

**THE DEALMAKER MILIEU:
THE ANATOMY OF SOCIAL CAPITAL IN ENTREPRENEURIAL ECONOMIES**

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ABSTRACT

TED DOUGLAS ZOLLER: The Dealmaker Milieu:
The Anatomy of Social Capital in Entrepreneurial Economies
(Under the direction of Maryann Feldman)

This dissertation assesses the characteristics of social capital in the context of regional development and argues that the literature's original conception of the entrepreneurial milieu, along with current theory about social capital and networking, overlooks important structural implications by observing social capital in the aggregate. Entrepreneurial social capital in a regional economy may indeed spur new firm births. However, the entrepreneurial economy may also be facilitated by a set of exceptional entrepreneurs and investors referred to here as *dealmakers*, who combine characteristics of seriality, brokerage, and mediation previously established in the entrepreneurship literature. This dissertation finds evidence that dealmakers mediate social capital networks in leading United States technopole regions and argues that structured social capital, when activated through the entrepreneurial network, is more closely associated with new firm births than the aggregated social capital referenced in the literature. This analysis concludes that the prevalence of dealmaker entrepreneurs and investors, with concurrent ties to multiple firms, is a better predictor of firm births than the prevalence and density of entrepreneurs and investors alone. This suggests that dealmakers are a critical catalyst in the entrepreneurial milieu, lending functional structure to a fundamental concept in regional development.

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When I started this project, a dear friend called the goal to complete a PhD my *quixotic dream*. I must admit that attempting to accomplish a PhD at a top research university while working full-time with Kenan-Flagler Business School's entrepreneurship program was at times like tilting at windmills. But Don Quixote became my inspiration. His image was with me the entire time that I was at the computer in the form of my screen saver and the mementos I picked up at a research conference in Spain. Thanks, Don.

So this project was my quixotic dream, representing the culmination of my work with start-up entrepreneurs over the last two decades. With vision and energy for their enterprises, these entrepreneurs spurred me on and motivated me to seek solutions to the barriers they encounter in realizing the potential of their work. Like doctoral research, it may surprise the reader to learn that founding a company is often a lonely exercise. A supportive social capital environment is often the difference between an entrepreneur persisting to build an enterprise into a going concern or giving up. My hope is that while this dissertation contributes to scholarship, it will also contribute new insights on how to establish supportive entrepreneurial communities. I look forward to a career of engaged scholarship that makes a difference to the entrepreneur. While it would be easy for me to dedicate this work to the entrepreneurs I've been privileged to coach, it would overlook the phenomenal support I've received from so many.

Every Don Quixote has by his side a Sancho Panza to keep him on course and help him realize the potential of his dreams. I have had many Sanchos by my side.

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deeply grateful to Allison, my patient, patient, patient and so supportive wife and friend, who never stopped believing in me, who suffered through countless hours of assuaging my daily doubts, and who was willing to sacrifice through two doctoral programs, moves to two university towns, raise our two children, and make it possible for me to do two jobs. I cannot express my gratitude enough for her tremendous sacrifice, and I pledge to her rewards that will return to her and to us through the remainder of my life.

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CHAPTER I

INTRODUCTION: SOCIAL CAPITAL IN ENTREPRENEURIAL ECONOMIES

This dissertation identifies and explores the impact of *dealmakers*, key social capital actors who mediate entrepreneurial and investor networks by maintaining active, concurrent ties to multiple firms. By empirically examining the social capital networks of 12 United States regional entrepreneurial economies, this dissertation determines that the share of network actors holding multiple firm ties is associated with greater entrepreneurial success, as measured by the birth of new technology-based firms (hereafter called new firms). Results show that network actors with three or more concurrent firm ties are, indeed, more prevalent in successful entrepreneurial economies such as Silicon Valley and Greater Boston, as well as in a set of successful secondary technology-based regions, including San Diego, Seattle, and North Carolina's Research Triangle Park (RTP).

By revealing the importance of multi-firm *dealmaker* actors in entrepreneurial economies, this analysis challenges an inherent premise of much of the existing literature on aggregate social capital networks, which treats all actors as equals. In fact, empirical results in this study suggest that the *structure* of social capital networks may be as or more important than their density and size. A complementary social network analysis reinforces these empirical results by comparatively examining the firm ties in each of the sample's twelve regional social capital networks. The study presents evidence that entrepreneurial regions with more dealmakers also produce more new

entrepreneurial firms, and the presence of dealmakers is associated with more cohesive social capital networks that comprise a supportive entrepreneurial milieu.

In order to understand the role and characteristics of a dealmaker at the functional level, this dissertation presents a qualitative analysis of the social capital composition of one of these sample regions—RTP—a leading example of a region that actively sought to induce the formation of an entrepreneurial economy through the establishment of a research park as a means to agglomerate the region's research and development capabilities and thereby encourage technology-based spinoffs. By using RTP as a prototype of a planned technology region as an empirical context, this analysis qualitatively examines the characteristics, career paths, and roles of dealmakers in entrepreneurial economies and profiles these actors to further understand their functions as agents in networked entrepreneurial economies.

It is hypothesized that dealmakers are more closely associated with a region's success in establishing vibrant entrepreneurial economies that encourage new firm births than measures of aggregate social capital currently cited in the academic literature. To test this hypothesis, this dissertation frames two research questions examined through empirical and qualitative research: First, are regions with a larger share of dealmaker entrepreneurs and investors more closely associated with higher rates of new firm formation, and are dealmakers a better indicator for successful entrepreneurial economies than aggregate measures of social capital currently posited by the literature? This may simply lead to a comparison of quality versus quantity, as the share of actors with multiple firm ties in a region appears to have far greater impact on the success in establishing new firms than the number of entrepreneurs and investors overall.

Second, how do dealmakers influence the regional entrepreneurial economy, and what are their career paths and common characteristics that inform their specific roles in

mediating entrepreneurial networks? This thesis poses an entrepreneur's dilemma in a regional context: Would you rather be networking at an event with a throng of people who have varying experiences, or with a smaller and tightly knit room of people with serial and deep experience? While this study will not answer this dilemma for the entrepreneur, it will attempt to answer it for the regional policymaker who seeks to encourage the establishment of an entrepreneurial economy.

By examining these research questions, this dissertation contributes to current scholarship and:

1. provides a more refined analysis of the anatomy of social capital in an entrepreneurial regional economy, building upon current aggregate network analysis to emphasize the role of individual dealmakers as a catalyst for new venture creation;
2. specifies the characteristics of the dealmaker in the regional economy, explaining how these actors mediate and shape social capital networks in entrepreneurial regions and explores how this affects new firm formation; and
3. introduces data analysis methods to identify and examine the characteristics of dealmakers by role in the social capital framework of a regional economy and further understand their career progression.

This dissertation consists of six additional chapters beyond this introduction. In Chapter 2, the theoretical and empirical research on social capital's influence on new venture formation is reviewed, providing a foundation for the concepts further developed in this research through a review of the sociology, entrepreneurship, and regional economic development literatures. Chapter 3 defines the concept of dealmaker posited as a researchable construct used throughout this dissertation and provides examples to conceptualize this new model. Chapter 4 reviews the methodology used to examine structured social capital and dealmakers and describes the data uncovered to study them, including a review of the sample frame consisting of twelve United States high-technology regional economies. Chapter 5 presents an empirical analysis of structured social capital and dealmakers and its relationship to the success of these 12 regions in

establishing successful entrepreneurial economies. Chapter 6 augments the empirical analysis with a qualitative examination of dealmaker social capital in the context of the RTP region, describing dealmakers' career paths, characteristics, and roles in the regional economy. Chapter 7 draws conclusions from the empirical and qualitative analysis useful for the development of future empirical research on the concept of dealmaker and considers the policy implications for the incorporation of the dealmaker concept to encourage the establishment of successful regional entrepreneurial economies.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL CONCEPTS

The entrepreneurship literature paints the anatomy of social capital and the types of actors who contribute to vibrant regional economies in broad strokes. In the regional development literature, economic sociologists argue that dense network structures facilitate new technology-based firms and propose different theories about how social capital mechanisms spur regional economic growth (Florida & Kenney, 1988; Saxenian, 1994). This literature argues that concentrated and specialized social capital networks provide the infrastructure to stimulate the formation of new ventures in a regional economy (Ahuja, 2000; Bell, 2005; Bruderl & Preisendorfer, 1998; Elfring & Hulsink, 2003; Hite & Hesterly, 2001; Karlsson, Johansson, & Stough, 2005; Kenney & Patton, 2005; Kim & Aldrich, 2005; Lavie, 2006; Liao & Welsch, 2005; Myint, Vyakarnam, & New, 2005; Senjem & Reed, 2003; Zhang, 2003). However, this literature examines social capital in a rudimentary framework, focusing on the aggregated effects of social capital created by *either* entrepreneurs (Audretsch, Keilbach, & Lehmann, 2006; Delmar & Davidsson, 2000; Neergaard, 2003) or by investors (Fainstein, 2005; Florida & Kenney, 1988; Hsu, 2006; Lerner, 1995; Powell, Koput, Bowie, & Smith-Doerr, 2002). These studies of aggregate social capital may overlook a separate class of network actors who rise from the ranks of entrepreneurs and investors to bridge entrepreneurial networks and motivate the success of entrepreneurial economies.

Regional economic development theory has long considered social capital among the important ingredients of successful entrepreneurial economies, citing the role

Table 1. Key Constructs Defined

| Term | Definition | Functional Description of Use |
|-----------------------|--|--|
| Milieu | "The structural properties of a regional environment which contribute to the development of innovations among its economic actors" (Camagni, 1991, p. 36) | The endowment of social capital that operates through social networks to spur economic transformation in a geographic region (Castells & Hall, 1994) |
| Social Capital | "The sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit. Social capital thus comprises both the network and the assets that may be mobilized through that network" (Nahapiet & Ghoshal, 1998, p. 243) | Social capital is the relational resources of embedded actors operating and mobilized through social networks of "friends, colleagues, and more general contacts through whom you receive opportunities to use your financial and human capital" (Burt, 2005, p. 9). |
| Social Network | Social network "consists of a finite set or sets of actors and the relation or relations defined on them. The presence of relational information is a critical and defining feature of a social network" (S. Wasserman & Faust, 1994, p. 20). | The set of relationships among specific embedded actors in a network, ascribing characteristics to the network itself as seen through the individual relationships between actors |
| ▪ Node | Actors (S. Wasserman & Faust, 1994, pp. 94-95) | Entrepreneurs and investors |
| ▪ Density | Measure of the level of cohesion and connectedness in the social network (J. Scott, 1988, p. 115) | Degree of concentration of the entrepreneurial network comprised of entrepreneurs and investors |
| ▪ Centrality | Structural measure of the most central actor (J. Scott, 1988, p. 111) | A measure of the actors in the entrepreneurial network who have the greatest degree of connectedness within the network, or the actor with the greatest influence on the network |
| ▪ Betweenness | Probability that a distinct actor, <i>i</i> , is "involved in the communication between the two actors" (S. Wasserman & Faust, 1994, p. 190) | The likelihood that a particular type of actor serves in a role between entrepreneurs and investors |
| ▪ Component | Connected subsets of nodes are components. Unique components are graphs partitioned into "two or more subsets in which there are no paths between the nodes in different subsets" (S. Wasserman & Faust, 1994, p. 109) | Groups of nodes, meaning entrepreneurs and investors associated in a single common graph through their respective common firm ties. |
| Brokerage | "People or firms who link units having complementary interests, transferring information or resources, and otherwise facilitating the interests of those not directly connected to one another" (Dubini & Aldrich, 1991, p. 310) | An intermediary between entrepreneurs and investors, who exploits competitive advantages and risk capital, and who accumulates rents by mediating among actors in the network based on this advantage and shaping the network |
| Seriality | "Someone who has had experience in multiple business startups, and simultaneously is involved in at least two businesses" (MacMillan, 1986, p. 241) | An entrepreneur or investor who has concurrent experience with at least two business start-ups at one time |
| Mediation | Mediation allows actors to "occupy structurally central positions that link otherwise disconnected people and provide differential resources" (Mehra, Kilduff, & Brass, 2001, p. 121). | A role played by an actor in a network that has a an influential and deterministic effect on networks, allowing the actor to shape the network through the act of brokerage |

of networks of actors as a backdrop or perhaps mechanism of the region's innovative and entrepreneurial capacity. Early conceptions of social capital in regional development theory, however, were mysterious and shrouded in obfuscation—situating the entrepreneurial functions of an economy as an outcome of its *entrepreneurial milieu*. Audretsch and Keilbach interpret this function as “entrepreneurship capital,” which consists of:

. . . . a regional milieu of agents that is conducive to the creation of new firms. This involves a number of aspects such as social acceptance of entrepreneurial behavior but of course also individuals who are willing to deal with the risk of creating new firms and the activity of bankers and venture capital agents that are willing to share risks and benefits involved. Hence entrepreneurship capital reflects a number of different legal, institutional, and social factors and forces. Taken together, these factors and forces constitute the entrepreneurship capital of an economy . . . entrepreneurship capital manifests itself by the creation of new firms. (Audretsch & Keilbach, 2004, p. 420)

A clear link is established in the literature between the entrepreneurial milieu and its direct influence on new firm formation. It was thought that the milieu combined the institutional setting, norms, and social capital to bring about new firm formation in the regional economy. However, a lack of precision in the definition of milieu has led to more attention being placed on the concepts of social capital currently pursued in the literature.

Regional development researchers have attempted to refine our understanding and measure the impact of social capital on the formation of entrepreneurial economies. Today the milieu is seen as the endowment of social capital that operates through social networks to spur economic transformation in a geographic region (Castells & Hall, 1994). This literature does not clearly specify the operational structure of a milieu, but it does contribute a conceptual frame that, while remaining largely untested in an empirical sense, suggests there is an important interplay among economic actors in a regional cluster, and particularly among entrepreneurial actors (Breschi & Lissoni, 2001; Castilla, Hwang, Granovetter, & Granovetter, 2000; Shefer & Frenkel, 1998). Other research in

this vein further refined the definition of a milieu to mean a regional environment that incubates new firms as a function of the various efforts of entrepreneurs: “New technologies are often introduced by new firms, created in (and by) the milieux in which they appear: the firm is not a heaven-sent agent which freely chooses an environment; it is secreted by its environment: it is the milieux which act as entrepreneurs and which innovate” (Maillat & Lecoq, 1992, p. 15). This view places more emphasis on the actor as opposed to the firm as the mechanism of regional success in entrepreneurship, and it suggests that relationships among the relevant firm actors—innovators, entrepreneurs, and investors—establish conditions in the aggregate upon which an entrepreneurial economy may be based. Researchers therefore attempted to update the ecological view of the milieu, which did not carefully specify a role for social capital, in favor of new concepts that incorporate the actor explicitly per se into the definition of the milieu. These later theorists believed that an enhanced understanding of the interplay of key actors in the milieu might help inform the behavior of an entrepreneurial economy.

A new generation of regional scientists dissatisfied with the definition and operational utility of the milieu concept have adapted the rubric of social capital to explore the effects of entrepreneurial networks in a regional economy (Breschi & Lissoni, 2001). Putnam’s early articulation of social capital, built upon Coleman, defined social capital as “the features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (Coleman, 1988; Putnam, 1995, p. 67). When applied in the regional economic context, social capital confers reciprocity and trust among actors involved in a network, such that the network itself becomes an input (Kogut, 1989).

A deep literature in regional development emphasizes the importance of agglomeration economies and the interplay between a region’s innovative potential and its entrepreneurial capacity to generate and exploit spillovers to spawn new firms

(Anselin, Varga, & Acs, 1997; Armington & Acs, 2002; Audretsch et al., 2006; Carree & Thurik, 2002; Feldman, Francis, & Bercovitz, 2005). While relying on more orthodox and tested econometric indicators to validate relationships between labor, production inputs, innovation spillovers, and new entrepreneurial firm formation, these cluster-based approaches have neither directly defined or operationalized the role of social capital at the same level as the other core inputs to economic growth, nor have they fully fleshed out the mechanism by which social capital plays a role in this process.

Innovation research based on patent citations was one of the earliest bridges between regional science and social capital theory, with specific bearing on cluster economics. This may very well be explained due to the empirical accessibility of patent citations as a phenomenon that can easily be measured, and for which data was readily available. These researchers used forward citations on United States patents to trace innovation spillovers to growth in the form of new inventions by individual innovators (Jaffe, Trajtenberg, & Henderson, 1993; Miyata, 2000; Trajtenberg, Henderson, & Jaffe, 1997). A later series of contributions related social capital to venture capital—another phenomenon that is similarly objectively measurable and accessible (Fainstein, 2005; Hsu, 2006; Lerner, 1995; Powell et al., 2002; Wright, Vohora, & Lockett, 2004). In this same vein, Shane and Cable (2002) asserted that network ties and reputation had considerable impact on the amount of venture capital financing that entrepreneurs received. This highly cited paper contributed a new approach to social capital relationships among entrepreneurs and investors by treating them as embedded actors in a network and considering how social ties influenced the venture formation process. Their paper legitimized the link between social capital networks and new venture creation at a time when solely economic explanations for entrepreneurial growth predominated.

Social Networks, Social Capital, and Regional Development

The application of social capital and networks in entrepreneurship was pioneered in the field of sociology, which recognized early the effect of networks on the transformation of society and on entrepreneurial economies in particular. The linkage among social capital and networks and economic phenomena is advanced by the work of Manuel Castells in his book, *The Rise of the Network Society*, which seeks to explain the impact of the information economy, globalization, and the resulting economic restructuring of transnational relationships on economic transformation (Castells, 2000). Castells, branded early in his career as a milieu theorist, explores how environments, cultures, and social capital networks interact to create economic transformation (Camagni, 1991). Wasserman, a definitive source on the subject of social network methodology more simply states that a social network “consists of a finite set or sets of actors and the relation or relations defined on them. The presence of relational information is a critical and defining feature of a social network” (S. Wasserman & Faust, 1994, p. 20).

By adopting this definition of the social network, it subsumes social capital as a component and inexorable part, seeing actors as embedded in a network structure defined by the relationships among and between them. The importance of social capital theory in the context of networks was amplified by Nahapiet and Ghoshal, who define social capital in the context of social networks as:

The sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit. Social capital thus comprises both the network and the assets that may be mobilized through that network (Nahapiet & Ghoshal, 1998, p. 243).

This analysis adopts this interpretation as the working definition of networked social capital. Given its focus on the regional unit of analysis, this dissertation sees social capital as an embedded function of regional networks and studies actors through the

context of the regional network they operate. This approach is legitimized by the current literature.

Planning scholars have adopted social networking and introduced a new paradigm to planning theory, observing society as a networked system wherein social capital explains the behavior of network actors (Fainstein, 2005). Burt's *structural holes*, Granovetter's *strength of weak ties*, and Aldrich's *small worlds* created a common language among sociologists and economic development researchers in the area of entrepreneurship: a common nomenclature to explain the actions of entrepreneurs in the firm-founding process and the effects of the surrounding environment (Aldrich & Kim, 2007; Burt, 2005; Granovetter, 2005). In this thinking, social capital and networks represent a vital ecology that impacts both micro-firm development processes through social capital and the macro development of entrepreneurial economies (Aldrich, 1990).

Entrepreneurship research has a long tradition of studying entrepreneurial networks and their effect on entrepreneurial firm success (Aldrich & Zimmer, 1986; Forsgren, Hagg, Hakansson, Johanson, & Mattsson, 1995; Nicolaou & Birley, 2003). The literature has firmly established the importance of networked social capital in entrepreneurship, with research citing the prevalence of networking among micro-business owners and the impact of participation in such networks (Lonier & Matthews, 2005); the importance of networking on a personal level and its effect on an entrepreneur's behavior (Klyver & Schott, 2005); the positive relationship of relational social capital's role in entrepreneurial growth and venture creation (Liao & Welsch, 2002); the impact and usefulness of formal and informal networks on entrepreneurship (Jack & Robson, 2003); the effect of social capital and network entrepreneurs on venture performance (Senjem & Reed, 2003); and one of the most important contributions, the network structure of social capital (Burt, 2000). Networking research has since focused on one of two areas: the effects of networks on entrepreneurial thinking and behavior

and the effects of networks on venture creation and performance. The importance of entrepreneurial support networks as a mechanism of regional development has long been recognized (Kenney & Burg, 1999; Saxenian, 1994) and has been variously termed an “incubator region” (Schoonhoven, Eisenhardt, & Lyman, 1990, p. 207), a “business discussion network” (Renzulli & Aldrich, 2005, p. 323), the “social structure of innovation” (Florida & Kenney, 1988, p. 35), an “ecosystem” (Bahrami & Evans, 2000, p. 9), the “new economy” (Castells, 2000, p. 11), or a “habitat” (Lee, Miller, Hancock, & Rowen, 2000, p. 4).

Kenney and Patton (2005) posit the notion of the entrepreneurial support network as being comprised of a range of actors who “assist entrepreneurs in creating a new firm” (p. 202). In the context of an entrepreneurial economy, social capital is a network of embedded actors who each mobilize assets by interacting within and influencing the network. It adopts Nahapiet and Ghoshal’s view that social capital and networks are distinct concepts that are interdependent in practice. Pollock, Porac, and Wade et al. (2004) contribute the notion of the *network architect* as an actor who can “design, build, and maintain transactional networks through their [*sic*] own strategic and profit driven activities” (p. 51). This view of social capital implies that individual actors influence the network and its related outcomes and differentiates a certain category of actors based on their characteristics and roles without explicitly identifying the mechanism.

This line of research, known today as the “network approach to entrepreneurship” (Bruderl & Preisendorfer, 1998, p. 213; Witt, 2004, p. 392), is founded on the underlying premise that entrepreneurs use their personal network of contacts to acquire resources and information that they are unable to acquire through markets. Hypothetically speaking, entrepreneurs are embedded in a social capital milieu: Entrepreneurs with larger and more diverse networks will receive more support from the network and will become more successful than entrepreneurs with ineffectual networks.

Economists and regional scientists who have adopted this proposition extrapolate it to explain network success at the level of the cluster or region (Stuart & Sorenson, 2005). Planning scholars have adopted it to examine society as a networked system whereby social capital is used to explain the behavior of actors in a network (Fainstein, 2005).

In the entrepreneurship literature, meanwhile, embryonic notions of structured social capital have been explored in a framework that also seeks to neatly classify network actors into two mutually exclusive categories of entrepreneurs or investors. These theories recognize the mediating characteristics of structured social capital in a network and attempt to assign these characteristics to various categories of entrepreneurs or investors. A fundamental proposition of this dissertation's analysis is that this simple classification misconstrues the nature of mediated relationships among entrepreneurial actors, a point we that will be examined later.

The Problem of Aggregation in Social Networks

The substantial disadvantage of all these approaches to social capital embedded in networks is that they view entrepreneurial phenomena in the aggregate. Glaeser, Laibson, and Sacerdote (2002) noted that a "lack of consensus exists because economists have by and large adopted social capital frameworks that are based on *aggregate* analyses . . . who define social capital as networks" (p. F438). This lack of highly specified and discrete models of social capital has relegated current theory to examining social capital effects in a summary manner. Indeed, the roles of key actors in social capital networks are not carefully specified, nor are their functions well defined. As Kenney and Patton (2005) assert: "While venture capitalists have received the most attention, the location of other constituents of the support network, including investment bankers, accountants, or persons who are capable of serving on the startup's board of directors, has received far less attention" (p. 202). While there is considerable effort placed in understanding the role of the actors in the social network in general, there has

not been as much emphasis placed on specific categories of actors or in perhaps a set of actors that mediate the aggregate network on behalf of others. While individual sets of actors are described, their respective roles in motivating and mediating networks have remained largely indeterminate in the literature.

Focus has been largely placed on two categories of social capital in the context of regional economies: entrepreneurs and investors. These two categories are perceived as distinct and mutually exclusive and take on very different interpretations when comparing aggregate views of social capital—which treat actors in networks in the aggregate—with structured views, which consider the roles of certain categories of actors in mediating networks. Indeed, by evaluating all actors as equals, certain nuances are missed by aggregate studies. Aggregate analyses make it difficult to translate the effect of social capital from the unit of analysis of the actor to the region. As Glaeser et al. (2002) explained: “The path from individual to aggregate social capital is difficult, because of the extraordinary importance of social capital externalities. The complexity of aggregation means that the determinants of social capital at the individual level do not always determine social capital at the society level” (p. F439). To resolve this challenge, a more enhanced understanding of the mechanisms of the network through social capital exchange is called for. The network itself assigns specific roles for actors that serve to differentiate their functions within the network. Kenney and Patton (2005) expressed similar concerns, noting that social capital networks do not experience the same “path-dependent clustering suggested by geographers” (p. 201) and that clusters in the aggregate vary by industry and therefore do not have homogenous characteristics and behaviors. Networks are heterogeneous and take on different characteristics based on the nature of relationships among the actors who comprise them. Shane and Cable (2002) offer a similar criticism, contending that the correspondence between social capital in a geographic context and regional cluster-based economics is not altogether

sound and that because purely economic explanations of new venture creation overlook the influence of social ties, they are *under socialized* and incomplete . On the flip side, Shane and Cable also argue that ecological viewpoints, which draw on the concept of social obligation, are *over socialized* and overstated. As a result, this literature calls for more carefully specifying the structure of social capital so that it may serve as a useful construct for entrepreneurship research. Current aggregate views of social capital have virtually ignored the potential for a hierarchical ordering of social capital by treating all categories of entrepreneurs and investors as equals and selecting one or the other as the driver of the entrepreneurial network.

Structured Social Capital

This dissertation suggests that the literature's current view of aggregate networks may be enhanced by a more careful understanding of the structural properties of the network and those actors who play a mediation role in the network. *Structured* means that there is a difference in how certain actors influence and shape a network and that these actors are imbued with properties that allow them to mediate networks (McPherson, Smith-Lovin, & Cook, 2001). By pursuing this question, first theoretically and then empirically, this analysis should lend definition to what Markusen (2003) called the "fuzzy concept" of the entrepreneurial milieu (p. 701).

This dissertation argues that both the original concept of the milieu and more recent theory relating to entrepreneurial social capital overlook important implications by observing social capital in the aggregate (Glaeser et al., 2002). The presence of entrepreneurial social capital in a regional economy may be necessary to generate new technology-based firms, but to understand how social capital creates new firms, the social capital network must be viewed through a structural lens. It is hypothesized that the entrepreneurial economy is mediated by exceptional entrepreneurs and investors who serve as brokers in a discrete structured network and that these individuals serve a

different role in bridging social capital within the aggregate network. This is the departure point for this dissertation.

This alternative view of social capital offers a more careful recognition of structured and hierarchical characteristics of social capital. Coleman (1988) defines social capital through its structural capacity and function, asserting that it “is not a single entity but a variety of different entities, with two elements in common: They all consist of some aspect of social structures, and they all facilitate certain actions of actors—whether persons or corporate actors—within the structure” (p. 598). While aggregate studies still predominate in the literature, new concepts are being explored to understand the structural mechanisms Coleman identified. Early notions of structure in social capital build on Granovetter’s (2005) concept of *bridging social capital*, which is also described as *cross-cutting social ties* which concerns relations across rather than within groups that serve to improve economic and social performance (Granovetter, 2005; Iyer, Kitson, & Toh, 2005).

An important building block in the examination of structured social capital is the concept of structural holes advanced by Burt (2005). He views brokerage as a function among actors in a network who span structural holes and defines those who fill holes as *network entrepreneurs*. “The social capital of structural holes,” Burt wrote, “comes from the opportunities that holes provide to broker the flow of information between people, and shape the projects that bring together people from opposite sides of the hole” (p. 65). In this view, brokerage is a structural response to closed networks (or closure)—a mechanism that allows brokers to rise above closure by accumulating reputation and trust. Brokers play an important mediation role in networks and serve to broker information based on their differentiated access to the network as a consequence of their status, accrued through their reputation in the network. Burt also regards brokerage as a key integrative function producing returns to the network: “People whose networks

bridge the holes are brokers rewarded for their integrative work” (Burt, 2005, p. 65). This view of brokerage defines not only a hole-spanning function between two distinct but mutually dependent communities, but it describes a more complex reciprocal relationship among actors in the network, with brokers serving as intermediaries and integrators between disparate actors.

Attempts have been made to apply Burt’s concept of a broker to a geographic context in order to understand the social capital contributions of key network actors who play the role of economic agents in regional economies. However, this leap to a regional unit of analysis that considers macro social networks is multifaceted and complex and is susceptible to oversimplification.

Brokers in the Entrepreneurial Economy

A pointed debate in regional development theory is underway around the roles played by specific sets of actors in social capital networks and how their activities support the growth of entrepreneurial economies. While the literature has isolated the effects of founders and entrepreneurs (Audretsch et al., 2006; Delmar & Davidsson, 2000; Neergaard, 2003) and venture capitalists (VCs) and investors (Fainstein, 2005; Florida & Kenney, 1988; Hsu, 2006; Lerner, 1995; Powell et al., 2002), a comprehensive typology of actors has yet to be developed or tested at the level of the regional entrepreneurial economy (Burt, 2005; Winch & Courtney, 2007). Classifying entrepreneurial network actors as either entrepreneurs or investors does not account for the roles or unique backgrounds of these highly connected broker-actors in the entrepreneurial network. A more thorough specification of actors with multiple firm ties will require a new theoretical framework of social capital that integrates the concept of hierarchy to accommodate those actors who influence and mediate entrepreneurial networks.

Complementing regional economic development theory, entrepreneurship research reveals that social capital networks are a vital component of successful entrepreneurial communities and has recognized it as an important research topic (Ahuja, 2000; Breschi & Lissoni, 2003; Cantner & Graf, 2004; Cantner & Joel, 2006; Fischer, 2006; Kenney & Burg, 1999; Shane & Cable, 2002; Sorenson & Stuart, 2008; Zaheer & Bell, 2005). Much of this research is beginning to make the association between social capital structure in an entrepreneurial regional economy and economic outcomes. It seems critical to determine what makes one network flourish while another flounders given that some communities are more successful than others at creating new firms.

One important clue may be found in the category of social capital that sociologists call brokers. These broker-actors function as intermediaries between typical entrepreneurs and investors in a social capital network, and their mediation facilitates the birth of new firms that support the growth of entrepreneurial economies (Myint et al., 2005; Pollock et al., 2004; Winch & Courtney, 2007). This interpretation of brokerage has been primarily used to explain transactional relationships at the level of the firm, and focuses on the mediating roles of business service providers such as attorneys, accountants, and other peripheral intermediaries as opposed to the central actors who most directly influence the establishment of the firm: the entrepreneurs and investors themselves.

An important building block in an examination of structured social capital is the concept of brokerage advanced in sociology and organizational theory. Paola Dubini and Howard Aldrich (1991) introduced the concept of brokerage in the context of social capital and network relationships between entrepreneurs and VCs at the level of the firm, defining brokers as:

People or firms who link units having complementary interests, transferring information or resources, and otherwise facilitating the interests of those not directly connected to one another. For example, VCs are probably as important for their broker role as for the funds they provide to struggling entrepreneurs, because they bring together technical experts, management consultants, and financial planners to supplement an entrepreneur's limited knowledge and experience. Some social settings facilitate brokerage, and some associations and organizations are themselves brokers in the role they play. . . . Brokers allow people to forge contacts that help them leap over otherwise unbridgeable gaps in their marshalling of resources. (p.310)

The brokerage concept has been better developed as a researchable construct in social capital and social network theory in the field of sociology, but it remains underdeveloped in regional science. While attempts to translate the brokerage concept into regional development theory have begun (Glaeser et al., 2002), common use of the construct has not been fully adapted to explain mediation effects at the regional unit of analysis.

This analysis adopts the term *broker* to describe a third party who acts as an intermediary between entrepreneurs and investors, who exploits competitive advantages and risk capital, and who accumulates rents by influencing multiple enterprises based on this advantage. A brokering concept in entrepreneurship has already been identified by Winch and Courtney (2007), who define a broker as:

A third party providing some sort of linkage between two or more other firms. These include co-ordinating [*sic*] and representative roles, but our focus here is on those that play a liaison role between firms that are not otherwise connected. (p. 748)

Winch and Courtney (2007) apply the concept to understand the role of brokers who act not only as intermediaries among firms but among other actors in the network, defining brokers as “a distinctive type of actor in networks—the broker, or actor that links other actors in the network” (p. 747). However, Winch and Courtney see the broker as a particular actor in an innovation process; they do not generalize beyond the immediate context to include a broker's role in the larger entrepreneurial process, nor do they offer a framework to understand a broker's role from an agency perspective. This concept closely resembles earlier and more crude concepts of brokerage such as Neergaard's

(2003) notion of the “alpha entrepreneur” (p. 1), an actor discerned from others in the network through his strategic networking behavior. This view suggests a type of actor in the social capital framework who is differentiated from others in the aggregate network by his specific and intentional actions—a function that extends well beyond the intermediate role traditionally observed in a broker.

An important insight in the literature comes from Kogut and Shan (1997), who argue that brokerage functions in a network may reshape its structure and behaviors, leading to a role well beyond Burt’s bridge-spanning concept:

If some firms have specific capabilities for information arbitrage, they may choose to broker relationships between organizations in different regions of the network. In this case, the existing structure is not strengthened but repeatedly reshaped. The early pattern of relationships is blurred as more organizations are linked together. To address these issues, we examine network formation in terms of its structural development, positing network structure as a social fact interacting with firm level behavior over time. (pp. 110-111)

Brokers may, in this sense, do more than simply span structural holes, as Burt stipulates: They may shape the characteristics and the structure of the network itself. Of course, not all actors in the network have equal access to structural holes and thereby exploitable opportunities. Brokers are distinguished by their unique ability to exploit opportunities selectively and thereby shape the network and their brokered interactions with other network actors as a whole. Kogut and Shan’s (1997) article was also the first to assert that it is not enough to look at the nature of transactions between firms in the aggregate. Instead, the entire network must be considered from the standpoint of how it is shaped by broker-actors to understand the nature of inter-firm networking, a point to which this analysis returns later.

