Journal of Business Venturing 30 (2015) 292–306

Contents lists available at ScienceDirect

Journal of Business Venturing

Turning water into wine? Exploring the role of dynamic capabilities in early-stage capitalization processes

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ARTICLE INFO

Article history:
Received 15 August 2012
Received in revised form 8 July 2014
Accepted 15 July 2014
Available online 30 July 2014

Field Editor: J.J. Chrisman

Keywords:
Resource-based theory
Early-stage capital
Technology-based ventures
Dynamic managerial capabilities
Entrepreneurial teams

ABSTRACT

Technology-based ventures face considerable challenges when attempting to raise early-stage capital during the early-stages of development. To create an operational business they need access to financial capital, but external investors prefer to see an operational business before investing capital. This study extends arguments grounded in dynamic managerial capabilities theory to examine the extent to which various trade-offs among the quality of a venture's management team, radicalness of the firm's technological resources, and demand uncertainty in focal markets impact the ability of ventures to resolve these capitalization challenges. We find that higher levels of demand uncertainty and more radical innovations do not appear to enhance the impact of strong management teams on the raising of early-stage capital. However, lower levels of uncertainty do appear to strengthen the effects of strong management teams. Implications of these findings for dynamic capabilities theory and early-stage capitalization processes are discussed.

1. Executive summary

High quality management teams are thought to be critically important to early-stage ventures in overcoming the challenges of commercializing radically innovative technologies and navigating the waters of change in turbulent industries. Consistent with this view, investors often claim that they would rather "invest in an 'A' management team with a 'B' technology, than a 'B' management team with an 'A' technology". In contrast, other commentators argue that even the most competent teams will often not be able to overcome the uncertainty inherent in startup environments. Instead, investors – especially early-stage investors – tend to favor some predictability in their investments and do not prefer taking extraordinary risks.

This study examines these competing views and explores how the capabilities of the management team impact the investment of early-stage capital into technology ventures under varying conditions of uncertainty. More specifically, we explore how various configurations of management teams, markets, and technologies impact the raising of early-stage capital for new ventures. To explore these questions, we assembled a database of 123 seed-to-early-stage technology-based ventures that were started between July 1, 1999 and December 31, 2007. Since, in most cases, the firms enter our sample before even formally incorporating, our sample overcomes survivorship bias — one of the most difficult issues in entrepreneurship research.

Consistent with these questions, our analyses indicate that the higher quality management teams increase the likelihood that technology ventures will raise early-stage capital. However, when these strong management teams are linked with radical

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http://dx.doi.org/10.1016/j.jbusvent.2014.07.008
0883-9026/

innovations and higher demand uncertainty of the external markets, the value of quality management teams increases only marginally. By implication, these results indicate that while early-stage investors do value high quality management teams, the predominant explanations for *why* investors might favor these teams are weakly supported by our analyses. In light of these findings, we offer several implications for emerging theory on the role and impact of dynamic managerial capabilities in entrepreneurial ventures.

Second, our study offers several important implications for practice. While the quality of the management team matters, other factors such as the market context and technological resources of the firm can dampen the impact of the management team. As such, especially for more technologically oriented founders who anticipate the need to raise outside funding, the conventional wisdom to hire an experienced management team at this stage may be pre-mature. Instead, when raising capital in the context of higher levels of technological and demand uncertainty, founders should focus on resolving the uncertainties inherent with the technology and/or market.

Finally, our results suggest that early-stage investors may benefit from using a real options investment strategy and investing smaller tranches of capital in ventures beset by high levels of uncertainty, regardless of the quality of the management team. We base this recommendation on the fact that it appears that investing in high quality management teams is limited by the fact that "…even the most competent team cannot turn water into wine" (Bhidé, 2008: 46). Therefore, convincing early-stage ventures to hire outside management with excellent experience and/or credentials as the conventional view suggests may encumber these ventures with excess labor costs that are not actually critical to the current stage of development.

2. Introduction

Early-stage technology-based ventures face significant challenges when attempting to raise external capital to fund the early phases of development: to create an operational business they need access to financial capital, but external investors generally prefer to see an operational business before investing capital (Bowers, 2008; Gompers et al., 2010). To resolve these challenges, new ventures compete in early-stage capital markets on the basis of three factors: the capabilities of the management team, the attributes of the technology, and the characteristics of the market in which the firm will operate (Bhidé, 2008). Naturally, firms operating in large, high-growth markets with star management teams and transformational technologies are likely to be more successful in competing for early-stage capital (Bhidé, 2008). However, early-stage ventures rarely exhibit all three ideal characteristics. Instead, these ventures operate in dynamic environments where "changes in industry structure, (in) stability of market demand, and probability of environmental shocks," (Sirmon et al., 2007: 275) coupled with unproven, radically-new technologies create substantial uncertainty thereby forcing investors to make significant trade-offs (Kaplan and Strömberg, 2004; Kaplan et al., 2009). Although early-stage investors are typically willing to accept some risk in one or two of these dimensions (for example, uncertain technology in high growth markets) scant evidence exists that investors are willing to accept risk in all three dimensions (MacMillan et al., 1985). As a result, a central agenda of entrepreneurial finance research is to explore how various configurations of these factors affect key capitalization outcomes for early-stage ventures (Kaplan and Strömberg, 2004; Kaplan et al., 2009).

The capabilities of the founding management team play a central role in attracting early-stage capital investments (Kaplan and Strömberg, 2004; MacMillan et al., 1985; Shane and Stuart, 2002). Consistent with this view, prominent investors such as Georges Doriot, one of the founders of the U.S. venture capital industry, often claim that they would rather "invest in an 'A' management team with a 'B' technology, than a 'B' management team with an 'A' technology" (Zacharakis and Meyer, 1998). According to resource-based logic, this preference exists due to the ability of high quality management teams to attract and utilize invested resources efficiently/effectively from key stakeholders (Erikson, 2002; Holcomb et al., 2009; Packalen, 2007), to improve the innovativeness of product offerings (Marvel and Lumpkin, 2007), and to increase firm growth/survival rates directly (Bates, 1990; Cooper et al., 1994; Gimeno et al., 1997). In short, high quality management teams are thought to be critically important to early-stage ventures, enabling the firm to overcome the challenges inherent in commercializing radically-innovative, new technologies, adapting ventures to the demand uncertainty inherent in dynamic markets (Kaplan and Strömberg, 2004; Zingales, 2000), and creating new opportunities (Alvarez and Barney, 2007).

Recent work in the finance literature challenges this view and argues that the contextualization of technological resources in markets through the venture's business idea plays a more central role in attracting capital to the firm in the early-stage capitalization processes than the quality of the management team (Kaplan et al., 2009). This perspective argues that the functional value of founding management teams is far more limited since "…even the most competent team cannot turn water into wine" (Bhidé, 2008: 46). Fundamentally, this research argues that early-stage investors may be over-weighting the importance of the capabilities of the management team (Baum and Silverman, 2004).

