

FORM OR SUBSTANCE: THE ROLE OF BUSINESS PLANS IN VENTURE CAPITAL DECISION MAKING

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We explore a well-known instance of fast decision making under high uncertainty, venture capital (VC) opportunity screening. We analyze a sample of 722 funding requests submitted to an American VC firm and evaluate the influence of the form of the submission and content of business planning documents on VC funding decisions. We improve on prior literature by a) using a large sample of known representativeness, b) relating request characteristics to actual VC decisions, and c) developing an inferential logic that takes account of the multiple sources of information to which VCs have access. We find that the presence of planning documents and some information contained therein are weakly associated with VC funding decisions. Based on our inferential strategy, we find that this information is learned independently of its inclusion in the business planning documents. Copyright © 2009 John Wiley & Sons, Ltd.

INTRODUCTION

Decision makers are often forced to make fast decisions with limited information (Eisenhardt, 1989; Wally and Baum, 2003; Ocasio, 1997; Hansen and Haas, 2001). Cognitive decision theory suggests that in such settings individuals rely on cues to facilitate decisions (Rosch, 1975). This study advances understanding of the use of cues in strategic settings by empirically identifying and characterizing cues associated with successful resource acquisition in the context of venture capital (VC) funding.

Keywords: business plans; venture capital; entrepreneurship; rare-events logic; prototype theory; fast decision making

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Venture screening is a particularly interesting instance of fast decision making under uncertainty. Venture capitalists review hundreds or even thousands of proposals for every one that receives funding (Goldfarb, Kirsch, and Pfarrer, 2005; Metrick, 2007). Time constraints prevent venture investors from studying each proposal in detail; therefore, investors make initial screening decisions based upon sparse information and necessarily rely upon shortcuts, or heuristics, to increase the speed of decision making.

Entrepreneurs control the initial flow of information to potential investors. Recognizing information asymmetries between investors and entrepreneurs (Gompers and Lerner, 1999), entrepreneurs will try to choose signals that are both costly to acquire to suggest that their ventures are of high quality (Spence, 1974). In this view (hereafter, the *communicative* view), these signals are important decision cues because they effectively

communicate information about the venture. In the language of Rosch (1975), these cues have high validity.¹

Ideally, investors and entrepreneurs would share a common understanding of what constitutes high validity cues; however, in uncertain environments, high validity cues may be difficult to identify. Instead, participants may rely upon cues that suggest mimetic conformance to prevailing norms (DiMaggio and Powell, 1983), even when such cues have low validity (i.e., have little association with the quality of the investment opportunity). In this view—hereafter, the *ceremonial* view—information disclosed by the entrepreneur that signified an understanding of the norms of exchange would legitimize the venture in the eyes of the investor. In effect, the information content would matter less than the ways in which its delivery conformed to expectations (Mauss, 1990; Zimmerman and Zeitz, 2002).

In practice, these two views make different empirical predictions. While conforming to norms may be an efficient shortcut, norms are not necessarily efficient (Scott and Meyer, 1991). Therefore, ceremonial cues should have lower validity than communicative cues. Based on this insight, we distinguish the effects of ceremonial cues from communicative cues in an important class of signals, the presentation and content of business planning documents.

Communications about planning activities—encoded in objects such as business plans, executive summaries, and similar types of documents—presumably convey information that influences the funding decision. The exchange of these materials constitutes one mechanism for the general flow of information described above. First, business planning documents may fulfill a ceremonial role in the exchange between entrepreneur and investor. In effect, the entrepreneur wishes to signal that the request conforms to expectations.

¹ The term ‘cue’ comes from the psychology literature (Rosch, 1975), while ‘signaling’ has roots in economics (Spence, 1974). Both literatures ask a general question: when is information A a reliable indicator that B is true? The signaling literature assumes that A is generated in a strategic setting, while the psychology literature studies the cognitive processes that underlie the interpretation of ‘cues’ absent consideration of the context underlying the cue’s creation. In our strategic setting, signals are a subset of all cues, and hence these distinctions are unimportant. However, we use the language ‘signal’ and the associated term ‘credible’ in discussions drawing from the economics literature and ‘cue’ and ‘validity’ when drawing from the psychology literature.

Was the right document form chosen and submitted? Do the documents look right? Are they the right length? Are they organized appropriately? Alternately, planning documents may fulfill a communicative role. In addition to opportunity-specific claims about intellectual property, market size, and other strategic factors, business planning documents contain information about human and organizational capital that is not specific to a given opportunity.