The theory that brokers play a central role in shaping networks was carried forward in multiple articles following Kogut and Shan’s contribution. Hsu employed an agency framework to empirically evaluate the value-added roles and reputational advantages of venture capitalists through an analysis of contractual transactions

(Hellman, 1998; Hsu, 2001, 2004; Kaplan, 2001; Lerner, 1995). Hsu portrayed venture capitalists as active in a range of activities that support entrepreneurs in their role as internal directors of the start-up, bringing strategic insight about the threats and opportunities in the business environment (Hsu, 2006). Hsu argues that VCs act as information intermediaries, providing privileged information access and reducing search costs for start-ups seeking appropriate partners (Aoki, 2000; Burt, 2000; Gans, 2002). Indeed, a VC is seen as an important intermediary of cooperative commercialization (Sorenson & Stuart, 2001), serving to extend the entrepreneur's network of information and contacts, as Rogers and Larsen (in Aldrich, 1990) pointed out much earlier:

Venture capitalists, and other investors, are probably as important for the mediating role they play in spreading knowledge of effective forms as for their role in funding start-ups. (p. 17)

Hochberg, Ljungqvist, and Lu (2007a) examined how VCs leverage their central position in the entrepreneurial process to shape the network and form investment syndicates, improving investment performance for syndicate members. However, the same authors call into question whether brokerage functions per se are actually the reason VCs enhance their investment performance. Hochberg et al. (2007b) argue that stronger investment performance at the fund and portfolio levels is associated with VCs who hold central or influential positions in the network. This finding has significant implications for brokerage theory, calling into question whether the characteristic that allows certain actors to influence the network is a function of brokerage or a product of their expertise, reputation, or centrality in the network.

While considerable work has been done in the field of sociology to understand the role of brokerage as a transactional relationship at the level of the firm, no common framework has emerged to explain what brokers contribute to regional social capital networks and to the success of entrepreneurial economies (Casson & Giusta, 2007; Franke, 1999). Franke proposed a central actor playing the role of net-broker in a virtual

network web representing the entrepreneurial economy. Casson and Giusta place the broker within the context of a rational actor framework, defining brokers as entrepreneurs who play a *market-making* role in a networked economy. This view implies that certain entrepreneurs distinguish themselves within the network, playing a more deliberate and distinct role as a broker in the enterprise-creation process. Such a role suggests that there is a hierarchy in the structure of social capital—perhaps driven by prestige and expertise, but this idea remains underdeveloped.

Pollock et al. (2004) explore the role of brokers as information intermediaries in their examination of *deal networks* in the IPO market. In their construct, so-called *network architects* broker and manage structural holes in mediated markets. Akin to Kogut and Shan's (1997) network-shaping broker, the underlying mechanism was identified much earlier by Simmel (1950) who called the behavior "*tertius gaudens*" (p. 413)—the role of a third party who benefits from shaping and manipulating the relationship between two others. As Burt (2000) has pointed out, the function of the *tertius gaudens* relies on the actor's ability to bridge the information and resource gaps between people who would otherwise remain disconnected. Such a function also requires that a "relationship of nonredundancy between two contacts" (p. 18) exists, meaning that competition to fill this role is resolved by actors purposefully taking action. This view ascribes a more active and deterministic design role for the broker in *configuring* the structure of the social network. The architect, according to Pollock et al. (2004), develops a brokerage function as a consequence of serial experience in dealmaking relying on "the stock of social resources the broker has accumulated from previously successful transactions that can be brought to bear on a current transaction . . . vital in controlling the motivations of the broker in a mediated transaction" (p. 51). Though speaking specifically about the IPO market, the notion of the network architect

has significant applicability to other mediated markets, including venture capital and enterprise creation.

This dissertation is concerned with the actors who are most responsible for generating and supporting entrepreneurial firms by *shaping* a vibrant regional network. It adopts these more active, deterministic, and mediated interpretations of the brokerage concept to analyze entrepreneurial dealmakers in the regional economy. This concept extends the definition of broker to include a notion of experience, reputation, and credibility gained through serial success in dealmaking and used to mediate and shape network relationships. These analyses suggest that neither the aggregated analyses that predominate the social capital and networks literature, nor the nascent constructs of brokerage currently developed in sociology adequately capture the function of dealmaker social capital in regional entrepreneurial networks. It is hypothesized that instead the dealmaker subsumes the constructs of serial experience, brokerage, and mediation currently advanced in the literature into a new synthesis—a novel framework that will now be explored.

CHAPTER 3

POSTULATING THE DEALMAKER

Dealmakers broker information, resources, and human capital required for new firms and serve to mediate the firm creation process in the regional economy.

Dealmakers combine the attributes of both entrepreneurs and investors and bridge the critical human capital (entrepreneurs, investors, and other network actors) required to establish entrepreneurial firms. In so doing, they span structural holes in the regional network to integrate critically required resources supporting the firm birth process.

Drawing on existing and established theory, this chapter characterizes the role of dealmakers at the level of the regional entrepreneurial economy to identify a unique synthesis that describes the mediating role they play in a region's network of entrepreneurs and investors and to specify a conceptual model that will be used to measure and interpret dealmaker social capital in the entrepreneurial economy—the dealmaker milieu.

The term dealmaker is used extensively and is commonplace in practice among entrepreneurs, but it has not been widely adopted in the academic literature. Indeed, a search on Google on April 1, 2010 yielded 371,000 returned web pages with dealmaker associated with the term *investor* and 51,600 returned web pages for dealmaker associated with the term *entrepreneurship*. These Google search results demonstrate the term's wide practical use, its association with both entrepreneurs and investors, and its relatively more extensive use in the investment community over the entrepreneurial community. References to dealmaker in the academic literature, however, are quite sparse. Searches performed at the same time on Google Scholar, the same search

engine as Google that covers academic literature, returned 696 associations of the term with investor and 295 references to entrepreneur, with few of the searches resulting in literature from the fields encompassed in this dissertation (economics, regional science and development, entrepreneurship, sociology, and strategy research). A thorough analysis of all uses of the term using a broader library search strategy yielded no similar uses of the term in the academic fields and topical area of this dissertation beyond the references cited. Kuhn (1988) made the first reference to dealmakers in the academic literature in his analysis of the investment banking industry. Wright et al. (1997) also used the terms “serial dealmakers” and “group creators” to describe entrepreneurs in a different context, involved in “a number of intermediate ventures which may or may not involve investment and which may or may not be successful . . . [and] are also more likely to be involved in more than one venture at the same time” (p. 265). Wright’s serial dealmaker is likened to the use of the term *serial entrepreneur* in the literature previously reviewed and suggested an intermediate in the entrepreneurial process, as opposed to an actor who actively shapes a network. The only other reference to dealmakers in the academic literature in entrepreneurship is from an unpublished conference paper from Guo and Nie (2007) who define dealmakers in the more limited sense previously adopted by Hsu and Hochberg to mean “venture capital firms as well as angel investors” (p. 2397). These more limited interpretations of the dealmaker concept do not capture the breadth of the term’s meaning proposed here.

The dealmaker in this dissertation is much more than a mere intermediate. Akin to Malcolm Gladwell’s (2000) prototypical “connector” in his thought-provoking book *The Tipping Point*, the dealmaker suggests that “in the six degrees of separation, not all degrees are equal” (p. 36). Dealmakers are differentiated from the typical actor in the aggregate network. They are distinct. The concept of dealmaker in use here recaptures the Austrian school and Simmel’s (1950) meaning of *tertius gaudens*—translated literally

from Latin to mean “the third who enjoys” or “the rejoicing third”—attributing to the dealmaker an enlightened but also opportunistic motivation as part of the entrepreneurial network who benefits from shaping and manipulating the relationship between other actors. The concept of dealmaker proposed here is an actor who not only connects but mediates and brokers relationships so that those involved in the transaction recognize the importance of the dealmaker in the process. At the same time, the dealmaker enjoys brokering the marriage but may or may not benefit directly from it. The benefits that accrue, if there is reciprocity, may be tangible, as in the form of equity, or intangible, as in the form of prestige or gained reputational advantage. The dealmaker’s role is much more activist, proactive, and deterministic, serving to manage and shape relationships through the act of brokerage.

While what motivates a dealmaker to mediate a relationship varies, it likely springs from a desire to *build* a vital community. There is a sense of responsibility that comes about from being a dealmaker. Most actors who rise to become dealmakers likely recognize that at one point in their history, another dealmaker assisted them in the process. Another insight on motivations stems from a desire to build a culture of entrepreneurship in a region or community. Dealmakers in the entrepreneurial network care take and nurture their own networks to build a business community that reflects what they aspire for the region: to be a vital ecosystem that supports entrepreneurs in building companies that reflect their own community goals. This goes well beyond the motivation to build a firm. It is tantamount to building a culture. In establishing and building the culture and its associated social capital, the dealmaker is building a cluster—a critical mass or a network that perpetuates deals like the ones he aspires to build next and perhaps building a *community* around them in the process.

In the story of Israel’s entrepreneurial ecosystem retold in the book *Start-up Nation*, Senor and Singer (2009) cite the importance of a diaspora in the development of

an entrepreneurial culture in Israel. They hypothesize that this diaspora, activated through the work of active entrepreneurs and investors in Israel and abroad, served to develop a vital and sustained entrepreneurial economy in Israel. In this example, a common heritage and national spirit motivated the diaspora. While clearly there are other notable examples of diasporas based on cultural or ethnic heritage—most notably among the Indus entrepreneurs and the Mormon culture—this dissertation asserts that regional community networks are established and mediated by dealmakers motivated simply by the desire to *build* a community that shares their common aspirations for place. Moreover, dealmakers are motivated by a desire to assist fellow entrepreneurs and investors without promises of tangible reciprocal return. While this desire does not need to be motivated by a common nationality or cultural or ethnic affiliations, communities are certainly built on these lines. The places built by dealmakers, like the diaspora, are defined by their homesteads—the communities where they have decided to plant roots. And the tree the dealmakers tend bears fruit in the form of like-minded entrepreneurs and investors who also share a vision for what the place has the potential to be. Moreover, the dealmaking process allows them to build bridges among entrepreneurs and investors that accrue reputational advantage to them, building their credibility in the community and their capacity for future dealmaking.

The insight of the diaspora places focus on the central dealmakers who serve to mediate, extend, and shape an entrepreneurial network. The conceptualization of dealmakers postulated here has been the result of cumulative observations made by the author through a two-decade-long career as an entrepreneur and through working with hundreds of individual entrepreneurs and investors in developing their ventures. While this dissertation cannot confirm the motivation that drives the dealmaker, any evolutionary claims on how the dealmakers form future networks, or how dealmakers benefit from the mediation process, it can only hypothesize at this point if dealmakers

exist, their characteristics, and their association with successful entrepreneurial economies.

So that a picture can be painted on what is meant by dealmaker in this dissertation, a few examples drawn from this experience (but anonymized for confidentiality) may serve to clarify the unique role dealmakers are hypothesized to play in mediating entrepreneurial networks.

Example 1. The Serial Entrepreneur Dealmaker: Consider this first example of the activist local serial entrepreneur. Rian has had a successful run as an entrepreneur and is now involved in her third successful venture. Receiving a substantial payout as a result of her last successful exit, she now serves as an investor in two regional angel funds and on the board of several promising early stage ventures, while serving as chairman of her newest venture. She hosts a get-together called a *meet-up* at her house every quarter for all active entrepreneurs in the region trying to get a start. Her LinkedIn account has countless contacts, which she allows to be observed by anyone who is looking for an introduction to other entrepreneurs, investors, and service providers. She is always happy to make introductions to others on behalf of entrepreneurs she believes in. Rian also has an active social philanthropy serving the autism community where she *mixes* those in the entrepreneurial network and culture of the region and those interested in supporting this cause. She is called upon by many individuals and organizations for both her expertise and for financial support, but she remains very strategic and judicious in what she uses her time doing so that she can remain focused on her primary objectives: the success of her newest venture, the development of an entrepreneurial ecosystem in her community, and her philanthropic goals.

Example 2. The Corporate Executive Dealmaker: Consider a second example of the corporate executive turned entrepreneurial CEO. Shawn worked his way up in several high-growth public companies in the telecommunications market in sales and

received progressively more responsibility over time to ultimately run the inside sales organization of a distinguished public company with an entrepreneurial history and culture. While developing his career, Shawn established channel relationships worldwide on behalf of his employers and amassed a set of contacts that are unparalleled in the mobile communications industry. While he continually received calls from headhunters asking that he consider senior sales and business development positions for several prominent start-ups, he never pursued them because he was paid better than those offers and thought he should be the CEO and not the salesperson for those ventures. After a number of such calls, he finally inquires, "Why am I not being called to consider CEO positions instead? I oversee a 1,200 person inside-sales division in a high-growth private company and have compensation and options valued five times higher than what you are offering." The headhunter responds, "Simple, you are not qualified yet to be CEO." This comment spurs Shawn on. He accepts a C-level position in a venture backed by a top VC in Silicon Valley and participates in a successful exit. Following this experience, he is offered a CEO position to run another venture backed by one of the investors in the syndicate that funded his previous venture. While CEO, he takes it upon himself to assist other corporate executives attempting to make the transition to becoming CEO and assembles a small angel investment group to support these aspiring corporate entrepreneurs in his specialized market. Through active investments, and by serving on the board of their ventures, he assists them in making the transition and thereby develops a set of high-growth ventures in his community.

Example 3. Professional Venture Capitalist Dealmaker

Consider this third example of the professional VC. Just finishing his MBA at Wharton, Skip started his career at a high-end services company with an active high-growth venture management practice based in New York. In this position, he supported multiple private-equity financings for high-growth companies and got to know the

management of these companies intimately by guiding them through the IPO process. He always asked himself, “If these folks can do this, why can’t I?” And after five years of working with outside ventures, he decided to do one himself. With the backing of a high net-worth investor he befriended during his consulting days, Skip established a well-timed venture in the e-commerce industry. After a three-year run, he sold the company to a major publicly listed information technology company and made considerable wealth from the transaction. The venture firm that financed his successful venture asked him to join them as a general partner and evaluate new investment opportunities in the information technology industry. Again, Skip’s timing was perfect. He rejected a life of leisure and daily golf in exchange for a brisk and busy life advising and overseeing portfolio companies. The fund was able to raise from institutional limited-partner investors hundreds of millions of dollars, and Skip spent eight years with the venture firm as a partner evaluating deals, making investments, and serving on boards. But he never lost his desire to run his own firm again; and when an opportunity presented itself through one of the VC investments in due diligence, he jumped at the opportunity. Skip quit the firm, is now the CEO of one of the firm’s portfolio companies, and actively partners with firms in complementary markets and industries in the region to assist them in building their ventures. While he is no longer investing himself as a partner in a venture capital firm, his opinions and advice are actively sought by CEOs preparing their ventures for consideration by venture capital investors. He is considered the *dean* of the region’s entrepreneurial network, having successfully exited a company, investing in scores more as a venture capitalist, and now returning to his roots to do it again.

In each of these examples—derived from personal experience—these actors play substantial roles that exceed their immediate responsibility to a particular company. Moreover, they defy a simple definition of *entrepreneur* or *investor*, as all have had experience in playing these roles interchangeably and in most cases concurrently.

Moreover, their experience and know-how has provided them the basis to mediate and shape entrepreneurial networks.

This dissertation returns to the conceptual model founded on existing theory in order to avoid cognitive bias introduced by the researcher's own views. It postulates that there are dealmaker entrepreneurs and investors who leverage their experience to occupy a unique role in social capital networks and thereby shape those networks to enhance entrepreneurial activity. This concept suggests that social networks may be mediated by dealmakers who are facile in the entrepreneurial market as a consequence of their serial experience in building, fostering, and funding companies and in developing credibility that is actively sought in the market by all stakeholders. Their credibility in the market is built on expertise and is perpetuated through serial experience, allowing dealmakers to play a strong mediation role in a networked economy.

Building upon and extending the body of existing theory reviewed earlier, this dissertation posits that dealmakers share three primary attributes:

1. **Serial Entrepreneurial Experience**: Dealmakers are facile and accomplished in establishing new entrepreneurial firms, either through an operating or investing role, and these roles are interchangeable. Moreover, dealmakers have serial experience and concurrent fiduciary responsibility for three or more entrepreneurial firms concurrently.
2. **Between Central Mediation**: Dealmakers are central actors in the network through whom information, resources, and communication flows, allowing them to mediate and facilitate relationships between entrepreneurs and investors in the firm formation process.
3. **Network Shaping Brokerage**: Dealmakers mediate between entrepreneurs and investors in market transactions and play a role in *shaping or configuring* networks by sharing expertise, information, and resources with others in the network with no assumption of tangible return.

These three characteristics, when blended together, represent a unique synthesis not previously advanced by existing theory. However, this synthesis is substantiated by integrating existing theory and then seeking to uncover these characteristics empirically

and qualitatively later. The next sections will outline how these three characteristics are combined into a unique synthesis typifying the dealmaker.

Serial Entrepreneurship

The first trait that characterizes a dealmaker is seriality. Serial entrepreneurship has been less examined in the literature as a structured social capital concept than brokerage. Current research associates serial entrepreneurship with the growth of business clusters (Rosa, 1998); opportunity identification behavior (Ucbasaran & Westhead, 2009); success over novice entrepreneurs in developing networks (Li, Schulze, & Li, 2009); business experience (Nicolaou & Birley, 2003); parallel entrepreneurship (Alsos & Kolvereid, 1998); policies that support novice entrepreneurs (Westhead, Ucbasaran, Wright, & Binks, 2005); and redeployment of human capital during bankruptcy (Baird & Morrison, 2005). Serial entrepreneurship, originally termed *habitual entrepreneurship*, was first defined by MacMillan (1986) as “someone who has had experience in multiple business startups, and simultaneously is involved in at least two businesses” (p. 241). While this original definition has held for the most part in the literature on seriality, attempts have been made to distinguish the concepts of serial from *parallel* or *portfolio* entrepreneurship, with seriality defined as sequential non-overlapping business ownership and parallel and portfolio entrepreneurship representing concurrent ownership of multiple ventures at one time (Alsos & Kolvereid, 1998; Westhead, Ucbasaran, Wright et al., 2005). This analysis maintains MacMillan’s (1986) original definition of seriality relating to simultaneous involvement in at least two or more businesses.

Another important attribute of the serial entrepreneur defined in the literature is the careful distinction between novice and serial entrepreneurs based on their degree of experience (Westhead, Ucbasaran, & Wright, 2005; Westhead & Wright, 1998). Nicolaou and Birley (2003), in their important study of academic entrepreneurs, found

that those without experience rely more heavily on network structures and third parties to span structural holes. In this construct, experienced serial entrepreneurs are an important element of social capital supporting novice entrepreneurs, which implies a relationship between serial entrepreneurs that extends well beyond brokerage. Instead, it suggests a mediation role that defines the relationship between experienced and less-experienced actors and influences the network structure through which each actor interacts. This interpretation lends important insight on the role of the experienced dealmaker in entrepreneurial network. There is an implied reciprocal relationship that accrues intangible reputational advantages to the dealmaker and allows the serial dealmaker to support and mediate relationships in the network on behalf of less experienced entrepreneurs. Serial experience leads dealmakers to become prominent in the network and span holes. This serial experience imbues dealmakers with status and reputational advantage to establish a hole-spanning function that exceeds the scope and character of simple intermediation and serves to complement and enhance their role as a mediator in the entrepreneurial network.

Between Central Mediation

The second trait that characterizes a dealmaker is between central mediation of entrepreneurial networks. Because there is not a comprehensive conceptual framework of brokerage at the level of the regional entrepreneurial network around which the literature may advance, entrepreneurship scholarship has stalled around a simple debate over whether entrepreneurs or investors contribute more to the success of social capital networks. As we have seen in the examples posed, the roles of entrepreneurs and investors often oscillate, switch, and intermingle in such a way that defies this distinction. Indeed, the literature's continued use of mutually exclusive categories of entrepreneurs and investors may have inadvertently precluded a third possibility: that emerging from both classes are broker-dealmakers who blend the characteristics of

entrepreneurs and investors who mediate networks. An effective broker-dealmaker's position in a social capital network may be, in effect, *between* entrepreneurs and investors and *central* to both.

Betweenness centrality is an established measure in social network analysis that provides objectively measurable data with which to identify brokerage characteristics. It measures the extent to which other parties have to go through a given actor to conduct their business, defined as the proportion of paths between all pairs of nodes (i.e., actors and firms) that pass through a given actor (Peter, 2004; S. Wasserman & Faust, 1994). Betweenness centrality is used extensively to measure brokerage functions played by central actors in entrepreneurial networks and is "interpreted as associated with an actor that may have greater power as an intermediary for information or access between other actors in the network" (Chiu, 2006, p. 26). Indeed, Kim and Aldrich (2005) assert that "actors with high betweenness centrality can act as brokers and take advantage of their central position" (p. 86). They go on to add:

This brokering scenario builds on Knight's definition of entrepreneurship, wherein an entrepreneur derives profits by bringing parties together, creating a market for economic exchange, and assuming the risk of a failed transaction. From this perspective, entrepreneurs need to cultivate a broad range of relationships to maintain high network efficiency and limited overlapping relationships. If successful, entrepreneurs holding this network position can become linkingpins, integrating previously disconnected local networks. Linkingpin individuals or organizations can fulfill three functions: communicating information, transferring resources or clients, and serving as role models (Kim & Aldrich, 2005, p. 78).

Borrowing from this insight, this dissertation posits that dealmaker actors with multiple concurrent firm ties serve as *linkingpin* individuals: centrally located actors whose positions in the network allow them to access more of the network and identify potential opportunities before others, and who therefore broker these opportunities in the network. By occupying a position on the critical path of *deal flow*, dealmakers can connect people with complementary information and resources, bring other actors in the network together, and selectively and opportunistically broker information flow between them.

The dealmakers' central position between other actors in the network also enables them to shape, channel, and mobilize the network to form interest groups and teams, investment syndicates, and other functions that support the creation and development of entrepreneurial firms (Kim & Aldrich, 2005).

Network-Shaping Brokerage

The third and final trait that characterizes dealmakers is their ability to shape networks in their role as a broker. The brokerage theory in sociology sets the stage for the dealmaker concept, but these functions and their related mechanisms in the social network have yet to be fully articulated at the regional level in planning scholarship.

One body of research attempts to explain these mechanisms through agency theory. For example, in order to solve potential agency problems between investors and entrepreneurs, several attempts have been advanced to analyze contractual transactions between them (Hellman, 1998; Kaplan, 2001; Lerner, 1995). As another example, Amit, Glosten, and Muller (1990) suggest that entrepreneurs mitigate information asymmetry by involving VCs. Also, Hsu (2001, 2004) empirically evaluates the value added to an entrepreneurial enterprise that involves a reputable VC. The agency theorists suggest that VCs play an important brokerage role in supporting entrepreneurial actors, providing privileged access to information well beyond the investment resources they provide to the entrepreneur, and that the reputation of the VC acting as a broker enhances the interaction. More recently, Hsu (2006) and others have argued that VCs mediate information between entrepreneurs and the market (Aoki, 2000; Burt, 2000; Gans, 2002). Sorenson and Stuart (2001) also posit an intermediary role for VCs in cooperative commercialization, suggesting that VCs partnering with entrepreneurs will extend the entrepreneur's information and contact network. Following in the same vein, Sarasvathy, Simon, and Lave (1998) assert that there are fundamental differences in the way that entrepreneurs and bankers perceive risk, which may have

important implications on how risk influences brokerage roles they play. This suggests that social capital related to entrepreneurs and VCs should be not viewed with a common lens and that this brokerage role is not confined to investors alone.

Indeed, current research also implies that a brokerage function exists among entrepreneurial social capital operating at the level of a regional network. Research on entrepreneurial networks has examined how entrepreneurs shape networks and asserts that the characteristics and extent of the entrepreneur's personal network influences the success of the start-up (Dubini & Aldrich, 1991; Witt, 2004). Theories building on this *network success hypothesis* posit a positive relationship between the networking activities of founders and the success of the venture (Aldrich & Zimmer, 1986), because socially embedded ties allow entrepreneurs to acquire resources that are expensive or impossible to obtain through markets, such as reputation and strategic customer contacts. This suggests that the strength and shape of an actor's embedded ties might be part of the reason that an entrepreneurial venture thrives or fails (Bruderl & Preisendorfer, 1998; Witt, 2004). As Bruderl and Preisendorfer (1998) put it: "Those entrepreneurs who can refer to a broad and diverse social network and who receive much support from their network are more successful" (p. 213).

Mediation, as an extension of brokerage, is not a practice inherently contained in the functional roles of entrepreneurs or investors as individual categories of social capital. Winch and Courtney (2007) point out that research assigning a mediating role to investors alone (as opposed to entrepreneurs) fails to specify exactly how these relationships incorporate a concept of brokerage. Their article brings into focus two core elements of the most recent research contrasting the principal-agent approach, which emphasizes the role of the actor, and ecological perspectives, which emphasize the role of the environment in influencing behavior. The concept of the brokerage used here must blend economic theory to understand the role of actors as economic agents, while

also understanding their social capital contributions. Blending arguments derived from both economic theory and agency theory, this dissertation asserts that the act of spanning holes, or bridging relationships, to connect disparate actors in a social capital network may be best accomplished by actors whose experience and concurrent firm ties span multiple functional activities, blending the roles of investor and entrepreneur to serve as a broker in shaping the entrepreneurial network: the dealmaker.

Conceptual Model

Building on the concepts established by the existing literature, the dealmaker in this study combines three characteristics—seriality, mediation, and network-shaping brokerage—that when blended together represent a unique synthesis not previously advanced by existing theory. For purposes of this thesis, a dealmaker is defined as:

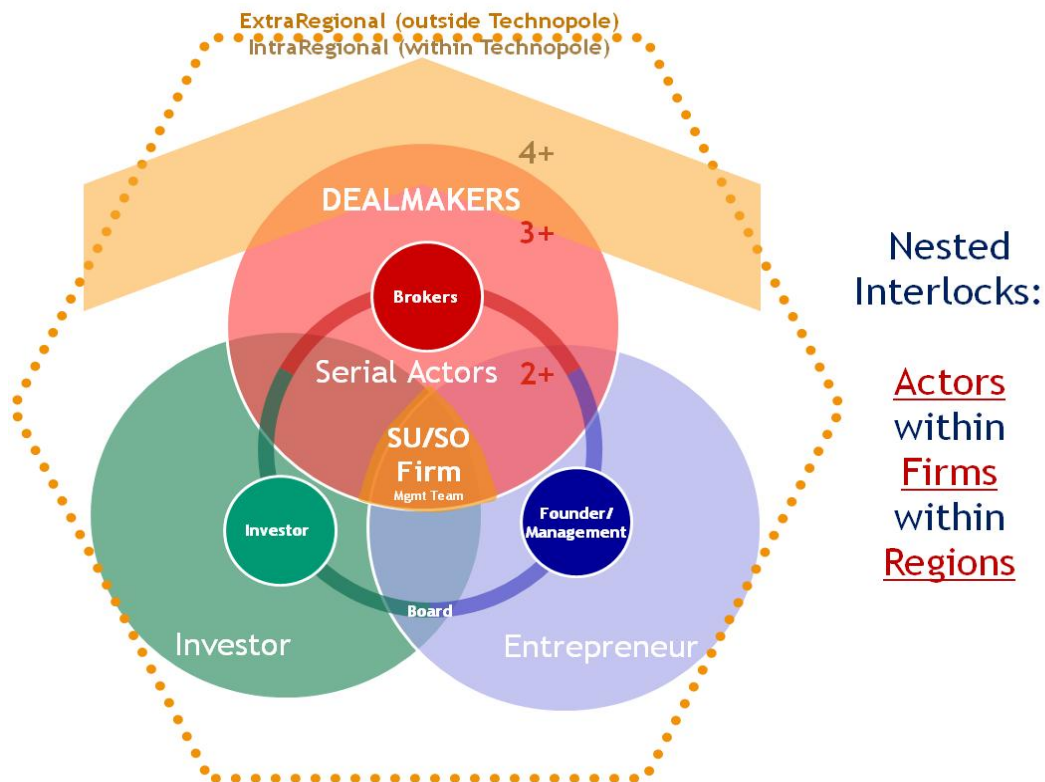
A facile and accomplished actor with serial venture experience in establishing new entrepreneurial firms who possesses fiduciary responsibility for three or more entrepreneurial firms concurrently; and plays a central role mediating, shaping, and configuring regional entrepreneurial networks to share expertise, information, and resources among entrepreneurs and investors, thereby facilitating new firm creation and supporting entrepreneurship.

This definition, integrating and synthesizing three established functions of entrepreneurial networks in existing theory—seriality, mediation, and brokerage—will be evaluated and tested empirically and qualitatively in the forthcoming analysis.

Figure 1 shows the conceptual model proposed to examine the social capital composition and network structure of an entrepreneurial economy and to compare aggregate and dealmaker views. The model separates actors in the entrepreneurial economy into the two mutually exclusive categories defined by aggregate social capital theory: investors and entrepreneurs. It then separates them further based on their roles and affiliations with entrepreneurial and finance firms. This mutually exclusive designation is derived from the actor's primary employment or board affiliation, based on that person's title and primary firm affiliation. The subject of interest—the individual actor

in an entrepreneurial firm—is qualified as a consequence of his or her direct involvement in the formation of entrepreneurial companies, as a member of a firm's board of directors, or as an officer of the company. As a board member or as an officer, the actor has fiduciary responsibilities to the firm; holds equity in the firm and/or is compensated for his or her services; and, as a consequence of the Sarbanes-Oxley Act of 2002, is legally liable for the firm. Because those with fiduciary responsibility for an entrepreneurial venture by definition serve as managers or board members of the firm, board and firm-tie interlocks are an effective method for identifying dealmakers.

Figure 1. Conceptual Model



Adopting MacMillan's (1986) definition of serial entrepreneurship as involvement in at least two concurrent ventures, this study defines an actor with three or more concurrent entrepreneurial firm ties as dealmakers. It then counts the frequency of concurrent ties to show the degree to which the dealmaker is connected to entrepreneurial firms. This characteristic is not possessed exclusively by a single class

of social capital as suggested in the aggregate literature, such as VCs, but is shared by entrepreneurs and investors alike (see Figure 1). Therefore, as the number of ties to entrepreneurial firms increase, an entrepreneur or investor with a single firm tie transitions to a serial actor (two ties) to a dealmaker (three ties). It is further hypothesized that while it is practical for an actor to have two firm ties and still maintain an operational role in a given firm, it is less likely for an actor to be able to maintain an operational role within a given firm when maintaining three concurrent ties, and even less likely when assuming four or more ties and so on. While serial entrepreneurs may retain an operational role in one or two firms, operational responsibilities to any one firm is expected to decrease as the number of firm ties increase due to the enhanced span of control involved. And as operational responsibilities for any single firm diminish, the actor's capacity for dealmaking increases. As the number of ties to entrepreneurial firms increase to encompass oversight of several firms concurrently (three or more), the dealmaker's role in any given firm will be more limited, but that person's reach and influence on other firms outside his or her core responsibility increases. However, the dealmaker remains responsible to the firm in a fiduciary sense as a result of a board or managerial tie to the firm. To evaluate the differences that arise in social capital structure as these transitions occur, the data on dealmakers is separated by frequency of ties, with specific focus on the early transition from three to four or more concurrent ties.

This study hypothesizes that regions with more dealmakers will generate more new entrepreneurial firms. Dealmakers build critical bridges through their core networks internal to the region to interconnect human capital, information, and resources germane to the firm birth process. It is hypothesized that regions developing a strong network of dealmakers and a milieu that supports the creation of dealmakers will also create more of the new firm births that are a hallmark of successful entrepreneurial economies.

CHAPTER 4

DATA AND METHODOLOGY

The data for the dissertation is drawn from the CapitalIQ database, a private database maintained and licensed by Standard & Poor's that provides quantitative research data and analysis applications to over 4,200 investment management firms, private equity funds, investment banks, advisory firms, corporations, and universities. This unique private dataset maintains detailed records about private firms, their managements, and their boards of directors based on data submitted by the companies at incorporation and through the SEC shelf registration process. CapitalIQ has one of the most comprehensive cross-sectional datasets of information on private companies and entrepreneurial firms available in the United States, which facilitates regional comparisons on a common analytical framework. A cross-check of the CapitalIQ data with Thomson Financial's VentureXpert—a comparative dataset that also covers the sample regions—confirmed that the firm- and actor-level data were robust, complete, and current.

The dataset provides a snapshot of current and past firm affiliations by person in each of the 12 sample regions as listed on December 18, 2009 when the data was extracted for this study. This yields a sample of 85,579 individual actors among 22,201 private entrepreneurial firms. In order to facilitate data acquisition and to identify patterns in social networks at the actor level, an algorithm was created to develop unique datasets from CapitalIQs formatted files. The algorithm identifies individual actors based on their entrepreneurial firm affiliations, their geographic locations, and their parallel affiliations as executives or board members of finance firms. By distinguishing clearly the

primary employment or board relationships for individual actors (entrepreneurial firms or finance firms), the algorithm allows actors to be classified into mutually exclusive categories according to their primary role as entrepreneurs or investors, upholding the entrepreneur-investor dichotomy framed in the literature. The algorithm also uses the affiliation data and geographic screens to build mutually exclusive sets of data for all actors identified by the CapitalIQ database who are selected by a consistent and common set of characteristics, facilitating uniform comparisons of the data across case regions. It further separates actors into groups based on the number of concurrent firm ties they hold, allowing for comparison between typical entrepreneurs and investors and those with dealmaker traits with multiple entrepreneurial firm ties, both within and across the sample regions. Finally, the algorithm uses the affiliation data and geographic screens to build mutually exclusive, consistent sets of data for each identified actor in all 12 sample regions, facilitating uniform comparisons of the data across regions.

The algorithm identifies all actors affiliated with entrepreneurial firms in the given region for the five industry sectors included in the analysis and categorizes their role, as follows:

Entrepreneur: any individual who is identified as having a board, management, or operating role in an entrepreneurial firm in the subject region, and who does not serve as a key executive of a finance firm inside or outside the region

Investor: any individual who is identified as having a board, management, or operating role in an entrepreneurial firm in the subject region, and who serves concurrently as a key executive of an investment or equity firm inside or outside the subject region

A drawback of the dataset is that it only provides a current snapshot of present and former firm affiliations by person and does not allow longitudinal time-series evaluation. Snapshot data may present an external validity threat because affiliation data for the sample regions on December 18 may not accurately reflect affiliations in the general population on that same date. Snapshot data may also fail to provide internal

consistency reliability, because affiliations in the sample regions may vary based on the date the data is extracted.

Moreover, because firm affiliations are more readily captured by the database provider when firms receive institutional financing, the data likely over report firms financed by venture capital, banks, or private equity and under report firms in the small-business sector, early-stage firms that are not yet documented, or firms that grow through revenue without outside financing. This bias is partially corrected because the biotech and information technology firms that dominate the entrepreneurial sector are much more likely to be financed by venture capital and private equity.