To address this critical view of management teams, this study builds on the dynamic managerial capabilities literature to explore how various configurations of management teams, markets, and technologies impact key early-stage capitalization outcomes for 123 technology-based ventures. Our analyses indicate that the substantive capabilities of the management team (Zahra et al., 2006) appear to increase the likelihood of technology ventures to raise early-stage capital. However, when these managerial capabilities are linked with radical innovations and demand uncertainty in external markets, the resulting resource-oriented and market-oriented dynamic capabilities (Barreto, 2010) do not appear to enhance capitalization outcomes for technology ventures. For emerging theory on dynamic capabilities, these results confirm prior speculation that dynamic capabilities do not always positively enhance firm performance outcomes (Zahra et al., 2006). In addition, these results suggest that many early-stage ventures do not possess well-formed resource- or market-oriented dynamic capabilities to convince early-stage investors to supply significant amounts of capital. Instead, these ventures potentially often operate with higher levels of capital constraints. Overall, these results suggest

that early-stage investors value high quality management teams, but that the perceived value of these teams appears to hinge upon the internal resource and external market context in which the firm operates.

3. Theory & hypotheses

3.1. Theoretical background

3.1.1. Managerial capabilities and early-stage capitalization processes

In the literature on early-stage capitalization processes, investors frequently point to the quality of the management team as a primary reason for investing in specific ventures (Fried and Hisrich, 1994; Haar et al., 1988; Kaplan and Strömberg, 2004; MacMillan et al., 1985; Muzyka et al., 1996; Shepherd, 1999; Tyebjee and Bruno, 1984). For example, MacMillan et al. (1985) interview a set of venture capitalists (VCs) and report that VCs, when making investment decisions, heavily weigh the background and experience of the management team. So-much-so that when these investors evaluate potential investment deals with weaknesses in two of the three critical dimensions (for example, management teams, markets, and technology), ventures with management team weaknesses were consistently categorized as "critically flawed" versus those deals where stronger management teams were paired with weaknesses in the other dimensions [such as an environment with extreme demand uncertainty (MacMillan et al., 1985)]. As such, MacMillan and colleagues conclude: "it is the jockey (entrepreneur) who fundamentally determines whether the venture capitalist will place a bet at all" (1985: 128). Consistent with this logic, since management teams play a central role in acquiring critical resources and in building flexible processes to maintain the firm's agility (e.g., Kaplan et al., 2009; Sirmon et al., 2007), the functional value of the firm's substantive managerial capabilities should increase the amount of early-stage capital raised by ventures.

Hypothesis 1. There is a positive relationship between the strength of the managerial capabilities in a firm and the amount of early-stage capital the firm raises.

3.1.2. Radical technologies and early-stage capitalization

In early-stage ventures, technological resource endowments such as high-quality patents (Baum and Silverman, 2004; Mann and Sager, 2007; Shane and Stuart, 2002) play a central role in the development of a venture's products and services, and provide it with at least temporary resource-based advantages (Engel and Keilbach, 2007; Powell and Dent-Micallef, 1997; Silverman, 1999). Furthermore, technological resource endowments often provide platform capabilities to ventures by providing a technical base for the development of follow-on products and even other technologies (Bharadwaj, 2000) thereby creating potentially valuable economies of scope (e.g., Prahalad and Hamel, 1990).

At the same time, radical innovations increase technological uncertainty since ventures need to transform these resources into competitive products and/or services (Schoonhoven et al., 1990). From the view of investors, radically innovative technologies often exacerbate these challenges for some firms (Junkunc, 2007) since the underlying characteristics of the radical technology often drastically alter means–ends relationships in firms (Eckhardt and Shane, 2003) increasing the difficulty of commercializing the radical innovation. For other firms, the economic returns generated by radical innovations are "dramatic…transform(ing) existing markets, creat(ing) new ones, and mak(ing) an enormous contribution" to society at-large (Marvel and Lumpkin, 2007: 807). To balance these issues, early-stage investors such as venture capitalists (Baumol, 2002), angel investors (Sohl, 1999), and corporate strategic investors (Dushnitsky and Lenox, 2005) leverage their specialized knowledge (Gupta and Sapienza, 1992), fund structures (Gompers, 1995), and dedicated governance/monitoring mechanisms (Arthurs et al., 2008) to manage the challenges associated with assessing the potential of innovative, new ventures with the hope that by investing in these ventures, the investor(s) will generate "very significant" payoffs (Bygrave and Timmons, 1992). Accordingly, many early-stage investors are willing to bet considerable amounts of capital on the possibility that early-stage ventures will be able to commercialize radical innovations successfully (Muzyka et al., 1996).

Hypothesis 2. There is a positive relationship between the radicalness of a firm's technological resources and the amount of early-stage capital the firm raises.

3.1.3. Demand uncertainty and early-stage capitalization processes

Among early-stage ventures, a critical external factor with which many of these firms must contend is demand uncertainty (Gompers, 1995; Hsu, 2004; Shepherd, 1999). Demand uncertainty is defined as "…the perceived speed of change and unpredictability of customers' product preferences and demands as well as the emergence of new customer segments" (Atuahene-Gima and Li, 2004: 584). Demand uncertainty is often problematic for firms since managers tend to be reluctant to invest in specialized assets for markets characterized by strong demand uncertainty—especially if these firms cannot divest excess resources in secondhand markets (Guiso and Parigi, 1999).

Research also indicates that firms will often delay new product introductions if demand uncertainty is too high (Chatterjee and Sugita, 1990). To resolve these challenges, firms often invest in adaptable resources such as flexible manufacturing systems (Goyal and Netessine, 2007), or postpone production decisions until demand can be forecasted more accurately (Anupindi and Jiang,

2008). However, in doing so, firms must possess specific resources and capabilities that enable the firm to remain agile in the face of changes to the demand structure of specific markets (Anupindi and Jiang, 2008; Atuahene-Gima and Li, 2004).

In early-stage capitalization processes, demand uncertainty increases the difficulty of making critical judgments regarding the viability of entrepreneurial ventures as investment targets (Bhidé, 2008). These difficulties arise for several reasons. First, stable markets often facilitate early-stage capital investments because the competitive advantages of products are easier to evaluate in environments with low levels of demand uncertainty (Shepherd, 1999). High levels of demand uncertainty also render traditional valuation models largely ineffective, thereby increasing the difficulty of efficiently allocating capital (Hsu, 2004). As a result, high levels of demand uncertainty tend to reduce the amount of capital raised at this stage of development (Gompers, 1995).

Hypothesis 3. There is a negative relationship between the amount of demand uncertainty in a firm's external environment and the amount of early-stage capital that the firm raises.

3.1.4. Resource-oriented dynamic managerial capabilities in early-stage capitalization processes

The managerial capabilities in founding teams are widely considered to play a central role in attracting early-stage capital to firms since they increase survival/growth rates (Bates, 1990; Cooper et al., 1994; Gimeno et al., 1997), improve the innovativeness of product offerings (Marvel and Lumpkin, 2007), and impact the accumulation and use of additional resources from key stakeholders (Erikson, 2002; Holcomb et al., 2009; Packalen, 2007). Thus, the capabilities of the founding management team play a central role in attracting early-stage capital investments (Kaplan and Strömberg, 2004; MacMillan et al., 1985; Shane and Stuart, 2002).

In entrepreneurship theory, dynamic managerial capabilities are thought to be a key factor that enables the firm to navigate the inherent challenges of the start-up process (Zahra et al., 2006). Despite broad consensus regarding their importance, Zahra et al. (2006) argue that the application of dynamic capabilities theory to entrepreneurship theory is hampered by a lack of definitional clarity. To remedy these issues, Zahra et al. (2006) define substantive capabilities as the "…set of abilities and resources that go in to solving a problem or achieving an outcome as a substantive (or 'ordinary') capability" (Zahra et al., 2006: 921). They differentiate substantive capabilities from dynamic capabilities and define these higher order capabilities as "…the dynamic ability to change or reconfigure existing substantive capabilities." (Zahra et al., 2006: 921). Building on this approach, Barreto (2010) defines dynamic capabilities as "…the firm's potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely and market-oriented decisions, and to change its resource base" (Barreto, 2010: 271).