We find that neither the presence of business planning documents nor their content serve a communicative role for venture capitalists. With some qualifications, we find that business planning documents may serve a limited ceremonial role. Nevertheless, business plan competitions (often cosponsored by venture investors) have proliferated, and master of business administration (MBA) students commonly enter entrepreneurship courses with the expectation that they will be asked to prepare a business plan (Honig, 2004; Zwahlen, 2006). Our results suggest limited external benefits accrue from the production of formal business planning documents. For the entrepreneur, engaging in planning may clarify goals and guide internal decision making (Timmons and Spinelli 2007; Baron and Shane, 2005). However, empirical support for this justification for business planning is mixed. While Delmar and Shane (2003) find a positive correlation between outcomes and business planning, Honig and Karlsson (2004) find little support for the practice.² In a broader review of business planning in the context of entrepreneurship, Honig (2004) finds weak empirical evidence of its effectiveness. He suggests that ‘the business plan and business planning education are more deeply rooted in ritual than efficiency’ (Honig, 2004: 260). Our findings are consistent with this view.

Alternately, our findings are consistent with the view held by VC practitioners who dismiss efforts to systematically evaluate the role of business planning documents. In this approach, the true skill of the venture capitalist is his or her ability to look past the presentation of the plan and other strategic actions intended to outwit the investor’s assessment processes. If each venture capitalist

² Bhide (2000) is commonly cited as providing evidence that business planning is not related to entrepreneurial success. Bhide’s sample consists of only successful firms. Therefore, his findings cannot inform this debate.

uses only idiosyncratic criteria to evaluate potential targets, any parsimonious theory will necessarily be wrong.³

Contextually, our study fits into a broader literature studying venture decision making. Early studies used interviews and surveys to identify decision variables (Poindexter, 1976; Tyebjee and Bruno, 1984), but were subject to self-reporting bias. Subsequent interview- and survey-based studies tried to address this problem by asking investors about only their most recent investment (Fried and Hisrich, 1994) or about both underperforming and overperforming investments (Schefczyk and Gerpott, 2001). Focusing, as we do, on the early screening process, Zacharakis and Shepherd (2001) used conjoint analysis in an experimental setting to identify pervasive overconfidence and availability biases. They proposed mechanisms to reduce the effect of bias, but backed away from *in situ* analysis of actual venture decisions. Meanwhile, MacMillan and Narasimha (1987) and Roberts (1991) examined funded and unfunded business plans, provisionally identifying features of the business plans that were associated with successful acquisition of funding. However, small, nonrandom samples limited generalizability of these findings. Taken as a whole, research on venture screening and evaluation has been hampered by data limitations. In a recent monograph, Metrick observed that '[m]any academics have studied the screening phase, but lack of access to a broad database prevents any strong quantitative conclusions' (Metrick, 2007: 136).

In our study we examine a large sample of funding requests and relate the patterns of referral and associated business planning documents to VC fundraising outcomes. In so doing, we address the three most vexing problems that have limited prior direct studies of VC decision making. First, we observe a larger sample that allows us to develop and test more constructs using more advanced analytic methods. This allows us to overcome limitations associated with relatively small samples of reviewed business plans (e.g., MacMillan and Narasimha, 1987). Second, we evaluate our

sample's representativeness according to Goldfarb *et al.* (2005), thereby allowing us to characterize biases with statistical rigor. Third, our results are based upon a broad swath of actual VC decisions. In contrast, prior studies have relied upon self-reporting of decision-making criteria by a limited number of VC investors.

The article proceeds as follows: We develop our theory in the next section. We then describe the rare-events methodology we use in our analysis. Subsequently, we introduce our data and follow with results, a discussion and conclusion.

Conceptual development

The venture investment decision is made under conditions of high uncertainty and strong information asymmetries. To mitigate the well-documented 'lemons' problem (Akerlof, 1970), entrepreneurs seek to provide signals of underlying quality to venture capitalists. Building on Akerlof (1970), Spence (1974) argued that employers use educational attainment as a proxy for critical but unobservable differences among potential employees. In the context of initial public offering (IPO) investment, Sanders and Boivie (2004) suggest that 'markets may use surrogate indicators of quality as effective sources of information cues that help to filter and screen new firms in emerging industries' (Sanders and Boivie, 2004: 169). If investors in newly public companies are relying upon such signals—and IPO candidates are already much more advanced than companies seeking initial funding—investors in early stage companies are even more likely to rely upon such cues in their *initial* screening decisions. Thus, the venture investor will rely upon observable signals to discern underlying quality of the investment target.

Screening, heuristics and prototype theory

Signaling theory offers little guidance about the exact content of the relevant signal, noting only that for a signal to be meaningful, it must be costly to obtain and correlated with the underlying characteristics that are relevant to the decision maker (Spence, 1974; see Weiss (1995) for a review).⁴

⁴ Signaling theory also presumes that full information would reveal the objective value of the underlying asset; however, in the VC setting, idiosyncratic risk is particularly high, and hence an objective probability of success is arguably unknowable.

³ Based on a series of structured interviews, Hisrich and Jankowicz (1990) found that while particular venture capitalists may make use of similar information across ventures, there was little commonality across venture capitalists. Consistent with predictions of an idiosyncratic decision process, Franke *et al.* (2006) find that venture capitalists tend to favor start-up teams that are similar to themselves.

For venture capitalists the problem is complicated by the sheer volume of information the venture capitalist must process. Venture capitalists screen hundreds if not thousands of solicitations annually (Goldfarb *et al.*, 2005; Metrick, 2007) forcing them to make fast decisions based upon limited information.