Firms are selected for inclusion in the database based on a consistent industry-classification scheme employed by CapitalIQ, which corresponds to standard North American Industry Classification System (NAICS) Code classifications for industries that typically generate significant numbers of entrepreneurial start-ups. Data are collected for private firms in five categories, representing the sectors from which high-growth, advanced-technology entrepreneurial firms are most often derived. Industry classifications are retained to allow for analysis of variance at the sector level. The sectors are:

Information Technology Industry Classifications

Health Care Technology (Primary)

Information Technology (Primary)

Telecommunication Services (Primary)

Life Sciences and Biotech Industry Classifications

Healthcare Equipment and Supplies (Primary)

Pharmaceuticals, Biotechnology and Life Sciences (Primary)

These two industries are selected in the study because they are associated with significant start-up activity based on innovation and consistently report early-stage organization and financing activities used as part of the data collection process to accumulate social capital data associated with new firm foundations described later.

Information technology and life sciences also represent technology-based industries that are clustered in each of the sample regions. Data is retained on the industry classifications of each firm through which social capital is associated to test for variations in social network patterns that arise by industry. All data and analysis reported in this dissertation, however, represent the combined set of industries listed.

Analytical Strategy and Methodology

There are two analytical chapters presented in this dissertation: The first (Chapter 5) entails an *empirical analysis* of the social capital structure of the case regions, and the second (Chapter 6) involves a *qualitative examination* of the social capital characteristics of actors in the RTP region. While the research questions and empirical and analytical approach used are reviewed in detail in each chapter, the analytical strategy for this dissertation is outlined here.

The *empirical* chapter of the dissertation is divided into two complementary and reinforcing analytical strategies based on the same firm- and actor-level data derived from CapitalIQ and screened through the algorithm: a social capital composition analysis and a social network component analysis. The first analysis *empirically evaluates the composition of social capital* for each of the subject regions and seeks to relate it to successful entrepreneurial outcomes as measured by new firm births. The analysis then presents correlations comparing aggregate social capital and structured dealmaker social capital and measures of successful entrepreneurial economies. The algorithm identifies all actors affiliated with entrepreneurial firms in the given region for the sectors included in the analysis, and these actors are placed into the two mutually exclusive categories: entrepreneurs and investors. The second analysis, *evaluating social network structure*, analyzes the component structure of the overall regional network of entrepreneurial firms and actors and compares the social networks in each of the study regions based on the characteristics of the aggregate and dealmaker networks. This

comparative analysis, based on the same empirical data presented for the social capital composition analysis, allows for inferences to be made on how social capital is structured at the level of the regional entrepreneurial network and relates network structure to the outcomes of the region in giving rise to new firms. The social network analysis is performed using a network graph editor called *yED*, which is used to compute and visualize the nodes and firm connections statistically and graphically from the social capital analysis from which macro- and micro-network analysis can be derived. This tool is used to show the differences in network structure among all 12 sample regions for the total network of dealmakers, with network diagrams visualizing the data presented in the appendices of this dissertation.

This *qualitative* chapter of this dissertation entails a more detailed analysis of the social capital composition of the RTP region of North Carolina in the United States in order to probe the common characteristics and profiles of dealmakers in this single case region in the sample. This analysis utilizes a research strategy undertaken in four cumulative and reinforcing qualitative analyses, namely:

- **Content analysis and career modeling:** a qualitative analysis of biographical data for individuals identified as dealmakers, modeling their current and prior positions
- **Pathway analysis:** a social network analysis to empirically assess the typical career progressions of dealmakers, to determine the highest-frequency pathways, and to identify the most central positions representing dealmakers
- **Betweenness centrality of the dealmaker network:** an analysis of the full network of dealmakers in the region to identify those who are most *between central* and thereby represent the nodes through which most social capital is connected and to identify how dealmakers mediate the network and connect aggregate social capital
- **Dealmaker profiles:** Following the identification of the most degree-central actors in the dealmaker network, a qualitative examination is performed to identify the most typical career profiles, characteristics, and progressions, serving as model profiles to understand typical dealmakers.

This qualitative analysis will serve to identify the backgrounds and characteristics of dealmakers, identify their likely origins and roles in the context of RTP, reveal how dealmakers are connected to one another and mediate aggregate networks, and finally establish a set of profiles that dealmakers follow in order to support future scholarship and empirical work applying the structured social capital concept of the dealmaker.

This dissertation employs a structured comparative empirical analysis to cross-compare social network characteristics and probe more deeply into the characteristics of the dealmaker. It presents the results of a structured content analysis of biographical data to show typical career pathways of dealmakers and then distills central pathways into a series of profiles detailing their social networks relationships, their embedded role in the regional entrepreneurial economy, and their professional origins. Those dealmakers profiled are selected using a social network analysis technique that estimates betweenness centrality, a measure to identify those with the highest mediation characteristics in the aggregate network.

This case study design employs both an empirical analysis and a qualitative content and network analysis, which provides two sources of information from which to derive evidence to support the case study analysis, thereby improving its robustness (Yin, 1984, 1993). Since this project is concerned with the *structured* analysis of an *unstructured* concept—the entrepreneurial milieu supporting new firm foundings—a case-study approach is most appropriate, as it provides a durable framework to explore complex social phenomena.

The drawback of this design is that it is impossible to draw causal conclusions for regional development from this project, as it does not provide a sufficient basis for scientific generalization (Stake, 1995; Yin, 1984, 1993). However, the analysis is structured based on the current theory in the literature and the body of research done on this phenomenon to date, thereby improving its leverage on future hypothesis

development. Moreover, by using existing theory to design the study and design the conceptual framework, this project satisfies Yin's (1993) assertion that it "not only facilitates the data collection phase of the ensuing case study. The appropriately developed theory also is the level at which the generalization of the case study results will occur" (p. 16). By constructing and situating the conceptual framework in the context of existing theory, this dissertation also draws upon the existing body of knowledge, as Marshall and Rossman (1999) assert "are "derived from a thorough familiarity with literature on relevant theory, empirical studies, reviews of research, and informed essays by knowledgeable experts" (p. 23).

It introduces a new level and approach to analyzing empirically social capital structure, thereby providing a rigorous framework to test hypotheses. Indeed, this design satisfies Yin's (1993) criteria both for "richness of the context," meaning that it relies "on a single data collection method but . . . use multiple sources of evidence," and "rigor" pursuing "quantitative, distinctive strategies needed for research design and for analysis" (p. 3). Therefore this research design will produce case study findings that will enable future researchers to formulate and test more precise and informed hypotheses based on the concepts investigated in this dissertation (Nooy, Mrvar, & Batagelj, 2005).

Empirical Context of the Technopole: Signaling Entrepreneurial Intent

This study identifies a similar set of regions for analysis known for their propensity to give rise to new technology-based firms. These regions commonly follow the model of the technopole, a widely investigated and researched metropolitan planning framework in the regional development literature beginning in the early 1980s that serves as the sample frame for this dissertation. This theory postulates that these regions are well positioned to encourage new technology-based firms as a result of a concentrated cluster of technology- and innovation-based industries. It was surmised that this concentration of resources would encourage the formation of a supportive

entrepreneurial milieu to bring about an entrepreneurial economy. This theoretical construct serves as a sampling strategy for this study. Technopole theory prescribed that high-technology regions develop a supportive milieu, meaning in this context a symbiotic entrepreneurial social capital structure. As this dissertation is concerned with social capital, technopoles serve as a means to identify a sample set of regions that sought to induce the formation of an entrepreneurial milieu through the adoption of a technology agglomeration strategy.

For three decades regions have tried to copy the success of Silicon Valley and transform their regional economies. This type of development, built upon the early regional development theory of the *technopole*, promised to exploit a region's innovative potential and its research and development competencies to transform its economy through the establishment of an entrepreneurial milieu. A core element of this theory postulated that with the development of the infrastructure of innovation, an entrepreneurial milieu would emerge to support the birth of new firms, stimulating the growth of an entrepreneurial economy (Breschi & Lissoni, 2001; Löfsten & Lindelöf, 2003; Shefer & Frenkel, 1998). It was hypothesized that regions that agglomerated industrial, university, and government innovation assets, termed *technopoles*, possess robust infrastructure to support entrepreneurial firm birth and development. Decades have passed, making it an opportune time to evaluate which technopoles created the entrepreneurial milieu they sought and which did not. The technopoles represent simply a productive and useful sample frame because these regions specifically pursued an entrepreneurial milieu by agglomerating innovation and resources with mixed entrepreneurial results. This analysis begins to discern the factors behind those mixed results by investigating each region's social capital structure and identifying characteristics in the social capital framework that are consistent with the concept of dealmakers. But the scope of this dissertation does not include an examination of

technopole theory per se and the validity of this regional development concept. The selection of technopole regions as a sample frame is simply a proxy for the signaling event for the region's intent to establish an entrepreneurial milieu.

While there have been myriad articles, manuscripts, and books written on the comparison of technopoles and technology-based regions—both in the United States and internationally—very little academic work has been done on the social capital implications that account for the variable success of entrepreneurial economies in encouraging new firm births. This dissertation adopts the regions that followed a technopole regional development strategy as a discrete sample frame. Technopole strategies commonly identify regions that sought to increase their entrepreneurial outcomes by pursuing an intentional strategy of entrepreneurship. With the adoption of technopole agglomeration strategies, these regions signaled their intent to develop a supportive entrepreneurial milieu. Technopoles sought to establish a strong entrepreneurial social capital framework to encourage the formation of start-up firms based on the technology advantage supported through the agglomeration of research and development in the region.

Rogers and Larsen (1984) were the first to address the growth of a high-technology social capital framework based on entrepreneurship in *Silicon Valley Fever: Growth of High-Technology Culture*, where they characterized the interplay between large research-intensive firms and new entrepreneurial firms in the context of an agglomerated economy. This early work, which sets the sample frame for this project, highlights the research and development profile of the Silicon Valley research complex and was the first to identify the role of venture capital and networking in the entrepreneurship culture that fueled regional economic growth. Rogers and Larsen emphasized innovation agglomeration and the entrepreneurial milieu as critical elements

of regional competitiveness, setting the stage for the literature on the technopole phenomenon.

Following Rogers and Larsen (1984), a series of books were published telling the stories of the emerging United States technopoles emulating Silicon Valley's success—particularly among secondary regions that are less well known and less understood than their celebrated Bay Area counterpart. Smilor, Kozmetsky, and Gibson's (1988) *Creating the Technopolis* included a comparison of Silicon Valley and Route 128, along with evaluations of Cambridge, United Kingdom; Osaka, Japan; the Albany region of New York; and the editors' home region of Austin. A comprehensive comparative analysis of the development of United States research parks was completed by Luger and Goldstein (1991) fueling greater interest in the role of research and development agglomeration in regional growth theory and policy. This was followed by an in-depth evaluation of Route 128 by Rosegrant and Lampe (1992), which evaluated the Boston region's unique strengths in government, industry, and academia credited for creating the now infamous *Massachusetts Miracle*. *Technopolis* by Scott (1993) featured the Orange County region of Southern California as a model, with an academic examination of geographic localization economies, innovation, and spatial agglomeration.

Saxenian's *Regional Advantage* (1994), published two years after Preer, has become the most cited work comparing Route 128 to Silicon Valley, likely because of its specific treatment of the differences in social network structure between the two regions (Preer, 1992; Saxenian, 1994). This was followed by a more exhaustive evaluation of the technopole concept by Castells and Hall (1994) that reviewed the characteristics of the innovative milieu of both Route 128 and Silicon Valley, accompanied by a score of other domestic and international examples. More recent contributions to the literature on technopoles include an anthology of essays, *Silicon Valley Edge*, which specifically deal with the intersection of innovation and entrepreneurship (Lee et al., 2000). This

literature, clearly rooted in endogenous regional growth theory and emphasizing the strengths and features of regional networks in building an entrepreneurial milieu, consistently stops short of empirically testing social capital theories (which clearly existed at the time) in any systematic way. This represents the departure point for this dissertation.

In terms of formal structured analysis of social network characteristics of new firms and their related social capital structures in the context of a regional economy, there are only three key studies done at the level of the technopole. The earliest analysis of the underlying social capital structure of Silicon Valley is an article by Castilla et al. (2000) that probes the social capital relationships between founders of semi-conductor firms, their related venture capital connections, and the organizations that support new entrepreneurial firms, namely the accounting and law firms and the investment banks. Mayer (2003) develops in her dissertation project a comprehensive analysis of the Portland, Oregon region, which she termed the “Silicon Forest” (p.43). While Mayer did not leverage social networking techniques, the study did examine the spinoff effects of the largest employers in the Portland region using an innovative firm genealogy-tree diagramming technique. The most competent analysis to date using social capital analysis and networking techniques at the level of the technopole is an analysis of the computer-related firm spinouts from Cambridge University by Myint et al. (2005) that probes the connections among common founders and their relationships with venture capital sources. While social network methodologies are well established and are used extensively in other areas of regional science, particularly in Europe, they have not been heavily leveraged in studying social capital structure or network-level phenomena in the context of an entrepreneurial economy.

Because the literature related to endogenous growth theory and new firm foundings has largely concentrated on regional macro-economic conditions and firm

clusters, very little is known about the structure of social capital comprising the entrepreneurial milieu. Based on the definitions in the literature, a composite definition may be derived to serve as a departure point in operationalizing this analysis, as follows:

A technopole is a regional economy that promotes technology transfer and commercialization through the agglomeration of innovation-based assets to enhance networking and cooperation among private, public, non-profit, and university institutions and equity capital; to encourage the growth of knowledge-based businesses and organizations; and to stimulate the development of an entrepreneurial milieu supporting the establishment of new technology-based firms.

Specifically, this project will focus on the relationship between structured social capital and the creation of an entrepreneurial economy encouraging high rates of new firm births.

Sampling Strategy

This literature has spawned a healthy industry of academic papers and publications making economic comparisons between metropolitan regions based on their technopole strategies and the characteristics believed to support an entrepreneurial economy's success. This literature represents a productive sample frame, given that an expected outcome from technopole theory and the adoption of a technopole regional development strategy is the emergence of an entrepreneurial milieu, which may be measured through a comparative analysis of social capital. The adoption of the technopole strategy therefore serves as a signal of intent to develop a regional economy based on technology-led entrepreneurship. The technopole is therefore a convenient construct used for the design of this sample.

This project focuses specifically on what explains variation in entrepreneurial outcomes among a relatively similar group of regions endowed with a homogeneous set of innovative resources supporting firm birth. In order to address the question of the role and structure of social capital, a sample of technopole regions represented a particularly fruitful sampling strategy, because they generally sought to induce an entrepreneurial

milieu by intentionally agglomerating innovation assets. Moreover, these regions are generally cited in both the academic press and in the popular press as *hot spots* of innovation and recognized for their ability to encourage entrepreneurship. However, the nature of social capital structure and composition has not been systematically and empirically studied in any of the books published on this topic to date, beyond anecdotal observation and conjecture. This regional sample therefore serves as a most productive sample frame to address the questions of social capital composition and structure hypothesized. While it is acknowledged that these findings will not be generalizable to all regions, it is hoped that this analysis will provide a critical assessment of the assumptions and validity of the social capital dimensions of technopole theory and provide insights on the composition of entrepreneurial social capital in technology-rich regions to advance current thinking.

To design the sample, a citation analysis was performed of all book or study-length projects examining the concept of the technopole in United States regions, beginning with Roger and Larson's *Silicon Valley Fever* (1984). A citation analysis was used to corroborate that each of the metropolitan regions cited by Rogers and Larsen was also cited in at least one subsequent book-length project on the topic of technopoles published between 1980 and 2000. This yielded the 12 regions shown in Table 2.

Clearly, Silicon Valley and Boston's Route 128 represent the most cited regions in the literature due to their historic success in building an entrepreneurial economy. Among the other regions in the sample, RTP has long been cited in the literature as a model of a formally planned technopole, anchored by what has emerged to become the largest research park in the United States. Among other domestic technopoles, both San Diego and Austin were cited more than twice. The remaining regions were each cited once after Rogers and Larsen. These 12 regions serve as the sample frame to be cross-

compared, with Silicon Valley and Boston serving as prototypes of successful entrepreneurial economies.

Table 2. Regional Citation Analysis of Studies on Technopoles

| Rogers (1984) | Smilor et.al. (1988) | Preer (1992) | Scott (1993) | Simmie (1994) | Wang (1998) | Castells/Hall (1994) | Hassiink (1996) | Cumulative |
|---------------------|-------------------------|----------------------|-----------------|------------------|----------------|-------------------------|--------------------|------------|
| Silicon Valley | Silicon Valley | Silicon Valley | | Silicon Valley | Silicon Valley | Silicon Valley | Silicon Valley | 7 |
| Route 128 | Route 128 | Route 128 | | Route 128 | Route 128 | Route 128 | Route 128 | 7 |
| RTP | RTP | RTP | | RTP | | | RTP | 5 |
| San Diego | San Diego | | San Diego | | | San Diego | | 4 |
| Dallas/Austin | Austin/San Antonio | Austin/San Antonio | | Austin | | | | 4 |
| Salt Lake City | | Salt Lake City | | | | | | 2 |
| Phoenix | Phoenix | | | | | | | 2 |
| Minneapolis-St Paul | | Minneapolis/St. Paul | | | | | | 2 |
| Denver/Boulder | | | | Denver/Boulder | | | | 2 |
| Portland | | | Portland | | | | | 2 |
| Seattle | | | | Seattle | | | | 2 |
| Orange County (LA) | | Orange County | | | | | | 2 |

To evaluate the relative success of entrepreneurial economies at the regional level, it is important to identify regions that pursued an intentional strategy of entrepreneurship. The following 12 regions derived from the citation analysis serve as the sample of this dissertation, shown in Table 3 below with their respective federal geographic units, their geographical name references, and their census reported populations in 2008:

Table 3. Geographic Definitions and Population of Sample Regions

| Region | Federal Unit Definition | Geographical Reference | 2008 Population |
|------------------------|--|---------------------------------------|--------------------|
| Boston / Route 128 | Combined Statistical Area 148 | Boston-Worcester-Manchester, MA-RI-NH | 7,514,759 |
| Silicon Valley | Combined Statistical Area 488 | San Jose-San Francisco-Oakland, CA | 7,354,555 |
| Phoenix | Metropolitan Statistical Area 6200 | Phoenix-Mesa-Scottsdale, AZ | 4,281,899 |
| Seattle | Combined Statistical Area 500 | Seattle-Tacoma-Olympia, WA | 4,087,033 |
| Minneapolis / St. Paul | Combined Statistical Area 378 | Minneapolis-St. Paul-St. Cloud, MN-WI | 3,562,284 |
| Denver / Boulder | Combined Statistical Area 216 | Denver-Aurora-Boulder, CO /1 | 3,049,562 |
| Orange County | Zip Codes within County (special case) | Orange County, CA | 3,010,759 |
| San Diego | Metropolitan Statistical Area 7320 | San Diego-Carlsbad-San Marcos, CA | 3,001,072 |
| Portland | Metropolitan Statistical Area 6442 | Portland-Vancouver-Beaverton, OR-WA | 2,207,462 |
| Salt Lake City | Combined Statistical Area 482 | Salt Lake City-Ogden-Clearfield, UT | 1,717,261 |
| Raleigh / Durham | Combined Statistical Area 450 | Raleigh-Durham-Cary, NC | 1,690,557 |
| Austin | Metropolitan Statistical Area 640 | Austin-Round Rock, TX | 1,652,602 |

A geographic analysis of the regions was performed to identify whether these metropolitan areas represented a single-core metropolitan area, designated as a Metropolitan Statistical Area (MSA), or a multi-core metropolitan area, designated as a Combined Statistical Area (CSA). MSAs have at least one urbanized area of 50,000 or more population, plus an adjacent territory with a high degree of social and economic integration with the core as measured by commuting ties. CSAs represent larger regional units with broader social and economic interactions characterized by multiple metropolitan cores. Where appropriate, the CSA was the preferred geographic unit (with seven of the 12 regions classified as CSAs) given that (1) entrepreneurial activity and firm locations are generally not confined to the tight geographic boundaries of a single metropolitan area, (2) social capital is mobile within a wider geographic region, and (3) geographic development patterns vary widely among these regions. In consultation with two leading regional scientists (Edward Feser at University of Illinois-Champaign Urbana and William Graves at University of North Carolina at Charlotte), this mix of MSAs and CSAs was confirmed as an appropriate comparative unit, along with Orange County, which was distinctly identified in the technopole literature citations as a county and was the only unit inconsistent with a defined federal statistical area. This is defensible as Orange County is part of a large metropolitan area (Los Angeles), the population of the county roughly represents the mean of the regions included in the sample, and the county operates as a relatively distinct economic unit. Geographic boundary definitions are derived from the *Standards for Defining Metropolitan and Micropolitan Statistical Areas*.¹

The research design specifies that actor-level social capital relationships are analyzed through firms, which are nested within regions, consistent with the conceptual

¹ Published by the Office of Management and Budget (OMB) in Federal Register Notice (65 FR 82228 - 82238) on December 27, 2000, and updated regularly through the OMB Bulletin series.

model shown in Figure 1. The design employs a firm- and board-interlock methodology adopted commonly in current social capital and network research to identify senior executives, members of boards of directors, and advisors of entrepreneurial firms in each of the 12 sample regions (Castilla, 2004; Gulati & Westphal, 1999; Stuart & Sorenson, 2005; Williamson & Cable, 2003). The algorithm classifies actors according to the number of concurrent firm ties they hold, which allows for identification of ties between actors through firms. Given that the central actors of an entrepreneurial venture would almost certainly hold board or managerial positions, multiple board- and firm-tie interlocks serve as an effective proxy for individuals with multiple firm ties who act as dealmakers in an entrepreneurial economy (Borgatti & Foster, 2003; Fich & Shivdasani, 2006).

Firm Birth as an Indicator of a Successful Entrepreneurial Economy

A successful entrepreneurial economy is defined as one with a high birth rate for new technology-based firms. Firm birth rate has been established as a reliable indicator of successful entrepreneurial economies by myriad studies relating to the formation of entrepreneurial networks (Armington & Acs, 2002; Gregorio & Shane, 2003; Huisman & Wissen, 2004; Reynolds, 2007; Reynolds, Storey, & Westhead, 1994; Shane, 2004). A *successful entrepreneurial economy* means a metropolitan region which produces a high rate of new firms and encourages the formation of new entrepreneurial firms with a supportive social capital structure. While it is acknowledged that many economic factors contribute to successful entrepreneurial economies, the fundamental purpose of this thesis is to test alternative viewpoints in existing theory relating to social capital constructs in networks to support future hypothesis formulation and to further empirical and qualitative studies. The composition of social capital is examined in 12 leading metropolitan regions through two complementary methods: an empirical evaluation and then a qualitative assessment of dealmaker social capital to uncover evidence that

regions producing high rates of new entrepreneurial firm births are associated with the presence of dealmakers. This section establishes and compares aggregate views against structured views of social capital by examining the association of aggregate networks in supporting new firm births in the region versus the hypothesized role of dealmakers in mediating the entrepreneurial economy.

CHAPTER 5

EMPIRICAL ANALYSIS: REGIONAL COMPARISON OF DEALMAKER SOCIAL CAPITAL

Current scholarship has already established that the density, seriality, and cohesiveness of aggregate social capital networks are associated with entrepreneurial outcomes as measured by firm births and enhance the economic performance of entrepreneurial networks (Dubini & Aldrich, 1991; Hite & Hesterly, 2001). This chapter investigates whether these important characteristics of social capital, associated with aggregate network theory, should perhaps be segregated as opposed to being combined to identify and isolate their separate effects on the formation of successful entrepreneurial economies.

While this thesis does not contest that aggregate networks are a necessary condition to encourage the formation of vibrant entrepreneurial economies, it questions whether they are sufficient. The hypothesis of this chapter instead asserts that structured social capital networks of dealmakers may be a better indicator of regional vibrancy. Aggregate and structural social capital concepts are compared to determine which construct is most associated with high frequencies of new firm births: dense and cohesive aggregate networks of entrepreneurs and investors or dealmaker actors with multiple firm ties. Dealmakers with high connectivity and cohesion may in fact be a better indicator of firm births in the regional entrepreneurial economy than the dense aggregate networks of entrepreneurs and investors most often credited in the literature. It is expected that regions with a larger share of dealmakers will be associated with higher rates of new firm formation.

Density refers to the “extensiveness of ties between persons or organizations” (Dubini & Aldrich, 1991, p. 309) and is measured by comparing the total to the potential number of ties that would occur if every unit in the network were connected to every other unit. Density of social capital is typically turned to as a measure to explain the performance of regions as a contingent part of agglomeration theory, which posits that density supports the formation of entrepreneurial networks “because of the social construction of localized political and cultural assets such as mutual trust, tacit understandings, learning effects, specialized vocabularies, transaction-specific forms of knowledge, and performance-boosting governance structures facilitating entrepreneurship” (Thornton & Flynn, 2005, p. 305). However, is the density of an aggregate entrepreneurial network sufficient to explain variation in entrepreneurial outcomes? Should the social capital effects of density of aggregate networks be separated from cohesiveness and seriality of structured social capital to better explain entrepreneurial outcomes? This chapter will investigate this question by empirically comparing the composition of social capital of the aggregate and structured social capital networks. It will further attempt to sort out how density versus seriality and cohesiveness explains the characteristics of social capital in entrepreneurial networks that lead to high incidences of firm births.

The analysis reviews the firm birth histories of 12 United States regions that signaled their intent to establish an entrepreneurial milieu and its related social capital by following a technopole-based regional development strategy. It then asks whether the relative success of each region is more consistent with aggregate social capital theories or with a dealmaker hypothesis of structured social capital. Third, it seeks evidence that regions developing new entrepreneurial firms have social capital networks with substantial evidence of social capital comprised of dealmakers.

Regional Firm Birth Findings

Table 4 presents the total number of firm births for the three sample years during the full period (1984-2004) and from 1984 to the present for each sample region, highlighting specifically three years (1984, 1994, and 2004). The first year sampled represents the publication date of the Rogers and Larsen (1984) study, representing the initiation of technopole concepts in use as a regional planning concept. In an attempt to control for economic fluctuations, the sample years are separated by one-decade intervals and were chosen because they represent *stable* years between recessionary periods or preceding the significant venture capital equity bubble at the turn of the century. These three sample years are selected to increase the consistency of firm birth as a reliable indicator of a vibrant entrepreneurial economy.

Table 4. Firm Birth Data for 12 Regions, Unnormalized (1984, 1994, 2004)

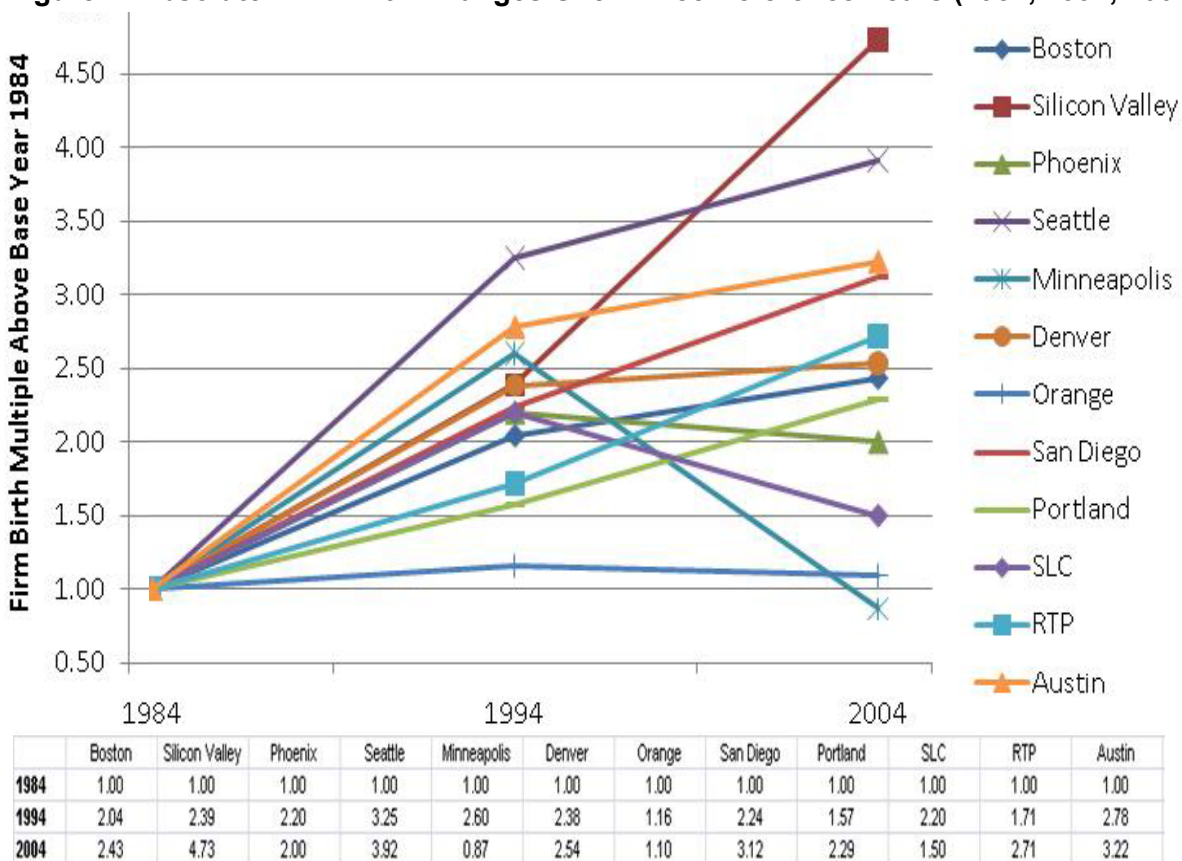
| | Boston | Silicon Valley | Phoenix | Seattle | Minneapolis | Denver | Orange | San Diego | Portland | SLC | RTP | Austin |
|----------------|--------|----------------|---------|---------|-------------|--------|--------|-----------|----------|-----|-----|--------|
| 1984 | 46 | 67 | 10 | 12 | 15 | 13 | 31 | 17 | 7 | 10 | 7 | 9 |
| 1985 | 42 | 72 | 12 | 17 | 23 | 15 | 30 | 20 | 12 | 17 | 8 | 10 |
| 1986 | 44 | 57 | 3 | 14 | 18 | 18 | 22 | 17 | 5 | 13 | 5 | 6 |
| 1987 | 51 | 77 | 8 | 19 | 25 | 16 | 33 | 28 | 11 | 15 | 6 | 7 |
| 1988 | 45 | 78 | 17 | 9 | 16 | 11 | 30 | 23 | 14 | 8 | 5 | 7 |
| 1989 | 61 | 101 | 17 | 15 | 17 | 16 | 37 | 24 | 9 | 15 | 8 | 13 |
| 1990 | 39 | 78 | 15 | 15 | 16 | 12 | 27 | 30 | 17 | 8 | 7 | 9 |
| 1991 | 59 | 110 | 22 | 17 | 22 | 24 | 20 | 25 | 9 | 11 | 3 | 14 |
| 1992 | 59 | 103 | 11 | 26 | 23 | 22 | 27 | 28 | 12 | 6 | 8 | 16 |
| 1993 | 77 | 136 | 20 | 24 | 29 | 34 | 25 | 30 | 10 | 9 | 11 | 16 |
| 1994 | 94 | 160 | 22 | 39 | 39 | 31 | 36 | 38 | 11 | 22 | 12 | 25 |
| 1995 | 104 | 205 | 24 | 40 | 39 | 40 | 52 | 43 | 15 | 16 | 16 | 16 |
| 1996 | 163 | 325 | 19 | 57 | 41 | 59 | 66 | 67 | 17 | 26 | 20 | 38 |
| 1997 | 158 | 320 | 37 | 51 | 41 | 43 | 59 | 71 | 24 | 20 | 17 | 30 |
| 1998 | 198 | 441 | 38 | 75 | 31 | 64 | 72 | 73 | 24 | 21 | 16 | 34 |
| 1999 | 253 | 642 | 30 | 97 | 59 | 59 | 96 | 91 | 36 | 28 | 41 | 57 |
| 2000 | 227 | 509 | 25 | 88 | 33 | 70 | 92 | 83 | 21 | 28 | 32 | 42 |
| 2001 | 147 | 314 | 34 | 61 | 31 | 50 | 68 | 67 | 25 | 20 | 30 | 32 |
| 2002 | 135 | 320 | 20 | 50 | 20 | 46 | 54 | 57 | 21 | 28 | 26 | 38 |
| 2003 | 111 | 333 | 21 | 44 | 18 | 44 | 38 | 47 | 21 | 23 | 21 | 40 |
| 2004 | 112 | 317 | 20 | 47 | 13 | 33 | 34 | 53 | 16 | 15 | 19 | 29 |
| 2005 | 86 | 312 | 23 | 59 | 15 | 27 | 30 | 52 | 12 | 18 | 14 | 30 |
| 2006 | 104 | 258 | 19 | 43 | 19 | 35 | 31 | 38 | 13 | 13 | 11 | 23 |
| 2007 | 67 | 194 | 12 | 51 | 8 | 24 | 17 | 36 | 4 | 9 | 11 | 11 |
| 2008 | 40 | 109 | 8 | 20 | 4 | 8 | 5 | 20 | 7 | 5 | 3 | 8 |
| 2009 | 9 | 29 | 1 | 6 | 0 | 11 | 1 | 5 | 2 | 2 | 1 | 2 |
| 3 Sample Years | 252 | 544 | 52 | 98 | 67 | 77 | 101 | 108 | 34 | 47 | 38 | 63 |
| 1984-2004 | 2225 | 4765 | 425 | 817 | 569 | 720 | 949 | 932 | 337 | 359 | 318 | 488 |
| Total | 2531 | 5667 | 488 | 996 | 615 | 825 | 1033 | 1083 | 375 | 406 | 358 | 562 |

The number of self-reported firm births in these metropolitan economies is consistent with Thomson Financial's VentureXpert, another dataset that reports new firm formation rates. The data shows significant differences between the firm births of Silicon Valley (4,765) and Boston (2,225) and the other sample regions (591.4 firms on

average). Orange County, San Diego, and Seattle report the highest firm birth outcomes among the remaining regions in the sample with San Diego producing the most firms per capital population.

Firm birth data is normalized in Figure 2 with 1984 as the base year and computing births as an absolute ratio of this result (with 1.0 representing equivalency). This normalization establishes relative growth in the number of new firm births as a ratio of 1984 births—a proxy for a successful entrepreneurial milieu—to allow for objective comparisons. If regional development strategies had established an effective entrepreneurial milieu, growth in firm births would increase consistently over the period.