Since the capabilities of the management team often play a decisive role in enabling firms to leverage radical technologies successfully (Stieglitz and Heine, 2007), the early-stage finance literature contends that strong management teams will complement radical technologies thereby enabling firms to raise higher levels of financial capital (Muzyka et al., 1996). This preference exists because high quality management teams are thought to have the ability to adapt these technologies to create new opportunities where none existed before as management teams re-purpose the functionality of these resources towards new objectives (Zahra et al., 2006). By "…creat(ing), extend(ing), and reconfigur(ing) the resource base…" (Barreto, 2010: 272) in early-stage ventures, these management teams display a critical set of resource-oriented dynamic capabilities. Accordingly, the resource-oriented dynamic capabilities of the management team reflect their ability to resolve the development and production challenges inherent in transforming radical technologies into viable products or services (Stieglitz and Heine, 2007) resulting in higher levels of early-stage capital invested within the firm.

Hypothesis 4. Radical innovations strengthen the relationship between the firm's managerial capabilities and the amount of early-stage capital raised.

3.1.5. Market oriented dynamic managerial capabilities in early-stage capitalization processes

Early-stage capitalization processes are also strongly influenced by the market context in which the firm operates. In particular, early-stage ventures tend to operate in dynamic environments where "changes in industry structure, (in)stability of market demand, and probability of environmental shocks," (Sirmon et al., 2007: 275) increase the challenge of leveraging resources to create innovative products/services (Katila and Shane, 2005). As such, the ability of these management teams to adapt their ventures in response to environmental dynamism (Lee et al., 2001; Shane and Stuart, 2002) or to seek out more attractive and predictable market spaces (Baker et al., 2003; Santos and Eisenhardt, 2009) "…(gives) firms the skills to adapt their products to market needs and to deal with competitive challenges" (Miller and Shamsie, 1996: 522). Furthermore, quality management teams are more likely to identify and add product features more aligned with emerging customer expectations (Schoonhoven et al., 1990). As such, earlier research suggests that there is a strong, positive link between the strength of the venture's managerial capabilities and capitalization outcomes (Kaplan and Strömberg, 2004; Shane and Stuart, 2002).

For early-stage ventures, the adaption of firms generally hinges upon the ability of the management team to solve the puzzle of demand uncertainty (Atuahene-Gima and Li, 2004). Arguments based in the dynamic capabilities literature suggest that firms with market-oriented dynamic capabilities (Barreto, 2010) can draw upon substantial knowledge-based, social, and human capital resources in order to resolve demand uncertainty (Atuahene-Gima and Li, 2004; Baron and Markman, 2003; Davidsson and Honig, 2003). Other scholars are less optimistic regarding the importance of the market-oriented dynamic capabilities of the management team to solve the puzzle of demand uncertainty since "…even the most competent team cannot turn water into wine" (Bhidé, 2008: 46), implying that the market context in which the firm operates largely determines the relative success of the firm. To the surprise of some scholars, prior research exploring the various trade-offs made by investors when evaluating potential investment deals suggests that the background/

characteristics of the management team and/or the strategy of the venture do not directly influence investor decision-making (Hall and Hofer, 1993). Instead, the nature of the venture's product and market context appear to be more directly tied to a favorable assessment of the investment opportunity (Hall and Hofer, 1993). Overall, this research argues that when demand uncertainty is high, thereby rendering the market opportunity difficult to assess, early-stage investors may discount the importance of the market-oriented capabilities of the management team (e.g., Baum and Silverman, 2004).

Hypothesis 5. Demand uncertainty weakens the relationship between the firm's managerial capabilities and the amount of early-stage capital that the firm raises.

Hypothesis 6. Demand uncertainty weakens the relationship between the firm's higher order resource-oriented dynamic managerial capabilities and the amount of early-stage capital that the firm raises.

4. Methods & data

4.1. Sample and data collection

According to the National Venture Capital Association, external, equity-based investments into entrepreneurial ventures before these firms generate positive net income are commonly referred to as seed/start-up and early-stage capital investments (Freear et al., 2002; National Venture Capital Association. NVCA, 2009).[2] Since these investments are typically allocated to firms when these firms are very young, reliable data on seed/early-stage capitalization processes are extremely rare and difficult to obtain. In addition, since early-stage firms are usually privately held and small, they are rarely included in traditional databases such as Dun and Bradstreet or VentureXpert (Kaplan et al., 2009). In light of these data constraints, to test our hypotheses in this study, we needed to develop a sample of seed/early-stage companies that were in process of actively seeking early-stage capital. We contacted a non-profit agency established in the Southwestern U.S. to aid entrepreneurs interested in the commercialization of new technologies. This agency is a quasi-venture capital firm that provides advisory services to these entrepreneurs and their firms, but during the time frame in which this study takes place did not provide equity-based investments to its client ventures.[3] Its staff consists of former entrepreneurs, venture capitalists, and business angel investors, all of whom possess extensive prior experience gained previously by starting and/or funding early-stage, technology-based ventures. In 2009, the agency was named as one of the world's top providers of technology commercialization services by an international economic development organization.

As part of their advisory services, the agency collects extensive data on all client firms and at the closing date of this study, the agency had built a database of 144 seed-to-early-stage technology-based ventures. These ventures were started between July 1, 1999 and December 31, 2007 and compete within 39 unique 6-digit NAICS industry sectors. A significant portion of these entrepreneurs/ventures became clients of the agency even before formally incorporating their ventures with the state. This unique tracking of ventures from the nascent stage forward allows this study to surmount one of the most difficult sampling issues in entrepreneurship research — the elimination of a survivorship bias (Busenitz and Murphy, 1996; Cassar, 2004). Second, regarding a potential selection bias (Pedhazur and Schmelkin, 1991), the agency's mandate does not allow the agency to select client ventures based on criteria such as the perceived likelihood of success. Furthermore, the agency experts are not compensated based on the relative success/failure of their client ventures thereby minimizing any incentives to "pick winners." Lastly, during the time frame in which this study takes place, since the agency was organized as a not-for-profit, I.R.S. rules prohibiting private inurement prevented staff members from personally investing in or receiving salaries from the ventures with whom the agency was working.

As with most longitudinal databases, we had to contend with missing data for some cases. Where sufficient data existed to impute missing data reliably, we imputed missing data in the following manner. First, for the control variables, the variable mean was substituted for all missing data in continuous variables, and the mode was substituted for all missing data in nominal variables. Second, for the independent variables, a regression imputation strategy was utilized to predict the likely value of the independent and moderating variables (Graham, 2009). Regression imputation strategies are preferable to eliminating cases with missing data since a regression model tends to reinforce relationships already existing in the sample while the elimination of cases reduces the available statistical power of the research model thereby making it increasingly difficult to confirm the true effect of key relationships predicted within the model (Cohen et al., 2003; Graham, 2009). In cases where the available data were not sufficient to reliably impute missing values, we eliminated the case. This step reduced the sample from 144 to 123.

