CLEC. One founder described this using the example of AT&T divesting its wireless business years ago before its potential was recognized: "Sometimes the upper management was entrenched into what they knew. Wireless was a big phone in a big bag. They weren't quick to catch on, and when they did, they didn't time everything right."

Thus, even when senior executives have developed valuable routines for managing their past complexities, the same dominant logics that helped them manage prior complexities appeared to have maladaptive effects in their new environment, where the nature of the interdependencies

were new and different. Together these "old mindsets," when applied to the complexity demands of a facilities-based CLEC, appeared to play a tangible and substantive role in their higher observed failure rates.

Interestingly, behind the observed effects of senior executive experience lies a paradox in the composition of founding teams, where the results are surprisingly inconsistent with the way in which CLECs in the resale-only and facilities-based models composed their founding teams. That is, in spite of the positive marginal effects of founding team senior executive experience in the resale-only model and the negative marginal effects of such experience in the facilities-based model (e.g., Table 5), facilities-based teams tended to have a far greater proportion of members with senior executive experience (0.57) than did resale teams (0.40). A proportional test of this difference confirmed its significance ($z=-2.79$; $p<005$). At face value, it seems reasonable to expect that more senior executives would be part of the facilities teams—which tended to be larger and required more "managing." Nevertheless, such logic does not fully explain why such individuals were found disproportionately *more often* in these contexts—even when they appeared to hinder venture survival. Similarly, the results do not fully explain why senior executives were found disproportionately *less often* among the resale teams where they appeared to aid venture survival at the margin.

In the resale scenario, the answers may lie in the greater relative costs of employing senior executives and in the limited attraction, in an opportunity cost sense, to the resale ventures, where there less potential exists, on average, to reward their risk of leaving their current positions. In the complexity scenario, the answer may lie in the selection process by which such teams form in the first place, and the importance of senior executive experience as a marker of legitimacy in securing initial financing for the type of new ventures that require this the most (e.g., facilities-based). As Burton et al. (2002: 253) explain, "Entrepreneurs with senior management experience have more legitimacy with external constituents and are more likely to obtain external financing." Once initial financing is secured however, the norms, routines, and patterns of

behavior with which they have been imprinted may not transfer as well to the day-to-day operations of running a new and complex business—the results of which are consistent with the significant findings of this study.

Together these findings shed light on the evolutionary and institutional mechanisms that help to explain new venture survival. Specifically, they provide evidence of unique selection mechanisms—associated with second-order learning and coordination—in entrepreneurial contexts where business models are complex. In terms of evolutionary economics, the findings have implications for the relative effectiveness of the evolutionary transfer of routines. When business models are complex, the related industry experience of the team and macro-level administrative routines of senior executives appear to have significantly less value and can even be harmful. In terms of institutional theory, the findings demonstrate the relevance of theorizing about dominant industry and organizational logics in entrepreneurial settings. The results show that such logics are not only inconsistent with the learning demands of complex business models, but that they can have a pronounced effect on the survival (or failure) of new ventures. This is because of the conjoined nature of new venture founding teams and new ventures themselves, which thus bears directly on new venture survival. Moreover, these effects are amplified in new and complex entrepreneurial settings because of the increased likelihood for such founding team members to fall back on their past experiences and heuristics when managing in such high demand environments (Hambrick, 2007).

7.2 Contributions

This research makes several contributions. For theory, it demonstrates a clear relationship between the alignment of founding team experience and the successful execution of a business model. Not all business models are alike, and founding teams need to be configured to reflect the unique demands that models place on them. By focusing the current inquiry on complexity, in

particular, this research also contributes a broader picture of the nature of entrepreneurship, including evidence of cognitive rigidities in its practice. Whereas traditional conceptualizations have tended to emphasize the more dynamic qualities of entrepreneurs: their ability to thrive amidst risk and uncertainty (cf.,Knight, 1921; Mises, 1963), to discover and exploit new opportunities (e.g., Shane & Venkataraman, 2000), and to foster novelty and change (Schumpeter, 1934), the findings presented here suggest conventional portrayals may not be as universally valid as often generalized, with institutionalized norms, routines, and patterns of behavior playing an important role in entrepreneurial behavior.

More specifically, it seems that senior executives bring a particular organizing approach and mindset to their ventures, which can have contingent value (or harm) depending on the complexity of a chosen business model. Although formal analysis of the qualitative interview data lies outside the scope of this dissertation, there appears to be a tendency for senior executives to be more familiar and comfortable with routines that pertain to the strategic and administrative aspects of organizing and managing, rather than to the more micro-level aspects of experimentation and learning. Although the former can be important success differentiators in more simple and certain environments, the latter may be especially important to managing the changing interdependencies of highly complex environments. Along with such effects, a related stream of research has suggested that the mindsets that senior executives bring to their organizations can either go less challenged or create internal conflict at higher levels in teams (e.g., Amason, 1996). Anecdotal evidence obtained from interviews with industry entrepreneurs and experts suggested that the "old mindsets" of senior executives led to inappropriate judgments and missed opportunities, which were especially consequential in complex business models, where the fluidity of the entrepreneurial context afforded smaller windows (and less slack) for the learning and adaptive reorientation they required.

For policy and practice, the findings provide evidence that the experiential characteristics of founding team members are not all equal in their likelihood of generating economic value through

entrepreneurship; what is conducive to venture survival in one entrepreneurial context may be detrimental in another. In turn, such findings point to the value of attending to contextual factors in the study of entrepreneurship, and executive leadership more generally (e.g., Carpenter, 2002). They begin to put empirical substance behind Low and Abrahamson's call for greater attention to entrepreneurial context (1997: 435), and that by Sandberg and Hofer (1987: 6), who rationalized the contextual effects to explain the weak significance of experience variables in their study:

> The limited success of previous academic models of new venture performance is also explained, as these models generally did not specialize by industry, by venture strategy, or by type of entrepreneur and did not look for interactive effects. In essence, the lack of specialization in these studies allowed the averaging process produced by interactive effects to mask many potential insights. The clear implication is that future studies of new venture performance must either more carefully limit their domains or be built on contingency models of performance

Even in this relatively isolated research setting, which was narrowly defined around the definition of a common regulatory opportunity, clear effects of context emerged.