Figure 2. Absolute Firm Birth Changes Over Three Reference Years (1984, 1994, 2004)



Results indicate that while Silicon Valley, Boston, Seattle, San Diego, Portland, RTP, and Austin sustained consistent growth over the three sample years, Phoenix,

Minneapolis, Denver, and Salt Lake City did not. Orange County largely continues to produce start-up firms at the same rate it did in 1984.

The regions with the highest absolute growth over the period (normalized by base year 1984) were Silicon Valley (4.73 times more firms than in 1984), Seattle (3.92 times), and Austin (3.22 times). RTP, Denver, and Boston experienced even and consistent growth over the period, although not as dramatic in absolute terms. It indicates that six of the regions in the sample have been successful at sustaining firm births since establishing the technopole—with Silicon Valley, Seattle, San Diego, and Austin experiencing the highest absolute growth in firm birth rates over the three sample years. This data also shows that while all regions experienced some growth in firm births between 1984 and 1994, growth was inconsistent from 1994 to 2004, with four regions—Orange County, Phoenix, Salt Lake City, and Minneapolis—experiencing negative growth over the latter decade. Minneapolis experienced the most dramatic drop-off in firm births among these four regions. It may be stated generally that Boston, Seattle, RTP, San Diego, and Austin experienced consistent growth in firm births over the full two-decade measurement period, while only Silicon Valley experienced more dramatic growth over this same period comparatively.

Analysis of Social Capital Seriality

One way to compare aggregate and structured social capital is to compare proxy measures that approximate these concepts. Density, measured in this study as the total number of actor-firm ties, is an adequate measure of aggregate social capital. Seriality by tie frequency is an adequate measure of structured social capital, discussed earlier as a core component of the dealmaker concept. While aggregate studies of social capital largely rely on density measures, seriality measures may indeed add additional insight to this view of social capital by showing data that reflect the structural properties of the network. While aggregate theories would suggest that dense networks are associated

with successful entrepreneurial economies, it is hypothesized in this analysis that economies with a higher prevalence of serially connected actors will also be more successful in producing a higher prevalence of new firm births. While this analysis later employs an algorithm that specifies dealmakers with more precise measures to analyze characteristics beyond seriality, this initial analysis simply looks at the frequency of *serially connected* actors, meaning individuals who maintain multiple ties to entrepreneurial firms.

A straightforward approach to identify serial entrepreneurs or investors is to count the total number of concurrent firm ties for all people associated with entrepreneurial firms in the region through their board and management interlock linkages. To accomplish this, all actors with board and management ties to high-technology firms are analyzed to determine the prevalence of total firm connections as shown in Table 5.

Table 5 compares aggregate and structured network characteristics by showing all actors in the regional network and their total firm connections by frequency. The density of the aggregate network would be estimated by the sum of all connections, listed as “aggregate” on the table. But then these data are distributed by frequency of connections per actor to tease out the structural characteristics of social capital in each sample region. For example, while Phoenix has a dense aggregate network with 2,583 actor-firm ties, there are 1,953 actors in Phoenix with one firm connection, 43 actors with five connections, and only four people with 10 connections, while Silicon Valley reports 31,221, 22,652, 515, and 77 respectively for the same parameters. These two regions, with approximately equivalent regional populations, show dramatically different estimates of density and seriality. While causality cannot be asserted from these general estimators, the density data appear to support the proposition in the literature that aggregate social capital is associated with firm birth. The regions with the highest firm

birth (Silicon Valley, Boston, San Diego, and Seattle) also have the densest networks with the largest aggregate number of actor-firm ties, also shown in the table, while those less successful have less density.

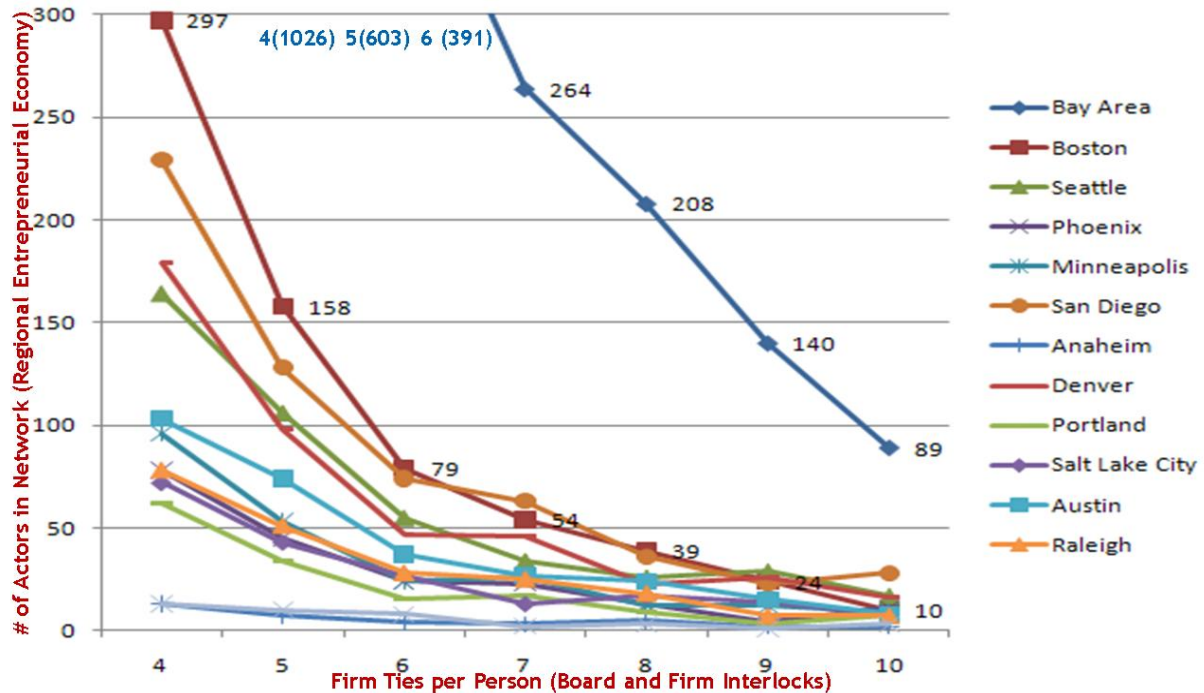
Table 5. Distribution of Total Concurrent Firm Connections of All Actors per Region

| Serial Connections | Boston | Silicon Valley | Phoenix | Seattle | Minneapolis | Denver | Orange Co. | San Diego | Portland | Salt Lake City | RTP | Austin |
|--------------------|--------|----------------|---------|---------|-------------|--------|------------|-----------|----------|----------------|------|--------|
| 1 | 11386 | 22652 | 1953 | 4014 | 2707 | 3239 | 4123 | 4968 | 1532 | 1651 | 1775 | 2274 |
| 2 | 2211 | 4211 | 314 | 734 | 438 | 567 | 695 | 989 | 243 | 283 | 378 | 421 |
| 3 | 882 | 1700 | 109 | 317 | 191 | 233 | 270 | 382 | 93 | 110 | 146 | 163 |
| 4 | 454 | 853 | 49 | 142 | 109 | 114 | 133 | 178 | 53 | 58 | 60 | 74 |
| 5 | 250 | 515 | 43 | 65 | 45 | 65 | 61 | 103 | 29 | 32 | 40 | 41 |
| 6 | 155 | 337 | 22 | 45 | 23 | 32 | 37 | 62 | 9 | 20 | 28 | 27 |
| 7 | 123 | 207 | 24 | 41 | 28 | 27 | 31 | 49 | 8 | 14 | 19 | 26 |
| 8 | 75 | 174 | 11 | 17 | 12 | 19 | 24 | 26 | 11 | 10 | 10 | 13 |
| 9 | 61 | 108 | 7 | 23 | 14 | 13 | 20 | 26 | 5 | 16 | 8 | 16 |
| 10 | 30 | 77 | 4 | 10 | 11 | 14 | 12 | 11 | 3 | 6 | 4 | 5 |
| Total 10+ | 270 | 387 | 47 | 77 | 78 | 82 | 94 | 128 | 39 | 43 | 52 | 62 |
| Aggregate | 15897 | 31221 | 2583 | 5485 | 3656 | 4405 | 5500 | 6922 | 2025 | 2243 | 2520 | 3122 |

It is important to note that state-of-the-art aggregate studies do not discern single-firm from serial entrepreneurs and investors at the regional level. Therefore, most aggregate studies would overlook the distribution of serial ties, also shown on this summary table. The most successful regions in producing a high prevalence of new firms are also seemingly associated with structured social capital comprised of a higher prevalence of actors with multiple firm ties. Interestingly, the most successful entrepreneurial regions in terms of firm birth show both a fat base—with a high prevalence of actors with one tie (and therefore high density)—as well as distributions of serial ties that are shown by thick tails—meaning higher prevalence of serially connected actors. Also the association of regions with high levels of new firm births and the seriality indicator appears to improve as the number of ties increase from two ties to dealmakers with three or more ties, a topic to be probed later with the data provided by the algorithm.

Note that all tables are presented in order of their regional population size, so that if this distribution simply varied with population, the frequencies would simply diminish as the table is read from left to right. This is not the case, as this data shows substantial variation in both density and seriality.

Figure 3. Dealmaker Concurrent Entrepreneurial Firm Connections



As a precursor to this study's more exhaustive examination of dealmakers, this same data as graphed in Figure 3 shows that there is substantial variation in the frequency of actors with four or more ties—with 1,026 in Silicon Valley, 297 in Boston, and 49 in Phoenix. Actors with 10 firm ties number 89 in Silicon Valley, 10 in Boston and none in Phoenix. This suggests some evidence that the structure of social capital varies from region to region in terms of seriality.

Aggregate studies that focus on network density and do not differentiate serial ties would universally overlook the differences in seriality among the actors in the aggregate network. Regions with a relatively higher distribution of serial connections also seem to have experienced success in establishing new firms, suggesting a possible

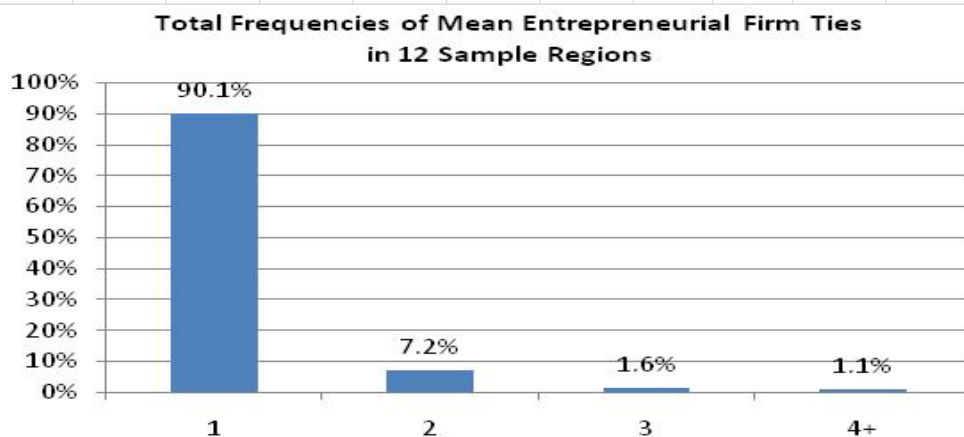
association, particularly for regions with a higher frequency of actors with multiple concurrent connections at the dealmaker level (actors with three or more connections). This result seems to suggest that firm birth and seriality may be potentially associated. However, this simple relationship is not definitive and certainly can neither confirm an association nor determine whether this association is as strong as or stronger than the density measures usually cited in aggregate analysis. In order to uncover the relative effects of density versus seriality in social capital on firm birth, a more in-depth analysis of the composition of structured dealmaker social capital is warranted.

Regional Comparison of Social Capital Composition

As shown in Figure 4, actors with one or two concurrent entrepreneurial firm ties compose 97.3% of the average regional sample, while 1.6% have three concurrent firm ties, and the remaining 1.1% have four or more. Dealmaker entrepreneurs and investors with three or more ties, therefore, consist of the top 2.7% of entrepreneurs and investors in the average sample region. While these actors are far less common, this dissertation

Figure 4. Distribution of Mean Total Entrepreneurial Ties per Person

| | Bay Area | Boston | Seattle | San Diego | SLC | RTP | Portland | Phoenix | Orange | Minneapolis | Denver | Austin |
|----|----------|--------|---------|-----------|--------|--------|----------|---------|--------|-------------|--------|--------|
| 1 | 86.07% | 89.44% | 92.20% | 91.39% | 93.94% | 93.85% | 95.56% | 95.93% | 95.87% | 93.11% | 94.78% | 92.99% |
| 2 | 9.44% | 7.68% | 6.13% | 6.62% | 5.13% | 5.28% | 3.80% | 3.41% | 3.76% | 5.58% | 4.31% | 5.83% |
| 3 | 2.45% | 1.71% | 1.00% | 1.36% | 0.62% | 0.60% | 0.35% | 0.50% | 0.31% | 0.96% | 0.50% | 0.70% |
| 4+ | 2.04% | 1.17% | 0.67% | 0.64% | 0.31% | 0.28% | 0.30% | 0.15% | 0.05% | 0.36% | 0.41% | 0.48% |



hypothesizes that they perhaps may represent the *vital few* and serve a quite important role in the founding of new firms. Figure 4 shows the variation in the distribution of actors

with one or two ties and dealmakers with three and four or more concurrent ties. There is substantial variation in this distribution by region, with higher percentages of dealmakers generally associated with the regions most successful in generating new firms.

Perhaps as a refinement of aggregate studies, these data provide an insight that those regions with the highest percentages of singularly connected actors and relatively smaller percentages of serially connected actors have not had sustained success in establishing new firms. Singularly connected actors represent the typical profile for rank-and-file entrepreneurs or investors in a given entrepreneurial economy, and surely the *supply* of single-tie actors will likely influence the frequency of firm foundings. Indeed, it is *36 times* more likely on average that an entrepreneur will have one or two concurrent firm ties rather than three or more in the sample regions.

But the frequency of serially connected, experienced actors is hypothesized to have as much or more influence on regional firm birth outcomes. On one end of the sample distribution we find Silicon Valley, with arguably one of the most vibrant entrepreneurial economies in the nation, where 86% of entrepreneurs and investors have one firm tie, 9.4% have two firm ties, 2.45% have three firm ties, and 2.04% have four or more firm ties. On the other end of the distribution is Orange County, California, which lags behind other regions in the sample in births of new technology firms. Here 95.9% of entrepreneurial actors show one firm tie, 3.4% show two firm ties, 0.31% show three firm ties, and 0.05% show four or more firm ties. This distribution suggests that a hierarchy in the structure of social capital exists in the entrepreneurial region and that higher distributions of dealmaker social capital are associated with higher firm birth in a given regional economy for this sample. The mean distribution provides a sound

Table 6. Entrepreneurial Firm Ties, Role by Social Capital Category, Unnormalized with Number of Companies

| | Boston Total | Bay Area Total | Phoenix Total | Seattle Total | Minneapolis Total | Denver Total | Orange Total | San Diego Total | Portland Total | Salt Lake City Total | RTP Total | Austin Total |
|---|-----------------|-------------------|------------------|------------------|----------------------|-----------------|-----------------|--------------------|-------------------|----------------------------|--------------|-----------------|
| 1. Parallel Investors | | | | | | | | | | | | |
| 7+ = | 2 | 23 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| 6 | 4 | 10 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 5 | 8 | 34 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 4 | 24 | 31 | 0 | 2 | 0 | 2 | 1 | 3 | 0 | 0 | 0 | 1 |
| 3 | 45 | 104 | 2 | 7 | 4 | 2 | 1 | 14 | 0 | 4 | 1 | 3 |
| 2 | 111 | 254 | 8 | 35 | 25 | 14 | 26 | 46 | 3 | 10 | 11 | 27 |
| 1 | 640 | 843 | 138 | 230 | 179 | 228 | 286 | 290 | 104 | 128 | 142 | 151 |
| 2. Professional Investors | | | | | | | | | | | | |
| 7+ = | 14 | 63 | 0 | 3 | 1 | 0 | 0 | 4 | 0 | 2 | 1 | 0 |
| 6 | 13 | 58 | 0 | 4 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 2 |
| 5 | 21 | 60 | 0 | 7 | 0 | 1 | 0 | 6 | 1 | 0 | 1 | 1 |
| 4 | 29 | 101 | 0 | 3 | 2 | 6 | 1 | 9 | 0 | 2 | 2 | 5 |
| 3 | 87 | 196 | 1 | 10 | 9 | 3 | 6 | 22 | 3 | 4 | 7 | 8 |
| 2 | 221 | 493 | 10 | 68 | 35 | 28 | 41 | 74 | 12 | 15 | 20 | 42 |
| 1 | 1255 | 1905 | 230 | 485 | 295 | 441 | 520 | 622 | 169 | 187 | 293 | 312 |
| 3. Entrepreneur/Investor | | | | | | | | | | | | |
| 7+ = | 1 | 11 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 4 | 19 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 5 | 7 | 16 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 4 | 18 | 29 | 0 | 6 | 2 | 1 | 0 | 2 | 1 | 2 | 1 | 0 |
| 3 | 35 | 108 | 0 | 7 | 6 | 5 | 1 | 12 | 0 | 3 | 3 | 0 |
| 2 | 119 | 287 | 9 | 28 | 27 | 27 | 21 | 47 | 10 | 19 | 10 | 14 |
| 1 | 937 | 1472 | 157 | 328 | 223 | 267 | 344 | 446 | 130 | 141 | 155 | 166 |
| 4. Entrepreneur/Non-Investor | | | | | | | | | | | | |
| 7+ = | 1 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 2 | 18 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 5 | 10 | 44 | 0 | 2 | 0 | 1 | 0 | 3 | 1 | 0 | 0 | 1 |
| 4 | 28 | 103 | 3 | 3 | 2 | 3 | 0 | 13 | 1 | 1 | 1 | 2 |
| 3 | 105 | 356 | 10 | 31 | 16 | 12 | 9 | 46 | 4 | 3 | 4 | 11 |
| 2 | 770 | 1914 | 61 | 205 | 117 | 121 | 119 | 291 | 52 | 71 | 92 | 99 |
| 1 | 11386 | 22652 | 1953 | 4014 | 2707 | 3239 | 4123 | 4968 | 1532 | 1651 | 1775 | 2274 |
| Sum Total Investors (1+2) | 2474 | 4175 | 390 | 856 | 553 | 728 | 882 | 1093 | 292 | 352 | 478 | 554 |
| Sum Total Entrepreneurs (3+4) | 13423 | 27046 | 2193 | 4629 | 3103 | 3677 | 4618 | 5829 | 1733 | 1891 | 2042 | 2568 |
| Percent Total Investors | 15.6% | 13.4% | 15.1% | 15.6% | 15.1% | 16.5% | 16.0% | 15.8% | 14.4% | 15.7% | 19.0% | 17.7% |
| Percent Total Entrepreneurs | 84.4% | 86.6% | 84.9% | 84.4% | 84.9% | 83.5% | 84.0% | 84.2% | 85.6% | 84.3% | 81.0% | 82.3% |
| Total People | 15897 | 31221 | 2583 | 5485 | 3656 | 4405 | 5500 | 6922 | 2025 | 2243 | 2520 | 3122 |
| Advanced Dealmakers (4+ Ties) | | | | | | | | | | | | |
| Parallel Investor Dealmakers | 38 | 98 | 1 | 4 | 2 | 5 | 1 | 5 | 0 | 0 | 0 | 3 |
| Professional Investor Dealmakers | 77 | 282 | 0 | 17 | 4 | 7 | 1 | 20 | 1 | 4 | 4 | 8 |
| Entrepreneur/Investor Dealmakers | 30 | 75 | 0 | 10 | 5 | 1 | 0 | 3 | 3 | 2 | 2 | 1 |
| Entrepreneur/Non-Investor Dealmakers | 41 | 182 | 3 | 6 | 2 | 5 | 1 | 16 | 2 | 1 | 1 | 3 |
| Total Advanced Dealmakers | 186 | 637 | 4 | 37 | 13 | 18 | 3 | 44 | 6 | 7 | 7 | 15 |
| Dealmakers (3 Ties) | | | | | | | | | | | | |
| Parallel Investor Dealmakers | 45 | 104 | 2 | 7 | 4 | 2 | 1 | 14 | 0 | 4 | 1 | 3 |
| Professional Investor Dealmakers | 87 | 196 | 1 | 10 | 9 | 3 | 6 | 22 | 3 | 4 | 7 | 8 |
| Entrepreneur/Investor Dealmakers | 35 | 108 | 0 | 7 | 6 | 5 | 1 | 12 | 0 | 3 | 3 | 0 |
| Entrepreneur/Non-Investor Dealmakers | 105 | 356 | 10 | 31 | 16 | 12 | 9 | 46 | 4 | 3 | 4 | 11 |
| Total Dealmakers | 272 | 764 | 13 | 55 | 35 | 22 | 17 | 94 | 7 | 14 | 15 | 22 |
| Total Dealmakers+Advanced Dealmakers | 458 | 1401 | 17 | 92 | 48 | 40 | 20 | 138 | 13 | 21 | 22 | 37 |
| Company Type | | | | | | | | | | | | |
| IT Companies = | 2790 | 6968 | 660 | 1201 | 778 | 1107 | 1341 | 1031 | 511 | 465 | 338 | 698 |
| Biotech Companies = | 456 | 570 | 60 | 126 | 66 | 73 | 126 | 373 | 27 | 77 | 108 | 34 |
| Healthcare Companies = | 436 | 506 | 67 | 109 | 260 | 108 | 248 | 222 | 47 | 90 | 62 | 62 |
| Total Companies | 3682 | 8044 | 787 | 1436 | 1104 | 1288 | 1715 | 1626 | 585 | 632 | 508 | 794 |

Table 7. Actors in Entrepreneurial Network by Social Capital Category, Normalized by Total Companies

| | Boston Total | Bay Area Total | Phoenix Total | Seattle Total | Minneapolis Total | Denver Total | Orange Total | San Diego Total | Portland Total | Salt Lake City Total | RTP Total | Austin Total |
|---|-----------------|-------------------|------------------|------------------|----------------------|-----------------|-----------------|--------------------|-------------------|-------------------------|--------------|-----------------|
| Total People | 4.317 | 3.881 | 3.282 | 3.820 | 3.312 | 3.420 | 3.207 | 4.257 | 3.462 | 3.549 | 4.961 | 3.932 |
| Total Investors per Company | 0.672 | 0.519 | 0.496 | 0.596 | 0.501 | 0.565 | 0.514 | 0.672 | 0.499 | 0.557 | 0.941 | 0.698 |
| Total Entrepreneurs per Company | 3.646 | 3.362 | 2.787 | 3.224 | 2.811 | 2.855 | 2.693 | 3.585 | 2.962 | 2.992 | 4.020 | 3.234 |
| Advanced Dealmakers (4+ Ties) | | | | | | | | | | | | |
| Parallel Investor | 0.010 | 0.012 | 0.001 | 0.003 | 0.002 | 0.004 | 0.001 | 0.003 | 0.000 | 0.000 | 0.000 | 0.004 |
| Professional Investor | 0.021 | 0.035 | 0.000 | 0.012 | 0.004 | 0.005 | 0.001 | 0.012 | 0.002 | 0.006 | 0.008 | 0.010 |
| Entrepreneur/Investor | 0.008 | 0.009 | 0.000 | 0.007 | 0.005 | 0.001 | 0.000 | 0.002 | 0.005 | 0.003 | 0.004 | 0.001 |
| Entrepreneur/Non-Investor | 0.011 | 0.023 | 0.004 | 0.004 | 0.002 | 0.004 | 0.001 | 0.010 | 0.003 | 0.002 | 0.002 | 0.004 |
| Total Advanced Dealmakers | 0.051 | 0.079 | 0.005 | 0.026 | 0.012 | 0.014 | 0.002 | 0.027 | 0.010 | 0.011 | 0.014 | 0.019 |
| Dealmakers (3 Ties) | | | | | | | | | | | | |
| Parallel Investor | 0.012 | 0.013 | 0.003 | 0.005 | 0.004 | 0.002 | 0.001 | 0.009 | 0.000 | 0.006 | 0.002 | 0.004 |
| Professional Investor | 0.024 | 0.024 | 0.001 | 0.007 | 0.008 | 0.002 | 0.003 | 0.014 | 0.005 | 0.006 | 0.014 | 0.010 |
| Entrepreneur/Investor | 0.010 | 0.013 | 0.000 | 0.005 | 0.005 | 0.004 | 0.001 | 0.007 | 0.000 | 0.005 | 0.006 | 0.000 |
| Entrepreneur/Non-Investor | 0.029 | 0.044 | 0.013 | 0.022 | 0.014 | 0.009 | 0.005 | 0.028 | 0.007 | 0.005 | 0.008 | 0.014 |
| Total Dealmakers | 0.074 | 0.095 | 0.017 | 0.038 | 0.032 | 0.017 | 0.010 | 0.058 | 0.012 | 0.022 | 0.030 | 0.028 |
| Total Dealmakers and Advanced Dealmakers | 0.124 | 0.174 | 0.022 | 0.064 | 0.043 | 0.031 | 0.012 | 0.085 | 0.022 | 0.033 | 0.043 | 0.047 |
| Company Type | | | | | | | | | | | | |
| IT Companies = | 2790 | 6968 | 660 | 1201 | 778 | 1107 | 1341 | 1031 | 511 | 465 | 338 | 698 |
| Biotech Companies = | 456 | 570 | 60 | 126 | 66 | 73 | 126 | 373 | 27 | 77 | 108 | 34 |
| Healthcare Companies = | 436 | 506 | 67 | 109 | 260 | 108 | 248 | 222 | 47 | 90 | 62 | 62 |
| Total Companies | 3682 | 8044 | 787 | 1436 | 1104 | 1288 | 1715 | 1626 | 585 | 632 | 508 | 794 |

Table 8. Frequencies of Actors in Entrepreneurial Network

| | Boston Total | Bay Area Total | Phoenix Total | Seattle Total | Minneapolis Total | Denver Total | Orange Total | San Diego Total | Portland Total | Salt Lake City Total | RTP Total | Austin Total |
|---|-----------------|-------------------|------------------|------------------|----------------------|-----------------|-----------------|--------------------|-------------------|-------------------------|--------------|-----------------|
| Total Investors per Company | 15.56% | 13.37% | 15.10% | 15.61% | 15.13% | 16.53% | 16.04% | 15.79% | 14.42% | 15.69% | 18.97% | 17.75% |
| Total Entrepreneurs per Company | 84.44% | 86.63% | 84.90% | 84.39% | 84.87% | 83.47% | 83.96% | 84.21% | 85.58% | 84.31% | 81.03% | 82.25% |
| Advanced Dealmakers (4+ Ties) | | | | | | | | | | | | |
| Parallel Investor | 0.24% | 0.31% | 0.04% | 0.07% | 0.05% | 0.11% | 0.02% | 0.07% | 0.00% | 0.00% | 0.00% | 0.10% |
| Professional Investor | 0.48% | 0.90% | 0.00% | 0.31% | 0.11% | 0.16% | 0.02% | 0.29% | 0.05% | 0.18% | 0.16% | 0.26% |
| Entrepreneur/Investor | 0.19% | 0.24% | 0.00% | 0.18% | 0.14% | 0.02% | 0.00% | 0.04% | 0.15% | 0.09% | 0.08% | 0.03% |
| Entrepreneur/Non-Investor | 0.26% | 0.58% | 0.12% | 0.11% | 0.05% | 0.11% | 0.02% | 0.23% | 0.10% | 0.04% | 0.04% | 0.10% |
| Total Advanced Dealmakers | 1.17% | 2.04% | 0.15% | 0.67% | 0.36% | 0.41% | 0.05% | 0.64% | 0.30% | 0.31% | 0.28% | 0.48% |
| Dealmakers (3 Ties) | | | | | | | | | | | | |
| Parallel Investor | 0.28% | 0.33% | 0.08% | 0.13% | 0.11% | 0.05% | 0.02% | 0.20% | 0.00% | 0.18% | 0.04% | 0.10% |
| Professional Investor | 0.55% | 0.63% | 0.04% | 0.18% | 0.25% | 0.07% | 0.11% | 0.32% | 0.15% | 0.18% | 0.28% | 0.26% |
| Entrepreneur/Investor | 0.22% | 0.35% | 0.00% | 0.13% | 0.16% | 0.11% | 0.02% | 0.17% | 0.00% | 0.13% | 0.12% | 0.00% |
| Entrepreneur/Non-Investor | 0.66% | 1.14% | 0.39% | 0.57% | 0.44% | 0.27% | 0.16% | 0.66% | 0.20% | 0.13% | 0.16% | 0.35% |
| Total Dealmakers | 1.71% | 2.45% | 0.50% | 1.00% | 0.96% | 0.50% | 0.31% | 1.36% | 0.35% | 0.62% | 0.60% | 0.70% |
| Total Dealmakers and Advanced Dealmakers | 2.881% | 4.487% | 0.658% | 1.677% | 1.313% | 0.908% | 0.364% | 1.994% | 0.642% | 0.936% | 0.873% | 1.185% |

Table 9. Total Dealmakers by Category and Ratio of Dealmakers—Average Firm Birth 2003-2007

| | Boston | Bay Area | Phoenix | Seattle | Minneapolis | Denver | Orange | San Diego | Portland | Salt Lake City | RTP | Austin |
|--|--------|----------|---------|---------|-------------|--------|--------|-----------|----------|----------------|--------|--------|
| Parallel Investor Dealmakers | 38 | 98 | 1 | 4 | 2 | 5 | 1 | 5 | 0 | 0 | 0 | 3 |
| Professional Investor Dealmakers | 77 | 282 | 0 | 17 | 4 | 7 | 1 | 20 | 1 | 4 | 4 | 8 |
| Entrepreneur/Investor Dealmakers | 30 | 75 | 0 | 10 | 5 | 1 | 0 | 3 | 3 | 2 | 2 | 1 |
| Entrepreneur/Non-Investor Dealmakers | 41 | 182 | 3 | 6 | 2 | 5 | 1 | 16 | 2 | 1 | 1 | 3 |
| Total Advanced Dealmakers | 186 | 637 | 4 | 37 | 13 | 18 | 3 | 44 | 6 | 7 | 7 | 15 |
| Parallel Investor Dealmakers | 45 | 104 | 2 | 7 | 4 | 2 | 1 | 14 | 0 | 4 | 1 | 3 |
| Professional Investor Dealmakers | 87 | 196 | 1 | 10 | 9 | 3 | 6 | 22 | 3 | 4 | 7 | 8 |
| Entrepreneur/Investor Dealmakers | 35 | 108 | 0 | 7 | 6 | 5 | 1 | 12 | 0 | 3 | 3 | 0 |
| Entrepreneur/Non-Investor Dealmakers | 105 | 356 | 10 | 31 | 16 | 12 | 9 | 46 | 4 | 3 | 4 | 11 |
| Total Dealmakers | 272 | 764 | 13 | 55 | 35 | 22 | 17 | 94 | 7 | 14 | 15 | 22 |
| Average Firm Birth 2003-2007@ | 96 | 282.8 | 19 | 48.8 | 14.6 | 32.6 | 30 | 45.2 | 13.2 | 15.6 | 15.2 | 26.6 |
| Parallel Investor Dealmakers % | 20.43% | 15.38% | 25.00% | 10.81% | 15.38% | 27.78% | 33.33% | 11.36% | 0.00% | 0.00% | 0.00% | 20.00% |
| Professional Investor Dealmakers % | 41.40% | 44.27% | 0.00% | 45.95% | 30.77% | 38.89% | 33.33% | 45.45% | 16.67% | 57.14% | 57.14% | 53.33% |
| Entrepreneur/Investor Dealmakers % | 16.13% | 11.77% | 0.00% | 27.03% | 38.46% | 5.56% | 0.00% | 6.82% | 50.00% | 28.57% | 28.57% | 6.67% |
| Entrepreneur/Non-Investor Dealmakers % | 22.04% | 28.57% | 75.00% | 16.22% | 15.38% | 27.78% | 33.33% | 36.36% | 33.33% | 14.29% | 14.29% | 20.00% |
| Parallel Investor Dealmakers / Average Birth 2003-07 | 0.40 | 0.35 | 0.05 | 0.08 | 0.14 | 0.15 | 0.03 | 0.11 | 0.00 | 0.00 | 0.00 | 0.11 |
| Professional Investor Dealmakers / Average Birth 2003-07 | 0.80 | 1.00 | 0.00 | 0.35 | 0.27 | 0.21 | 0.03 | 0.44 | 0.08 | 0.26 | 0.26 | 0.30 |
| Entrepreneur/Investor Dealmakers / Average Birth 2003-07 | 0.31 | 0.27 | 0.00 | 0.20 | 0.34 | 0.03 | 0.00 | 0.07 | 0.23 | 0.13 | 0.13 | 0.04 |
| Entrepreneur/Non-Investor Dealmakers / Average Birth 2003-07 | 0.43 | 0.64 | 0.16 | 0.12 | 0.14 | 0.15 | 0.03 | 0.35 | 0.15 | 0.06 | 0.07 | 0.11 |
| Total Advanced Dealmakers / Average Birth 2003-07 | 1.94 | 2.25 | 0.21 | 0.76 | 0.89 | 0.55 | 0.10 | 0.97 | 0.45 | 0.45 | 0.46 | 0.56 |

basis of comparison for a more detailed examination of social capital composition explored in Tables 6-9 showing the algorithm's results from the CapitalIQ snapshot data.

As shown in Table 6, the distribution of firm ties varies widely among actors in the 12 sample regions. Table 6 presents the frequencies of all actors in each of the sample regions by social capital category, displays the number of firm ties for each actor, and summarizes the total number of dealmakers in each region. The total social capital network of entrepreneurs and investors is first divided into four categories based on their ties to financial firms. These four categories are called: (1) *parallel investors*, for investors with more than one key executive tie to a financial firm; (2) *professional investors*, for investors with one key executive tie to a financial firm; (3) *entrepreneur-investors*, for entrepreneurs with non-executive ties with finance firms; and (4) *entrepreneur-non-investors*, for entrepreneurs with no finance affiliations. Within these four categories, actors are arrayed by the number of concurrent board and executive ties with an entrepreneurial firm (one to seven plus).