One potential point of concern with the imputation strategy for missing data is that the observations with the imputed values would bias the distributions of the independent and dependent variables. To make sure that no bias existed, we conducted a one-way ANOVA with a dummy variable for the cases with imputed values as the factor variable (1 — observation contains imputed data; 0 — observation contains no imputed data) for total early-stage capital raised, managerial capabilities, radical innovation, and demand uncertainty to test whether there were differences in the means between these two potentially different groups. Based on our ANOVA analysis, there were no statistically significant differences between the means of either group for any of the variables ($p > .05$). Lastly, to ensure that the imputed values were not biasing the overall results of the model, we also re-estimated the models using a smaller sample of 75 observations that contain no imputed values. The results of these models are directionally and

[2] According to industry standards, growth-stage investments, which comprise the bulk of equity-based investments, occur after firms start generating positive net income.

[3] In 2008, after the study window closed, the agency started providing equity-based, seed-stage investments to select client ventures.

statistically equivalent to the full models with imputed values except for the interaction between management team and demand uncertainty, which becomes marginally significant ($p < .10$) due to the loss of statistical power.

4.2. Dependent variable measures

4.2.1. Early-stage capital raised

Early-stage capital raised serves as the key dependent variable in this study. To calculate this variable, we used private data obtained directly from the records compiled by the agency for each venture in the sample and included any investment made by external investors in exchange for an equity stake in the venture. Specifically, the three types of equity-based capital investments were included in this variable: 1) "angel" investments; 2) venture capital investments; 3) corporate investments made by external organizations.[4] Since new ventures tend to seek capital from a variety of sources, we aggregate the capitalization outcomes from the three sources of equity-based capital to account for the presence of co-investment (Denis, 2004).

One possible limitation of the decision to aggregate these different types of early-stage capital is that we potentially mask some underlying individual differences between the different types of investors. For cases where venture receives funding from only one type of investor we utilized dummy variables to rule out this alternative explanation. We discuss these control variables in more detail below.

Regarding the validity of the dependent variable, several facts are important to note. First, in most cases, the agency experts were involved in the capitalization process and therefore possess first-hand knowledge of the capitalization outcomes for each venture and so their records stored in the archival database are utilized as the primary source for the variable. Second, agency staff members periodically check the major VC databases such as VentureSource to see if any venture obtained funding of which the agency experts were unaware. Third, we also examined the business plans and other proprietary documents of each ventures to check for prior funds not listed in the main database. This final validation check uncovered only one $12,000 angel investment that was not previously recorded in the main database. Accordingly, we believe our measures accurately reflect the total early-stage capital raised by each venture.

4.3. Independent variable measures

4.3.1. Managerial capabilities

Adner and Helfat (2003) argue that dynamic managerial capabilities are a higher order construct built upon three factors: 1) Managerial human capital — "the expertise and human capital required in decision-making;" 2) managerial social capital — social relationship which provide influence, control, and power; and 3) managerial cognition — beliefs and mental models that serve as the basis for decision-making. Consistent with the scope of dynamic managerial capabilities, we examined background characteristics of the management teams including the dominant skills and specialization, the complementary strength of the board, and managerial background characteristics such as prior entrepreneurship experience to serve as an observable proxy for unobservable cognitive/mental models. Collectively, we used these factors as the basis for operationalizing the substantive capabilities of the management team (Amason et al., 2006; Cannella et al., 2008; Carpenter and Fredrickson, 2001; Zott and Huy, 2007). Specifically, the measure that we utilized to capture these critical dimensions of managerial capabilities evaluates the following dimensions: 1) The management team has prior industry/start-up experience; 2) the functional skill sets of the management team cover the major operational areas of the company; 3) the management team has a proven track record of achieving major milestones in previous endeavors; 4) the management team has access to a board of advisors/directors to provide critical social ties and mentoring.

During the client entry process, agency experts evaluate the quality of the venture's management team utilizing a comprehensive process. First, prior to providing their advising services, agency experts conduct a thorough due-diligence process to evaluate the capabilities of the management team. The extensive nature of this process based on interviews, meetings, and (in some cases) background checks provides an abundance of data that these experts use to rate the managerial capabilities of each venture. Furthermore, these evaluations are made before the agency begins to assist the venture in their commercialization efforts thereby eliminating any retrospective bias on the process. Third, all agency experts with their extensive backgrounds in entrepreneurship and/or early-stage financing processes are eminently qualified for evaluating the capabilities of each management team.

Based on this process, the agency consulting staff collectively generates a composite score between 0 and 100 based on the dimensions that we outline above to capture varying levels of quality in the capabilities of the management team. We were provided access to this score and utilized it to measure the quality of the management team quantitatively instead of alternative methods commonly used in prior research to measure key dimensions of management teams. For example, to measure managerial human capital, prior studies often use categorical and/or ordinal variables to capture whether entrepreneurs possess experience in prior startups, industries, etc. (Baum and Silverman, 2004; Hsu, 2004, 2007). Although these measures are consistently linked with improved capitalization outcomes (e.g., entrepreneurs with more years of experience in an industry are more successful in the capitalization process — e.g., Baum and Silverman, 2004), the challenge with this approach is that ordinal measures often fail to capture key differences in terms of the quality of these experiences. For example, "objective" ordinal measures capturing the number of prior years of experience in starting new ventures would fail to address the key differences between a self-employed, lifestyle entrepreneur with five years of experience selling a couple of DVDs per month on eBay and those faced by the founders of Netflix, who scaled the venture to reach millions of customers during the early phases of development. In these cases, our belief is that the assessment of the quality of these prior experiences based on a due diligence process conducted

[4] Approximately 25% of the funding events in the sample involve co-investments among various combinations of angel investors, VCs, and corporate strategic investors.

by the agency staff is a superior method for determining the quality differences between management teams with equivalent years of experience (Zacharakis and Meyer, 1998). Accordingly, we believe that the continuous measure provided by the agency for use in this study provides us with the best method for measuring the variance in quality of the managerial capabilities between the founding teams in the sample.

4.3.2. Radical innovation

To measure *radical innovation*, two independent coders who were not on the authorship team for this study analyzed a professional market research report prepared individually for each venture as part of the due diligence process. Both coders possess extensive experience in entrepreneurship/technology management and were trained specifically on how to read the research report developed during the due diligence process. Using a set of scales developed by Gatignon and Xuereb (1997) to capture key dimensions of the radicalness of a firm's technological resources, the coders assessed the following questions: 1) Is this new technology a major departure from current technology in the market? 2) Does this technology incorporate a small body of existing technological knowledge? 3) Is the future development difficult to forecast?

The professional market research report was purchased by the agency from an established market research firm. This report contains an extensive analysis of the market-based, competitive, and technological dynamics of the specific environment within which each individual venture will operate. The researchers compiling the report often use both public information and private information gathered through searches of databases and interviews with industry experts to develop a clear set of factors which shape the environment and determine the radicalness of the venture's technological resources. Following Gatignon and Xuereb (1997) the anchors of the 7-point Likert-type scale were 'disagree' and 'agree.' Finally, upon completion of the coding process, to assess the reliability of both the individual and combined efforts of analyzing the content of the reports, inter-rater reliability statistics were calculated for *radical innovation* [Cohen's Kappa was .76—Landis and Koch (1977) argue that any score over .61 represents substantial agreement]. Since acceptable inter-rater reliability was achieved, the final score was calculated by averaging the scores from both coders together.