In this setting, venture capitalists must categorize incoming funding requests into those that are more or less attractive. Applicable theories from cognitive science include prototype theory and cue validity. Prototype theory explains the likelihood that a particular object or description will be readily classified into preexisting mental categories. This classification allows for the 'induction of invisible features' when such objects or descriptions are not exact replicas of previous instances (Kruschke, 2005). However, subtle differences in objects can generate larger differences in meaning. For example, in a seminal work, Rosch (1975) finds that 'chair' invokes the cognitive category 'furniture' with greater salience than does 'table.' Similarly, subtle differences between planning documents may trigger distinct reactions among potential investors. Prototype theory implies that venture capitalists will infer differences in underlying quality based upon easily observed characteristics of funding requests. Shepherd (1999), for example, argues that cognitive cues facilitate decision making among venture capitalists.⁵

Different attributes possess varying levels of 'cue validity.' Cue validity is the likelihood that a piece of information is associated with a particular outcome and is measured on a scale of zero to one. For example, the cue validity that viewing lightning is associated with electrical discharge is one. In contrast, the cue validity that viewing lightning is associated with rain is lower. An effective signal will, by definition, possess some cue validity and allow for quick information processing by appealing to existing cognitive associations in the mind of the decision maker (Rosch, 1975).

⁵ Prototype theory has been used frequently to explore managerial decision making. For example, Dutton and Jackson (1987) suggest that cognitive categorization enables managers to identify potential threats and opportunities. Porac, Wade and Pollock (1999) apply categorization theory to explain the processes by which executives establish peers to calibrate compensation. Prototype or categorization theory has thus far not been applied to the context of venture decision making.

A venture capitalist should react to information with high cue validity. However, some characteristics of the funding request may have low cue validity but still influence VC decision making. Operationally, we classify such characteristics as ceremonial. In general, the outward characteristics of the request, which presumably are meant to conform to norms of exchange, are likely to have lower cue validity than the information indicating the presence of a known success factor. For example, the degree to which an entrepreneur prepares a document in a 'standard' way is not necessarily correlated with the quality of the proposed venture, whereas well-educated founders are known to be associated with venture success (e.g., Bates, 1990). Thus, for screening purposes, knowing that a founder is well educated should have higher cue validity than receiving a conforming proposal.

Given that the entrepreneur is the source of information, she is motivated to present the opportunity in a positive light. She must decide whether or not to include specific information in the request for funding. This logic leads to two types of hypotheses below. First, we hypothesize about the inclusion of particular types of information, and second, conditional on its inclusion, we hypothesize about the quality of the venture as proxied by this information.

Inclusion of information in a request for funding indicates that the entrepreneur believes that this information is an important signal to a venture capitalist. Entrepreneurs include information that fulfills communicative and ceremonial functions, but hide unflattering qualities of the venture. For example, Bull and Watson (2004) examine evidence disclosure in a court of law in the context of bilateral or multilateral trade contracts. They conclude that positive evidence is forthcoming and negative evidence is withheld, unless there is a punishment for withholding evidence that is sure to be discovered. By analogy, assuming VCs understand the strategic nature of information disclosure, the mere inclusion of particular types of information will be an important cognitive cue. More formally, if entrepreneurs believe that a higher value of an attribute is viewed more favorably by VCs, then the mean of this attribute in requests that disclose this information will be higher than the mean of this attribute in requests that choose not to disclose. To be clear: our inferential strategy relies strongly on this theoretical implication. Moreover, if that type of information fulfills a communicative

function, then the information content will also be a valid cue. In contrast, content will be ignored when the inclusion of information performs a ceremonial role.⁶

This logic guides an empirical strategy that discerns between the inclusion of information in an attempt to conform to norms, versus the inclusion of information to communicate important attributes of the venture. In practice, the strategy categorizes cues as predominantly ceremonial or predominantly communicative.

If a cue is of high validity, then it should be predictive of VC decision making. Conditional on its inclusion, we also observe the content of the information. If there is variation within the information content, this information should also be predictive of funding outcomes. Thus, if the inclusion of a cue and the cue's content, conditional on inclusion, are both predictive of venture outcomes, we may conclude that the cue is communicative. If only inclusion of the cue is associated with venture decision making, then the cue is ceremonial.

As an example, consider a business with a full founding team and the candidate cue 'founding team size.' If the entrepreneur believes founding team size to be a valid cue for venture capitalists, she will include a description of her team in the request for funding. If she is correct, this act will increase the likelihood of successful funding. Alternatively, an entrepreneur without a full founding team cannot truthfully include information about her team and will not be able to trigger this cue. Thus, we expect the inclusion of founding team information to predict funding outcomes. However, a savvy entrepreneur may include team information to conform to venture capitalists' expectations. Thus, this test alone does not tell us whether the inclusion of information about founding team size serves a ceremonial or communication function. To distinguish between these functions, we rely upon the content of the

cue. Conditional on its inclusion, if the cue is communicative, larger teams should be associated with better outcomes. If founding team size plays a ceremonial role, venture capitalists will not care about the actual size of the founding team, and we will not find a relationship between founding team size and outcomes. A finding that neither inclusion of a cue nor its content conditional on inclusion is predictive of VC decisions suggests that the candidate cue is ignored by venture capitalists.