To address the common blending of entrepreneurial and investor roles, particularly among dealmakers, the classifications are refined more granularly to separate entrepreneurs with financial affiliations from entrepreneurs without financial affiliations. Similarly, investors are separated into two mutually exclusive categories based on the number and location of their financial firm ties. This is accomplished by developing tables of equity and investment firms in the database and cross-identifying individuals who are reported as board members or managers of entrepreneurial companies while concurrently serving as a *key executive* of a financial firm. Finally, to maintain the dichotomy in the literature between entrepreneurs and investors, a filtering methodology was employed to discern whether entrepreneurs-investors are affiliated more closely with entrepreneurial firms or with finance firms. The result is four mutually exclusive categories:

Investor

At least one entrepreneurial firm tie in the designated regions and sectors, plus:

Parallel Investor = concurrently connected as a key executive of two or more finance firms inside or outside the region

Professional Investor = concurrently connected as a key executive of one finance firm inside or outside the region

Entrepreneur

At least one entrepreneurial firm tie in the designated regions and sectors, plus:

Entrepreneur-Investor = at least one finance firm affiliation inside or outside the region, but not as a key executive

Entrepreneur-Non-Investor = no finance firm affiliations

To better discern the differing contributions of actors with multiples ties to entrepreneurial firms, this analysis separates dealmaker entrepreneurs and dealmaker investors by their frequency of ties, with specific focus on dealmakers with three ties and those with four or more ties.

To facilitate side by side comparisons, all regions are presented in the order of metropolitan population size arrayed from the largest to the smallest. Boston and Silicon Valley serve as a baseline for comparisons with the remaining 10 regions as the most successful regional entrepreneurial economies. If there were no observable relationship between entrepreneur- or investor-related social capital and their respective dealmaker subsets, one would expect to see these social capital categories vary directly with population, which is clearly not the case.

These distributions indicate that the largest set of actors in all of the sample regions are entrepreneur-non-investors, followed second by professional investors, third by entrepreneurs-investors, and lastly by parallel investors with multiple concurrent finance firm ties. While the numbers in each category seem to vary by the outcome—variable (new firm births), the general distribution among these categories does not vary

significantly. However, it seems plausible from the distribution that individuals with dealmaker characteristics (three concurrent ties or more) are more prevalent in the most successful entrepreneurial economies. The small variation across the sample in the numbers of single-tie entrepreneurs and investors suggests that an aggregated count of social capital may be a less reliable predictor of firm births, as all regions seem to possess a base of social capital comprised of entrepreneurs and investors. At the same time, entrepreneurs with multiple firm ties are more prevalent in regions with more firm births, and their numbers vary to a greater degree and with each successful region. This suggests that dealmakers may be a better indicator of entrepreneurial success than the total numbers or shares of single-tie entrepreneurs and investors in a region generally relied upon by aggregate studies.

Now this thesis turns to the ratio of entrepreneurs and investors to see if there are clues as to which group is more important to the entrepreneurial outcome in each region. The frequency data for each of the social capital categories for each region presented in Table 6 suggest a direct relationship between investor and entrepreneurial networks and successful firm births in the sample regions. The ratio of total entrepreneurs to total investors ranges from between 81%:19% in the developing region of RTP to 86.6%:13.4% in successful Silicon Valley. Although the variance is too small to conclude much from this outcome, it suggests that successful entrepreneurial regions may have larger concentrations of entrepreneurs relative to investors. The sum total of entrepreneurs to investors, when put in the context of regional population size and relative success in firm births, suggests perhaps a stronger effect. Seattle and San Diego stand out as having the largest entrepreneurial and finance networks as a share of population.

Interestingly, while the total entrepreneurial network is generally comprised of 85% entrepreneurs and 15% investors, dealmaker investors outnumber dealmaker

entrepreneurs in all successful economies. Silicon Valley, for example, has 380 dealmaker investors or 60% of this category compared to 257 dealmaker entrepreneurs (the remaining 40% of the category). Combining all dealmakers, the distributions in all 12 regions are roughly equal between investors and entrepreneurs with investors as a share of dealmakers increasing as ties increase, suggesting the relative importance of finance relationships among dealmakers in the entrepreneurial network.

This effect is better isolated in Table 7, which displays the data normalized by the total number of entrepreneurial companies in the sample region. The numbers represent a ratio of the number of actors in each category to the number entrepreneurial companies in the region. The two regions exhibiting the greatest success in new firm births—San Diego and Seattle—show relatively higher ratios of total investors and total entrepreneurs per company than other regions: .672 investors and 3.585 entrepreneurs in San Diego, and .596 investors and 3.224 entrepreneurs in Seattle. This reflects the same pattern shown by the two successful reference regions: Silicon Valley (.591:3.362) and Boston (.672:3.646). Austin, also a successful entrepreneurial economy, exhibits a similar pattern in terms of investors per company (.698:3.234) but has a relatively smaller share of entrepreneurs per company than the other successful regions cited here.

In absolute terms, the structure of social capital networks is discernibly different among the four *successful* entrepreneurial economies of Silicon Valley, Boston, San Diego, and Seattle. Most notably, in all four categories of network actors there are a higher number of actors with three or more concurrent firm ties. This suggests that dealmakers are more prevalent in successful entrepreneurial economies than in less successful ones. This appears to be the case particularly among professional investors and parallel investors, who show a greater number of entrepreneurial firm ties per investor in successful regions than in less successful regions.

Table 8 normalizes the data by reporting each category of social network actor as a percentage of total network actors in the region. This facilitates a cross-sample comparison of actors with multiple firm ties in all four dealmaker categories on a percentage basis for the total network. For example, dealmakers with ties to three or more entrepreneurial firms in a region represent 4.49% of total investors and entrepreneurs in Silicon Valley, 2.88% in Boston, 1.67% in Seattle, 1.99% in San Diego, and 1.19% in Austin. In the remaining regions, which are also among the lowest performers in the sample in terms of firm births, less than .93% of actors and entrepreneurs function as dealmakers, ranging from this frequency in Salt Lake City to .36% in Orange County. The same patterns emerge when looking at more advanced dealmakers who have ties to four or more entrepreneurial firms in a region: Silicon Valley and Boston have 2.04% and 1.17%, respectively, in this category; San Diego has .64%; Seattle has .67%; and Austin has .48%, while the remaining regions vary from Denver at .41% to Phoenix at .15%.

Regions that are most successful in generating new firm births also have higher concentrations of dealmakers in their entrepreneurial networks. While these results are not definitive, the data suggests that regions with greater firm births derive a higher portion of their dealmakers from parallel and professional investors, suggesting perhaps that a more robust finance infrastructure may be important for developing successful entrepreneurial economies. As exhibited in Tables 6 through 8, there is considerable variation across regions in the counts and prevalence of each social capital type, though they are not proportional, nor do they vary with population. This suggests that network actors with multiple firm ties may be a more reliable indicator of entrepreneurial success in a region.

Table 9 summarizes the total number of dealmakers by social capital type and then presents the total number of actors per average firm birth in 2003-2007. To control

for fluctuations in the economic conditions for each region, the snapshot data of social capital composition in a given region is compared to firm births averaged over 2003-2007 and summarized in Table 9. Looking first at annual firm births, it is clear that Silicon Valley earns its reputation as a successful entrepreneurial economy. Its annual average of 282.8 firms born was considerably higher than the other sample regions, including its larger entrepreneurial counterpart, the Boston region, which produced 96 new firms on average per year. Interestingly, Phoenix and Minneapolis (19 and 14.6 firms per year respectively) are comparatively anemic in firm births despite their relatively large metropolitan populations, while Portland, Salt Lake City, and RTP are roughly equivalent in both population and births (13.2, 15.6, and 15.2, respectively). Seattle, San Diego, and to a lesser extent, Austin stand out among the comparison regions for having greater success in generating firm births relative to their population sizes.

The dealmaker ratios normalized by average firm birth, presented at the bottom of Table 9, show a clear distinction between the ratio of dealmakers to new firms among the successful economies of Silicon Valley and Boston and among the 10 remaining sample regions. The normalized data clearly show an association between the prevalence of dealmakers and firm births in San Diego, Seattle, and Austin that are more consistent with the results in Silicon Valley and Boston.

In virtually every category of social capital (normalized for average firm birth), dealmakers are more highly represented among the successful economies and less so in the unsuccessful ones. However, in the two model economies, Boston and Silicon Valley, there are generally two dealmakers per average firm birth (1.94 and 2.25 respectively), while in the other successful economies, there is one dealmaker (0.76 in Seattle, 0.97 in San Diego, and 0.56 in Austin). The remaining economies have considerably less than .5 dealmakers per average birth, with the exception of Minneapolis which has .89, perhaps explained by its relatively sparse network and poor

birth results relative to other regions its size. Their relative larger prevalence of dealmaker capital suggests that perhaps the entrepreneurial regions of San Diego and Seattle may be the best prepared to develop into the next model successful entrepreneurial economies should the dealmaker hypothesis prove to be valid after more extensive empirical scrutiny.

Correlations

Table 10 presents a correlation matrix of all categories of social capital and average firm birth. The correlation matrix shows simple correlations among six study variables: three measures of aggregate social capital (total network, all entrepreneurs and all investors), two variables relating to structured social capital (dealmakers with three and four ties respectively), and new firm births, the outcome variable of interest.

Table 10. Summary Correlation Matrix

| | Total Network | Entrepreneurs | Investors | Dealmakers (3 ties only) | Dealmakers (4 + ties) | New Firm Births |
|----------------------|---------------|---------------|-----------|--------------------------|-----------------------|-----------------|
| Total Network | 1.000 | | | | | |
| Entrepreneurs | 0.992 | 1.000 | | | | |
| Investors | 0.917 | 0.035 | 1.000 | | | |
| Dealmakers (3 ties) | 0.473 | 0.958 | 0.129 | 1.000 | | |
| Dealmakers (4+ ties) | 0.374 | 0.468 | 0.035 | 0.958 | 1.000 | |
| New Firm Births | 0.161 | 0.253 | -0.054 | 0.848 | 0.935 | 1.000 |

The correlation matrix exhibits a progressively stronger set of correlations between the various categories of social capital and average firm birth as they progress from the aggregate entrepreneurial network to the structured network of dealmakers and increase again as the number of ties increase. The correlation between the aggregate network and new firm births is weakly positive at .1612, while aggregate entrepreneurs alone are a little better positively correlated at .253. Aggregate investors alone are negatively correlated at .054. The negative correlation for single-tie investors in the aggregate network suggests that investors with limited ties are not positively associated with new firm establishments. For structured social capital measures, the correlations are

progressively stronger, reported at .848 for dealmakers with three concurrent ties and improving to .94 for dealmakers with four or more concurrent connections.

Notably, the weakest correlations are among social capital categories that the current literature associates with the aggregate entrepreneurial network (i.e., entrepreneurs and investors with one firm tie) and average firm birth. This suggests that dealmakers are a better indicator of firm birth than measurements of an aggregate entrepreneurial network, as is now advocated in the literature. In general, dealmakers with four or more ties are better correlated than the dealmakers with only three ties, and the general entrepreneurs and investors in the total network with a single tie, suggesting that the concept of dealmakers is perhaps a better measure of successful entrepreneurial economies and their ability to promote the birth of new firms.

While causal relationships cannot be confirmed by a correlation matrix, Table 10 does suggest that dealmakers are perhaps more closely correlated to average firm birth than aggregate social capital measures comprised of single-tie entrepreneurs and investors currently advocated and emphasized by the aggregate social capital literature.

Social Network Component Analysis

Component analysis is widely used to compare the effects of aggregate density relative to the degree of interconnectivity and cohesiveness and of complex networks (Angelusz & Tardos, 2006; Boschma & Wal, 2005; Huisman & Wissen, 2004; Kalish & Robins, 2006). These data and the associated visualizations (in the appendices) allow for an easier comparison of whether new firm births in a region are more closely associated with total networks of entrepreneurs and investors or with the subset of a region's actors exhibiting dealmaker characteristics.

An empirical component comparison is presented in Table 11, with accompanying social network diagrams presented in the Appendices A-C showing the

same network decomposed from the aggregate to the dealmaker networks, as reflected in this study's conceptual model, as follows:

Component Analysis for Aggregate Social Capital: compares the primary cluster of associated actors and firms and the range of firm-actor ties in the region that are disassociated from the main cluster to show the degree of cohesiveness in regional networks among entrepreneurs and investors through firm ties

Component Analysis for Dealmakers: filters the full component network of entrepreneurs and investors to show only those individuals with more than three concurrent firm ties, showing the degree of cohesiveness among dealmaker-related social capital

Results are arrayed from left to right by regional population size to facilitate regional cross-comparison of total social capital networks and the subset of those networks classified as dealmakers.

The component analysis comparing the aggregate entrepreneurial network and the dealmaker network for each of the 12 sample regions is shown in Table 11. A component analysis displays the relative distribution of interconnected and disassociated

Table 11. Component Analysis: Aggregate Versus Dealmaker Network

| Total Network | | | | | | | | | | | | |
|--------------------------|--------|----------------|---------|---------|-------------|--------|--------|-----------|----------|----------------|--------|--------|
| | Boston | Silicon Valley | Phoenix | Seattle | Minneapolis | Denver | Orange | San Diego | Portland | Salt Lake City | RTP | Austin |
| Total Nodes | 18273 | 36111 | 3067 | 6373 | 4314 | 5145 | 6509 | 7983 | 2381 | 2631 | 2867 | 3616 |
| Nodes in Primary Cluster | 12509 | 28419 | 293 | 3470 | 1649 | 1839 | 663 | 4505 | 837 | 943 | 1386 | 1458 |
| Associated Nodes | 68.46% | 78.70% | 9.55% | 54.45% | 38.22% | 35.74% | 10.19% | 56.43% | 35.15% | 35.84% | 48.34% | 40.32% |
| Secondary Component Size | 33 | 41 | 86 | 37 | 74 | 43 | 345 | 45 | 45 | 27 | 27 | 56 |
| Tertiary Component Size | 22 | 27 | 49 | 33 | 47 | 35 | 114 | 33 | 39 | 27 | 20 | 44 |
| All Other Components | 1039 | 1624 | 393 | 488 | 436 | 509 | 808 | 570 | 264 | 259 | 207 | 307 |
| Dealmaker Network (3+) | | | | | | | | | | | | |
| | Boston | Silicon Valley | Phoenix | Seattle | Minneapolis | Denver | Orange | San Diego | Portland | Salt Lake City | RTP | Austin |
| Total Nodes | 2466 | 6897 | 126 | 613 | 325 | 307 | 248 | 722 | 98 | 146 | 149 | 333 |
| Nodes in Primary Cluster | 2419 | 6885 | 47 | 582 | 312 | 271 | 135 | 650 | 89 | 95 | 111 | 303 |
| Associated Nodes | 98.09% | 99.83% | 37.30% | 94.94% | 96.00% | 88.27% | 54.44% | 90.03% | 90.82% | 65.07% | 74.50% | 90.99% |
| Secondary Component Size | 7 | 4 | 12 | 7 | 5 | 6 | 16 | 11 | 5 | 20 | 12 | 5 |
| Tertiary Component Size | 4 | 4 | 10 | 6 | 4 | 5 | 13 | 5 | 4 | 10 | 10 | 4 |
| All Other Components | 36 | 4 | 57 | 19 | 4 | 25 | 84 | 56 | 0 | 21 | 20 | 21 |

nodes in the total network. If a node is disassociated, it does not possess a tie to the largest cluster of commonly associated nodes in the network and is isolated. In the

context of this analysis, this means that the actor is not part of a cohesive central cluster and is isolated from the main network of actors in the entrepreneurial network.

If dealmakers serve to mediate aggregate networks, this analysis expects that regions with substantial dealmaker social capital would have higher ratios of associated clusters versus disassociated clusters. Dealmakers would possess common ties to the primary entrepreneurial network in the region and therefore be counted among the associated clusters. Table 11 presents the total nodes in each network (as a measure of density) and the number of nodes associated with the primary cluster (the primary interconnected cluster as a measure of cohesiveness). A simple percentage is calculated as a crude measure of the degree of cohesiveness in the network, with a higher percentage indicating that a greater number of actor nodes are interconnected with one another as a percentage of total nodes. This is a simple way to measure the degree of density and cohesiveness of both the region's aggregate and dealmaker networks and compare it against the region's success in firm foundings.

There appears to be a relationship between regions with more firm births and regions with a high degree of cohesiveness measured by associated nodes among the aggregated network—for example, Silicon Valley, with 78.7% of nodes associated, and Boston, with 68.5% associated. Moreover, San Diego and Seattle, the next most successful regions in establishing new firms, show the next highest degree of associated nodes, at 56.4% and 54.5%, respectively. However, when considering the same data for the dealmaker networks, these successful regions exhibit even greater associated node cohesiveness. It is striking that while Silicon Valley has the highest cohesiveness in the aggregated network (at 78.7%), that it has almost a completely cohesive dealmaker network at 99.83% associated nodes. This simply means that dealmakers in Silicon Valley are virtually all connected in a common network, with very few exceptions. This can't be said of the region's aggregate network. This suggests that there is a great deal

of interconnectivity and cohesiveness among dealmakers in successful economies, more so than in the aggregate network. Boston follows a similar pattern with 98.09% associated, as does Seattle, San Diego, and Austin—all above 90%.

Perhaps counter intuitively, the regions with lower comparative cohesiveness in the aggregate networks, namely Minneapolis and Portland, show very high cohesiveness among the dealmaker network. The way to perhaps resolve this paradox is to consider the density of these networks. While these aggregate networks are not cohesive, they are also comparatively small and less dense networks given their population size. Some communities have small aggregate networks, but they appear to overcome this by establishing highly interconnected albeit small dealmaker networks. This intuitively makes sense, as these two communities have anecdotal reputations of being very close-knit.

Two regions stand out for having small primary clusters: Phoenix with 9.6% of nodes associated and Orange County with 10.2% associated. As might now be expected, the two regions with the highest percentage of associated nodes also have the largest shares of dealmakers within their total entrepreneurial networks. Conversely, regions with the lowest percentage of associated nodes also have the smallest shares of dealmakers. The large metropolitan areas of Minneapolis, Denver, and Orange County have less densely associated networks than the RTP and Austin regions, which are comparatively smaller. Three regions—Portland, Salt Lake City, and Orange County—appear to be in the bottom quartile of the sample in terms of network density and in the degree of interconnectedness and cohesiveness among actors in the entrepreneurial network's main cluster.

The regional variation in network density is especially dramatic when viewed through the networks of dealmakers. Most notably, the reference regions of Silicon Valley and Boston display significantly denser, more cohesive, and interconnected

associated networks than less successful regions. The density and interconnectedness of a network do not seem to vary with population either. For example, Phoenix is the third-largest metropolitan region in the sample, but its network is the least dense and interconnected in the sample.

Silicon Valley and Boston's dealmaker networks exhibit both high density and extraordinarily high cohesiveness in comparison to their aggregate networks, both exhibiting a large cohesive central cluster. Seattle and San Diego share characteristics and networking patterns similar (though on a comparatively lesser scale) to Boston, suggesting that these developing regions may be best situated to build a leadership position similar to that of Silicon Valley, given their social capital composition. However, comparatively speaking, Seattle and San Diego's combined dealmaker populations are less than one-quarter the size of Boston's, and less than 10% of the size of Silicon Valley's. Indeed, in many of the regions in the sample—most notably Phoenix, Orange County, and Portland—one could convene a sample of combined dealmakers around a conference table.

In advanced entrepreneurial regions such as Silicon Valley and Boston, as well as in the emerging economies of San Diego and Seattle, dealmakers appear connected to one another through common firm-actor ties in one primary cluster. But in less developed economies, the dealmaker networks are not commonly connected and are often split into many firm-actor sub-clusters. Less successful entrepreneurial networks appear to exhibit less cohesiveness and greater fragmentation among their dealmakers. This substantial variation in the dealmaker social capital networks (a great deal more pronounced than in the aggregate networks) and in their degree of interconnectivity and cohesiveness follows the correlation with firm births presented earlier.

This suggests that, as a refinement of existing theories of social capital networks, the prevalence of dealmakers in a region is a better indicator of entrepreneurial success

than a measure of aggregate networks of entrepreneurs and investors. The frequency data on aggregate entrepreneurial and investor social capital—both actual and normalized—suggest clearly that strong entrepreneurial and investor networks are associated with successful entrepreneurial economies, serving to confirm current theory. The proposition that successful entrepreneurial economies, as measured by high rates of firm births, are associated with structured social capital and dealmakers exhibiting strong serial and mediation characteristics are *also* supported by this analysis, suggesting a new structural dimension be added to update existing theory.

There is considerable variation across regions in the number and share of each social capital type. While the ratios do not vary enough to make strong claims, patterns exhibited in all sample regions suggest that successful entrepreneurial regions have more entrepreneurs than investors and more of both than less successful regions. This finding suggests that *existing* theories emphasizing the presence of both entrepreneurial and investor social capital are valid in explaining successful entrepreneurial economies. If causality could be asserted in this case study, it would serve to moderately confirm the hypothesis. This analysis lends credibility to the body of theory that associates regional entrepreneurial outcomes to aggregate networks of entrepreneurs and investors. For example, Silicon Valley's social network appears to be about five times denser than San Diego's and two times denser than Boston's, based on the total number of ties among entrepreneurs, investors, and firms.

However, the findings of dealmaker capital suggest that structured social capital should be incorporated into current views of social capital. For example, the dramatic difference in the prevalence of dealmakers between the two reference regions—Boston and Silicon Valley—and the other subject regions indicates a substantial structural difference between the social capital networks of advanced successful entrepreneurial economies and networks in less developed regional entrepreneurial economies. The

frequency and normalized data on dealmakers clearly demonstrate that all four social capital categories are associated with successful entrepreneurial economies.

The correlation analysis reinforces this comparative empirical analysis, showing a higher association between dealmakers and firms births than with aggregate entrepreneur and investor networks. This correlation improves when comparing dealmakers with three ties and average firm births, and it improves even more when comparing classes of social capital among dealmakers with four or more ties. This suggests that firm births may be more associated with a prevalence of dealmakers and especially *better-connected* dealmakers than with the aggregate network of entrepreneurs and investors. This lends support to the proposition that dealmakers may play a role in the success of entrepreneurial network, and may therefore serve as a better indicator of successful entrepreneurial economies than the aggregate social capital indicators.

Indeed, some of the least successful and anemic entrepreneurial economies in this study have so few dealmakers that they could gather in a single room. The dealmakers in Silicon Valley and, to a lesser extent, in Boston, would fill a metropolitan arena. The findings in this study validate the base of existing theory while also suggesting a refinement: The dealmakers among a region's social capital network may, in fact, serve as a more promising indicator variable for the success of entrepreneurial economies in generating high rates of firm births than the aggregate measures currently advanced in the literature.

The task of the social network component analysis is to test the proposition of the current literature that successful entrepreneurial economies are associated with dense, cohesive, and interconnected concentrations of entrepreneurs and investors. Consistent with the social capital analysis, the regions with the greatest success in producing firm births also possess the densest and most cohesive and interconnected network clusters.

But density and cohesiveness do not vary together in all cases. The cohesiveness of a dealmaker network appears to be a strong indicator of the success of an entrepreneurial economy when combined with a dense network. But the findings also suggest that limited density of social capital can perhaps be overcome with improved cohesiveness among dealmaker social capital. Thus, the social network component analysis supports the assertion that regions whose investors and entrepreneurs are more densely interconnected are more successful in generating firm births, but those with cohesive dealmaker networks are perhaps even more successful.

The component analysis further suggests that the degree to which a region benefits from a common, dense, and cohesive entrepreneurial cluster is related to the number of dealmakers found in the region. The differences in prevalence and interconnections in the sample regions among actors in the aggregate entrepreneurial network and in the dealmaker networks are substantial. The dealmaker analysis is even more strongly correlated, given the degree of difference exhibited region to region. When considering the dealmaker networks, the progression from an RTP to a San Diego to a Boston to a Silicon Valley is likely more of an exponential progression than a linear one, such as that exhibited in the aggregate data. Moreover, large metropolitan areas such as Phoenix, where dealmakers are scarce, will likely have a more limited core of assets and social capital on which to build. The distributions of dealmakers in the sample economies suggest that the most likely regions to emerge as *the next Boston* are San Diego and Seattle respectively. Even Boston must evolve to become the next Silicon Valley, which has established both the densest and most cohesive network of dealmakers among the sample regions.

While the dealmaker concept borrows heavily from existing theory on serial entrepreneurship (with individuals with deep experience), mediation and brokerage, this notion of the dealmaker and the cohesive milieu the dealmakers establish collectively in

a regional economy, transcends current concepts of seriality and cohesiveness currently articulated in the literature and combines them into a new, researchable phenomenon.

While it is not possible in this thesis to uncover the causal mechanisms that explain specifically how dealmakers influence firm births, these findings support the proposition that dealmakers are an important, if not critical, ingredient in successful entrepreneurial economies. Dealmakers possess extensive experience in building, advising, and operating entrepreneurial firms or in financing them. While these skills are necessary to build an individual high-growth entrepreneurial venture, connections among actors in the entrepreneurial network may facilitate access to these skills among a wider range of firms. Moreover, because a dealmaker's span of control exceeds a single entrepreneurial firm, his or her connections may facilitate diffusion of the information, experience, and expertise that is required to develop high-growth entrepreneurial ventures.

The next chapter will look more closely at the bridging and mediation characteristics, firm ties, and career histories of dealmakers in this study's sample, paying particular attention to traits or positions that suggest these actors play a brokering or mediating role in the network that could improve entrepreneurial outcomes. While this thesis has now uncovered an insight that dealmakers may play a critical role in the success of entrepreneurial economies, the next task will be to uncover the mechanisms through which dealmakers contribute to and perhaps mediate the regional social capital network, a concept that will be explored in more detail in the next chapter.

CHAPTER 6

QUALITATIVE ANALYSIS OF RTP DEALMAKERS

The role dealmakers play in mediating a region's entrepreneurial network requires a more in-depth analysis. Taking the entrepreneurial network of North Carolina's RTP as an empirical context, this chapter identifies through the firm- and board-interlock approach the most central dealmakers in this region to study in-depth how these actors mediate relationships between entrepreneurs and investors. The analysis specifies their professional origins and career development paths and profiles the typical characteristics that blend the functions of both the entrepreneur and the investor through an enhanced dealmaker role in a regional economy.

RTP offers a rich empirical setting for a qualitative case study of dealmakers in social capital networks. The RTP region is home to the oldest and largest research park in the world. The region has developed one of the highest concentrations of high-technology employment of any region in the United States and is regarded in the regional development literature as a model of a planned technology region (Luger & Goldstein, 1991). Among a sample of 12 regions in the United States most cited for entrepreneurial success, described in Chapter 5, RTP is the third highest cited. RTP exhibits the largest aggregate entrepreneurial network per company formed both in terms of the number of entrepreneurs and investors per company of any region in the sample per firm birth, as seen in Table 12.

Table 12. Number of Actors by Social Capital Class per Company (Normalized)

| (Per Total Companies) | Raleigh Area | Bay Area | Boston Area | Seattle Area | San Diego | Salt Lake City Area | Portland Area | Phoenix Area | Orange County | Minneapolis Area | Denver Area | Austin Area |
|-----------------------|-----------------|----------|----------------|-----------------|-----------|------------------------|------------------|-----------------|------------------|---------------------|----------------|----------------|
| Total Entrepreneurs | 4.157 | 3.425 | 3.793 | 3.290 | 3.667 | 3.047 | 3.009 | 2.835 | 2.750 | 2.866 | 2.922 | 3.302 |
| Total Investors | 0.803 | 0.457 | 0.525 | 0.530 | 0.590 | 0.502 | 0.453 | 0.447 | 0.457 | 0.446 | 0.498 | 0.630 |
| Total People | 4.961 | 3.881 | 4.317 | 3.820 | 4.257 | 3.549 | 3.462 | 3.282 | 3.207 | 3.312 | 3.420 | 3.932 |
| Total Dealmakers (3+) | 0.043 | 0.174 | 0.124 | 0.064 | 0.085 | 0.033 | 0.022 | 0.022 | 0.012 | 0.043 | 0.031 | 0.047 |

RTP has a heavy endowment of general entrepreneurial social capital per company but an average number of dealmakers among the sample regions (the subject of this dissertation's interest). This distribution suggests that while the aggregate RTP entrepreneurial social capital network is more extensive than other regions, it has been less successful on a per-firm basis than other regions despite its large aggregate network and lags behind more successful regions in the number of dealmakers per company formed. RTP has fewer dealmakers per company than six of the 12 study regions—the median for the sample.

To establish some context based on the author's experience working in the RTP entrepreneurial network, RTP has the reputation of having a substantial base of technological innovation to draw from; but it has a less mature social capital framework of entrepreneurs to draw from to form companies based on this advantage. That reputation notwithstanding, RTP benefits from a strong cadre of leaders who have sought to encourage the development of entrepreneurial social capital and networking. Case in point, RTP is home to the largest entrepreneurship networking organization in the United States, the Council for Entrepreneurial Development, whose charge is to organize and internetwork the region's entrepreneurs. This success is evidenced by the broad aggregate entrepreneurial and investor network suggested in Table 12.

However, these efforts have not resulted in as strong an outcome in terms of new firm births—the proxy for successful entrepreneurial economies—with well-below average results among the sample regions. This large endowment of social capital per company in RTP has not resulted in a leading position for the region in its firm birth

results, leading only Portland in the actual number of firms formed within the sample as shown in the firm birth data reported earlier in Table 4. Nevertheless, the relative growth of the number of firms formed in RTP have been consistently growing in absolute terms over the period 1984-2004, as shown earlier in Figure 2. A reason for this apparent paradoxical result may be RTP's relatively small share of dealmakers. While RTP has the largest aggregated network of single-tie actors per firm, it has a below-average number of dealmakers per firm, higher than only five other regions in the sample (the median), as shown in Table 12. The combination of the highest aggregate network, an average dealmaker network, and low firm birth results make RTP a fertile region to examine the nature of dealmakers and their role in supporting entrepreneurial economies.

Dealmaker actors are hypothesized to be centrally involved in supporting the birth and formation of entrepreneurial ventures in regional economies as described in Chapter 4. This analysis studies these unique actors in the network and their characteristics, relationships, and roles in the formation of new high-technology firms. This analysis specifically explores where dealmakers originate: Do they arise from a network's community of entrepreneurs, from its community of investors, or do they perhaps cross these functional boundaries to blend characteristics of each? It tests this question by first identifying the career origins and professional pathways of dealmakers in the RTP region of North Carolina to assess if they can be classified neatly as either entrepreneurs or investors. Second, it investigates how RTP's population of dealmakers plays a mediating role between the region's entrepreneurs and investors by identifying central dealmaker-brokers in the network by computing the actors with the highest betweenness centrality in the network. Finally, it profiles characteristics that are common among RTP dealmakers to begin what it is hoped will become a larger conceptual and

empirical discussion about the role of dealmakers as embedded actors in a networked system, and about their impact on the success of entrepreneurial regions.

Content Analysis Modeling Dealmaker Professional Careers

As a first step in this analysis, a content analysis is performed on the biographical data of all RTP dealmakers in the sample, and a position analysis is performed to show an exhaustive set of positions held by all dealmakers and the career progressions derived from the sequences of these positions. This analysis serves two purposes: (1) It establishes the dealmaker's current position at the time the snapshot data was compiled, and (2) it provides a set of career progressions common to dealmakers based on synthesizing the reported biographical history of each actor. The use of position analysis in career progressions in qualitative research is well established in organizational theory and is frequently applied in the entrepreneurial setting (Lawrence, 1990; Poole, VandeVen, Dooley, & Holmes, 2000; VandeVen & Poole, 1995). Indeed, rational choices by actors are seen by Pescosolido (1992) as a function of the career history of actors embedded in complex network interactions. Actors' positions in the network are defined by their career progressions, which influence their centrality in the network and their potential for brokerage and boundary spanning to influence the network (Sundararajan, 2008). By studying dealmakers through their histories and their embedded roles in the context of the network, clues may be inferred as to their influence on the establishment of entrepreneurial firms and the underlying supportive entrepreneurial milieu.

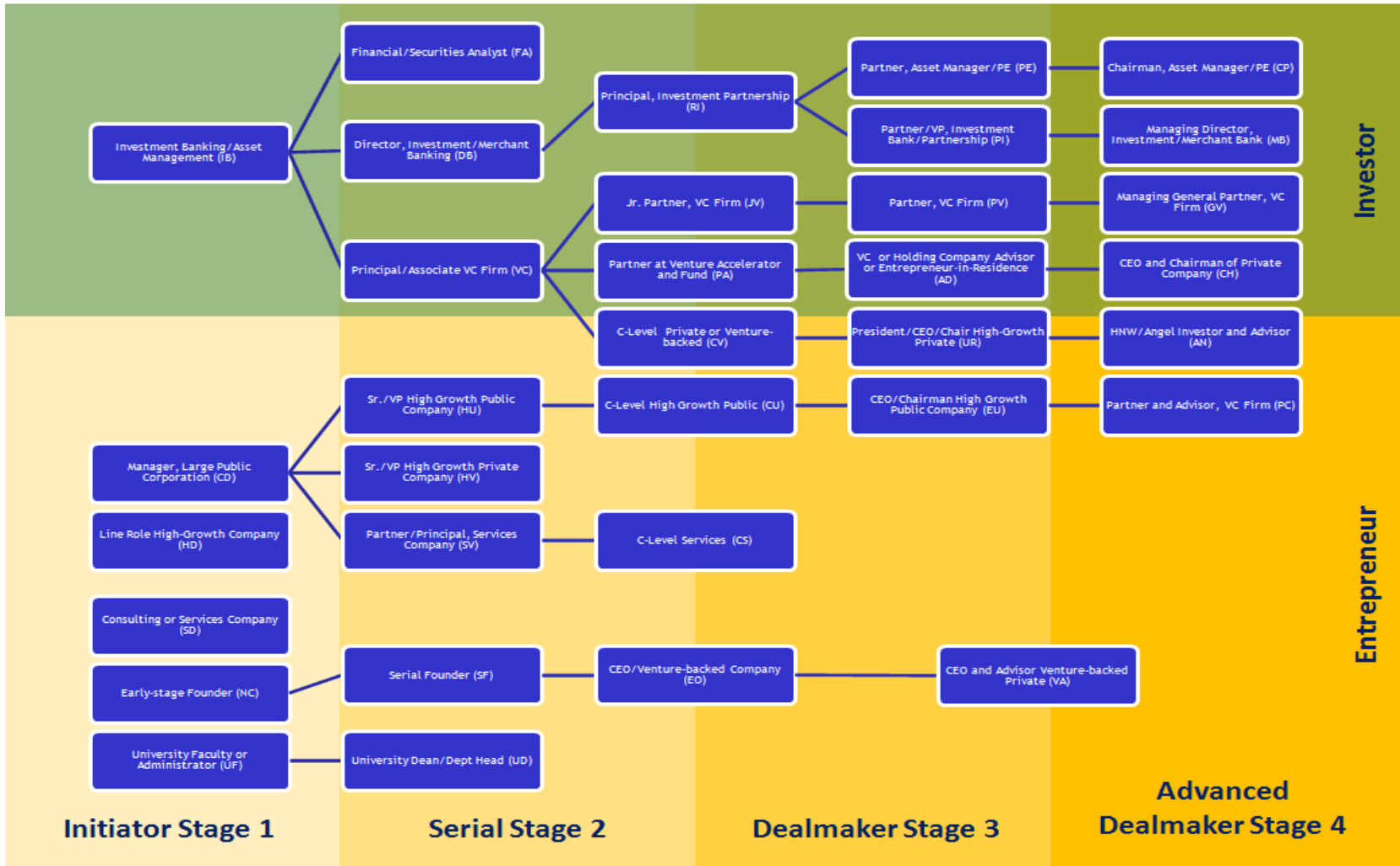
Data detailing all entrepreneurial firm ties in RTP on December 18, 2009 were collected from CapitalIQ and segmented with an algorithm to identify actors with three or more concurrent board and officer ties in the region. (A complete description of the identification process can be found in Chapter 4.) Complete biographical sketches were collected from these individuals to document their chronological professional histories. The actors identified by the algorithm meet the definition of dealmaker (with three or

more concurrent entrepreneurial firm ties) described earlier. On December 18, 2009, this analysis yielded 20 dealmakers in RTP with four or more ties and 42 dealmakers with three ties only that were selected for content analysis. While these actors were analyzed as a combined set, the distinction in the number of ties was retained to see if those with higher firm-tie concurrency played a different role than those who met the definition of dealmaker with only three concurrent ties. The full sample of network actors in the RTP network contain 3,491 individual actors with board and officer ties, including 206 actors with at least two firm ties and 3,223 actors with a single firm tie.