4.3.3. Demand uncertainty

We utilized a similar coding process described above and the scales from Gatignon and Xuereb (1997) to assess the relative demand uncertainty in the environment: 1) Are consumer preferences difficult to assess for this technology? 2) Is demand difficult to forecast for this technology? 3) Are changes in consumer preferences difficult to predict for this technology? Following Gatignon and Xuereb (1997) the anchors of the scale were 'disagree' and 'agree.' Finally, upon completion of the coding process, to assess the reliability of both the individual and combined efforts of analyzing the content of the reports, inter-rate reliability statistics were calculated for each coder for each summed variable. For demand uncertainty, Cohen's Kappa was .65—[Landis and Koch (1977) argue that any score over .61 represents substantial agreement]. Since acceptable inter-rater reliability was achieved, the final score was calculated by averaging the scores from both coders together.

4.4. Control variables

4.4.1. Early-stage funding targets

To calculate the total early-stage targets, we summed the total external capitalization goals reported by the firms in their business plans. We included this variable as a control since firms within the same industry often differ significantly based upon the strategies of the firm (for example, the capitalization goals of biotech ventures range from $5M to $21M).

4.4.2. Non-local investors

Since the state in which most of the data were collected from is not one of the top "money centers" for venture funding, ventures receiving funds from investors from outside of the state may receive larger amounts of capital. To account for these effects, we developed a dummy variable called *non-local investors* categorizing those ventures that received funds from investors from outside the state as a "1," while ventures with all local investors were included within the omitted category.

4.4.3. VC funded

We also needed to rule out the categorical differences between venture capitalists and the other types of investors. Specifically, ventures may raise more funding if funded solely by VCs instead of strategic or angel investors (Denis, 2004; Hellman and Puri, 2002). To rule out these categorical differences, we developed the dummy variable *VC funded* categorizing ventures receiving capital from only VCs (1—Yes; 0—No).

4.4.4. Angel funded

In addition, ventures may raise less funding if funded solely by angel investors instead of VCs or strategic investors (Denis, 2004; Hellman and Puri, 2002). To rule out these effects, we developed the dummy variable *angel funded* categorizing ventures receiving capital from only angel investors (1—Yes; 0—No).

4.5. Analytic strategy

To test the hypotheses predicting the total early-stage capital raised by the venture, the clustering of the distribution of our dependent variable at zero (i.e., since many of the ventures did not raise any capital), required the use of a single-limit, two-

stage tobit model to test our hypotheses (McDonald and Moffitt, 1980; Tobin, 1958). Earlier research criticizes the interpretation of interaction effects in limited dependent variable models (LDV—e.g., Hoetker, 2007; Bowen and Wiersema, 2004; Wiersema and Bowen, 2009; Bowen, 2012). Based on these criticisms, new techniques have been proposed for testing and interpreting the total moderating effects in LDV models (Hoetker, 2007; Wiersema and Bowen, 2009). However, as Bowen (2012) points out, total moderating effects are still misleading since the slope of the interaction plots still conflate the actual true moderating effect with the structural effect of the specific statistical technique being used in the model. To resolve these concerns, following Bowen's guidelines (Bowen, 2010), we calculated and tested the significance of the secondary moderating effects of a venture's dynamic managerial capabilities on both radical innovation and demand uncertainty to predict the total amount of early-stage capital raised by the firm.[5]

In addition, it is possible that the specialized expertise of certain types of investors might influence their decision-making processes thereby impacting the amount of capital invested in each venture. To rule out these effects, we utilized clustered, robust standard errors with the 2-digit NAICS code for each firm as the cluster variable (Rogers, 1993). Clustered, robust standard errors adjust the standard errors of each variable in the model for any intra-group correlations among the firms in the sample based on their membership in specific industry clusters. In addition, while the state from which our data are gathered has traditionally had a strong energy sector, since the oil bust in the 1980s, the state economy has diversified substantially to where it now also has a significant, emerging presence in the medical and high-tech sectors among many others. As a result, many of the early-stage investors tend to be deal-specific and focus on the merits of individual deals rather than specializing in specific sectors. When these investors need specialized expertise for managing certain investments, they tend to bring in outside investors as co-investors to provide this specialized expertise. Taken together, the combination of statistical controls and unique attributes of the institutional environment rules out the potential bias stemming from any industry-specific, specialization of the early-stage investors in our sample.

5. Results

Table 1 reports the means, standard deviations, and correlations among all variables utilized in this study. Before testing the full models we conducted tests of normality for all continuous control, dependent, and independent variables. All continuous, independent variables are within the normally accepted ranges for kurtosis and skewness (Hair et al., 1998). However, consistent with most prior research in the early-stage capitalization literature, the distribution of total early-stage capital raised was highly skewed (Total Capital: Skewness = 4.42) reflecting the reality that many firms receive no capital, while the majority of the funds are raised by only a few firms. To address these issues, we utilized two options. First, we utilized a single-limit tobit regression model to address the clustering of the distribution of the DV at zero for the firms that raise no external funding. However, since this step only addresses part of the issues with skewness, we also transformed the DV by adding a constant (+1) to ensure that each observation is a positive integer, and then we calculated the natural log of the DV.

After centering our continuous variables, we also tested the variance inflation factors (VIFs) to ensure that multicollinearity was not influencing our models. Our VIF scores were all below 3, well below the standard threshold of 10, suggesting that multicollinearity was not an issue. Table 2 reports the results for the models predicting the total early-stage capital raised with both the single-limit tobit regression models and the full, negative binomial regression model included as a robustness test.

First, in Hypothesis 1, the study predicts that the substantive managerial capabilities will positively enhance the ability of the firm to raise early-stage capital. In Model 2 of Table 2, the positive and significant coefficient for management team predicting early-stage capital raised suggests strong support for this hypothesis. Second, Hypothesis 2 predicts that more radical innovations embedded within the technological core of the organization will increase the amount of early-stage capital raised by the firm. In Model 2 of Table 2, the positive and significant coefficient for radical innovation suggests that more radical innovations increase the ability of the firm to raise early-stage capital suggesting that the logic of Hypothesis 2 is supported in this analysis. Third, Hypothesis 3 predicts that higher levels of demand uncertainty will reduce the amount of early-stage capital raised by the firm. In Model 2 of Table 2, the lack of a significant p-value suggests a lack of support for this hypothesis.

Fourth, we predicted in Hypothesis 4 that resource-oriented dynamic capabilities would increase the total amount of capital raised for early-stage ventures. Model 3 in Table 2 reports a negative coefficient for the secondary interaction between managerial capabilities and radical innovation suggesting that more radical innovations are perhaps weakening the effects of the management team. To better understand the results of Model 3 in Table 2, we plot the interaction effects in Fig. 1. Based on this interaction plot, we find that the relatively steep slope of the interaction between strong management teams coupled with less radical innovations suggests that the effects of strong management teams are most evident when coupled with innovations that are less radical. In comparison, while stronger management teams fare slightly better than weaker management teams in raising early-stage capital when coupled with more radical innovations, the magnitude of this effect is not as pronounced as the effect of more incremental innovations. Taken together, these results suggest that the incremental value of management teams hinges largely upon the type of innovation that the firm is attempting to commercialize.

In Hypothesis 5, our theory predicts that high levels of demand uncertainty in the focal firm's environment will weaken the direct impact of dynamic managerial capabilities on a firm's capitalization outcomes. In Model 4 of Table 2, a negative coefficient for the interaction between demand uncertainty and managerial capabilities suggests that strong management teams raise less funding when coupled with environments characterized by higher demand uncertainty versus more funding in environments with lower

[5] We thank Harry Bowen for the use of his STATA code and for his assistance in calculating and interpreting the secondary moderating effects accurately.