7.3 Limitations

The CLEC research setting afforded unique natural controls and design features; yet, important boundary conditions are worth noting. First, I looked only at firms operating in Georgia. This concern is mitigated by the fact that Georgia CLECs are representative of the national population in terms of average number of lines owned and competitive presence; however, there may be other factors unique to CLECs in Georgia that I have failed to account for in my analysis, but which may represent important idiosyncrasies associated with forming and operating a venture in this state. Second, the founders in this setting chose the business model they pursued, which raises the prospect that there are unobserved selection effects that may provide alternative explanations for the results. Although available tests indicated that selection was not a problem, the possibility remains that an improved instrument would reveal a different

diagnosis. Third, the research setting for this analysis is a regulated industry. And, although the legislative motivation for CLEC emergence was de-regulation, considerable regulatory influences remained throughout its lifecycle that were important for its advancement. These features may limit how well the findings generalize beyond industries with similar characteristics (e.g., resource dependencies on incumbent firms, strong political and regulatory influence). However, because I had access to several multi-level resource measures and the data allowed me to begin to control for several of these idiosyncrasies, the benefits of the research setting are likely to outweigh its limitations.

Potential alternative explanations. Particular caveats are also important to note in terms of potential alternative explanations for these findings. For instance, while the findings are suggestive of several operative mechanisms (e.g., learning, adaptation, coordination), many of these were not tested explicitly. For instance, while dominant industry and organizational logics are theoretically consistent with the institutional theory-based explanations of the results that were presented, these dominant logics were never tested directly; thus, their attribution in explaining the results should be interpreted with caution.

Similarly, the research design for this study benefitted from two business models that were clearly distinct in terms of their complexity; however, additional distinctions existed in these models that may have been responsible for driving at least a portion of the observed effects. For instance, differences in the barriers to entry may have attracted different types of founders, with unobserved heterogeneity in this selection contributing to differences in the results. While conscious attempts have been made to account for these and other differences (e.g., through selection model tests), the existence of within-business model differences, which are independent of differences in complexity, also suggest caution when interpreting the results.

Finally, in terms of the senior executive measures and effects, many of the executives who joined the facilities firms were from the incumbent provider of local telecommunications services. Such senior executives were seldom likely to be the top leadership of these large

established incumbents, but rather the middle managers who ran them. When these managers left their firms, they also left with them the access to the broader top management expertise and inter-functional awareness. If it is the awareness and management of such *broader* organizational interdependencies that matters the most in complex new ventures, then the current explanations hold up less well. While the anecdotal interview evidence aligns with current explanations, future research would benefit from greater clarity around the particular aspects that give senior executive experience—at different levels—both its benefits and harm in new venture settings.

7.4 Conclusion and research extensions

The findings from this research raise the prospect of several intriguing extensions of the current research, including possibilities with new data, measures, and methodologies. It also suggests new research questions altogether.

In terms of data, several opportunities exist to extend the current research. One is to expand beyond the current state of Georgia to collect data from additional jurisdictions. Beyond a larger sample size, this would allow for greater insights around geographic patterns and timing of entry and exit. Similarly, this research was limited to a single industry, however cross-industry comparisons would be particularly important to test and refine explanations around the generalizability of these findings. For instance, similar demographic data exist, as to what was used in this study, around deregulation in the banking and airline sectors. Such a comparison, for instance, could examine whether prior experience transfers more effectively in banking, where the *ex-ante* and *ex-post* complexities are most similar, thus shedding greater light on explanations around the role of related experience and complexity.

In addition, supplemental data would be useful to shed additional light on explanations of the effects revealed in this study. For instance, survey measures that assess more closely the intervening mechanisms theorized (e.g., team communication) would provide greater clarity

around the observed effects. As well, more direct measures of business model complexity are warranted. In this research setting, a general comparison across business models provided broad insights; however, the complexity *within* these two models also differed. A refined measure would be useful to assess factors such as the number of products offered, type of customers serviced, rate of growth, etc., in order to derive an index of complexity that could provide more refined insights than was possible here.

As well, an intriguing methodological extension of the current research relates to team demography. Conventional statistical approach require *ex ante* theorizing of how particular aspects of founders' prior experience configure together, and with other characteristics of their ventures and their environments, to predict survival. However, the opportunity exists to apply an emerging methodology, fuzzy-set/qualitative comparative analysis (fs/QCA), to identify and examine these configurations more explicitly. Fs/QCA uses set logic and could be applied to the population of CLECs to deduce the various configurations of variables that are most parsimoniously associated with success and failure. An explicit investigation of the firms associated with these configurations, perhaps through the paired use of archival and qualitative methods, could shed additional light on the dynamics of venture survival, including the substitutability of various resources and their contextual relevance.

The variance in new venture founding teams and performance observed in the CLEC setting also raises questions about the source and nature of new venture identities. Little research has investigated the relationship between founders' identities and the identity of their ventures. Even the simple question of "What does a new venture identity look like, and what is its genesis?" is not all that clear. This dissertation setting, with a narrowly defined industry space but variance in how the resale and facilities CLECs claimed their identities and represented them to others, provides an ideal setting to examine these questions. Such an investigation would benefit from a fuller collection and analysis of the qualitative data that supplemented this study, as well as the collection and content analysis of archival website data on each firm, which can be accessed

through the "Wayback Machine" Internet archive. Similarly, more formal analyses of the qualitative data that were collected for this study stand to shed greater light on the study's results.