In order to establish the universe of positions and progressions exhibited by the dealmakers in RTP, a content analysis is constructed from the universe of all biographical sketches for RTP dealmakers, with the positions arrayed according to the career progressions documented in the biographical sketches to account for every variation of position and progression in the sample, as shown in Figure 5. An intuitive two-character code is assigned to identify each position title included in the career progressions described in the biographical sketches of all dealmakers. Individual actors' positions are coded based on the career progressions indicated by their chronological biographies. If career steps within typical progressions were either jumped (meaning the actor bypassed a typical intermediate step in a ladder) or were omitted in the biography, the step is coded as a jump. If an individual has advanced to the dealmaker stage (with three concurrent firm ties) but has not advanced beyond three ties, the remaining position steps are left blank to represent that person's career status at time the data were collected.

The content analysis yields 34 unique positions at various stages in the progression from initiator to dealmaker. While the working titles of these positions vary slightly, there is general uniformity in the scope, focus, and span of control represented

Figure 5. Dealmaker Position Career ProgreSSION Models



by each individual position. The titles assigned to identify all positions in the career progression models (Figure 5) closely fit all positions identified through the biographical analysis, serving to validate the functionality of the final position models used for the social network analysis.

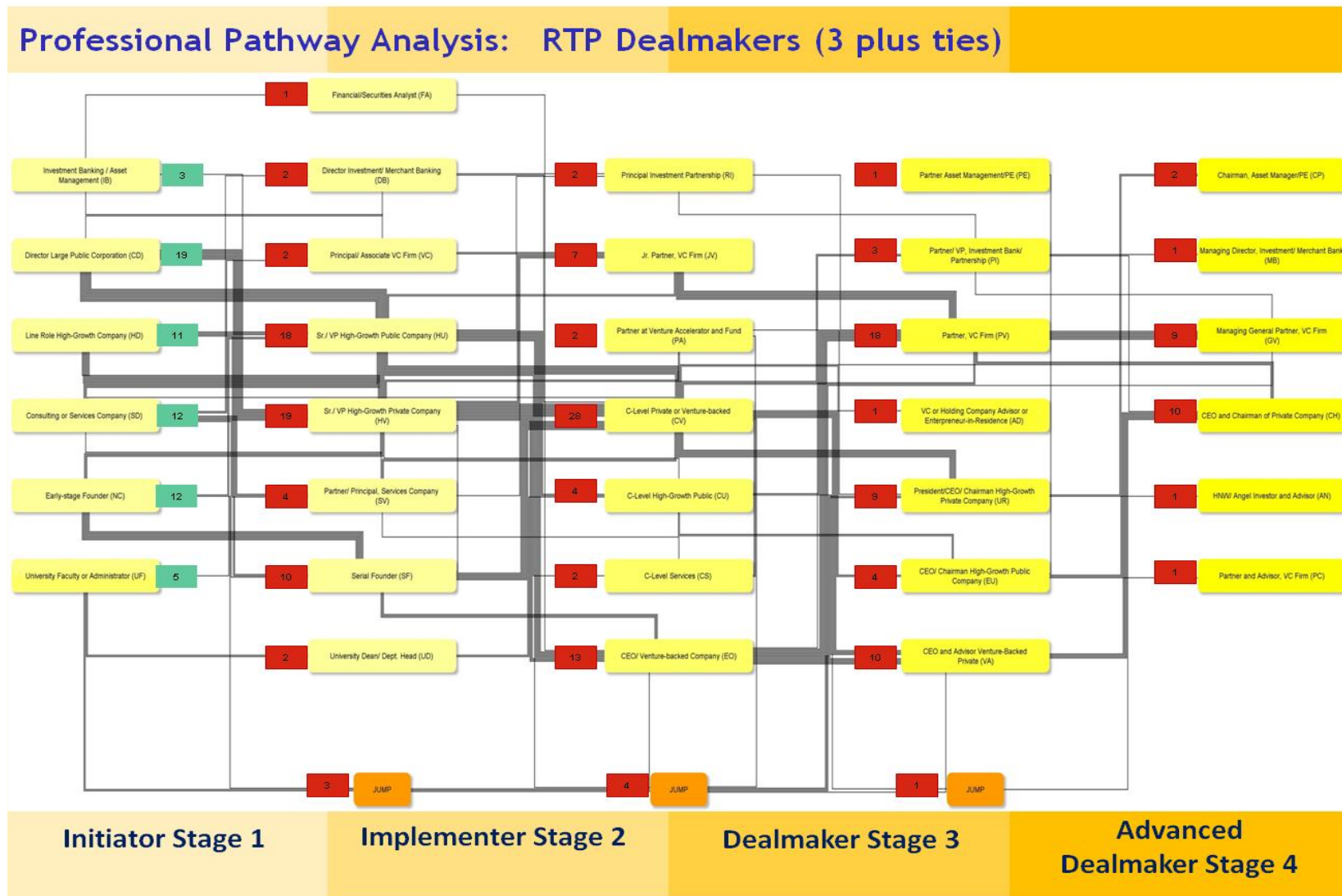
The positions, in a standardized career progression, are arrayed across four career stages through which actors generally progress, from early career stages when they may initiate entrepreneurial activity in a single firm (the initiator stage), to the stage when they are fundamentally involved in the daily operations of one or more firms (the serial stage), to senior positions when they exhibit a span of control beyond a single firm (the dealmaker stage), and finally to the stage when they exhibit influence over multiple firms concurrently (the advanced dealmaker stage). The position sequences were also arrayed into two mutually exclusive categories corresponding to the conceptual model, with investor-related positions at the top and entrepreneurial-related positions at the bottom. This classification scheme allowed for testing whether the career profiles fit neatly into an entrepreneurial or investor classification, as suggested in the aggregate literature.

A social network analysis is then performed on the coded RTP dealmaker data (both position progression and full social network) to identify whether the career progressions and profiles identified in the prior literature hold or if new insights can be gathered from a micro simulation on the data. The first social network manipulation maps the professional progressions using a pathway analysis displayed in Figure 6, which records the frequencies of each pathway indicated from the chronological biographical record based on the data coded in the career progression analysis previously undertaken.

Career path models have been established as a researchable concept within the field of organizational development, specifically applied to researching actors in the

Figure 6. Pathway Analysis: Dealmakers

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context of entrepreneurial firm development (Buttell, 2009; DeMartino & Barbato, 2003; Douglas & Shepherd, 2000; Fayolle, 2005). A pathway analysis is conducted of all career progressions for the RTP dealmakers. Pathway analysis is a network modeling approach that allows for biographical data to be reconstructed visualizing career pathways in the same chronological order as presented in the career histories of all actors. It should be noted that this method is not being used in this analysis to evaluate an actor's history as a time-series phenomenon, but it is used instead to reconstruct biographical data collected for actors at one point in time and assess their career progressions historically. The data set of dealmakers provides a common and consistent set of complete biographical sketches for each actor. A common career pathway is developed for dealmakers to show cumulative effects as entrepreneurial actors reach their career pinnacles. Following the career progressions of dealmakers from their earliest to ultimate positions, this analysis outlines a set of positions that represents the typical career paths of dealmakers.

A pathway analysis of RTP dealmakers (aggregated to establish a larger and more significant sample) shows that the most frequent pathways originate and progress through C-level management roles in both public and private companies (20:62 or 32%) as opposed to originating through finance (3:62 or 5%) or through start-up entrepreneurship (12:62 or 19%). C-level is a term used commonly in private firms to describe the senior managers of an entrepreneurial firm, as their titles contain the word *chief*, as in Chief Executive Officer, Chief Financial Officer, Chief Information Officer, Chief Marketing Officer, etc. These actors play an executive role with a significant span of control and represent key actors in their industries, and they are often compensated by receiving ownership equity (shares of the firm's stock) in the firm. The most common pathway trends may be modeled as follows:

Manager, Large Public ▷ Sr. Manager, Growth Private ▷ C-Level, Private ▷ Chair, Large Private

with the next most frequent pathway modeled as follows:

Mgr, Hi-Growth ▷ Sr Mgr, Growth Private ▷ C-Level, VC-Backed ▷ Partner, VC ▷ Mg. Prt, VC Firm

A related set of actors follow this same path but initiate their careers in the service industry, generally in a consulting or accounting firm that supports high-growth ventures.

The third most likely pathway begins with the founder of an entrepreneurial firm who becomes a serial founder, then generally by his or her second or third venture is working more closely with venture capital, and either becomes CEO of a venture-backed portfolio company or joins the VC firm as a partner or advisor. This path may be modeled as follows:

Early Stage ▷ Serial Founder ▷ CEO, Venture Backed ▷ Partner/Advisor, VC Firm

This path suggests that as founders build credibility, competence, and probably most importantly, a successful track record in building entrepreneurial firms, they are sought by equity investors both for their expertise and for their management acumen in leading venture-backed enterprises with larger capitalization.

A small but not inconsequential number of dealmakers are derived from highly specialized technical backgrounds. They begin their careers as researchers, a path which may be modeled as follows:

University Faculty ▷ University Department Chair or Dean ▷ CEO, Venture Backed ▷ CEO, Chair

All RTP dealmakers who emerge on this pathway come from life sciences backgrounds and build successful companies around their specific scientific expertise, all of whom capitalize their enterprises through venture capital investments. As the firms grow, they develop board ties and likely invest in similar companies in the same scientific domain. Unlike the group of dealmakers who become affiliated directly with VC firms and serve as CEOs of venture-backed portfolio companies, most of these founders remain as chairmen of the companies they found and serve as board members in the related companies, not assuming direct managerial responsibility in these other firms.

Despite the literature's emphasis of social capital associated with investors, very few of the dealmakers in the RTP sample are derived from exclusively financial management backgrounds. In fact, only one actor initiated his career in investment banking and went on to affiliate with investment partnerships, asset management firms, and venture capital. In fact, professional senior VCs who evolved into dealmakers came almost exclusively from management backgrounds in public, private, or service firms—a career progression that may be modeled as follows:

Mgr, Public-Private-Services Firm ▷ Sr Mgr, Public-Private Firm ▷ Partner, VC ▷ Mg Gen Partner, VC

Those dealmakers who affiliate with asset management firms later are involved in most cases with substantial asset management pools that invest in a large portfolio of companies; and they have only indirect ties from a managerial standpoint, each serving as a board member of the entrepreneurial firm in which the fund invests. Many of these dealmakers are high net-worth actors who invest their own personal wealth through structured funds and receive seats on the board as a direct result of their investment, a pathway that may be modeled as follows:

Mgr, Public ▷ Sr. Mgr, Public ▷ C-Level, Public Firm ▷ CEO, Public Firm ▷ Partner, Invest Pship

In a couple of notable cases, individuals developed close ties with high net-worth investors through working in a development capacity with a university or through a university endowment and then leapfrogged to the dealmaker stage by forming a fund comprised of investors developed through these relationships.

Now that the common career pathways of dealmakers are better understood in the context of RTP, it will be helpful to illuminate the central pathways that dealmaker careers follow based on the same data. To amplify the most frequently pursued career pathways, these pathway data are then manipulated again using a betweenness centrality measure to indicate the nodes through which career progressions most frequently flow. In this application, the node is the position, and the career pathway is the

set of links between the positions defined in the biographical data. A social network analysis is performed using a network graph editor called *yED*, which both visualizes the nodes and connections graphically and calculates the betweenness centrality values to determine the most central nodal career positions. In this case, a program was developed to keep the positions fixed as static nodes, with the event of interest being the career progressions indicated by the pathway analysis.

Betweenness centrality is calculated to identify the most likely career paths for the dealmakers and is used in a different context later for the full dealmaker network to identify the most central actors. The same measure of betweenness centrality is used for both procedures, as follows: let g_{ij} denote the number of geodesic paths from node i to node j , and let g_{ikj} denote the number of geodesic paths from i to j that pass through intermediary k . Then the betweenness centrality is defined as follows: $C_k^{\text{BET}} = \sum_i \sum_j \frac{g_{ikj}}{g_{ij}}$. The measure is, in effect, k 's share of all shortest-path traffic from i to j , summed across all choices of i and j (Borgatti & Everett, 2006). Betweenness centrality is a measure of the extent to which an actor is between, or falls on the geodesic path(s) between, other actors in the network (Hanneman & Riddle, 2005). This manipulation has the effect of amplifying the most central nodes in the network through which the pathways pass most frequently—in this context betweenness centrality serves as a key indicator of the most common career paths followed by the dealmaker.

Given the relatively small sample size of dealmakers in RTP (i.e., 62 actors of 3,491 in the total RTP network, or 1.78% of the sample), it is useful to calculate central pathways to observe common patterns, although the sample size does not allow for causality to be inferred. It simply is a visual representation of the data that enhances the author's ability to describe pathway phenomena. The betweenness centrality analysis of the RTP dealmaker sample shown in Figure 7 amplifies the effects on the position nodes

Betweenness Centrality: RTP Dealmakers (3 plus ties)



and clearly shows that the most central pathway to dealmaking is as a C-Level manager of a private or venture-backed firm, most frequently after serving as a senior manager or vice president of a public or private firm among the small sample of RTP dealmakers. Actors who advanced to the dealmaker stage were most likely to serve as president, CEO, or chairman of a high-growth private company. The second most likely path is for the dealmaker to serve as CEO or chairman of a public company and then go on to become a partner in an investment partnership or bank that invests in a wide cross-section of private companies, as the visualization shows with the enlarged nodes representing the most central pathways through which dealmakers advance in their career.

The next most frequent central career progression is for an actor to first serve as a C-level executive in a private venture-backed firm and then as a partner in a venture capital firm, after which many actors in the sample advance to serve as managing general partners of venture capital firms. The betweenness centrality analysis suggests that VCs per se are not the most central dealmakers as a consequence of their role in the venture capital firm. It is their prior experience in developing private venture-backed companies that gives them the expertise they utilize as venture capital investors to assist high-growth companies. This confirms the perspective held in the literature that VCs play an important role supporting emerging companies by lending managerial experience to firms and serving in a critical advisory function beyond the capitalization they bring (Hsu, 2004).

Based on the content and pathway and betweenness centrality analyses, a set of general inferences can be made on the origins, characteristics, and typical backgrounds of dealmakers in the context of RTP. It is acknowledged that these data cannot be generalized to other settings or to other regions at other points in time. However, the insights gleaned from this qualitative assessment may support the formation of future

hypotheses to be tested empirically. They also provide insights on the characteristics of dealmakers in the context of RTP, a point returned to later.

To the extent it can be summarized in this small sample, dealmakers can be described through their careers in each of the four stages outlined in the early content analysis as follows:

Initiators—Early Positions of Dealmakers (Stage 1). In virtually all cases in the RTP sample, the entry-level or first position in the initiator stage represents a staff or line role in an existing enterprise. The exceptions were independent actors, namely early stage founders and university faculty or administrators. While most dealmaker profiles did not initiate their careers in the financial field, those who remained as investors generally initiated their careers in entry-level positions in investment banking or asset management. Generally speaking, individuals who completed their careers leading an asset-management or investment or merchant-banking firm initiated their careers in this field. Interestingly, RTP dealmakers who principally had careers in venture capital rarely initiated their careers in investment banking. In fact, there is a clear difference in career paths for dealmakers in asset management and for those in venture capital, with the former more likely coming from private equity or banking and the latter from corporate.

Those actors who are managers or entrepreneurs within existing firms in RTP began their careers as entry-level managers or in a line role in either large public corporations, high-growth private companies, or in consulting and services companies that served high-growth companies. Those who went on to play senior management roles in high-growth private companies generally began their careers either in public companies or in other high-growth private companies. A small but not inconsequential number of RTP dealmakers initiated their careers in services companies, generally in positions that served high-growth private companies such as high-growth practices in consulting and accounting firms.

Given that the sample of dealmakers in RTP is derived from information technology and life sciences, it is not surprising that many of the dealmakers initiate their careers as founders, since many early advanced-technology firms in these fields rely on the specialized expertise of the founder. Another specialized set of dealmakers initiated their careers as university faculty or administrators. In all cases among the RTP dealmakers, these actors possessed distinctively unique scientific capabilities and backgrounds that first allowed them to found companies and then to influence the future development of other companies in the same scientific domain. In all cases, these actors are considered leaders in their specific scientific domains and represent a first mover in the advanced-technology market where they compete.

Serial Stage—The Defining Position for Dealmakers (Stage 2). The serial stage represents the defining position that prepares an entrepreneurial actor for a future as a dealmaker. It is apparent from the content analysis of the biographical sketches that at this stage, actors become acquainted with the market and acquire skills needed to become dealmakers. This exposure sometimes comes through direct experience within an early stage private company or through supporting or participating in a financing event relating to a growth company. Among investors, three typical position profiles emerged from the content analysis: an analyst-level position within a financial or securities firm, a director-level position in an investment or merchant-banking firm, or a position at the associate or principal level in a venture capital firm. Those working in securities or in banking typically possess competence in financial engineering and in high-level financial analysis relating to market-level investment opportunities in the aggregate, as opposed to the firm-level financial analysis. Venture capital associates generally possess financial modeling skills at the firm level, combined with strategic market and management insight related to the industry in which they principally invest.

Within the entrepreneurial manager profiles, three typical position profiles emerge from the content analysis, namely: (1) a senior manager or vice president level of a public company; (2) a position at the same level in a high-growth private company; or (3) a partner or principal level in a related services company, specifically in the management consulting or accounting fields and specifically in their high-growth management practice area. Those actors who work for public and private companies generally specialize in a specific market domain or in a specific set of skills, such as engineering, development, marketing, or business development. It is unclear if any specific expertise acquired at the serial stage better qualifies actors to advance to the dealmaker stage. It is more common, however, to find individuals with technical backgrounds at the serial stage in the life sciences sector than in the information technology industry, while information technology favors business development.

Among typical entrepreneurial founders in the sample, the content analysis uncovered two typical career profiles: serial founders, meaning firm founders who went on to found a second or third company, and specialized scientific-thought leaders who served as department heads or deans of significant academic units involved in research related to the firm. In the case of serial entrepreneurs, several actors were discovered to have experience founding more than two companies in a series. In most cases the later companies were larger, more sophisticated, and generally had venture or equity financing. This indicates that serial experience in founding firms increases credibility among large-scale equity investors—generally VCs—who value the founder's experience in building new enterprises. Indeed, the literature has already revealed that the serial entrepreneur's path is well worn among those who emerge as dealmakers in the entrepreneurial economy (Alsos & Kolvereid, 1998; Li et al., 2009; Westhead, Ucbasaran, & Wright, 2005).

Actors coming from senior-level academic positions were generally recognized as leaders in their scholarly fields because of their research prominence and history of innovation; and they had advanced to lead their research group, department, or school. In all observed cases, this expertise was highly focused in a new market area experiencing high growth or in a representative technology that was a first mover in its discipline. Many actors at this stage pursued an entrepreneurial opportunity in parallel with their academic roles, generally serving as the Chief Executive Officer of the firm they found based on their innovation. Many of these actors retained a relationship with their research groups and universities throughout their entire careers, particularly among those involved in the life sciences sector.

Dealmakers—Impact Outside of the Firm (Stage 3). The third stage in the career progression—the dealmaker stage—represents individuals who lead enterprises and whose backgrounds indicate they are beginning to influence actions outside the boundaries of a single entrepreneurial firm. These actors are officers of their firms, generally holding board seats, and who are fiduciarily responsible for the financial results of their enterprises. Moreover, they have significant influence over the cluster of firms they partner with or invest in and have substantial credibility within their industry domain based on their biographical history. Indeed, these individuals are generally sought after for opportunities to either run or invest in high-growth private firms as a consequence of their prior experience. In RTP they represent the top 1% of actors in the network.

Among investors, there are three typical positions in the dealmaker stage: principal of an investment partnership, junior partner in a venture capital firm, or partner in a venture accelerator—a holding company based on an internal fund investing in multiple companies. Actors involved in investment partnerships were generally involved in large private equity funds, funds of funds, or in hedge funds and had indirect

relationships with firms as investors through large funds with multiple portfolio investments.

Among entrepreneurs, dealmakers previously served in C-level positions in public, privately held, and venture-backed companies or in related services companies advising high-growth firms. This pool of dealmakers are generally considered for president and CEO positions in public and private firms in the next stage of their careers, assuming they have not already assumed the position of Chief Executive. At this juncture in the career progression, an actor's career is generally defined as either having management expertise in a large public company or having been qualified to be on the management team of a high-growth private or venture-backed company. It is not clear from the content analysis whether it is more likely for an executive to emerge as a dealmaker from either a public- or private-company management background, although it is more likely for an actor in an implementation role of a public company to transition to the C-level of a private company rather than vice versa. However, it is interesting to note that the distribution of dealmakers in the sample come from both large public company and small private company backgrounds alike.

Also among entrepreneurs at the dealmaker stage were CEOs of venture-backed companies who emerged from backgrounds as serial founders of entrepreneurial companies. This career progression represents the fastest way an actor in any career progression achieves the role of CEO in a private company and emerges as a dealmaker. While the evidence is not definitive, it appears based on the content analysis that CEOs at this level oversee much earlier, smaller firms than what is typical at the dealmaker stage. It has been established by the literature that many serial founders serve as the interim or early CEO while the company is transitioning through its early growth phases, with many being replaced by professional CEOs when the needs of the

company have outgrown the founder's capabilities (N. Wasserman, 2003). This would explain the early advancement of founders to CEO positions.

The content analysis also reveals that a number of individuals who serve as CEOs earlier in their careers often serve as CEOs of larger firms later, and many go on to advise several venture-backed private firms while leading a company concurrently. Also among dealmakers, scientific experts who emerge from university faculties often serve as the initial CEOs of the firms they found; but from the qualitative analysis in RTP, it is also more likely that they will continue in their roles longer as the firms progress, likely as a result of their long-term value to the development of those companies and their products and services.

Advanced Dealmakers—Reaching the Career Pinnacle (Stage 4). The fourth and final stage—the advanced dealmaker stage—represents terminal positions held by a small set of actors in an entrepreneurial economy who represent those at the top of their respective career ladders, representing the top half of 1% of all actors in the case of the RTP network. Interestingly, most actors in this analysis (and in the RTP region in general for that matter) never achieve this pinnacle. Indeed, of the 3,491 actors identified through the board linkage strategy in RTP, only 20 (.58%) were serving on four or more boards of directors concurrently at the time the sample was drawn. While the dealmaker stage is characterized by the most active, central, and inter-networked actors in the entrepreneurial economy represented by this sample in RTP, there are many roles that dealmakers play, as evidenced by the career progressions in Figure 6. Generally those who rise to this level are CEOs or partners of their respective firms; and many serve as chairmen, managing directors, or managing general partners overseeing the entire enterprise. Another common pattern is that while serving in these roles, dealmakers hold significant oversight over several other firms outside their primary firm affiliation, while generally serving as chairmen of the board.

Among investors, dealmakers generally advance to the partner level of asset management firms, investment partnerships and banks, or venture capital firms. The most senior of these dealmakers served as chairman, managing director, or managing general partner of their respective investment company. Among entrepreneurs, dealmakers serve as president, CEO, or chair of public and private companies, with many concurrently holding advisory responsibilities and equity positions in investment partnerships, private equity firms, or in venture capital funds.

A typical pattern was found among successful public company CEOs, who joined investment partnerships or made direct investments in high-growth companies following their tenure leading a public company. These public CEOs serve on multiple boards concurrently, either as a consequence of directly investing in the firm or more probably due to their status within the industry and their ability to provide entree to key customers, partners, and potential acquirers. Unlike their private company counterparts, most of the public CEOs following this pattern have sufficiently high net worth that they become investors in their own right, many forming investment partnerships and private equity firms to manage their own investment portfolios. In this way, former public company CEOs become both strategic advisors to the management of private firms helping them access key growth markets, while concurrently playing the role of investor.

Another common pattern that emerges from the content analysis is a series of private CEOs oscillating between venture capital firms and growth companies, many of whom are drafted to run companies that are part of venture capital portfolios. A hybrid scenario commonly found in the content analysis is that of individuals who serve as entrepreneurs-in-residence of venture capital firms and who are called on to lead portfolio firms as CEO when needed, particularly at critical times in the firm's development. These individuals defy simple classification as entrepreneurs and investors.

These results indicate a symbiosis between senior managers and VCs, many of whom become interchangeable in a typical venture-backed company. The content analysis also revealed, perhaps counter intuitively, that many professional VCs were first trained to run companies and served as senior executives of private firms, most of which were venture backed. The typical training for a professional VC in RTP begins in corporate management as opposed to financial management. This point is probed further in the social networking analysis that follows.

Findings: Full Network Betweenness Centrality

In order to understand the role of dealmakers in the embedded context of the networked economy, a third social network manipulation is performed for the full RTP entrepreneurial network. Again, betweenness centrality is measured for all ties in the aggregate network to identify the dealmakers with the highest betweenness centrality. In this case the node is the individual actor (as opposed to the position as before). In this context, high betweenness centrality measures are proposed as an indicator of a central brokerage or mediation function played by dealmakers in the aggregate RTP entrepreneurial network. These actors represent the most central nodes in the network through which the highest number of actor ties flow, suggesting that they play a possible mediation function (either actively or passively).

A full entrepreneurial network of actors for RTP was derived from all board and management linkages among the full set of entrepreneurial ventures in the region, as shown in Figure 8. The full network was analyzed for the embedded characteristics of dealmakers with the highest betweenness centrality among all actors in the entrepreneurial network through board and management firm ties. The full network consists of 2,520 actors in the entrepreneurial network among 475 firm nodes in RTP, exhibiting a dense and highly central core cluster, a less dense secondary cluster, and one-third of the network disassociated from the two core clusters. All of the actors who

Figure 8. RTP Aggregate Entrepreneurial Network

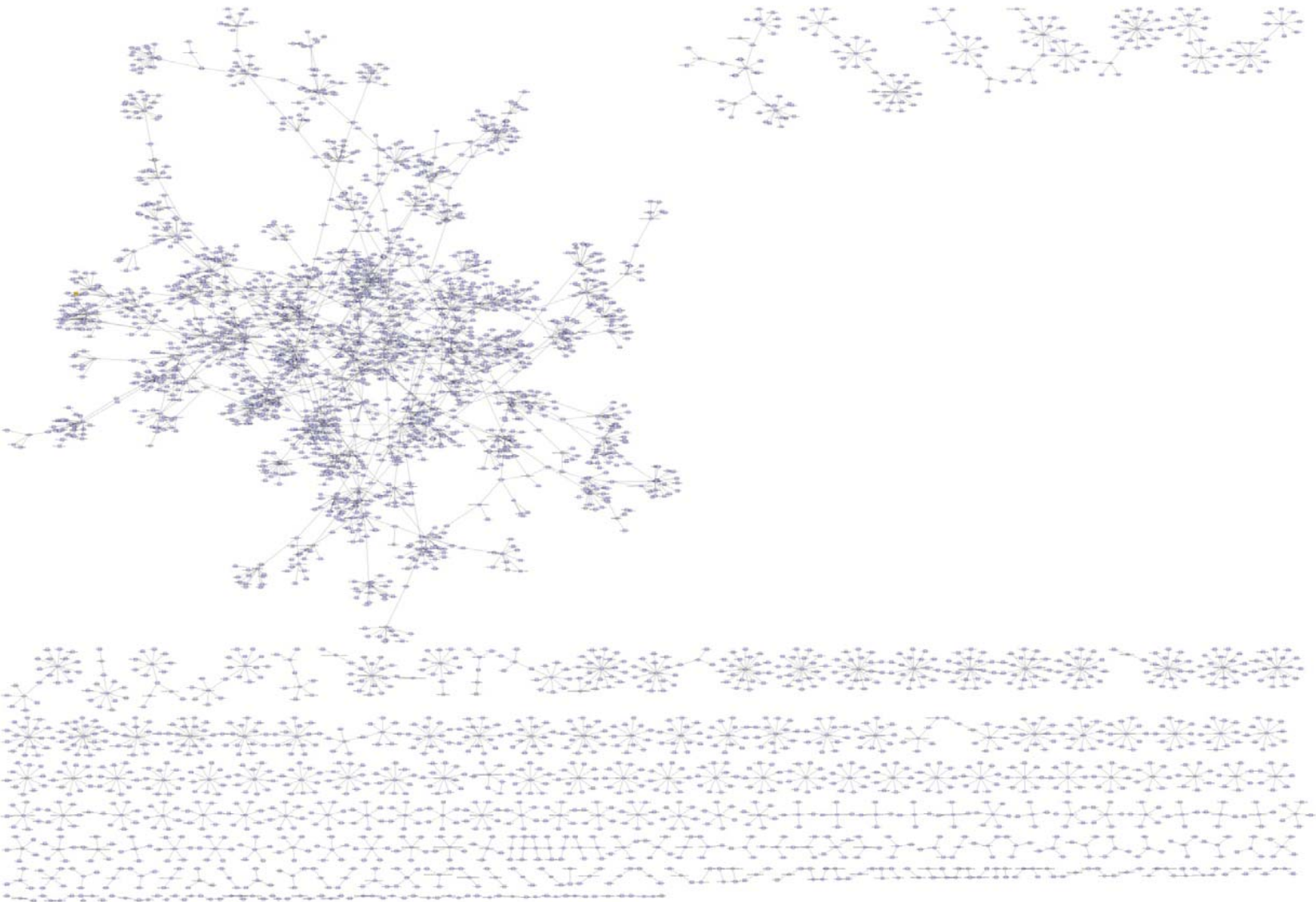


Figure 9. Highest Betweenness Centrality: Model RTP Dealmaker Profiles

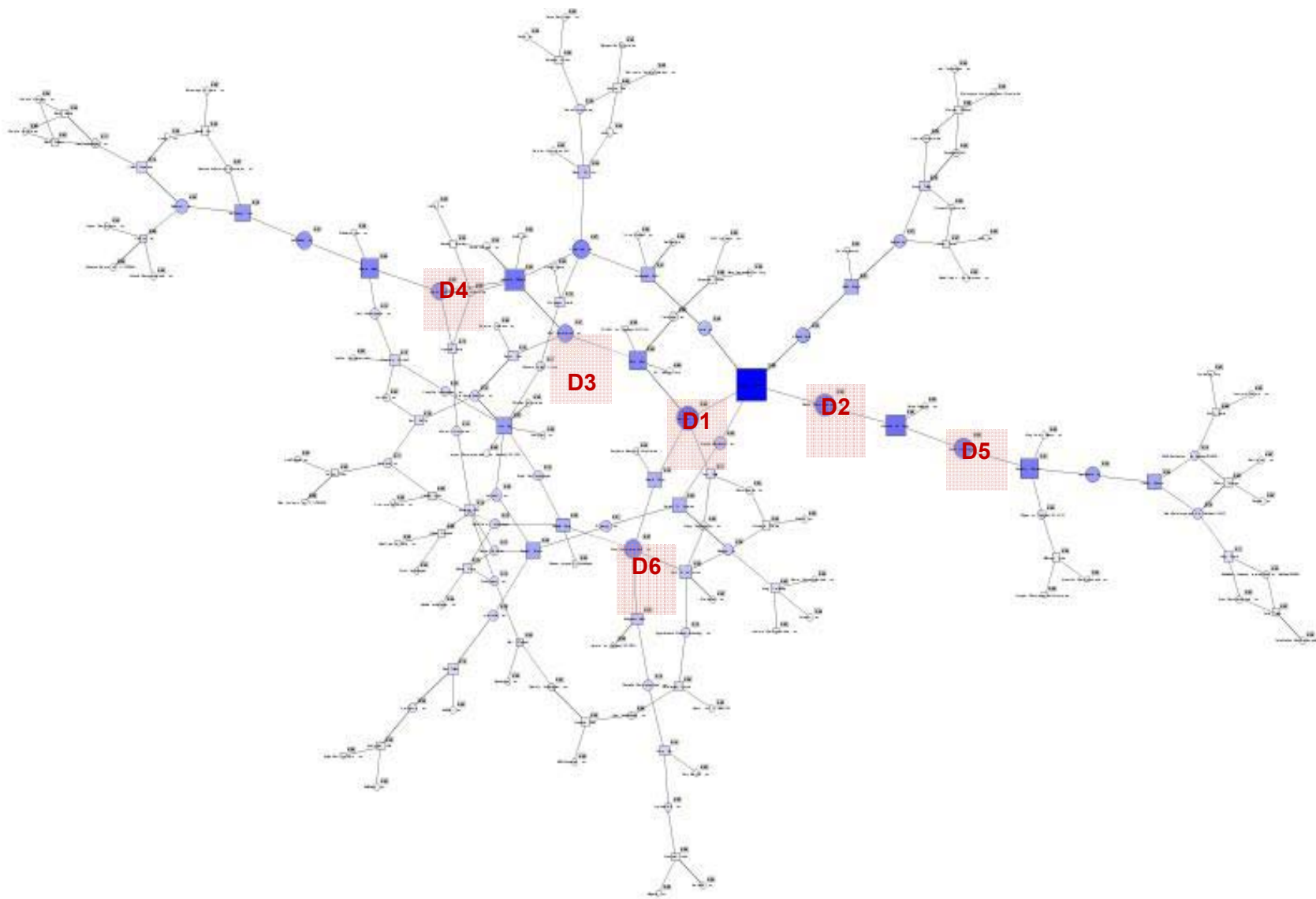
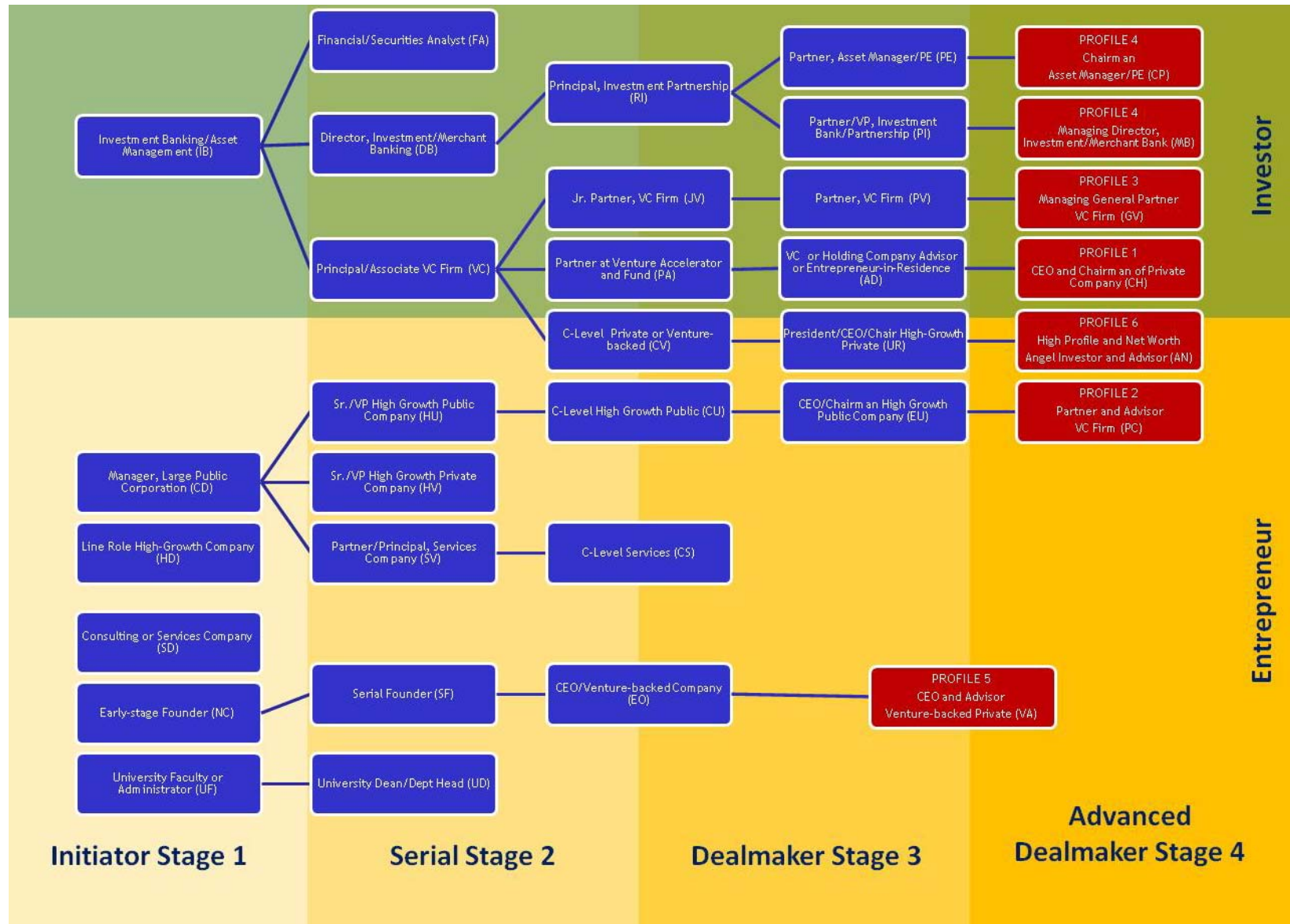


Figure 10. Dealmaker Profiles



have advanced to the dealmaker or advanced dealmaker stages are associated with the core cluster and share a common interconnected network with the exception of three dealmakers who are associated with a weak and fragmented secondary cluster and none with the disassociated firms. This indicates a dense, centralized, interconnected, and cohesive network operating in the RTP entrepreneurial economy, with the dealmakers sharing several key bridging and overlapping ties. Among the dealmakers, 14 of the 20 in RTP are interconnected in a common cluster, with three interconnected in a secondary cluster and three independent of any cluster.