Table 1
Means, standard deviations, and correlations among all variables.[a,b]

Variables	Mean	St. dev.	1	2	3	4	5	6	7	8	9
1 Total early stage capital	985,133	3,065,943	1.000								
2 Total early stage capital (log)	7.451	5.469	0.490	1.000							
3 Management team	59.063	12.022	0.190	0.177	1.000						
4 Radical innovation	3.284	1.407	0.101	0.061	−0.123	1.000					
5 Demand uncertainty	3.950	1.393	0.126	0.040	0.029	0.588	1.000				
6 Non-local investors[b]	0.203	0.404	0.553	0.553	0.077	0.154	0.164	1.000			
7 Funding targets (log)	13.982	1.180	0.177	0.042	0.011	0.313	0.291	0.026	1.000		
8 VC funded[b]	0.049	0.216	0.281	0.281	0.078	−0.047	−0.018	−0.021	−0.118	1.000	
9 Angel funded[b]	0.333	0.473	0.526	0.526	0.092	−0.063	−0.091	0.157	−0.130	−0.160	1.000

[a] N = 123. Absolute values greater than .17 are significant at $p < .05$; values greater than .23 are significant at $p < .01$.
[b] Spearman rank correlations reported where categorical data are used.

demand uncertainty. To confirm this interpretation of the results of Model 4 in Table 2, we plot the interaction effects in Fig. 2. The differences in the slopes illustrated in Fig. 2 indicate that strong management teams raised less early-stage capital when demand uncertainty was high but more early-stage capital when demand uncertainty was low.

In Hypothesis 6, we argue that demand uncertainty will also weaken effects of the combination of management teams and radical innovations, thereby resulting in lower amounts of capital raised. In Model 5 of Table 2, a positive, significant coefficient for the three-way interaction among managerial capabilities, radical innovation, and demand uncertainty suggests support for this hypothesis. To confirm this interpretation of the results of Model 5 in Table 2, we plot out the three-way interaction effects in Fig. 3. The differences in the slopes illustrated in Fig. 3 indicate that the combination of strong management teams, markets with low demand uncertainty, and less radical technological resources is the optimal configuration of factors that will maximize the total amount of early-stage capital raised by the firm. In addition, we find that high levels of demand uncertainty appear to decrease the amount of early-stage capital raised when coupled with firms employing strong management teams that are attempting to commercialize radical innovations.

Table 2
Results of single-limit tobit and negative binomial regression models for total early-stage capital raised.[a,b,c]

Variables	DV: Total early-stage capital raised (log)					DV: Total ESC raised[c]
	Model 1: Controls	Model 2: Main effects	Model 3: Interaction	Model 4: Interaction	Model 5: Interaction	Model 6: Interaction
Controls						
Non-local investors	9.114 (1.497)***	9.0656 (1.692)***	8.489 (1.544)***	8.604 (1.251)***	8.586 (1.590)***	16.75 (1.01)***
Funding target (log)	0.971 (0.478)*	0.827 (0.507)	0.853 (0.482)†	0.744 (0.533)	0.814 (0.438)†	0.66 (0.24)**
VC funded	14.908 (1.858)***	14.558 (1.440)***	14.635 (1.237)***	14.016 (1.171)***	14.704 (1.239)***	17.36 (1.38)***
Angel funded	11.696 (1.016)***	11.443 (0.805)***	11.248 (0.718)***	11.117 (0.772)***	11.298 (0.777)***	15.81 (1.18)***
Constant	−2.114 (1.202)†	−2.009 (1.097)†	−2.026 (0.993)*	−1.713 (0.943)†	−2.379 (0.980)*	−2.36 (0.93)*
Main effects						
Management team		0.092 (0.043)*	0.121 (0.038)**	0.106 (0.037)**	0.100 (0.027)***	0.16 (0.04)***
Radical innovation		0.487 (0.167)**	0.511 (0.166)**	0.296 (0.212)	0.293 (0.177)†	−0.77 (0.33)*
Demand uncertainty		−0.294 (0.507)	−0.500 (0.497)	−0.235 (0.419)	−0.497 (0.428)	−1.28 (0.30)***
Interactions						
MGT X radical innovation[b]			−0.073 (0.030)*		−0.107 (0.043)*	−0.17 (0.05)**
MGT X demand uncertainty[b]				−0.065 (0.029)*	−0.011 (0.043)	−0.05 (0.04)
RadInnov X demand unc					0.331 (0.149)*	0.77 (0.07)***
MGT X RadInnov X demand unc					0.019 (0.011)†	0.07 (0.01)***
Model statistics						
F-statistic	46.88***	211.91***	414.74***	398.31***	11,333***	––
Log pseudolikelihood	−202.5	−200.21	−193.5	−196	−192.2	−976
Pseudo R^2	0.252	0.260	0.286	0.276	0.290	––

––, negative binomial regression models do not report F-statistics or pseudo R^2.
[a] N = 123. Clustered, robust standard errors reported in parentheses next to each coefficient.
[b] Interaction effects of calculated, secondary moderating effects (Bowen, 2010).
[c] Post hoc analyses reported in Model 6 are estimated using negative binomial regression with clustered, robust standard errors.
*** $p < .001$.
** $p < .01$.
* $p < .05$.
† $p < .10$.

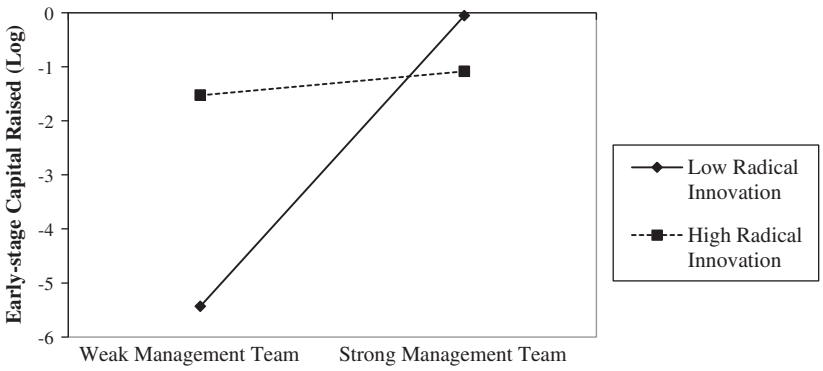

Fig. 1. Plot of the two-way interaction between radical innovation and management team predicting total early-stage capital raised (log).

These results support the argument that high levels of demand uncertainty negatively impact the total amount of early-stage capital raised by the firm.

6. Discussion & directions for future research

6.1. Management teams and early-stage capital acquisition

The theoretical focus of this study examines the validity of functional value arguments as causal explanations for why strong management teams might be important to early-stage capital investors. Based on these arguments, we find that while stronger management teams raise more capital than weaker management teams, the major functional value arguments in dynamic capabilities theory for why investors might heavily weight management teams receive mixed support in our analyses. Specifically, the incremental value of strong management teams appears to hinge on whether the firm is attempting to commercialize a more incremental innovation versus a more radical innovation, or when the firm competes in an environment where demand uncertainty is lower. When the environment is unpredictable because the firm is attempting to commercialize a more radical innovation or because the firm is operating in a market with a high degree of demand uncertainty, the incremental value of the management team to early-stage investors is much less pronounced.