Importantly, a finding that included information content matters is a sufficient test to conclude that this cue is communicative, though it is insufficient to conclude that this information was learned from planning documents. As discussed above, when entrepreneurs strategically include positive information, the information content from those funding requests will be more favorable than the information that would have been included by the omitting entrepreneurs. Hence, if VC decision makers are acquiring this information from reviewed business planning documents, we should also expect to find a relationship between inclusion of information and outcomes. If we do not, then investors are acquiring information by other means. We apply this logic to the nested hypotheses below and summarize it in Table 1.⁷

Application of this logic requires an additional, important assumption. One must assume that the content of a request does not deviate from the actual attributes of the underlying venture, or if it does deviate, this deviation is systematic. According to Bull and Watson (2004), we would not expect systematic deviation for easily verifiable information, although it may occur if some entrepreneurs are particularly naïve or when information is difficult to verify. For example, revenue projections are likely to deviate systematically because they are difficult to verify. Therefore, revenue projections may be biased upward, but will be discounted accordingly by venture capitalists. If we identify a relationship between revenue

⁶ Countersignaling, in which entrepreneurs do not report biographical information of prominent individuals, could also explain the omission of information. The logic is that it would not be necessary to describe Bill Gates's accomplishments, because everyone would already know them. A need to describe accomplishments indicates that they are not common knowledge, and hence only medium quality individuals would be so identified. While we cannot know this directly, we do not believe this an important concern in our context. First, such businesses would probably not seek capital from a VC of mid-level prominence. Second, though not scientific, a cursory review of the data did not reveal any household names. We thank an anonymous reviewer for bringing this potential issue to our attention.

⁷ As noted, this inferential strategy requires the assumption that there is sufficient variation conditional on information inclusion. If the inclusion of information is strategic, as suggested by Bull and Watson (2004), then it will only appear in the planning documents if it is difficult to verify and/or favorable. To exploit the conditional information, we must believe that entrepreneurs occasionally err by including business attributes that decrease the likelihood of funding. Given the complexity of the venture funding process, it is unlikely that entrepreneurs, in general, understand the decision criteria of VCs to such a precise degree that no negative information would appear in funding requests.

Table 1. Inferential logic for the role of included cues

Cue value (conditional on inclusion) Cue Inclusion	Predictive	Not predictive
Predictive	Communicative	Ceremonial
Not predictive	Information is learned independent of its inclusion in the business planning documents	Not a relevant cue

projection and acquisition of funding, the fact that the expected revenue stream was believed by all to be lower than promised would not invalidate the underlying relationship between planning document and expected outcome. In contrast, if low-quality entrepreneurs do not truthfully report their own personal histories, then we might not detect a connection between the underlying attributes of the founding team and the outcome of the venture. Moreover, if entrepreneurs do not engage in strategic disclosure of information, we would not be able to exploit the inclusion of information to ascertain the role of the planning document.

Presently, we develop our formal hypotheses. We identify candidate cues as follows: If a given factor or attribute has been shown in the literature to be a determinant of new venture outcomes (i.e., predictive of the presence of funding, a successful business launch, or achieving growth and scale) and the information content is readily verifiable, then we examine this attribute as a potential decision cue. We also exploit variation in the form of requests for funding. For the sake of brevity, our literature reviews of the underlying relationships between the factors and success are necessarily incomplete.

Finally, given our context we hypothesize specifically about VC decision making. However, the theory may generalize to other settings. For example, other investors in new businesses, such as banks or individual private equity investors (business angels or angels), may use similar decision-making heuristics because both operate in similar environments. Moreover, social networks and business planning documents almost certainly play a role in these sources of exchange.

Business plan as standard artifact

Leading entrepreneurship texts strongly encourage business plan authors to follow conventional formatting when constructing a business plan and,

moreover, are generally in agreement as to the information that should be included in a plan. Conformity to a standard may simplify identification of particular cues that in turn facilitate categorization by decision makers (Zuckerman, 1999). Given the opportunity cost of a venture capitalist's time, the extra cost of extracting cues from a nonstandard artifact may increase the probability that the opportunity associated with such an artifact is categorized as 'unattractive' (Shepherd 1999). Thus, conformity may be a cue. We hypothesize:

Hypothesis 1: Ventures associated with the submission of a standard document, such as a business plan or executive summary, are more likely to receive VC funding.

Inclusion of information in business planning documents

Similarly, conformity to a specific business form may suggest to the VC that the entrepreneur is doing things the 'right way' and make it easier to find information in the planning document. Conversely, an incomplete plan omits information and may suggest strategic withholding of information. Both arguments lead to the following hypothesis:

Hypothesis 1a: Controlling for the submission of a planning document, ventures associated with business plans that are complete—in the sense that they conform to norms dictating what information should be included—are more likely to receive VC funding.