As well, the analyses presented here raise interesting questions about selection into entrepreneurship in general, but more specifically into particular *types* of entrepreneurial endeavors. The results raise the question of how founding teams are formed. What experiences are sought out? Is it a more instrumental or random process? Who determines the founding team composition? What effect does being a parent company or venture-funded firm, for instance, have on these decisions and subsequent entrepreneurial processes? Does the experience that is anticipated to be important at founding turn out to be as relevant as expected? If not, what surprises tend to emerge? And, in terms of this study in particular, was there unobserved heterogeneity in the founders of the CLEC ventures that might be more closely measured, and how did this variance explain the choice of business model pursuits? Closer investigation of such questions provides an intriguing direction for future research.

In terms of institutional theory, this research raises questions around the influence of dominant industry and organizing logics in new venture founding teams. The findings here suggest their negative influence in complex new ventures; however, it is unclear whether such an influence is malleable and the extent to which organizational mechanisms can mitigate these negative effects. As was noted earlier, Google attempts to curb against "old mindsets" through a culture that rewards ideas that are determined to be of high quality, rather than an emphasis on seniority and safe bets (Iyer et al., 2008). Do senior executives with old mindsets avoid ventures like Google altogether, or are Google practices able to change old mindsets? Similarly, are more functionally diverse teams more important when more senior executives are present, and what influence does organizational power have on these effects? Presumably, when managers are more powerful, it may not only be more difficult to change their mindsets, but the effects of their mindsets will be more pronounced in their organizations; thus, greater attention is also warranted to the role of power in new venture founding teams.

In terms of evolutionary economics, this research raises questions around the nature of the roles and routines that provide effective configurations in new ventures. Whereas macro-level routines and knowledge of running a large established organization have certain benefits (e.g., broad perspectives, industry awareness), these may best be paired with more micro-level learning and start-up routines. Although I examined the effects of functional diversity in this dissertation due to theoretical precedent for doing so, future research would also stand to benefit much from attention to diversity in the industry and role experience of the founding team.

Finally, Nelson (1994) described the need to understand how selection mechanisms vary by context. This research approached this gap in terms of differences in complexity; however, there also appears to be temporal patterns in the emergence of new ventures that warrant attention. One relates to the dominant problems that new ventures face as they evolve (Kazanjian, 1988). The findings in this research suggest, for instance, that the selection demands for "getting into the game" may be very different from being successful once new ventures are founded. Similarly, other research has pointed to differences in timing of entry and the unique effects of shifts in industry dynamics (Aldrich et al., 1994; Navis et al., 2008).

More generally, this research points to the value of attending to contextual factors in the study of entrepreneurship. As Low and Abrahamson (1997) explained:

> Entrepreneurship research has paid insufficient attention to the context in which new businesses are started. Consequently, efforts to identify factors that consistently lead to entrepreneurial success have failed. This is because what works in one context will not necessarily work in another. Even worse, factors that lead to success in one context may lead to failure in another (p. 435).

Importantly, contextual factors need not be written off as analytical noise; rather, an opportunity exists to exploit their features to advance new theoretical insights. This study examined the moderating role of complexity. A deeper understanding of *when* variables are more or less important can be instrumental in shedding light on the mechanisms behind *how* and *why* they are important (Davis, 2006). This study is intended as a step in that direction.

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APPENDICES

A. Codebook

Codes / Variables	Description / Rules	Examples	Source
FIRM IDENTIFIERS			
Certification Number (CertNum)	Certification number of the CLEC firm. CLECs are assigned chronological certification numbers upon filing with the GA PSC. Beyond its function as a key identifier for each CLEC firm, the natural sequencing of these numbers provides a means for tracking and ensuring examination of the full population of CLEC applicants.	"L-0001" (first assigned certification)	GA PSC Website
Control Number (SOSNum)	Control number assigned to CLEC entities operating in Georgia with the legal status of "LLC" or "Corporation." Excluding municipalities, only 2 firms were not organized as LLCs or Corporations (but rather, as "individuals"); accordingly Secretary of State (SOS) records are unavailable for tracking / triangulating the creation and subsequent (e.g., dissolution) activity of these firms (n < 1%).	"J922281"	GA Secretary of State Records (Website)
Docket Number (DockNum)	File number associated with a registry of events / transactions associated with a CLEC. Each Cert # has a one-to-one relationship with a Docket #. The dockets are accessible online and include summary information about CLEC events including disconnect notices, bankruptcies, and transfers of ownership—each of which has been triangulated in the master data file with other sources (hard-copy files at the PSC, Factiva and Nexis archives, etc)	"5836"	GA PSC Website
Company Name (Name)	Name of the original applicant for whom founding team and other data are of linked. Note, the PSC Website data may reflect a different company name as the original applicant based on subsequent merger or acquisition activity. For instance, Realcom was acquired by MFS in 1996. Later that year, MFS was acquired by WorldCom. In 1998 WorldCom merged with MCI. Then, in 2005, MCI was acquired by Verizon in 2005. PSC records reflect the most recent activity associated with a company name. In this case, it is MCI WorldCom Communications, Inc., which cancelled its certificate (L-0001) in 2004, prior to its acquisition by Verizon.	"Realcom Office Communications"	GA PSC Website
FIRM ORIGINS			
Heritage (Parent Company)	Dichotomous measure of the heritage of a CLEC based on whether it was formed as a *de novo* entity—with no legal ties to another established firm (coded as "0"), or whether it was formed as a parent-company firm, which could mean it was formed either as a spin-off or through a joint venture (coded as "1"). .	(0,1)	CLEC Application & Factiva and Nexis
Parent Name (ParName)	Name of parent company firm, if one exists. Parent company designations are listed on the CLEC application for certification. Archival records from Factiva and Nexis validate and, at times, supplement these designations by either confirming the *presence* of a parent company affiliations when one is designated or by confirming its *absence* when one is not designated (i.e., that the CLEC is truly operating as a *de novo* entity).	"MFS Communications"	CLEC Application & Factiva and Nexis