As shown in the Appendices D and E, the most between-central actor in the main cluster is a serial executive associated with the largest venture capital firm in RTP, who has served as CEO of several venture-backed, high-growth companies over the last 10 years. The most between-central firm, Inspire Pharmaceuticals, is one of the oldest and most successful high-growth biotechnology firms in RTP, with a history of spinning off new companies, which may explain its degree-central position in the network.

The full RTP network was then decomposed to isolate the effects of all dealmakers, with the networks derived showing only actors with these tie characteristics, as seen in Figure 9. In order to isolate and easily observe the most central actors in the network, the betweenness centrality computation from the aggregate network carries forward to this smaller and more focused visualization showing only the dealmaker and firm nodes.

Betweenness centrality serves to estimate brokerage characteristics among actors in the full network consistent with the notion of dealmakers. This estimator establishes the actors through which all ties in the full network flow, suggesting a substantial mediated function being played by dealmakers. As seen in this network diagram, all of the dealmakers in the RTP region are connected to one another directly in a common, dense network. Those dealmakers with the highest centrality scores are

identified on the diagram with the overlays superimposed on the figure corresponding to six typical profiles (P1-P6) detailed next. Based on the full social network diagram of RTP, these actors are shown in their embedded context in Figure 9, and the nature of their relationships with others in the network is analyzed and common characteristics discussed. These dealmakers were studied in depth to establish a set of profiles and to uncover evidence on their characteristics and identify any possible mediation functions that they contribute to the regional social capital network.

The dealmakers with the highest betweenness centrality in the aggregate network are examined on a case-by-case basis to identify prototypical profiles. In these profiles, common characteristics are described, including their inferred contribution to the network as an entrepreneur or investor, their positions in the network, the nature of their connections to others, and their hypothesized roles. These profiles have been anonymized to protect confidentiality. A series of six profiles are presented that correspond to the most typical patterns found in the career progressions in the dealmakers' analysis, as shown in an updated Figure 10, with the dealmakers' profiles highlighted as the culminating position in the career progression and corresponding to the overlays in Figure 9 (Profile 1 is marked P1 and so on).

The betweenness centrality analysis of RTP's dealmaker community reveals four typical profiles highlighted in Figure 9 among advanced dealmakers with four or more concurrent ties: (1) Professional Private Company CEO, (2) Professional Private Company CEO Turned VP, (3) Professional VC, and (4) Serial Private Investor. Two additional profiles appear among dealmakers with three ties only: (5) Serial Entrepreneur and (6) Bridge Builder Intermediaries. Building upon the findings of the pathway analysis, the following sections provide descriptions of the characteristics of these typical profiles among dealmakers in RTP, showing their roles in the network, their typical

professional backgrounds, and their varied roles in the formation and mediation of entrepreneurial firms in the regional economy.

Dealmaker Profile 1: Private CEO (shown on Figure 9 as P1).

Both the pathway and betweenness-centrality analyses reveal the importance of the professional private company CEO among the dealmakers' network. These dealmakers generally have a progressively successful record in running private companies, with backgrounds characterized by deep industry expertise, prior history at a senior level in related public and private companies, and close ties to various capital sources. These dealmakers are sought after for their business development experience, abilities to develop and manage a team, and their focus on building operational and business processes. Three of the dealmakers in the RTP network typify this profile. All three are specialized in specific industry domains—application development, telecommunications, and biotech respectively—and due to their management experience and business development contacts are called to serve on the boards of outside companies. While as a private CEO one is generally offered a board seat in the company that one runs, what makes these individuals unusual is that they can concurrently serve on outside boards. For example, one of the dealmakers in this profile is CEO of a venture-backed company, while serving on the boards of two private companies and a venture-backed company. It is also interesting to note that this dealmaker serves as the chairman of the Council for Entrepreneurial Development in RTP, the largest entrepreneur networking organization in the region. This pattern is consistent among all of the professional CEOs in this category.

While all of the professional managers fitting this profile have strong entrepreneurial credentials, it would not be appropriate to classify them as entrepreneurs, as in most cases they did not found the companies that they operate. In fact, most developed the skills that qualified them to run private companies as senior

executives within large public companies, where they developed the business development contacts to support the growth of a new company as CEO.

Dealmaker Profile 2: Private CEO Turned VC (shown Figure 9 as P2).

Another set of professional CEOs are more closely embedded with institutional venture capital. This profile is characterized by a dealmaker who oscillates between the role of private-venture CEO and partner of a venture capital firm. While these roles are not standardized and easy to identify, the content analysis of the biographical sketches of the CEOs makes it clear that their primary value to the venture capital firm is attributed to their management experience running private companies. In fact, in all of the cases among the dealmakers in RTP, each actor assumed a partnership role in a venture capital firm and subsequently served as CEO for one of the venture capital firm's portfolio companies. Two of the most central dealmakers in the RTP network typify this profile. It is perhaps not surprising that both have formal relationships with the leading venture capital organizations in RTP: Intersouth Partners and Aurora Funds. However, it would be inappropriate to classify them as VCs and investors given their substantial backgrounds running entrepreneurial companies.

These two examples represent two different career progressions: (1) transitioning from a high-growth public company to run private companies and then joining venture capital; and (2) founding an entrepreneurial company, founding a second company backed by venture capital, and then serving as an executive-in-residence within a venture firm. While these types of roles are not standardized in any given firm, it is a very common pattern within venture capital to employ in-house management talent who can later be deployed to serve as a CEO of one of the firm's portfolio companies. While both of these dealmakers originated from different backgrounds, this was the role they played in the venture capital organization.

The most highly degree-central dealmaker in the RTP aggregate network fits this profile, namely a corporate executive who becomes a C-level executive of a private company and then becomes a partner in a venture capital firm, thereby serving as the model for the private-CEO-turned-VC profile. This dealmaker is connected to eight firms concurrently, representing the VC on the portfolio company boards. However, this dealmaker's background suggests that beyond his role as an investor, he is sought after for a board position as a consequence of his managerial experience and expertise. This profile is representative of the *highest frequency* career progression and pathway exhibited in the RTP network data, as shown in Figure 9.

This same pattern is evidenced in the network surrounding the second dealmaker fitting this profile, in this case a serial-entrepreneur-turned-VC executive-in-residence. In this case, the second dealmaker is associated with a separate VC firm than the first. The board-linkage networks overlap but are not shared, suggesting that the two VC firms these dealmakers represent do not invest together. Indeed, a cross-check of the CapitalIQ data shows that none of the firms these dealmakers advise are part of a shared syndicate among the VCs. The overlap in the network connections, therefore, may be explained by the fact that this dealmaker's management expertise largely overlaps the same industry domain. It is interesting to note that as of this writing, the first dealmaker cited has recently announced his departure from the venture capital firm he is associated with to run one of its largest portfolio companies as its Chief Executive Officer. Given the career progression noted in this profile, one would expect these dealmakers to oscillate between running companies and a VC role over time.

Dealmaker Profile 3: Professional VC (Figure 9 as P3).

The second most frequent profile in the dealmaker pathway analysis represents the professional VC. These dealmakers are characterized by early professional experience in public corporations or in the service sector, leading to progressive

expertise in venture capital investing. Individuals in this profile seldom serve as CEOs of portfolio companies and are valued for their expertise in overseeing multiple portfolio investments concurrently. While the CEOs profiled earlier had a greater degree centrality and possessed more concurrent board ties, professional VCs have higher betweenness centrality, meaning that more ties flow through this actor in the network than through the actor who has the greatest number of connections. This is consistent with theory that says VCs mediate among entrepreneurs in the network and connect resources among multiple ventures in a region. As the model profile, the founder of the largest venture capital firm in RTP is the dealmaker with the highest betweenness centrality in the total network. While the literature would indicate that finance and investing acumen would be the core competence of the VC, it is interesting to note that even this dealmaker began his career in the services industry at the partner level serving high-growth companies. Not surprisingly, other dealmakers that fit this profile in the RTP network are the leaders of the three largest venture capital investment firms in RTP and share a similar career background. None of them have ever run a company, but they do have corporate experience in the service industry. While one would expect that a VC would have multiple board seats, the professional VC profile is not the progression that represents the highest number of concurrent board linkages in RTP. This is contrary to a widely held assumption and fundamental theoretical construct in the entrepreneurship literature.

Dealmaker Profile 4: Serial Private Investor (shown Figure 9 as P4).

A final profile among dealmakers with four or more concurrent ties in RTP is represented by a special class of investors who are not affiliated with professional venture capital, but who instead work with institutional funds to invest their own personal net worth. There are two dealmakers in the RTP network that fit this profile. While these two dealmakers may be commonly termed serial investors, they represent two distinct and disparate career progressions. The first is a successful former venture capitalist

from the Boston area who retired from the industry and now co-invests in early-stage entrepreneurial companies with angel investors. This dealmaker explicitly states in her biographical sketch that she uses her extensive expertise gained from her years in professional venture capital to support early stage companies to develop growth strategies and attract long-term capitalization. The network ties in this social capital profile show not only the connections to her direct investments but to the syndicate partners with whom she works as co-investors.

The second serial private investor in RTP is a former corporate vice chairman of a Fortune 10 information technology company and has formed an investment partnership to invest his net worth with other high-net-worth individuals in structured private equity deals. This class of investor maintains a portfolio that consists of conventional financings and investments, with a minority percentage of capital deployed in earlier-stage private financings. While this type of investor does not invest all his committed capital in early stage investments—such as would be the case with some venture capital firms—he does represent an important class of equity investor for new firms in RTP. While both dealmakers featured here have widely different career trajectories, they share a common capability to attract later-stage capitalization to the ventures in which they invest, perhaps explaining their between centrality in the aggregate network implying a strong mediation role. It is hypothesized that these dealmakers are sought after by firms for their ability to attract long-term financing partners leading to successful growth and exits.

Due to their backgrounds, they share a common credibility among sophisticated investors, and their involvement in a venture represents an endorsement of the potential success of the venture. Both of these dealmakers are regarded within RTP as respected opinion leaders in the private investment community. Both lend their credibility and expertise to third-party private investment groups, while contributing their capital as part

of their own personal investment strategies. An important difference, however, between these two dealmaker profiles is that while one is focused on early stage investing and has deep experience in this arena, the other is qualified for long-range capitalization and private equity strategies, with an emphasis on later-stage growth financing and exits through mergers and IPOs.

Dealmaker Profile 5: Serial Entrepreneur (shown Figure 9 as P5).

While the four profiles previously reviewed encompass actors who possess four or more firm ties and have generally reached their career pinnacles, this profile represents serial entrepreneurs who possesses three concurrent firm ties and are relatively earlier in their respective careers. While these individuals are still reasonably early in their careers, it is hypothesized that they serve in important bridge spanning roles the network of the RTP entrepreneurial economy, linking key resources and serving as intermediates to support the development of an entrepreneurial culture in the region. While the literature has focused widely on the start-up entrepreneur, this particular profile of dealmaker has already had multiple start-ups to his credit and has gained credibility in building a series of companies. The term *serial entrepreneur* is generally used to describe this profile given that dealmakers who follow this pattern generally execute companies in the same industry domains of their first start-up, and this is a recurring pattern. There are three dealmakers that fit this profile in the case of RTP.

According to the biographical data, the serial entrepreneurs identified in RTP are specialized in their identified industry domain—application development, mobility, and biotech, respectively—but have branched out to advise other companies within their industry specialization beyond the companies they currently oversee. While they generally serve as CEOs of the ventures they found, unlike other CEOs profiled, they are not considered professional CEOs (as they generally do not have industry experience), nor do they have formal affiliations with venture capital. In all three cases,

these founders are regarded as opinion leaders within the RTP entrepreneurial economy and are sought for their expertise in their specific industry domains and markets. While the network analysis indicates that there are close cooperative relationships with venture capital, these relationships are generally held at arm's length. While this dealmaker profile fits most closely the concept of an entrepreneur in the literature, it is important to note that the contributions of these dealmakers go well beyond the founding of the ventures that they initiate, developing strong relationships with multiple companies in the RTP cluster based on the nature of their connections in the aggregate network.

Dealmaker Profile 6: Angel Bridge Builders (shown Figure 9 as P6).

A second notable class of dealmakers with three ties serves as intermediaries in the network, characterized by high betweenness centrality among the widest array of actors in the network. This profile is characterized by individuals who serve both entrepreneurs and investors as service providers in the regional entrepreneurial economy. The two dealmakers who typify this profile are an active RTP corporate attorney and venture accountant respectively. While both of these dealmakers formed an entity to do structured angel investing in early stage companies many years ago, their roles and positions in the network indicate a much more substantial contribution to the development of social capital in the RTP entrepreneurial economy. In fact, none of the three concurrent firm linkages that qualify them as dealmakers are associated with ventures they invested in through their investment partnership. As an example of the dealmaker's bridge-building role in the social capital of an entrepreneurial region, it is interesting to note that one of these dealmakers founded the leading entrepreneurial networking organization in RTP, the Council for Entrepreneurial Development, further suggesting a unique bridge-spanning and cluster-development role played by the dealmaker in this profile.

Both of these dealmakers are differentiated from other profiles based on their vocational background and technical expertise, each possessing skill sets and expertise that allow them to support new firms through their unique bundle of capabilities. In the case of RTP, these two bridge-builder dealmakers cite experience with supporting multiple successful private ventures in their biographical sketches, while serving in a fiduciary role for only three concurrent firms. Indeed, the biographies indicate that both dealmakers cited possess the deepest experience with the widest array of firms in RTP in a non-fiduciary role. Put more simply, these dealmakers serve as intermediaries and have the widest breadth of contacts among the RTP entrepreneurial community. While only fiduciary ties would appear in the algorithm, the biographical information and position descriptions for this profile suggest that they have much greater impact on a broader range of firms than any other category of dealmaker, well beyond the fiduciary ties identified through this analysis. The bridging roles of attorneys and accountants in the entrepreneurial networks have been previously cited in the literature, which appears confirmed by this analysis (Kenney & Patton, 2005; Lee et al., 2000). However, the existing research on bridging capital roles of intermediary service providers has been based on interview data and qualitative analysis. This is the first time to the author's knowledge that these intermediary relationships have been operationalized quantitatively within an existing network pattern based on third-party data.

Discussion

The findings of this qualitative data and social network analysis suggest that drawing a sharp distinction between the entrepreneur and the investor oversimplifies and misspecifies the structure of social capital in an entrepreneurial economy. Among these dealmakers, there is a great deal of heterogeneity in terms of their backgrounds and roles, with very few who could be neatly separated into either the entrepreneur or the investor category. Indeed, dealmakers in RTP universally blended these two functions.

This analysis suggests that the simple classification of actors in the network as entrepreneurs or investors is more likely appropriate for actors in the earlier stages of their career development. As actors progress to the dealmaking stage, these roles are blurred, if not combined. The simple dichotomy of the entrepreneur and the investor is insufficient to understand the wide array of roles, progressions, and contributions made by dealmakers in the entrepreneurial economy. Case in point: Returning to the two mutually exclusive dimensions of the conceptual model presented in Chapter 3 of the dissertation—investors and entrepreneurs, we discover that the six prototype profiles that emerge from the structured content analysis do not fall neatly into these categories, as demonstrated by the pathway analysis. Generally speaking, dealmaker career pathways oscillate between roles that would be associated with entrepreneurial and investment roles.

This calls into question the fundamental dichotomy in current theory. These findings may call for a more sophisticated and descriptive classification of actors to study those who are most central to the entrepreneurial firm development process. Most of these dealmakers defy simple classification, as the pathway analysis demonstrates. The pathway and social network analysis reveal a set of actors who functionally combine features of both investors and entrepreneurs concurrently. While there are profiles that do fit this paradigm—specifically the professional VC who falls more closely in the investor prototype and the serial entrepreneur who may be classified as an entrepreneur as the literature suggests, there are several career progressions that show clear transition from entrepreneur to investor and, in some cases, back again. These roles transition throughout the typical career progression of the dealmaker and do not fit the dichotomous model. Even among professional VCs and serial entrepreneurs, where the similarities are the closest, this analysis finds that the former begin their careers as entrepreneurs and the latter often become investors—again defying simple

classification. As actors in the entrepreneurial economy advance to dealmakers, their roles evolve to fuse features of entrepreneur and investor, indeed bringing these two elements of social capital more closely together.

But probably most significant in this qualitative analysis is the finding that the most central dealmakers in the RTP entrepreneurial economy are those who serve as CEOs of high-growth private companies. Some develop from an entrepreneurial founder background, some grow up within high-growth private companies, but most begin their careers working in the corporate environment as opposed to initiating their careers with a start-up *in the garage* as the literature suggests (Audia, 2005). In fact, the RTP sample of dealmakers demonstrates that the founder entrepreneur is not the most likely dealmaker profile. The most likely dealmaker is a product of an existing public or private enterprise, who then transitions to a more senior role leading a private company as President or CEO. In fact, very few dealmakers are the original founders of the enterprises they go on to run (3:62 or 5%). This fact conflicts with the assertions in the current entrepreneurship literature, which largely emphasizes the founder entrepreneur as a dominant profile.

Among the dealmakers, founders and serial entrepreneurs appear and contribute significantly to the entrepreneurial economy, possessing strong ties with investors and other entrepreneurs based on their embedded characteristics in the RTP network. While the sample of RTP dealmakers is not large, the findings suggest that the serial entrepreneur is quite important to the entrepreneurial economy in serving the bridge to other entrepreneurs. However, to characterize the serial entrepreneur as the most important dealmaker in an entrepreneurial economy, as the literature suggests, would be inconsistent with the findings in RTP.

Also, among dealmakers, there is another most interesting class of intermediaries who serve as bridge builders in linking the social capital of the region.

These individuals serve high-growth companies, often providing legal and financial management and accounting services; and through their work, they serve to integrate and bring together investors and entrepreneurs (Granovetter, 2005). Indeed, we find that many of the dealmakers in the RTP sample initiate their careers in the service economy or in capacities where they work with companies as a service provider. It is telling that many of the professional VCs in RTP also come from this background, having been trained in service companies that work with high-growth entrepreneurial firms. These intermediaries deserve closer attention in the future research on dealmakers.

The betweenness centrality analysis suggests that dealmakers may play a more active brokerage function in the RTP network, hypothesized to mediate between entrepreneurs and investors and perhaps motivate the network. Indeed, those with the highest number of concurrent ties to entrepreneurial firms also hold roles that allow them to influence multiple firms beyond those to which they are fiduciarily responsible. Moreover, the betweenness analysis that isolates dealmaker capital verifies that all dealmakers are connected in a common network separated from one another by less than one degree of separation in the case of RTP. This suggests an enhanced interpretation of brokerage than what has been suggested in the sociology literature. It is hypothesized that dealmakers, as a consequence of their deep serial experience and their prominent roles in the network (based on their relative seniority and background), serve to mediate the network and facilitate communication and resource exchange among other actors in the aggregate network. While the only evidence that can be brought to bear to support this claim is the secondary biographical data and descriptions, the betweenness centrality manipulation shows clearly that dealmakers are positioned appropriately in the network to serve in the mediation role that is surmised.

In order to understand dealmakers, a revised classification or typology is required to account for the intermingling of the entrepreneur and investor roles that appear in the

career progressions of these important actors in the entrepreneurial economy. Research in entrepreneurship can fruitfully adapt to discover the vital symbiosis between entrepreneurs, corporate leaders, financing experts, investors, and intermediaries who comprise the most active segment of social capital in the entrepreneurial economy. Also, while this examination largely speaks to the role of dealmakers in the birth of new firms, the findings suggest a new hypothesis, which is that dealmakers may play a facilitation role in post-founding maturation and development of firms. While this cannot be claimed by the analysis presented here, the mediation functions played by dealmakers most likely benefit the firm not only during the birth process but also during its development and maturation process.

The social network analysis contributes a set of common profiles to future scholarship and provides an empirical framework through which structured social capital can be quantitatively measured and qualitatively evaluated. The dichotomy of the entrepreneur and investor may give way to a more comprehensive typology of dealmakers that account for the effects of seriality, brokerage and mediation hypothesized in this dissertation as a new concept of structured social capital.

CHAPTER 7

REFLECTIVE CONCLUSION: THE DEALMAKER MILIEU

This dissertation proposes a new conceptualization of the social capital framework that supports the establishment of entrepreneurial economies and proposes the *dealmaker milieu*. Dealmakers are hypothesized to play a central role in motivating the regional entrepreneurial economy and mediating the social networks that support for the formation of new firms. The concept of the dealmaker reframes the debate among academic researchers and policymakers about how a successful entrepreneurial economy is established. While the latest thinking is largely dominated by a two-dimensional definition of social capital, oscillating between two alternative viewpoints that attribute success to the entrepreneur or the investor, dealmakers combine both of these functions and add a vital third dimension. While current aggregate social capital theory places entrepreneurs and investors in a neat and tight x-y axis, the dealmaker offers a functionality that operates on the z axis.

The argument of this dissertation does not take issue directly with the proposition in the current literature that successful entrepreneurial economies result from dense and vibrant aggregate networks of entrepreneurs and investors. Indeed, the findings of this dissertation are consistent with and serve to confirm current theory, showing that regions generating high rates of firm births are associated with the presence of viable and dense entrepreneurial social capital structures. While causal inferences cannot be drawn from this sample, both the empirical and social network analyses suggest that while an interconnected network of entrepreneurs and investors may be a necessary condition for

the establishment of a successful entrepreneurial economy, it is not sufficient. The empirical comparison and component analysis suggest the following:

1. While aggregate networks are associated with new firm births, structured dealmaker networks appear better associated.
2. Regions with relatively better success in establishing new firms are generally better endowed with dealmakers, and the most successful regions have more dealmakers per average firm birth than less successful economies.
3. Successful regions have both a higher aggregate density of entrepreneurs and investors but similarly have an even higher degree of dealmakers per firm.
4. Successful regions with cohesive dealmaker networks are associated with success in establishing new firms, and regions with dense and cohesive dealmaker networks are even more highly associated with successful firm birth outcomes.
5. The component analysis suggests that regions with relatively weaker and less dense aggregate networks may be able to overcome this deficit with a more cohesive dealmaker network.

For economies to achieve sustained success in generating new technology-based companies, this analysis suggests that they must possess a vital network of dealmakers. Dealmakers leverage their experience and multiple firm ties to build bridges among actors in the social capital framework and serve as examples, enhancing the quality of interconnections among the entrepreneurs and investors active in a network.

However, this analysis questions the assertion in current theory that all entrepreneurs and investors are created equal. Instead, this study suggests that there may be sets of dealmakers whose network ties span multiple firms; who may build critical bridges between all entrepreneurs and investors in aggregate regional networks;

and who may thereby mediate, motivate, and enhance the networking characteristics of the regional entrepreneurial economy. The principal outcome of this dissertation departs from the existing literature, which perhaps overemphasizes the role of entrepreneurs and investors in the aggregate in establishing entrepreneurial economies. This study suggests that the existence of dealmakers may in fact be a better predictor of the establishment of a successful entrepreneurial economy than the number of entrepreneurs or investors in the region or other traditional measures of aggregate social capital. This study also suggests that there may exist a critical symbiosis between individual entrepreneurs and investors and the dealmakers who may build bridges among them.

The concept of the dealmaker has been built upon the foundation of existing theory and complements current active models in research. The concept of dealmakers, who merge features of serial entrepreneurs and investors, adds functional dimension to the aggregate views of social capital. Dealmakers represent an amalgam of three tested concepts from theory: seriality, brokerage, and mediation (see review of this literature in Chapter 3). While these three independent concepts are known and tested mechanisms in the empirical literature in entrepreneurship, the dealmaker concept represents a unique synthesis serving to integrate and extend the existing interpretations of these functions to imply a much more active, coordinative, and deterministic role for dealmakers in the regional entrepreneurial network. This case study and empirical examination suggests that theory based on aggregate social capital does not sufficiently explain the important brokerage and mediation functions played by dealmakers in successful entrepreneurial milieux.

Evidence is brought to bear in this dissertation that dealmakers serve in a mediation role that exceeds the interpretation of a simple brokerage or intermediation function isolated by Burt and the sociologists. The high betweenness centrality estimates

in the regional social network suggest that dealmakers may mediate if not motivate an entrepreneurial network. While this qualitative analysis could not demonstrate why these actors are most central, it is hypothesized that they are sought after by other actors in the network for their serial experience in building ventures, for their knowledge of venture finance, and for their broad array of connections throughout the network which allow them to shape network outcomes.

Dealmakers are surmised to play an important role in motivating an entrepreneurial economy. Following evidence gleaned from RTP, dealmakers generally are among the most facile entrepreneurial actors in the economy. While they typically have serial experience in founding, operating, or investing in entrepreneurial firms, this case study suggests that their experience provides a basis for them to serve as catalysts and as central brokers of information, resources, and insights that are critical to the formation of new companies. The biographical analysis suggests that they are valued for their unique perspectives and abilities in the firm formation process, for their access to critical network connectivity, and to important resources and contacts required to establish a new firm. In a sense, dealmakers serve as the catalyst of highly entrepreneurial economies. While all that could be demonstrated through this case study was the strong association of active and vital entrepreneurial communities and the presence of dealmaker social capital, it could very well be proven through further empirical work that dealmakers are the critical catalysts required to establish and sustain a brisk and active entrepreneurial economy characterized by high frequencies of new firm births.

This dissertation also demonstrates that the dealmaker's role and position in the entrepreneurial network is complex. Dealmakers come from all walks of life. They are serial founders, corporate CEOs, professional venture capitalists, high net-worth angel investors, professional managers, and highly skilled innovators, technicians, and

scientists. But the sample of RTP dealmakers shows that they are most likely to serve as a C-level executive in a company prior to becoming a dealmaker. A dealmaker's accumulated experience as a serial entrepreneur, manager, or investor may be especially valuable to other actors who require critical skills, linkages, and resources to support the development of their own entrepreneurial firms. But this experience isn't confined only to the process of founding a firm.

Indeed, most of the RTP dealmakers spent time in high-level corporate positions which allowed them to accumulate experience and relationships with important business development contacts, many of whom may serve as potential customers, partners, or acquirers of the firms the dealmaker supports. With a wide array of contacts and accumulated experience, dealmakers are shown to transcend a single venture or firm to have ties and influence multiple firms concurrently and therefore may command an enhanced span of control and influence in shaping the network. In this manner, they may mediate or broker relationships within the social capital network and thereby exert a significant influence on the regional entrepreneurial network as a whole.

But just as importantly, the content analysis of biographical data shows that dealmakers represent a class of actors who have the greatest expertise, experience, and know-how in building high-growth companies. While some develop their expertise in a specific industry domain or technological area, most dealmakers have a heterogeneous and varied background, combining deep technical or operational expertise with wide and varied experience. Moreover, the typical dealmaker has direct experience in building high-growth private companies and has a wealth of business development contacts within both public and private companies, as shown by the pathway analysis. This result suggests that the most central dealmakers come from managerial backgrounds with public and private companies, as opposed to the serial entrepreneurs or VCs who have been celebrated by the literature, at least in the context

of RTP (Audretsch et al., 2006; Delmar & Davidsson, 2000; Fainstein, 2005; Florida & Kenney, 1988; Hsu, 2006; Lerner, 1995; Neergaard, 2003; Powell et al., 2002). Most dealmakers have been trained first in public companies or in the service sector, which prepares them to assume senior roles in high-growth private companies where they repeat this habit continuously and over time transition to a dealmaker role and assume the role of the investor.

Indeed, their actions in facilitating the establishment of new firms may serve to produce a deeper pool of entrepreneurial social capital that serves to perpetuate the region's economic vitality. While the total population of entrepreneurs and investors serves as the foundation of the aggregate entrepreneurial economy, it is surmised that the presence of dealmakers amplifies dramatically the interconnections, carrying capacity, and impact of the network. Analyses of both social capital composition and the social network component structure suggest that while the density of entrepreneur and investor networks in a region plays a significant role in its success generating firm births, the presence and cohesiveness of dealmaker networks separate regions that are highly successful from those that are not.

The empirical setting of RTP, however, suggests that the context of the regional economy matters. Dealmakers in RTP come from corporate roles and backgrounds. Based on the current literature in entrepreneurship, the expectation is that these highly central actors would be serial entrepreneurs and venture capitalists (Alsos & Kolvereid, 1998; Baird & Morrison, 2005; Hsu, 2006; Kenney & Patton, 2005; Lerner, 1995; Westhead, Ucbasaran, & Wright, 2005; Wright et al., 1997). Therefore, RTP represents a counterintuitive result. Although this finding cannot be compared to other regions given the limitations of this research design, this result certainly suggests that economic context matters. RTP represents one of the largest formal concentrations of corporate research and development enterprises in a research park setting in the United States.

Given the unique interplay between start-up companies and larger corporate partners in RTP, it may likely inform who emerges as dealmakers in the context of the regional economy. While one may expect the model of the *garage entrepreneurs* celebrated in Silicon Valley, in RTP the dealmaker may very well be quite different, and more likely a *corporate entrepreneur* (Audia, 2005).

Contributions to Future Theory Development

This dissertation advances current concepts in the scholarly literature to refine current thinking and research constructs. First, it places dealmaker social capital in the context of established aggregate social capital constructs in explaining successful entrepreneurial economies, and it specifically focuses effort on the underlying anatomy of social capital, understanding the dealmaker in terms of his or her role in mediating social capital networks. This dissertation makes contributions to the literature germane to the origins, roles, and characteristics of dealmakers who mediate entrepreneurial networks; and it develops a new way to characterize and measure social capital in the context of the regional entrepreneurial network.