Following the logic summarized in Table 1, adjudication of the possible justifications for Hypothesis 1a depends upon whether the candidate cues in the planning documents are predictors of VC decision making.

Informational content of the business plan

Previous financing and funding request

The interaction between the venture capitalist and the entrepreneur is characterized by high levels of information asymmetry. Knowing that a third party has vetted a particular funding request and deemed it worthy of investment is a potential cue. This effect is well documented in the context of initial public offerings. For example, finance scholars have found that the participation of VC investors conveys valuable information to IPO investors (cf. Megginson and Weiss, 1991). Similarly, Stuart, Hoang, and Hybels, (1999) find that previous funding, as well as strategic alliances, convey increased legitimacy to IPO investors. By analogy, venture capitalists may view prior equity investment as a signal of quality. Accordingly, we would expect entrepreneurs to include information attesting to prior funding in their plans if indeed they had received it.⁸ Conditional on funding, a higher amount of funding would represent a stronger endorsement.

We hypothesize:

Hypothesis 2: Ventures associated with planning documents that include statements of prior non-VC external private equity funding are more likely to receive VC funding.

Hypothesis 2a: Conditional on inclusion of information about prior non-VC external private equity funding, documents that report greater amounts of funding are more likely to receive VC funding.

The size of VC firms has grown over time (Gompers and Lerner, 1999). However, managerial expertise is not necessarily scalable. Hence, venture capitalists tend to finance in larger amounts than other non-venture private equity investors

⁸ One could also argue that previous funding may be detrimental as it could make a VC deal more complex (Ibrahim, 2008), although there is little systematic evidence that this is the case (Goldfarb *et al.*, 2008). One might expect that the type of prior equity funding would impart important information to a potential VC. For example, while we observe prior funding generally, we occasionally observe whether these investors were internal (i.e., founders), or external (i.e., non-VC investors, generally business angels). One can formulate arguments that either one of these investment types would be a positive signal to VCs. However, in unreported regressions we do not find that either the inclusion of this information or the amount of each type of funding impacts outcomes. For the sake of brevity, we exclude a discussion.

(Fenn, Liang, and Prowse, 1995). A request for too little money will cue the venture capitalist to the possibility that the opportunity is either not of sufficient size to be of interest, or the entrepreneurs are not particularly savvy, or both. We expect the amount requested to have high cue validity. We hypothesize:

Hypothesis 3: Ventures associated with planning documents and related communications that articulate financing requests will be more likely to receive VC funding.

Hypothesis 3a: Conditional on an articulated financing request, ventures that request greater amounts of financing will be more likely to receive VC funding.

Following the logic summarized in Table 1, simultaneous support of Hypotheses 2 and 2a is consistent with a communicative role, while support for Hypothesis 2 alone is supportive of a ceremonial role. Support of Hypothesis 2a without support for Hypothesis 2 is supportive of neither role. A failure to support Hypotheses 2 or 2a suggests that these are not relevant cues. Similar logic applies to Hypotheses 3 and 3a.

Organizational and team structure

Structural attributes of the entrepreneurial team are related to the performance of new ventures. Consistent with Stinchcombe (1965), Sine, Mitsuhashi, and Kirsch (2006) report that new ventures benefit from functional specialization of founding teams by allowing organization members to concentrate on the execution of narrowly specified tasks and thereby accumulate task-related knowledge. Specialization also increases accountability and facilitates monitoring. In general, founding team size has been shown to be positively related to revenue growth in new ventures (Eisenhardt and Schoonhoven, 1990). Moreover, a person named in the planning document is indirectly endorsing the proposed venture (Sarasvathy, 2007). Larger teams therefore signify stronger endorsements. Planning documents that do not refer to any specific individuals might reasonably suffer due to the omission effects previously identified. Conversely, reporting a large founding team may be a cue that increases the likelihood that a solicitation is categorized as attractive. Thus, we believe

that inclusion of this information is likely a cue. More formally:

Hypothesis 4: Ventures associated with business planning documents that reference team information are more likely to receive funding.

Hypothesis 4a: Conditional on referencing team information, ventures associated with business planning documents that reference more management team members are more likely to receive funding.

There are other characteristics of the team that may matter. Extending the pioneering work of Stinchcombe (1965), recent research has identified the importance of organizational structure in increasing the performance of new ventures in emerging industries (Burton, Sørensen, and Beckman, 2002). Sine *et al.* (2006) find that greater formalization and specialization within founding teams is associated with higher revenue growth. Accordingly, the articulation of greater organizational structure may serve as a cue that will facilitate positive categorization of the opportunity by potential funders.

Hypothesis 4b: Conditional on referencing team information, ventures associated with business plans showing evidence of increased role specialization and greater organizational completeness are more likely to receive funding.