Parent Year Founded (ParYr)	Year when parent company, if present, was established. Parent founding year is sometimes provided in the CLEC application for certification, but it often needs to be researched, or triangulated at least, through online archival records (e.g., Factiva and Nexis).	"1998"	CLEC Application & Factiva and Nexis
Parent Age (ParAge)	Age of parent company firm, if one exists, at CLEC founding. Measure is transformed into the natural log of this age for empirical analysis.	"4.23"	*Derived* (PSCDate – ParYear)
Other Certifications (OthCert)	Other PSC certifications of the CLEC or its parent in GA. When CLECs are either spawned from parent-company firms or have pre-existing operations, these fields are used to help determine the nature of those operations (coupled with archival descriptions of their activities). Several certifications are authorized and governed by the PSC. Primary among these are the Interexchange Carrier (IXC), Resale, Payphone Service Provider (PSP), Independent Local Exchange Carrier (ILEC), and Interconnection certification designations (all types are described below). ADAD – An Automatic Dialing and Announcement Device is used primarily by business to place computer-generated calls and prerecorded messages for the purpose of advertising goods, services or property that is for lease or sale. Any person or organization who wishes to use ADAD equipment in the state of Georgia must obtain a permit from the PSC and pay a fee of $100; AOS – Alternative Operator Services have their own telephone operators and resell telecommunications services; ILEC – An Independent Local Exchange Carrier is a local telephone company, whether classified traditionally as an (alternative) "ALEC," (rural) "RLEC," or (incumbent) "ILEC," local exchange carrier; ITS – Institutional Telecommunications Services are private telecommunication companies that provide pay phones to institutions; IXC – Interexchange carriers are providers which carry long distance telephone traffic, for example AT&T, MCI and Sprint; PSP – Payphone Service Providers. Resale – Carriers which resell long distance telecommunication services (compared to the local services resold by CLECs); TSOE – Telephone Service Observing Equipment is a device attached to a telephone that allows calls to be monitored; Interconnection – Long distance interconnection authority	"Resale"	GA PSC Website
Other Certification Year (OthCertYr)	Year when each type of other certification was granted. Because companies may be certified in several different ways and under different affiliated company names, it is important to cross-validate certifications with the company affiliations that CLECs list in their applications for certification. For instance, the CLEC, Plant Telenet is recognized as affiliated with the incumbent (rural) LEC, Planters Telephone Cooperative, based on these records.	"1994"	GA PSC Website
Parent Business (ParBus)	Nature of parent company operations, coded for CLECs spawned from parent-companies (field is coded as "N/A" for *de novo* CLECs.) Field reflects the core business that the parent company is involved in. The other certifications field (OthCert) provides the primary guidance for this field, highlighting companies certified in ILEC ("LEC"), IXC, PSP, and Resale ("LD Resale") lines of business. Additionally, related industry designations of "CAP," "CATV," "ISP," "Utility," "Wireless," and "Other" are used as values for this field. These designations are described in greater detail in the definitions of the industry experience fields.	"CAP"	"OthCert" field, CLEC application, SEC.gov, Factiva and Nexis

FIRM OPERATIONS			
CLEC Strategy (PPD, FAC, & RSL)	Dichotomous indicator of how a CLEC competes based on its strategy, or certification type, which must be designated in its application for certification. CLECs can be either facilities-based provider s (FAC) or pure resellers (RSL), sometimes referred to as "total service resale." Within the resale category, firms may also offer prepaid services (PPD). Codes reflect the initial strategy the firms pursued. Some firms become certified to offer both resold and facilities-based services. Although the data are coded as this more granular level, only those with no facilities component are treated as resellers in the empirical analysis. Many CLECs offered service through what was known as the unbundled network elements platform, or UNE-P, which allowed them to provide end-to-end service delivery without any facilities; still, this common strategy required facilities-based certification from the PSC. To more appropriately capture the nature of these operations, UNE-P CLECs are treated in this study as resellers. When CLECs apply for certification, they clearly designate whether they will be competing through UNE-P, without acquiring (purchasing rather than leasing) their own facilities.	(Yes, No) PPD ("0") FAC ("1") RSL ("1")	GA PSC Website and CLEC application (to correct for UNE-P)
Legal Status (LglStat) (OrgCode)	The legal status of a CLEC at founding. Most CLECs are formed as corporations or LLCs; however, many others are formed as municipalities, and rarely as individuals. These data are primarily useful to facilitate the exclusion of certain types of CLECs (e.g., municipalities) from analysis. Legal status is indicated on the CLEC application for certification. It also appears in the SOS records.	"Corporation"	CLEC Application and GA Secretary of State Records (Website)
Team Size (TmSize)	Count of the number of members on the founding team	"6"	CLEC Application
Gender Diversity (GendDiv)	Composite measure of the proportion of female members on the founding team	"0.2"	CLEC Application
Geographic Scope (Geog) (MktGen) (MktSpec)	Categorical measure of the market span of a CLEC upon establishing operations in GA (including pending applications in other states), whether local, regional, or national. Local operators have no operations outside GA. Regional operators include CLECs that operate beyond Georgia, but not outside the former BellSouth operating region (AL, FL, GA, KY, LA, MS, NC, SC, & TN). National operators include CLECs headquartered outside the former BellSouth operating region as well as CLECs headquartered within this region but with operations in other regions.	"National"	CLEC Application
FIRM FINANCIALS			
Total Assets (TotAsset)	Continuous measure of the total assets available to a CLEC at start-up, reflecting the "size" and "start-up capital" often used in empirical analyses. For parent-company firms, these values will often reflect the financial support of the parents as designated in the CLEC application for certification. Full balance sheet data are requested by the PSC as part of the CLEC certification process in GA. At times, however, these data are filed as Trade Secret by CLECs, rendering them inaccessible outside PSC personnel. Occasionally, the firms later go public and release their historic financials; when their financials date back to the founding period, they are used. Occasionally as well, reports from Factiva and Nexis will describe the venture capital amounts provided to CLECs to fund their start-up, even when these data are filed Trade Secret in the CLEC application. In these cases, such amounts are used as	"1,867,134,000"	CLEC Application, SEC.gov, & Factiva and Nexis