6.1.1. Implications for resource-based theory/dynamic managerial capabilities

For dynamic capabilities theory, these results suggest several extensions of extant theory regarding the relationship between dynamic capabilities and firm-level outcomes. First, one of the central debates in dynamic capabilities theory is whether dynamic capabilities are simply substantive capabilities operating in dynamic markets, or whether they are something more (Zahra et al., 2006). On one hand, initial dynamic capabilities research suggests that dynamic capabilities are simply managerial capabilities that operate within dynamic markets (Eisenhardt and Martin, 2000; Teece et al., 1997). In contrast, Zahra et al. (2006) argue that dynamic capabilities are more than substantive capabilities utilized in dynamic markets and instead argue that "(d)ynamic capabilities may be most valuable when the external environment is changing rapidly or unpredictably…but a volatile or changing environment is not a necessary component of a dynamic capability" (Zahra et al., 2006: 923). The results of our study provide strong support for this latter approach. In our analyses, we find that more radical innovations and higher levels of demand uncertainty appear to have little

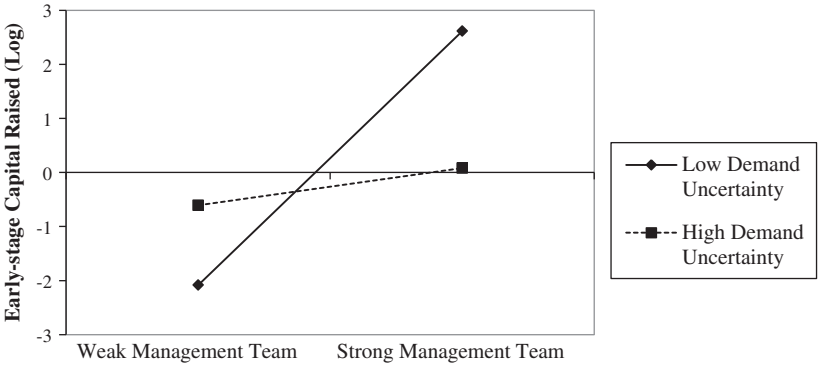

Fig. 2. Plot of the two-way interaction between demand uncertainty and management team predicting total early-stage capital raised (log).

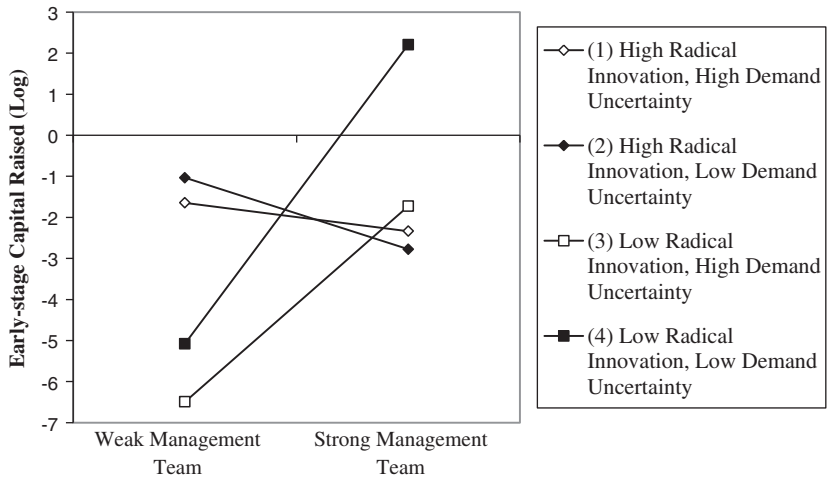

Fig. 3. Plot of the three-way interaction among radical innovation, demand uncertainty, and management team predicting total early-stage capital raised (log).

influence on the relative impact of managerial capabilities in early-stage capitalization processes. As such, our results suggest that early-stage investors favor investing in firms where strong management teams are building more incremental technologies, presumably because these technologies are easier to evaluate. In addition, when firms operate in markets characterized by a high degree of demand uncertainty, the incremental value of quality management teams is much less than thatin more predictable market contexts. Again, predictability appears to trump the capabilities of the management team in determining the amount of early-stage capital that the firm raises.

6.1.2. Implications for early-stage capitalization research

This study suggests a different explanation regarding the importance of management teams to early-stage investors. Baum and Silverman (2004) argue that investors may be over-weighting the importance of management teams to early-stage ventures in dynamic markets and that other factors (e.g., the firm's technological resources) are more important to the future success of firms. Our study suggests an intriguing alternative perspective for why management teams may be valued by early-stage investors. On one hand, our results clearly indicate that strong management teams do not raise considerably more funding when paired with more radical innovations and markets beset by high levels of demand uncertainty. On the other hand, our results indicate that investors are not apathetic to the quality of the management team since stronger management teams raise more funding than weaker management teams. So if early-stage investors are not investing in management teams based on the functional value of these teams in managing the uncertainties of the startup process, what alternative reasons might explain why early-stage investors value management teams?

In our view, the symbolic value of these management teams may also play a considerable role in enabling firms to raise early-stage capital (Zott and Huy, 2007). In situations where good faith (Bourdieu, 1998), reputation (Rindova et al., 2007), personal credibility and the social status of entrepreneurs (Zott and Huy, 2007) affect the resource mobilization process, the effects of the symbolic value of management teams may complement and even extend beyond the functional value of these teams. In earlier research, symbolic value—derived from Bourdieu's concept of symbolic capital (1984)—is defined as the social meanings and importance which objects/resources enable individuals or firms to express to external constituencies regarding their identity and social status (Bourdieu, 1984, 1990; Ravasi and Rindova, 2008; Zott and Huy, 2007). Although distinct from the other forms of value, Bourdieu (1990) argues that symbolic factors such as social status can act as a form of credit and "…is one of the mechanisms which (no doubt universally) make capital go to capital."

Thus, in the early stages of development, the possibility exists that early-stage investors may favor strong management teams not because the dynamic capabilities of the managers are enabling the firm to overcome the uncertainties inherent in the startup process. Rather, consistent with theories of financial intermediation where the role of professional investors in resolving challenges derived from the information asymmetries that firms present to capital markets is emphasized (Hellman and Puri, 2002), strong management teams will likely minimize (or even remove) the need for investors to "professionalize" the managerial ranks of firms thereby better enabling investors to eventually sell the equity of the firm to public investors under favorable terms (Hellman and Puri, 2002; Kaplan et al., 2009; Sapienza et al., 1996).

6.1.3. Limitations

It is important to note also that this study is limited in several ways. First, our sample is drawn from a population of early-stage ventures largely from one state naturally raising questions about the generalizability of these findings to other geographic contexts. In response, several factors related to this concern are worth noting. There appears to be no such thing as a global or even national capital market for early-stage financing; instead, firms that specialize in this stage of the investment cycle tend to make more geographically

concentrated investments (Gupta and Sapienza, 1992). Accordingly, most early-stage investments in new ventures are highly localized with little capital flowing across state borders. Furthermore, although many states and locales are making significant investments in building up local technology clusters (Lerner, 2002; Lipper and Sommer, 2002), research into these efforts to build technology sectors is still in its infancy. The theoretical arguments that we develop here should allow future researchers to search for inter-regional differences in early-stage capital markets to assist public policy makers in shaping a more optimal environment for facilitating venture-based investments. So, while we make no claims that our findings are perfectly generalizable to other geographic locales, the theoretical underpinnings of our models provide a framework for exploring these phenomena in other geographic locations.