Interpretation of the corresponding tests of Hypothesis 4 and its conditional corollaries 4a and 4b follows the logic summarized in Table 1.

Human capital

Business planning documents showcase the characteristics and qualifications of the founders and management team. Recent evidence suggests a relationship between human capital and the ability to acquire resources (Colombo, Delmastro, and Grilli, 2004; Almus and Nerlinger, 1999). Moreover, folk wisdom in the new venture community supports the idea that 'VCs invest in people as much as, if not more than, they invest in technology' (Grossman, 2006: 1). Thus, we expect that human capital characteristics of the founders and management team will function as cues in the VC selection process.

Education, the most common measure of human capital, is positively associated with resource acquisition (Bates, 1997). Receiving an advanced degree signifies acquisition of human capital (Colombo *et al.*, 2004; Almus and Nerlinger, 1999; Becker, 1962). This would, in turn, suggest that the inclusion of formal human capital information will be interpreted as a positive cue in the categorization of an associated opportunity. Alternatively, it is not clear that formal education provides the specific human capital necessary to successfully start a business, in which case the inclusion of this information might be viewed as a negative (or perhaps uninformative) cue by a potential VC investor (Gimeno *et al.*, 1997). Nevertheless, we hypothesize in the affirmative:

Hypothesis 5: Ventures associated with business planning documents that refer to prior educational human capital attainment are more likely to receive VC funding.

Hypothesis 5a: Conditional on reporting educational attainment, plans with team members who report advanced degrees will be more likely to receive VC funding.

Entrepreneurial experience

Research on the phenomenon of serial entrepreneurship suggests that new venture creation is a complex skill that can be honed through practice. Specific attributes of work history, such as related industry experience, have been shown to be related to resource acquisition (Colombo *et al.*, 2004). Entrepreneurs with greater entrepreneurial experience may be better connected to VC networks. This suggests that prior entrepreneurial experience will serve as a positive cue for the prospective venture capitalist. Moreover, the failure to report any entrepreneurial experience may be interpreted as a negative cue. Taken together, we hypothesize:

Hypothesis 6: Ventures associated with business planning documents that refer to the prior entrepreneurial experience of founding team members are more likely to receive funding.

Hypothesis 6a: Conditional on business planning documents containing a reference to the prior entrepreneurial experience of founding

team members, ventures associated with business planning documents that report more prior entrepreneurial experience are more likely to receive funding.

Nonentrepreneurial work history may be indicative of important skills necessary to manage a new business. Gimeno *et al.* (1997) found that industry-specific experience contributed to both survival and growth, though they observed no significant relationship between general professional experience and either venture survival or growth. We expect prior professional experience to serve as a cue for venture capitalists.

The implied endorsement of having worked at a high status firm may convey legitimacy to would-be investors (Stuart *et al.*, 1999). Moreover, Burton *et al.* (2002) argue that entrepreneurs may inherit entrepreneurially specific legitimacy if their former employer possesses a reputation for spawning higher quality start-ups than others. Hence, we hypothesize that the source of professional experience may also be a cue for venture capitalists and inform about the communicative role:

We hypothesize:

Hypothesis 7: Ventures associated with business planning documents that refer to the prior professional business experience of founding team members are more likely to receive funding.

Hypothesis 7a: Conditional on business planning documents containing a reference to professional business experience, ventures associated with planning documents that refer to greater prior professional business experience of management team members are more likely to receive funding.

Hypothesis 7b: Conditional on business planning documents containing a reference to professional experience, ventures associated with planning documents that reference prior professional business experience at entrepreneurially prominent firms are more likely to receive funding.

Interpretation of the corresponding tests of Hypotheses 5, 6, and 7 and their conditional corollaries follow the logic summarized in Table 1.

EMPIRICAL METHOD

In our analysis below we explicitly test whether information in business plans predicts VC funding. Our dependent variable is dichotomous, implying a discrete choice analysis (probit and logit are common implementations). In our data, only five percent of the plans were funded after solicitation. This presents a challenge for testing our hypotheses, because we need sufficient variation in the dependent variable.⁹ Insufficient variation will create a downward bias on estimated coefficients. To correct for this bias, we use a rare-events logit model (King and Zeng, 2001).

To see why there is a bias, consider a hypothetical case where firms above a certain (unobserved) quality threshold received VC funding.¹⁰ The goal of the empirical analysis then would be to identify that threshold. Conditional on sample size, if the probability of observing firms on each side of the threshold were equal, and if the distance from this threshold were randomly distributed, then the data would provide a significant amount of information to estimate the threshold. Now imagine that the dataset was reduced in size by randomly eliminating observations. This exercise would, in general, reduce the number of observations above and below the threshold equally. In this case, while we would be able to estimate the threshold with less precision, the expected point estimate would remain unchanged. Now consider a case where the probability of observing a plan of sufficient quality were small, say five percent. Each high-quality draw is particularly important in identifying the threshold. Moreover, each such draw is from the tail of the distribution, which in turn teaches us about the extent of this tail. Since the likelihood of observing extreme observations is low, we will infer that the ones we do observe are the most extreme, and systematically underestimate the size of the tail. In a rare-events scenario, this tail is of interest: these 'border' firms provide the bulk of information with which to estimate the threshold. In the extreme case, if there are very few firms with quality measures beyond the 'border,' then the information with which to estimate the threshold

⁹ To see this, consider the case where none of the companies in the sample received VC funding. In such a case, the data would be completely unsuitable for our theoretical framework.