	measures of the Total Asset start-up capital available to the CLECs. Otherwise, the fields are designated "Trade Secret," indicating missing data. Measure is transformed into the natural log of the Total Asset amount for empirical analysis.		
Current Liabilities (CurLiab)	Continuous measure of the current liabilities associated with a CLEC at start-up. For parent-company firms, these values will often reflect the financial burdens of the parents as designated in the CLEC application for certification. Full balance sheet data are requested by the PSC as part of the CLEC certification process in GA. At times, however, these data are filed as Trade Secret by CLECs, rendering them inaccessible outside PSC personnel. Occasionally, such firms later go public and release their historic financials; when such financials date back to the founding period, they are used. Otherwise, the fields are designated "Trade Secret," indicating missing data.	"$274,457,000"	CLEC Application, SEC.gov, & Factiva and Nexis
Total Liabilities (TotLiab)	Continuous measure of the total liabilities associated with a CLEC at start-up. For parent-company firms, these values will often reflect the financial burdens of the parents as designated in the CLEC application for certification. Full balance sheet data are requested by the PSC as part of the CLEC certification process in GA. At times, however, these data are filed as Trade Secret by CLECs, rendering them inaccessible outside PSC personnel. Occasionally, such firms later go public and release their historic financials; when such financials date back to the founding period, they are used. Otherwise, the fields are designated "Trade Secret," indicating missing data.	"$1,036,802,000"	CLEC Application, SEC.gov, & Factiva and Nexis
Current Ratio (CurRatio)	Financial ratio indicating the ability for a CLEC to satisfy its near-term (12-month) debt obligations, measured as a ratio of current assets to current liabilities. Such measures (of current assets and liabilities) are somewhat noisy in this analysis and among start-ups more generally, and should be used with caution, if at all. A more appropriate measure of financial health, or at least scale, may be the total assets available to a CLEC for their start-up operations, which is less subject to temporal variability. As well, the TotAsset value is reported more consistently across CLECs in their certification filings, enhancing its validity and usefulness as a measure.	"1.36"	*Derived* (CurAsset / CurLiab)
ENTRY TIMING			
Initial Registration (SOSDate1)	Date of initial GA SOS filing / registration of the corporate entity associated with a CLEC application. When SOS dates match closely those of the CLEC application filings on record at the PSC, this provides a level of validation that the correct corporate entity (and associated Control #) is being used as a basis for evaluating CLEC outcomes. Typically, this Control # is provided directly in the CLEC application however, and this validation step is not necessary. The date also provides insight into how long an entity has been operating in GA, which can guide research into its operational history pre-CLEC certification.	"11/16/1989"	GA Secretary of State Records (Website)
CLEC Registration (SOSDate2)	Date of CLEC registration, if unique from SOSDate1. For parent-company ventures, SOS histories typically reflect changes in the name or legal status of an entity corresponding with the formation of a CLEC unit. This date is coded to assist in the validation described above (with SOSDate1).	"7/16/1996"	GA Secretary of State Records (Website)

PSC Filing Date (PSCDate)	Date that a CLEC application was filed at the GA PSC. It is used as the basis for calculating the number of days until all relevant survival events occur. Although timing for the PSC approval process can vary by CLEC, the filing date was chosen as a start-point because it reflects the initiation of CLEC activity. As well, variance in PSC timing is minimal and is largely consequent of the actions and behaviors (or performance) of the CLECs themselves.	"5/18/1995"	GA PSC Website
PSC Filing Year (PSCYr)	Year that a CLEC application was filed at the GA PSC. Used for analyzing year fixed effects.	"1995"	*Derived* (Year of PSCDate)
Entry Timing (Period)	Indicator of whether CLEC entered in the early or later stage of industry emergence. Derived based on PSCYr entry; for entrants before 2001, coded as '0'; from 2001 onward, coded as '1'	"1"	*Derived* (PSCYr)
OUTCOME EVENTS			
Bankruptcy (Bnkrpt)	An event declaring the financial insolvency of a CLEC, measured by the date it occurs during the sample period. When a CLEC successfully emerges from bankruptcy, the bankruptcy event is not used as an input in determining the final CLEC outcome; otherwise, it is included in this calculus (See Outcome field). Bankruptcy events are recorded in the CLEC dockets and have been triangulated in the master data file with archival Nexus and Factiva records. When no bankruptcy event has occurred, "No" is recorded in this field; else, the date of the bankruptcy is recorded.	"No" (for L-0001) "12/28/2001" (for L-0011)	CLEC Docket Records, Factiva and Nexis, & Web BRD Bankrupty Database
Carrier Notice (CarNtce)	A notice issued by an incumbent local carrier (e.g., BellSouth) of its intent to disconnect the services of a (non-facilities-based) CLEC's end customers due to the CLECs lack of payment of past due balances. When a CLEC has one or more past due account balances, incumbent providers generate a notice stating that if the CLEC's past due balance is not paid within 15 days, the recipient CLEC will be denied the ability to place new orders for any of its accounts. The notice also states that if the CLEC's past due balance is not paid within 30 days of notice generation, the incumbent has the right to disconnect all the account(s) for which the past due balance is still unpaid. When collections procedures reach this final state, the PSC must be notified by the incumbent of the intent to disconnect the services of a CLEC's customer base. When a CLEC has received no such carrier notices over its history, "No" is recorded in this field; else, the date of the notice(s) is recorded. The CarNtce event is used as an input in determining the final CLEC outcome (See Outcome field)	"No" (for L-0001) "4/27/2004" (for L-0012)	CLEC Docket Records
Merged or Acquired (MrgAcq)	An event signifying a merger with (Mrgd), or acquisition by (Aqrd), another firm. Indicator is associated with the initial CLEC that filed with the GA PSC and is used as a basis for tracking its history and any transfers of ownership. Merger events are not considered outcome events; rather, they are treated as continuances of the original founding team operations. Acquisition events, however, are used as an input in determining the final CLEC outcome (See Outcome field). Critical is whether the acquisition was favorable or unfavorable to the CLEC being acquired, as indicated in the Favorable Acquisition field (See Fav). All transfers of ownership are reported in the CLEC Docket records.	"Mrgd" or "Aqrd"	CLEC Docket Records