Second, it specifically examines the enhanced brokerage and mediation roles played by dealmakers in the regional social capital network, seeking to better characterize the nature of their *between central* role as embedded actors in the network. While the specific mechanism cannot be causally established by means of this qualitative analysis, an enhanced understanding of the role, origins, and common attributes are revealed for RTP dealmakers through the career pathway, betweenness, and profile analyses based on the content of the biographical data. This allows for the shaping of a stronger understanding of dealmaker social capital, particularly in the context of a planned research park technopole.

Third, it advances a new qualitative framework to examine and visualize social capital data in the context of networks. This dissertation has sought to extend available

quantitative and social network analysis strategies to enhance the descriptive power of the qualitative case study. The dealmaker algorithm allows access to publicly available commercial datasets and extracts and recompiles the data in a way that allows for enhanced and quantitatively accessible empirical analysis. This data retrieval and analysis technique will allow for the adaptation of more sophisticated qualitative analysis techniques. Moreover, it outlines a set of methods that could be used for more comprehensive empirical examinations of the same concepts.

Limitations

It is recognized that this analysis has some important limitations. First, the author acknowledges that this project may be subject to endogeneity threats by associating dealmakers with successful entrepreneurial economies. It is an open and proverbial question whether dealmakers facilitate and motivate entrepreneurial economies or successful economies generate dealmakers. Of course, the same criticism could be levied against the aggregate social capital data that dominates the comparative literature: Do successful economies generate more entrepreneurs and investors, or do more entrepreneurs and investors make economies successful? The theoretical logic of this analysis is that network actors with multiple firm connections are a better proxy for dense, cohesive entrepreneurial networks than the number of individual entrepreneurs and investors a network sustains.

Second, the snapshot data used in this dissertation may present an external validity threat because affiliation data for the small sample of regions cannot be generalized to reflect affiliations in all regions nor the general population. Snapshot data may also fail to provide internal consistency reliability, because affiliations in the sample regions may be different at other points in time than when the sample was drawn. Furthermore, because firm affiliations are more readily captured when firms receive institutional financing, the data likely over report firms financed by venture capital, banks, or private equity and

under report firms in the small-business sector, early stage firms that are not yet documented or that grow without external financing. This bias is partially corrected because the biotech and information technology firms that dominate the entrepreneurial sectors in this study are much more likely to be financed by venture capital and private equity.

Third, clearly there are other threats to external validity posed by the relatively small size of the sample (12 regions) and the use of secondary data. These threats have been mitigated through the use of established social networking analysis techniques to attempt to bring rigor to this qualitative assessment. Social network tools focus the analysis on the actors exhibiting dealmaker characteristics from a variety of regional contexts and support a more detailed qualitative examination of the sample of actors in the RTP entrepreneurial network. The content analysis, pathway analysis, and betweenness centrality assessment were all intended to sharpen the theory posited by this study, namely that dealmakers combine both entrepreneurial and investor social capital to play an important brokerage role in regional entrepreneurial networks.

Fourth, and perhaps most importantly, it is acknowledged that this study design introduces additional external validity threats stemming from the fact that the study's findings are not generalizable beyond the twelve regions analyzed. It is difficult to protect against these threats at the regional level of analysis used here due to the volume of data required. While this study analyzes regional characteristics with large samples of firms ($n = 22,329$) and even larger samples of associated senior executive and board members ($n = 86,036$), in the end it can only draw inferences about what these differences mean for regional economies. While the 12-region sample used here is large enough to discern variations and uncover intriguing patterns among entrepreneurial networks, it does not provide a sufficient basis for scientific generalization (Yin, 1984). Because the unit of analysis is the region, it is impractical to identify sufficient regions to

allow for more advanced statistical, regression-based, or econometric analyses—a task for future empirical work. However, the social network analysis and algorithm supplement the case study and extend the analytical power of the project to enhance qualitative understanding and insight and to support future theory building.

Finally, the conceptual model employed in the dissertation allows for a test of existing theory in a transitive fashion, but a qualitative research design like the one used here does not allow for an assertion of causality. Case studies do provide a rigorous framework for testing hypotheses by drawing upon multiple sources of evidence, with data converging in a triangulating fashion (Yin, 1993). This study accomplishes this by employing three complementary analytical approaches: an empirical social capital analysis to examine the data, a social network analysis to examine and characterize the social networks for the 12 subject regions, and a qualitative content and network analysis of dealmakers in RTP.

Notwithstanding these stated limitations, the case study format does support an expansion of regional development and entrepreneurship theory and the development of a new analytical framework to explain differences in social capital composition and structure for regions with successful entrepreneurial outcomes, thereby advancing theory building for future quantitative analyses. Since this study is set in the context of established theory, the case evaluation is intended to influence the development of new research, to account for deficiencies uncovered in current theoretical paradigms in the literature, and to encourage the development of nascent concepts of dealmaker social capital set in the context of regional entrepreneurial networks. The specific empirical analyses and social network analyses conducted in the dissertation uncover intriguing associations among (1) dealmakers with multiple concurrent firm ties, (2) mediated, cohesive entrepreneurial networks, and (3) productive entrepreneurial economies measured as new firm births. These insights suggest that existing theory should be

extended to explore structured social capital networks, and to fully understand the overall impact of social capital structure in the establishment of entrepreneurial economies to include the new concept of dealmaker.

Policy Implications

The results of this dissertation suggest a number of important implications for future policy considering the insights on dealmaker social capital—*the dealmaker milieu*.

First, policy oriented toward enhancing entrepreneurship should be directed well beyond the construct of the firm to include the dealmakers associated with the firm and indeed the regional network. This analysis lends support to the proposition that dealmaker actors in social capital networks are associated with higher rates of new firm formation in regional entrepreneurial economies. Future examinations of policy should look beyond an aggregate assessment of rank-and-file entrepreneurs and investors and should instead place particular attention on dealmakers. While many policies implemented today are most concerned with how individual entrepreneurs and investors behave, policy may be better informed by seeing the implications of policy as the effect of the entire network, particularly among those in the network who mediate relationships and resources. Policies intended to encourage entrepreneurship tend to focus on the needs of the firm as an entity. This dissertation suggests instead that the needs of the central actors in the entrepreneurial network should also be the focus of policy.

Second, dealmakers may help both *inform* effective public policy and represent an efficient network through which policy change may be *implemented*. Dealmakers influence multiple firms. Therefore, public policies may be designed to work in parallel with the dealmaker—to facilitate their work and facilitate policy through their work—and thereby encourage the formation of new entrepreneurial ventures. Moreover, once new policy is adopted, this same set of actors may be used to communicate and facilitate policy changes. While policymakers likely already consult with those entrepreneurs and

investors held in highest regard by the community, the algorithm used to identify these dealmakers may be used to select from actors in a wider array of industries, backgrounds, and capabilities that a typical personal social or affiliation network would otherwise overlook. Dealmakers may be seen as a social capital network that facilitates new policy adoption and evaluation, leading to a *virtuous circle* of policy that reinforces elements that support the network and modifies policy that do not.

Third, a persuasive case can be made that for regions to encourage the formation of a successful entrepreneurial economy, they may need to enhance the function of their regional network by encouraging ties among dealmakers and between dealmakers and actors in the aggregate network. While this study cannot speak to the mechanisms that lead to the establishment of a dealmaker social capital system, it does suggest that policy may be better informed by placing emphasis on the dealmakers in a given economy whose influence serves to shape the entrepreneurial network. While this analysis is mute on this specific evolutionary mechanism that gives rise to dealmakers, Feldman has identified the role of entrepreneurs in the context of the cluster as an evolutionary mechanism of regional economic growth (Braunerhjelm & Feldman, 2006; Feldman et al., 2005). Under the same logic, it stands to reason that regions should aim to develop stronger cooperative ties among entrepreneurs and investors and encourage multiple linkages to seed their networks with dealmakers derived from their own regional populations. Dealmakers will then emerge from the cadre of regional entrepreneurs and investors in the aggregate network, thereby perpetuating a vital network. Future theory building will need to investigate this evolutionary concept more fully, identify the mechanism by which dealmakers support the evolution of entrepreneurial social capital, and more closely specify the mediation role they play in supporting and perhaps facilitating the evolution of the entrepreneurial network.

Fourth, there is some data in the analysis that suggests dealmakers may be *recruited* to work in a region with a less dense and cohesive entrepreneurial network. Indeed, many of the biographical sketches of RTP dealmakers included evidence of active ties and in some cases split time between the subject region and another locale. In some cases, dealmakers split time between two regional offices, for example Atlanta and RTP, and in a of couple cases, Silicon Valley and RTP. For regions that do not have as strong a track record in developing an entrepreneurial economy, it may be possible to encourage these linkages by establishing ties with dealmakers in other economies and building routines that would encourage the development of linkages among the region's existing entrepreneurs, investors, and dealmakers both within and outside the region. Policies that seek to enhance recruitment and migration of dealmakers from the outside into less developed and mature entrepreneurial networks may in fact serve as a catalyst for the maturation of the regional network and perhaps to *seed* the establishment of a stronger dealmaker cadre in the region. Moreover, the analysis suggests that regions with limited density among their regional network of entrepreneurs and investors may be able to overcome these limitations by enhancing the cohesiveness among their existing dealmakers. This may be accomplished through policies that encourage dealmakers to communicate or perhaps even collaborate and cooperate in the formation of new entrepreneurial ventures to seed the development of a dealmaker milieu.

Fifth, the analytical strategies and methodologies employed in this dissertation may serve to complement existing cluster-based economic development analysis strategies currently in use. This may extend cluster-based approaches in regional economic theory to identify corresponding and reinforcing elements of social capital that play a role in the formation of clusters. This analysis suggests that cluster approaches would be significantly supported by building complementary social capital frameworks based on the dealmaker concept, placing a *face* of the most central actors in the cluster.

Dealmaker actors in a given cluster may be identified and recruited to lead proactive strategies to develop more advanced or new industry cluster taking full advantage of the region's current social capital endowment within core industry concentrations. Regions that understand how their social capital reinforces their industry clusters may be in a better position to develop and mature these clusters to fuel future regional growth.

Directions for Future Research

It is impossible to generalize the findings presented in this thesis and to assert causal mechanisms to definitively alter regional development theory. For this to be possible, the dealmaker concept will have to undergo more rigorous quantitative examination involving a larger universe of regional economies. While prior work has noted this potential and relied on qualitative methods to begin identifying these influences, this dissertation provides a conceptual model and a set of potential quantitative measures that may be developed to accomplish the wider task.

Should the concept of the dealmaker prove to be a fruitful alternative view of structured social capital complementing the current body of research, this concept will open avenues to the pursuit of new theory in structured social capital, seriality, brokerage, and mediation and will serve to facilitate a more comprehensive understanding of specific actors in vibrant entrepreneurial economies. Indeed, this dissertation proposes, perhaps boldly, a *dealmaker's milieu* as a prototype for the successful entrepreneurial region. The implications of this line of research are significant, as it may allow future researchers and policymakers to focus their efforts on those actors whose presence and behaviors have the most influence on the establishment and development of successful entrepreneurial economies.

Beyond this dissertation, future research could further probe some important mechanisms that are not revealed in this analysis and that require better specification, namely the:

- differences and interplay between serial entrepreneurs and investors;
- specific mechanisms of brokerage implied in social capital frameworks internal and external to the region;
- changing nature of dealmakers as the number of concurrent firm ties increase;
- evidence how the regional economic and socio-demographic context influences the role and characteristics of dealmakers;
- role of dealmakers in establishing, developing, and sustaining successful entrepreneurial milieux; and
- potential evolutionary mechanisms that unfold among dealmakers to establish and sustain the milieux through time.

These questions suggest that, first, the tie between dealmaker capital and a successful entrepreneurial milieu will have to be established more concretely using an expanded quantitative research design. Secondly, more robust studies will involve an empirical cross-evaluation of dealmaker capital in multiple regions, with a focused analysis of how dealmaker characteristics change in different regional contexts. Third, an in-depth analysis will be required to ascertain the differences between and behaviors among classes or categories of individual dealmakers, extending the typology defined in this dissertation. Lastly, this case study points out that the structure of social capital should be studied in an evolutionary format considering the origin, development, and structure of social capital and how entrepreneurial actors are embedded in a networked context. A time-series analysis of changes in social network structures would be most helpful in informing this question.

This analysis suggests that future research on dealmakers should account for the development of experience over time and for their professional progression as a defined process. Indeed, this dissertation finds that early career stages are much simpler to model than those at the later stage, especially among dealmakers, who generally combine the attributes of both investor and entrepreneur. Dealmakers simply defy simple

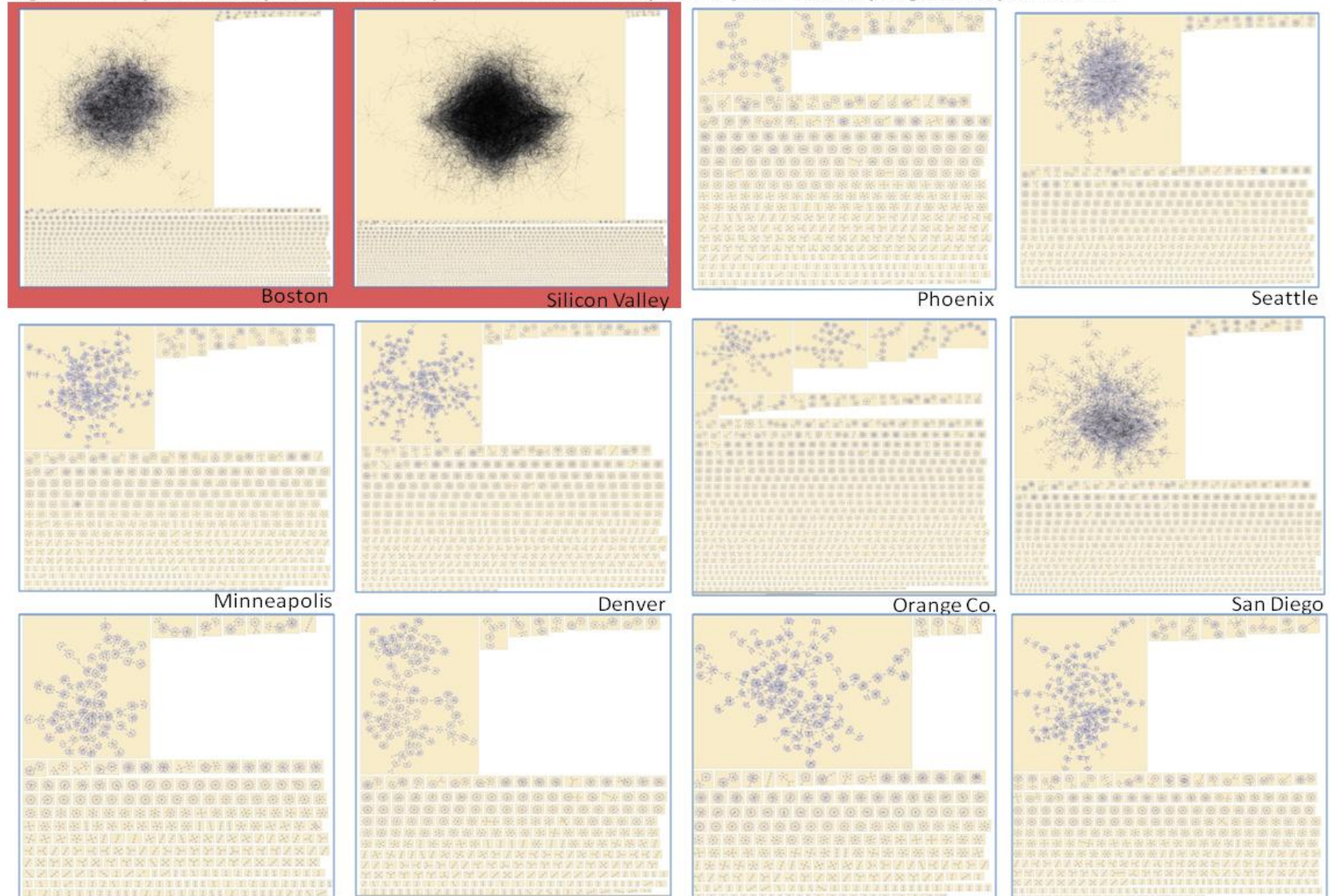
classification. This dissertation concludes that dealmakers are central actors who mediate entrepreneurial economies and asserts that they should be studied in their own right as a distinct phenomenon and as a compelling agenda for future research. These empirically driven cases, and the results presented here, hopefully will stimulate interest about the nature of hierarchical social capital and the unique role of dealmakers in the entrepreneurial economy.

APPENDICES

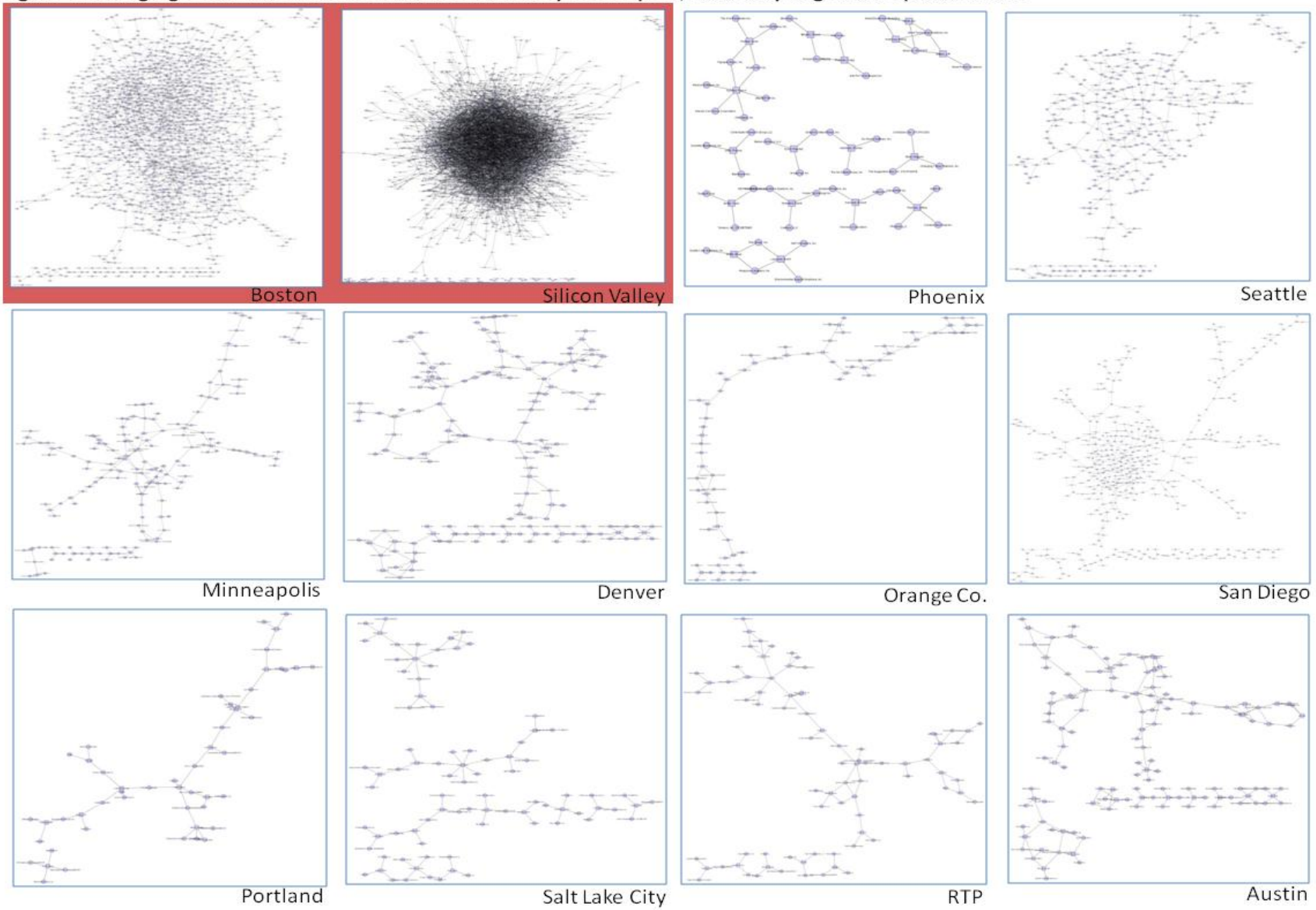
Note to Appendices

The empirical and component analyses presented in this dissertation is supported through a series of component analysis social network visualizations contained in the Appendix A-D that present the same data in this dissertation in the form of network visualizations. The social network component analysis is performed using a network graph editor called *yED*, which allows for the empirical and visual comparison of the differences between network structures of dealmakers among the 12 sample regions. The network diagrams compare aggregated social capital networks with a decomposition of the same network isolating only dealmakers by means of a component analysis. These visualizations show that most firms that are independent of the primary cluster have limited or no ties with other actors in the primary entrepreneurial network. The disassociated and independent clusters for the social network can be easily discerned from the primary cluster. This analysis not only shows the degree to which actors and firms are interconnected by common ties facilitating communication and reciprocity, but it also reveals the degree to which entrepreneurial firms are disassociated with each other in a region—indicating a lack of cohesiveness in the network. The following Appendix contains the following social network visualizations: Appendix A, shows the component analysis of the aggregate networks for the 12 sample regions; Appendix B shows the same network with only dealmakers with 3 or more concurrent ties, and Appendix C shows it for dealmakers with 4 or more concurrent ties. Appendix D shows a detail of the RTP aggregate network with centrality computed, and Appendix E expands this detail to the two highest between central nodes; lastly, Appendix F shows the RTP dealmakers with four or more ties.

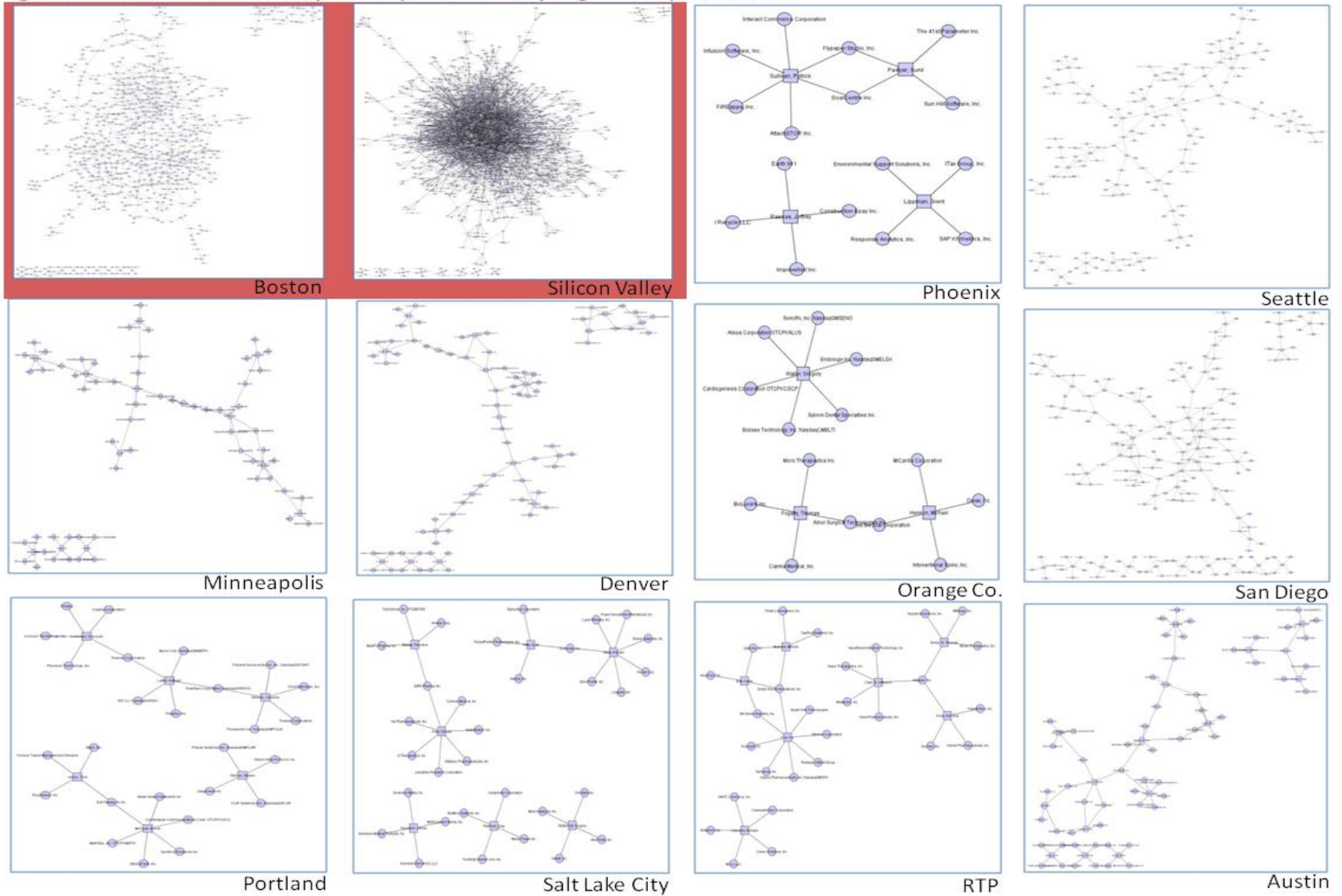
Appendix A. Component Analysis: Total Regional Network of Entrepreneurs and Investors in Firm Clusters



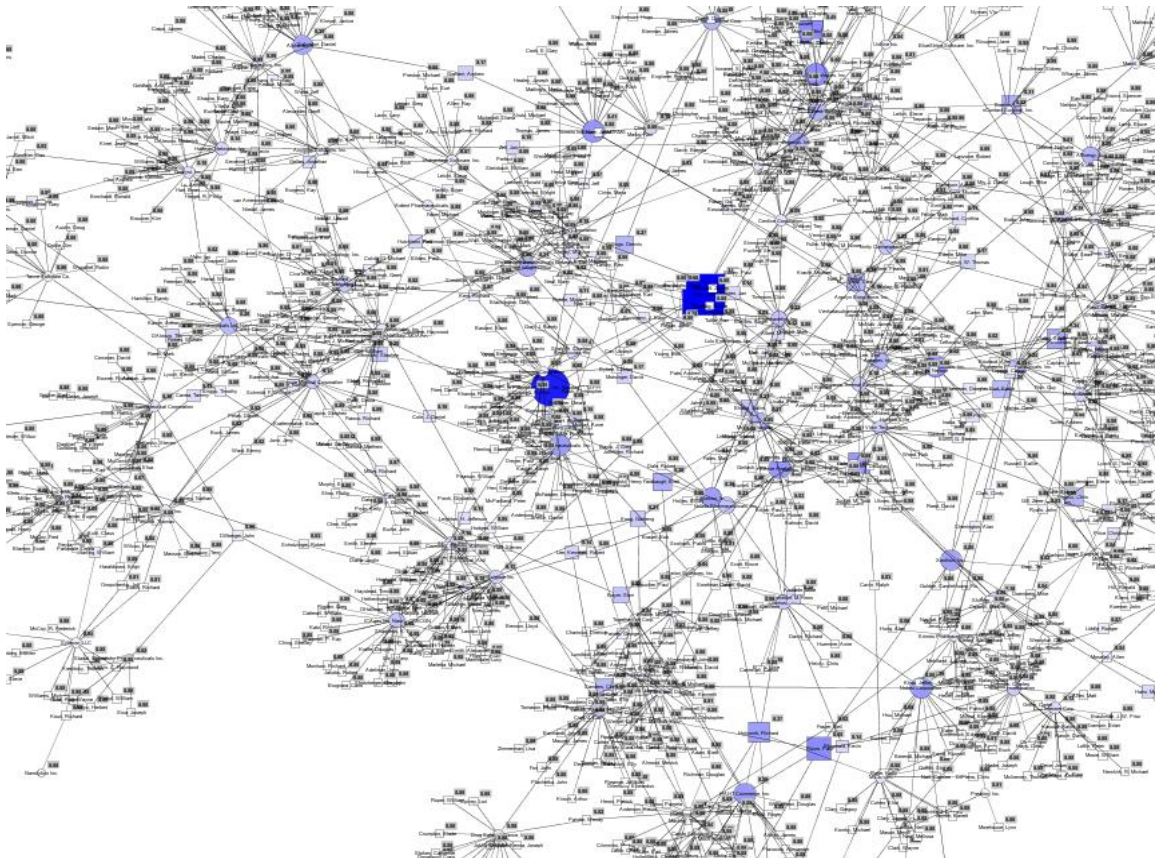
Appendix B. Component Analysis: Dealmakers (Three-Plus Concurrent Ties)



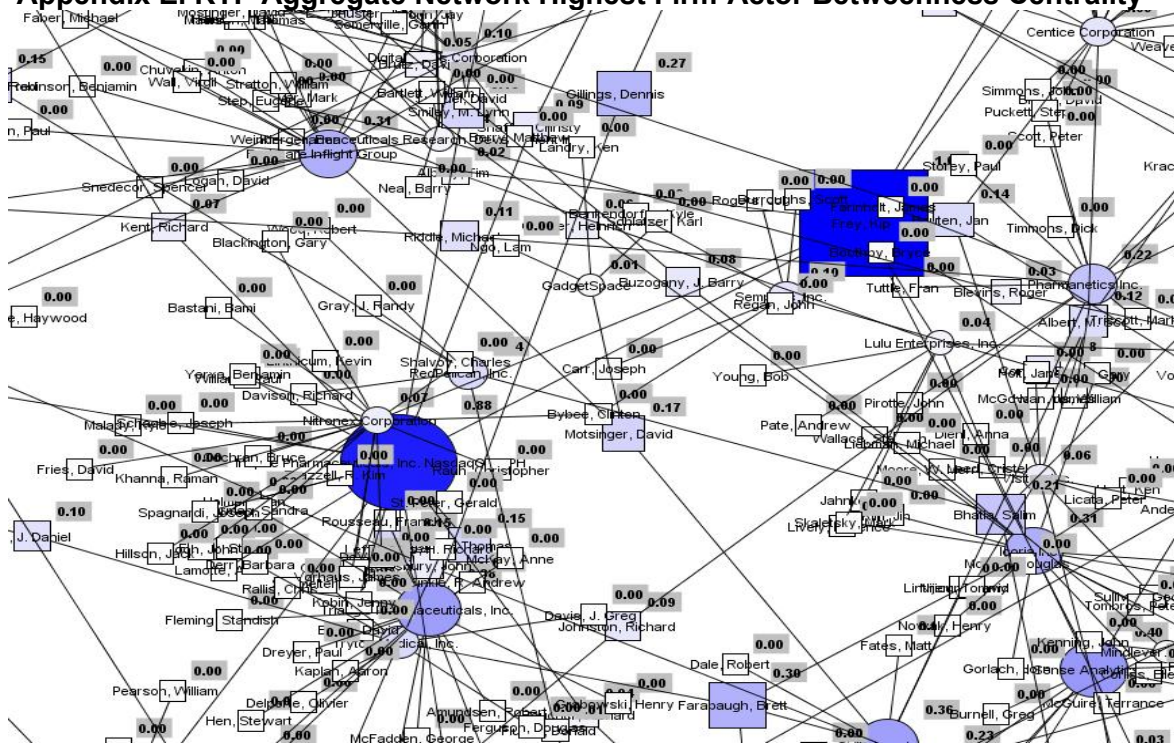
Appendix C. Component Analysis: Dealmakers (Four-Plus Concurrent Ties)



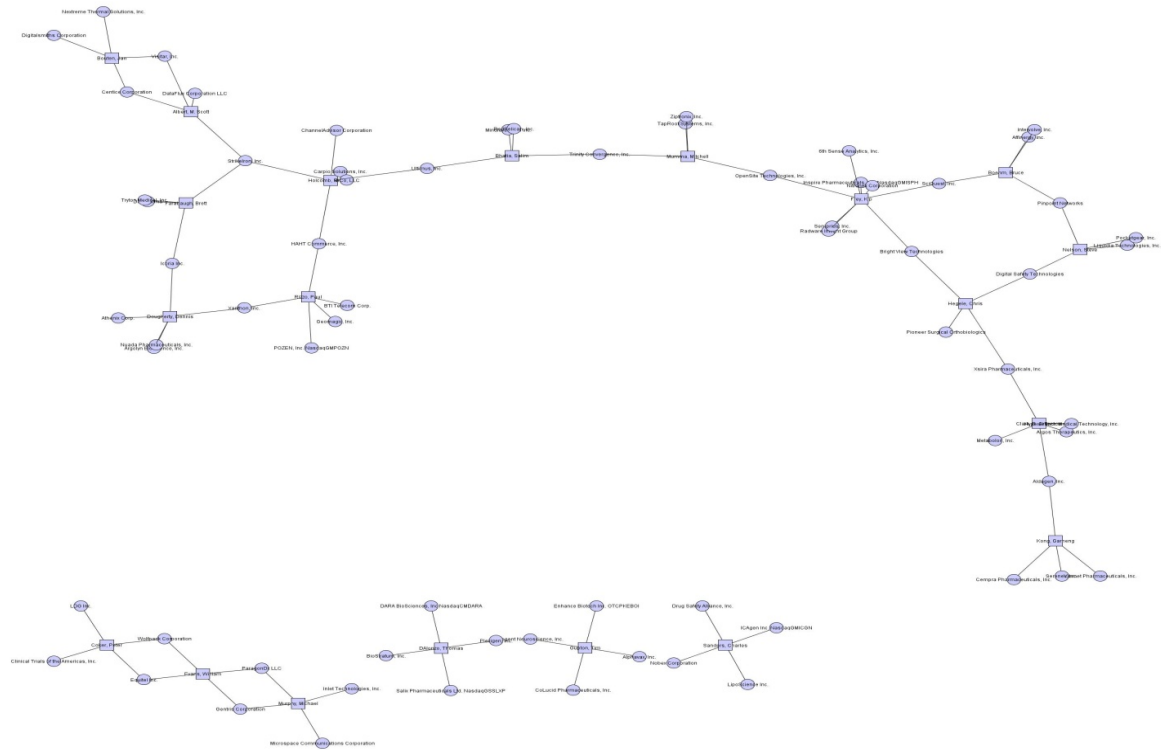
Appendix D. RTP Aggregate Network with Betweenness Centrality



Appendix E. RTP Aggregate Network Highest Firm-Actor Betweenness Centrality



Appendix F. RTP Advanced Dealmakers Network (Four-Plus Concurrent Firm Ties)



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