Second, by focusing on the early-stage capitalization processes, we potentially limit the extent to which these firms exhibit sufficient operational histories upon which the investors can evaluate the functional value of the management team in compensating for technological uncertainty and/or market dynamism. Given our focus on exploring the factors that enable firms to raise sufficient amounts of early-stage capital, we believe that such boundaries for our sample are appropriate. Yet it is also possible that the effects of the dynamic capabilities of management teams on capitalization outcomes might take considerable time to manifest in observable ways in firms. Rindova and Taylor (2002) suggest that dynamic capabilities evolve over time in firms, in two ways — by improving both managerial and market capabilities. As such, it is likely that early-stage firms need additional time for upgrading these capabilities and once the firm is able to produce observable evidence that these capabilities exist (e.g., rapidly increasing market share in growth-stage firms), late stage investors may be willing to provide more capital. Future research that examines the evolution of managerial capabilities within technology ventures will undoubtedly yield additional insights into how management teams impact the performance of these firms.

Third, given our focus on exploring the factors that enable firms to raise early-stage capital, we believe that the choice of *early-stage capital raised* is appropriate for this particular study given the importance of the total capital received to the ongoing operations of the firm. However, to further explore the functional value arguments in resource-based logic, future research might consider how various configurations of management teams, markets, and technologies impact alternative dependent variables such as the pre- and post-money valuations of firms (e.g., Hsu, 2004). It is possible that future research may find that the strength of management teams, even when paired with radical innovations, and markets with high levels of demand uncertainty, is reflected in the valuation of the firm.

Fourth, one possible alternative interpretation of the results in this study is that the negative impact of high levels of demand uncertainty and radical innovation on the receipt of early-stage capital by the firm may also, at the same time, increase the option value of making smaller bets into the venture. In other words, investors may see the value in investing in strong management teams, but since both demand and technology uncertainties are high, these early-stage investors may be investing smaller tranches of capital in order to see if the management team can turn these investments into something significant using something like a real options investment strategy. Stated differently, early-stage investors may be willing to invest in strong management teams when either demand uncertainty is high or the technology is radical, as long as the other market or technology dimension is not highly uncertain. By implication, these results suggest that extant theory on the functional value of dynamic managerial capabilities to firms could be augmented with real options logic whereby the value of these managers to the firm is expressed (and captured) over time through a dynamic value creation process. In sum, dynamic managerial capabilities may not always yield higher performance in the firm, but the real value of these types of capabilities may instead increase the option value of the firm's strategic initiatives.

6.2. Directions for future research

6.2.1. Early-stage capitalization processes and radical innovation

Earlier research strongly links the human capital of entrepreneurs to the radicalness of the innovations that the firm is attempting to commercialize (Marvel and Lumpkin, 2007). However, among early-stage ventures, financial capital is often the fuel that enables these firms to capitalize upon the potential of radical technologies. In this study, we find that radical innovations are positively linked with the total amount of early stage capital raised, but that the positive effects of radical innovations on the total amount of capital raised hinge upon other characteristics of the firm and market. In Model 5 of Table 2, although we did not specifically discuss the

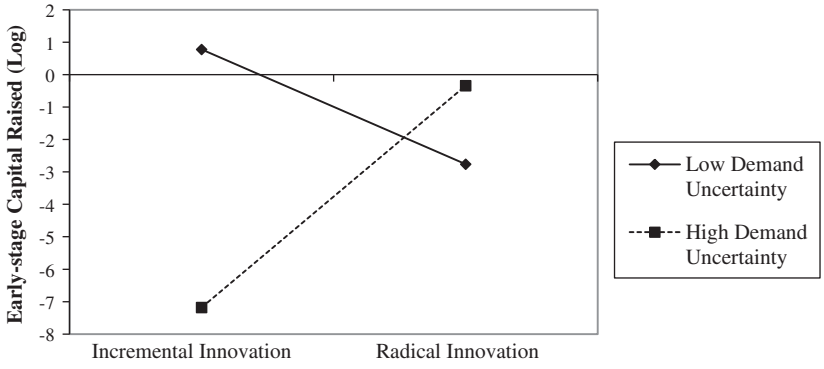

Fig. 4. Post hoc analysis of two-way interaction between radical innovation and demand uncertainty predicting total early-stage capital raised (log).

significant interaction between radical innovation and demand uncertainty since it was not part of our theoretical focus, the positive interaction reported in this model suggests several important implications of our study for both the radical innovation literature in entrepreneurship theory and the early-stage capitalization literature. In a post-hoc analysis, we plot the interaction between radical innovation and demand uncertainty in Fig. 4 and find that high demand uncertainty appears to enhance the value of more radical innovations while low demand uncertainty appears to enhance the value of incremental innovations.

By implication these results suggest that uncertain markets can enhance the value of radical innovations. In future research, exploring how entrepreneurs balance the investment of the early-stage capital between the internal development of the radical innovation into a viable set of breakthrough products and marketing efforts to reduce the demand uncertainty in the external environment will undoubtedly offer more insights into why some ventures are more successful than others in successfully creating and pursuing opportunities.

6.2.2. Implications for practice

Lastly, our study offers several important implications for practicing entrepreneurs and investors. For entrepreneurs, conventional wisdom holds that the quality of the venture's management team will play the central role in determining the success of the venture in external capital markets. Our study suggests that while the quality of the management team matters, other factors such as the market context and technological resources of the firm can diminish the impact of the management team. As such, especially for more technologically oriented founders who anticipate the need to raise outside funding, the conventional wisdom to hire an experienced management team at this stage may be pre-mature. Instead, especially in light of our post hoc analysis that shows the value of more radical innovations when coupled with markets characterized by higher levels of demand uncertainty, these founders should focus on the technology and market.

For early-stage investors, the results of this study suggest that the conventional wisdom that these investors would rather "invest in an 'A' management team with a 'B' technology, than a 'B' management team with an 'A' technology" is not systematically true in early-stage capitalization processes. Instead, a radical technology with the potential of disrupting markets appears to play a much more central role in shaping the investment decisions of early-stage capital providers. However, since both demand and technology uncertainties are high with these types of ventures, these early-stage investors are likely to have the most to gain by using a real options investment strategy and investing smaller tranches of capital.

Lastly, our work suggests that the contextualization of technological resources in markets through the venture's business idea plays a more central role in the early-stage capitalization process than the quality of the management team (Kaplan et al., 2009). As such, our findings suggest that some early-stage investors may be over-weighting the importance of the capabilities of the management team since the functional value of founding management teams is far more limited since "…even the most competent team cannot turn water into wine" (Bhidé, 2008: 46), particularly when radical innovations are coupled with high demand uncertainty. Therefore, forcing early-stage ventures to hire outside professional management to ensure consistency with the conventional view that complete management teams are critical at this stage may encumber these ventures with excess administrative personnel who are not actually critical to the current stage of development.

Acknowledgments

We thank Professor Jim Chrisman and three anonymous reviewers for their helpful comments during the review process. We also thank Ted Baker and seminar participants at the 2010 Brown International Advanced Research Institute and the 2010 Babson College Entrepreneurship Research Conference for helpful comments on previous drafts of this paper. An earlier version of this paper appears in the 2010 Frontiers of Entrepreneurship Research.

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