Acquirer (Acqrer)	Indicator that a CLEC has acquired some or all of the assets of another firm during the sample timeframe. Currently, this field has no active use; rather, it is included for informational purposes and as a complement to any qualitative analyses of firms' histories. All transfers of ownership are reported in the CLEC Docket records.	"Yes" or "No"	CLEC Docket Records
Ownership Transfer (OwnXfer)	Name of the corresponding firm(s) that is party to a merger or acquisition event, and the year of the event's occurrence. Currently, this field has no active use; rather, it is included for informational purposes and as a complement to any qualitative analyses of firms' histories. All transfers of ownership are reported in the CLEC Docket records.	"Intermedia / Worldcom (1996)"	CLEC Docket Records
Favorable Acquisition (FavAcq)	Indicator of whether a CLEC was acquired under favorable (Yes) or unfavorable (No) terms, in the event of an acquisition. Acquisitions are considered favorable when no evidence of distress (e.g., bankruptcy or carrier notices) precedes the acquisition, based on GA PSC accounts and archival records from Factiva and Nexis and are framed and signaled in positive terms for the acquired CLEC in public announcements (e.g., strategic synergies, shared management). When the favorability of the outcome is ambiguous, this field is marked AcqTBD; future efforts may either clarify these outcomes (e.g., through consultation / validation with industry experts) or elect to remove them from the analysis.	"AcqFav"	CLEC Docket Records, Factiva and Nexis, & Industry Experts (Planned)
SOS Status Activity (SOSActvy)	Status of a CLEC entity according to GA SOS records at a given time in history (used in conjunction with the SOSStatDate field). Primary status entries include "Merged," "Acquired," "Active/Compliance," "Name Change," "Withdrawn," "Active/NonCompliance," "Auto Dissolution/Revocation." Because a CLEC's SOS registration can typically take three years to be automatically dissolved or revoked due to inactivity, the "Auto Dissolution/Revocation" outcome is paired with two other entries: the last activity of a CLEC, and the anniversary of the last activity referenced as "Last Plus One" to determine the final date.	"Merged"	GA Secretary of State Records (Website)
SOS Status Date (SOSStatDate)	Date of SOS Status Activity. Used to track transaction history of CLECs and to triangulate with PSC records for validation. The SOSActvy event is used as an input in determining the final CLEC outcome (See Outcome field)	"2/19/1998"	GA Secretary of State Records (Website)
PSC Status Activity (PSCActvy)	Status of a CLEC entity according to GA PSC records at a given time in history (used in conjunction with the PSCStatDate field). Status entries indicative of ongoing concerns include: "Interim" and "Active." Status entries indicative of discontinued entities include: "Cancelled," "Return Mail," "Withdrawn," and "Active."	"Cancelled"	GA PSC Website
PSC Status Date (PSCStatDate)	Date of PSC Status Activity. Used to track transaction history of CLECs and to triangulate with SOS records for validation. The PSCActvy event is used as an input in determining the final CLEC outcome (See Outcome field). Note that the SOS and PSC dates may differ, as the PSC dates pertain to the certification status rather than the entity status; that is, an acquisition, for example, may result in the acquiring firm retaining the original certificate of the acquired firm, as happened in the L-0001 example illustrated here.	"7/19/2004"	GA PSC Website

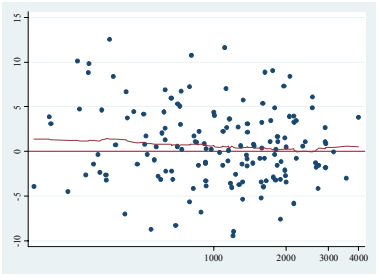
Outcome (Failure)	Dichotomous measure according to a decision rule that treated the first instance of: 1) bankruptcy, 2) a notice from an upstream service provider of the intent to disconnect services for prolonged non-payment, or 3) an unfavorable acquisition, as an instance of failure.	"1"	*Derived* (Decision rule)
End Date (EndDate)	For censored observations, the date when the first event designated as a failure, per the "Outcome" rule occurs.	"12/1/2004"	*Derived* (Decision rule)
Days (Days)	Number of days survived	"360"	*Derived* (EndDate - PSCDate)
INDUSTRY CONDITIONS			
Capital Expenditures (CapEx)	Capital expenditures include capitalized computer software, capitalized interest during construction and expenditures for land development and improvement. Capital expenditures exclude equipment acquired under operating leases, good will and expenditures for subsidiaries and branches located outside the United States. Values chosen to be consistent with those used for FCC CLEC reporting. For 1995 through 1997, data represent Standard Industrial Classification (SIC) industries 481, 482, and 489. Starting in 1998, data are based on the North American Industry Classification System (NAICS). NAICS Codes are 51331 for Wireline 51332 for Wireless and 51333, 51334 and 51339 for others. For 2004 they are 5171, 5172, and 5173, 5174, and 5179, respectively.	"$37,799" ($M)	Census Bureau, Annual Capital Expenditures Survey
INDUSTRY EXPERIENCE			
Related (TmLEC)	Composite measure of the span of a CLEC founding team's industry experience in an industry space that is core to the CLEC offering. Closeness measures are coded separately for resale and facilities-based providers to reflect the unique characteristics of the two business environments. Measures are coded dichotomously for each founder with the composite level representing the average of such experience across the entire founding team (ranging between 0 and 1). For facilities-based and resale providers alike, related industry experience includes that gained in one of the original "Baby Bells" or their current manifestations (e.g., BellSouth, Verizon) ("LEC"). Other coded measures not currently qualifying for core include that in an alternative local exchange carrier (e.g., GTE) ("LEC"), another CLEC venture (for later entrants) ("CLEC"), long distance resale ("LD-RSL") a payphone service provider ("PSP"), and as a long distance facilities provider ("LD-FAC").	"1"	CLEC Application
FUNCTIONAL EXPERIENCE			
Operations & Engineering (OpsEng)	Composite measure of the span of a CLEC founding team's experience in the operations function. Measured dichotomously for each team member, with the composite level representing the average of this experience across the entire founding team (ranging between 0 and 1). Operations and engineering experience is that which claimed by team members in the operations, network management, engineering, industrial management, logistics, and related manufacturing functions. It is technical in nature, emphasizing optimization and efficiency rather than innovation and development	".25"	CLEC Application