¹⁰ For a formal description of the econometric reasoning, see King and Zeng (2001).

becomes negligible. An uninformed regression will not take this into account, and hence will tend to bias the estimate toward zero. An informed regression, however, will overweight the information associated with firms with positive values (i.e., the firms that received funding). Applying this technique, the high-quality firms will more strongly influence the estimates—in essence, magnifying the information of the rare events.

Ideally, we would use population-level information about the propensity of firms to receive VC funding. Unfortunately, the propensity of technology firms to receive VC funding is not known generally, and hence we are unable to correct for this problem (the rare-events methodology that we use assumes that the sample is representative). However, following the logic behind the rare-events bias, we can state with certainty that this problem will attenuate our estimates. In this regard, our hypothesis testing exercise is particularly conservative. The rare-events logit procedure also allows us to explore the sensitivity of the results to different assumptions about the baseline probability of technology firms to successfully obtain venture funding. The results are not sensitive to these assumptions.

DATA

To explore the relationship between the content of business planning documents and the observed outcome of the proposed venture, we exploit a sample of funding requests submitted to a single VC firm based in the Northeast United States from April 1999 to February 2002. The requests in the sample were received during the peak of the dot-com bubble and its immediate aftermath. The VC firm that received the requests partnered with a major Internet portal; over 89 percent of the requests proposed to create dot-com firms (defined with reference to the taxonomy of Internet business models proposed in Afuah and Tucci (2003)). The potential implications of sampling during this period are addressed more fully in the discussion below.

The sample consists of 1,063 requests for first round VC funding for which the focal venture capitalist (FVC) maintained paper records.¹¹ These

¹¹ In our discussion, we consider an additional 93 firms seeking later round funding. These 1,063 requests represent approximately 40 percent of the requests for funding that the FVC

paper records include business plans, executive summaries, emails and memos, one page venture summary documents, private placement memoranda, press kits, press releases, related news articles, financial statements, and PowerPoint presentations. All records were preserved as part of the FVC's internal processes and donated to the business plan archive run by one of the authors after the FVC ceased receiving requests in 2002.

Of these 1,063 requests, 718 contained at least a full business plan, private placement memorandum, and/or an executive summary. Many of these included other documents as well. From these 718 requests, we coded data from any document that was submitted to the venture capitalist.

Gera, Kirsch, and Goldfarb (2008) find that social mediation is an important determinant of venture funding acquisition for this sample. Ideally, we would add a control variable for social mediation. However, with one exception, unmediated requests never received funding from *any* venture capitalist. Because no additional information is needed to predict the outcome, these observations are necessarily dropped from the regression analysis. In particular, of the 1,063 requests we observe the presence or absence of mediation for 428 requests, 302 of which were not socially mediated.¹²

Of the 718 requests, 672 contained management team information. These 672 requests describe 3,773 individuals. Of these, 2,763 served in managerial roles, 660 served on boards of directors, and 602 served on advisory boards (some served in multiple roles). There were 704 individuals noted as founders. The median management team had 5.23 individuals, while the largest had 33. These managers had previous (reported) experience in

received. For the remaining 60 percent we only observe a one line spreadsheet entry indicating that a request had occurred, the date of the request, and how the FVC processed the request. Gera, Kirsch, and Goldfarb (2008) document that the FVC viewed the 1,063 requests, on average, less favorably than the 60 percent of requests for which we observe more limited information. However, our dependent variable is funding by *any* venture capitalist. Using a methodology similar to that in the Appendix, Goldfarb *et al.* (2005) fail to find differences between those of the 1,063 businesses that eventually received VC-backing and those of the remaining 60 percent with limited information that eventually received VC-backing. This suggests that beyond the low-quality bias documented by Goldfarb *et al.*, (2005) there is no additional measurable bias associated with the selection of these 1,063 requests from the population of requests the FVC received.

¹² The FVC only began recording social mediation on 11 November, 2000.

4,652 firms, and reported graduating from 711 universities/schools. In this sense, there is considerable variation in the nature of information included in these documents.