Marketing (Mktg)	Composite measure of the span of a CLEC founding team's experience in the sales and marketing function. Measured dichotomously for each team member, with the composite level representing the average of this experience across the entire founding team (ranging between 0 and 1). Sales and marketing experience is that which claimed by team members pertaining to the sales and marketing function, including the activities of business and market development	".75"	CLEC Application
Finance & Accounting (FinAcctg)	Composite measure of the span of a CLEC founding team's experience in the finance and accounting function. Measured dichotomously for each team member, with the composite level representing the average of this experience across the entire founding team (ranging between 0 and 1). Finance and accounting experience is that which claimed by team members pertaining to the financial management, accounting, and debt and equity funding-related functions	".66"	CLEC Application
Legal & Regulatory (LegReg)	Composite measure of the span of a CLEC founding team's experience in the legal and regulatory function. Measured dichotomously for each team member, with the composite level representing the average of this experience across the entire founding team (ranging between 0 and 1). Legal and regulatory experience is that which claimed by team members pertaining to the public (telecommunications) policy, legislative matters, regulatory support, and related functions. It is included in this study as a control variable to reflect its more specialized application to the deregulatory environment under study.	"0"	CLEC Application
Functional Diversity	Measure of average intra-personal functional diversity across the team, using OpsEng, Mktg, FinAcctg, & LegReg inputs in the calculation	"0.75"	*Derived* (Calculation)
Functional Dominance	Difference score measure that uses the squared difference between the team level proportion of experience in operations and engineering (OpsEng) and sales and marketing (Mktg).	"0.50"	*Derived* (Calculation)
Functional Difference	Difference score measure that uses the non-squared difference between the team level proportion of experience in operations and engineering (OpsEng) and sales and marketing (Mktg).	"0.25"	*Derived* (Calculation)
ROLE EXPERIENCE			
Entrepreneur	Composite measure of the span of a CLEC founding team's experience in the entrepreneurial start-up role. Measured dichotomously for each team member, with the composite level representing the average of this experience across the entire founding team (ranging between 0 and 1). Entrepreneurial start-up experience is coded when founding team members claim to have founded at least one business prior to becoming a CLEC.	"1"	CLEC Application
Senior Executive – Broadly Defined (ExecBroad)	Composite measure of the span of a CLEC founding team's experience in the role of senior management. Measured dichotomously for each team member, with the composite level representing the average of this experience across the entire founding team (ranging between 0 and 1). Senior management experience is coded when founding team members claim organizational experience, prior to their becoming a CLEC, as a chief, senior, or director-level executive of an established corporation, including the roles of President and Vice president and GM and Partner	"0.33"	CLEC Application

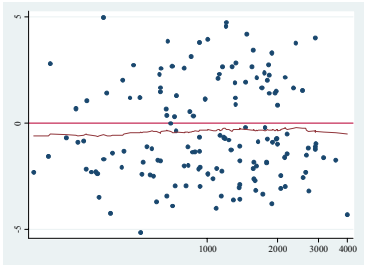
Senior Executive – High Rank (ExecRank)	Composite measure of the span of a CLEC founding team's experience in the role of a high ranking senior management. Measured dichotomously for each team member, with the composite level representing the average of this experience across the entire founding team (ranging between 0 and 1). High rank senior management experience is coded when founding team members claim organizational experience, prior to their becoming a CLEC, as either the CEO or President of a corporation	"0.25"	CLEC Application
Senior Executive – Tenure Total (ExecTnrTotal)	Continuous measure of the total number of years of a CLEC founding team's experience in the role of a senior executive (ExecBroad)	"53"	CLEC Application
Senior Executive – Tenure Average (ExecTnrAvg)	Continuous measure of the average number of years of a CLEC founding team's experience in the role of a senior executive (ExecBroad)	"7.3"	CLEC Application
Senior Executive – Large Firm (F500)	Composite measure of the span of a CLEC founding team's experience in the role of a Fortune 500 executive (ExecBroad). Measured dichotomously for each team member, with the composite level representing the average of this experience across the entire founding team (ranging between 0 and 1). Fortune 500 senior management experience is coded when founding team members claim organizational experience, prior to their becoming a CLEC, as an executive of a firm that was on the Fortune 500 rankings between 1995-2007	"0.50"	CLEC Application Fortune
Senior Executive – Related Industry (LECExec)	Composite measure of the span of a CLEC founding team's experience with executive experience (ExecBroad) in a related industry. Measured dichotomously for each team member, with the composite level representing the average of this experience across the entire founding team (ranging between 0 and 1). Related industry executive experience is coded when founding team members claim organizational experience, prior to their becoming a CLEC, as an executive of a firm that met the industry criteria defined with TmLEC	"0.25"	CLEC Application

A. Proportionality plots of primary covariates

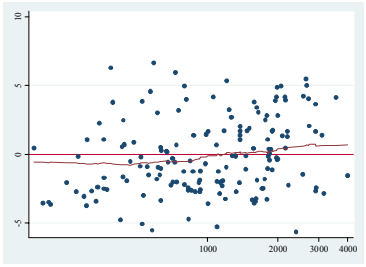
Industry CapEx



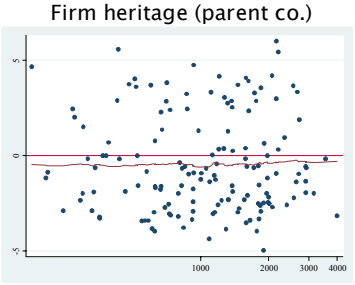
Firm business model



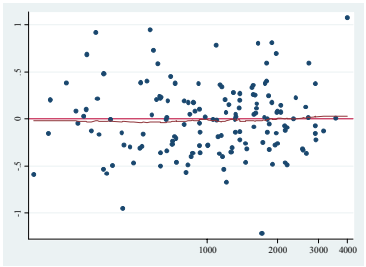
Firm sub-model (prepaid services)



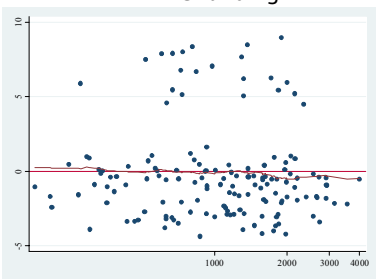
Firm heritage (parent co.)



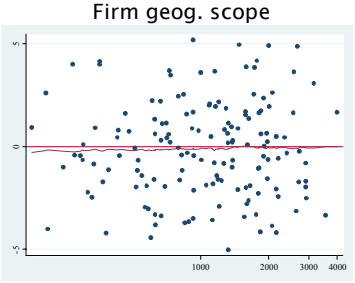
Firm start-up capital (assets)



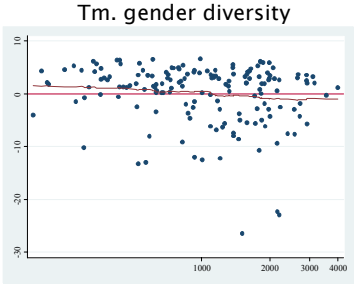
Firm VC funding



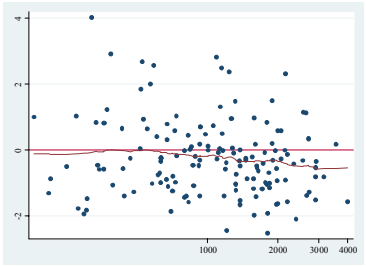
Firm geog. scope



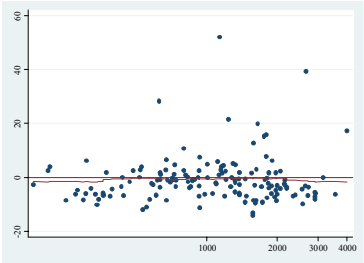
Tm. gender diversity



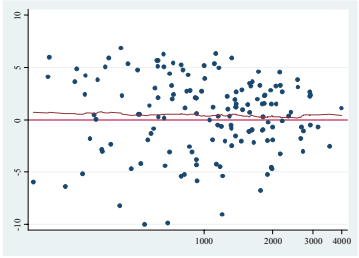
Tm. size



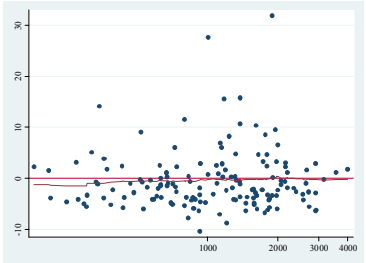
Tm. ind."Bell" exp.



Tm. fncl. diversity

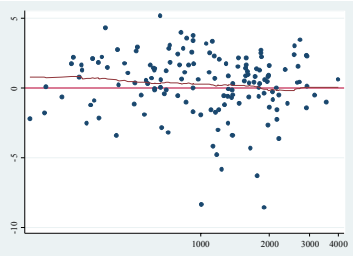


Tm. fncl. dominance

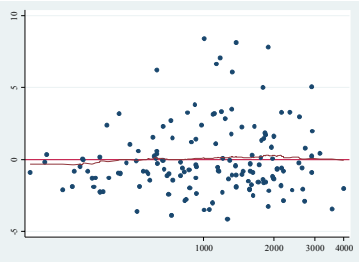


B. Proportionality plots of primary covariates (continued)

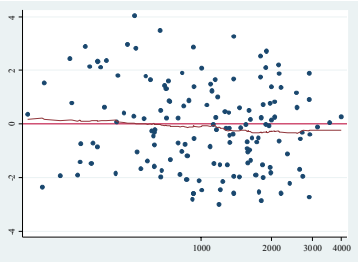
m. ops. & eng. exp.



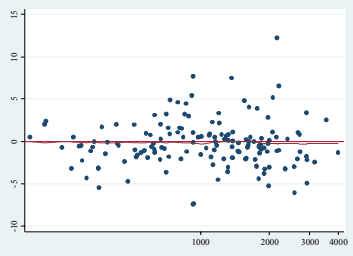
Tm. sales & mktg. exp.



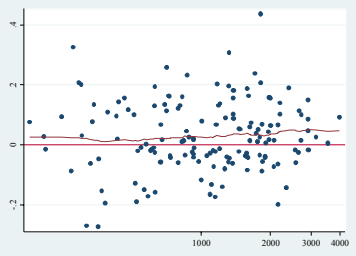
Tm. ent.exp.



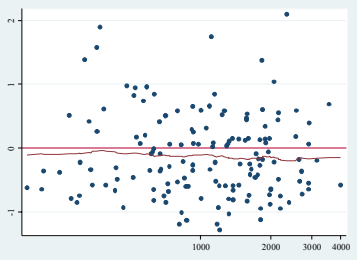
Tm. sr. exec. exp. (broad)



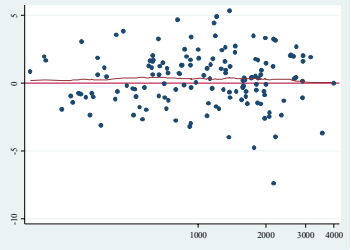
Tm. exec. total tnr.



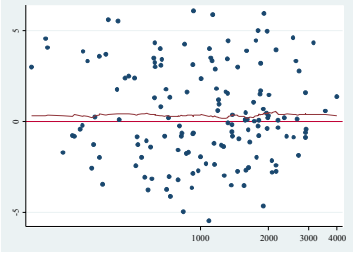
Tm. exec. avg. tnr



Tm. exec. high rank



Tm. F500 exec. exp



Tm. ind. “Bell” exec. exp.