As this is a convenience sample, we seek to understand whether there are biases associated with it. Ideally, we would compare attributes of the studied population to attributes of a representative sample of the general population along observable dimensions. Unfortunately, we know of no representative sample of dot-com firms. Instead, we exploit the fact that of the 1,063 firms requesting first round funding, 58 were eventually successful. We then compare the attributes of these firms' funding rounds with those of the general population. This allows us to determine if and to what degree the funded companies from the studied population are different from the entire population of venture funded companies along several dimensions. We then assume that these differences characterize the contrast between our studied sample of requests and the entire population of VC funding requests. The database VentureXpert, from Thomson Financial Venture Economics, categorizes U.S.-based VC deals that are entrepreneurial focused as 'PWC' (PricewaterhouseCoopers Money Tree) deals.¹³ In our benchmarking analysis, we include only PWC or angel deals. Of the firms that received funding, 16 do not meet this criterion, generally because they were either non U.S.-based firms or alternatively, because they were funded by non-U.S.-based venture funds.¹⁴ We report the results and details of this comparison in the Appendix. As in Goldfarb *et al.* (2005), the funded plans received less first

round financing amounts than the general population, and appear to have been systematically valued at amounts less than the mean firm in the population. Moreover, the VCs that funded sample firms appear, in general, to be lower quality. This suggests that we undersample high-quality firms. This sample characteristic may lead to a general paucity of VC funding events. A lack of representation of high-quality VCs in our sample implies that our results may not generalize to that class of investors.

Many of the requests for funding were received in the dot-com bubble and its immediate aftermath. This poses two important problems. First, we are studying an era of early industry emergence. There was no tried-and-true way to do business on the Internet during this period (see Goldfarb, Kirsch, and Miller, 2007). Second, our sample is Internet specific. It is unknown to what extent our results generalize to business planning documents for mature industries or to other emerging industries such as, say, biotechnology. This problem is mitigated somewhat as our sample also includes requests received during the post-bust era when the industry was (slightly) more mature.

Finally, as the FVC did not invest in any of the companies that we observe, the analysis implicitly assumes that the cues identified in the business planning documents submitted to the FVC were the same or substantially similar to those submitted to the eventual funders. While this assumption may be strong for testing hypotheses relating to the form of the request (i.e., Hypothesis 1), the strategic decision to disclose information and the information content disclosed are likely to remain constant.¹⁵

¹³ PWC Money Tree deals include 'cash-for-equity investments by the professional venture capital community in private emerging companies in the U.S. The survey excludes debt, buy-outs, recapitalizations, secondary purchases, IPOs, investments in public companies such as PIPES (private investments in public entities), investments for which the proceeds are primarily intended for acquisition such as roll-ups, change of ownership, and other forms of private equity that do not involve cash such as services-in-kind and venture leasing. Investee companies must be domiciled in one of the 50 US states or DC even if substantial portions of their activities are outside the United States' (see <http://www.pwcmoneytree.com/moneytree/nav.jsp?page=definitions>). Because of our interest in angel financing, we also included all deals of individual investors and angels regardless of the deal's PWC status. (Angels were either self-identified or listed as 'individuals' in VentureXpert.) The results are insensitive to including all venture deals ignoring fund origin.

¹⁴ The results of the comparison are qualitatively similar when we include the non-PWC deals.

¹⁵ For example, this assumption is likely to fail if the companies that eventually received funding were not measurably different in our sample and if such firms more effectively learned how to present information to venture capitalists. Consider a case where two entrepreneurial teams requested initial funding at the same time, and the learning trajectories of each one is different and unrelated to measurable qualities. In this case, our assumption would be wrong. However, our strategy will work under the weaker (and more realistic) assumption that we observe ventures in different stages of their funding cycle; and hence, we should still observe varying levels of sophistication that would be correlated with the nature of the plans that are observed by potential funders. For this reason, we do not look for evidence of funding after 2003. A longer time frame might allow us to find more matches, but potentially undermine the assumption that firms submit substantially similar business plans to competing funders.

Table 2. Funding request characteristics

	n = 991 Total requests that included document type	Total requests that included document type excluding those known to be unsolicited	Associated businesses that eventually received funding	Success rate (%)
Business plan	274	193	12	4.38%
Executive summary	464	325	13	2.80%
Intro communication	718	471	18	2.51%
Public relations material	44	32	4	9.09%
Company profile	92	63	3	3.26%
Background information	228	129	10	4.39%
Financial information	54	34	1	1.85%
Private placement memorandum	55	43	5	9.09%
PowerPoint presentation	57	38	2	3.51%
Product information	45	29	3	6.67%
Screenshot	64	39	3	4.69%
Business plan or private placement memorandum	317	228	16	5.04%
Executive summary only	401	276	9	2.24%

Note: Groups are not mutually exclusive.

Dependent variable

Acquisition of desired funding

Our unit of observation is the business associated with the request for funding. We used archival methods to establish whether or not the venture succeeded in raising the funds sought in the solicitation. In particular, if we identified a funding round in the VentureXpert database after the solicitation date, and that round was classified as a PWC deal or readily identifiable as an angel deal, the dependent variable took the value of one. Otherwise, it took the value of zero.

Independent variables

Structure of requests for funding

We observe significant variance in the types of documents in the requests for funding. We report the types of documents submitted in Table 2. Excluding the 302 known to have been submitted without social mediation, we find the following: The average solicitation included 1.16 company generated documents (s.d.0.9). These requests included 228 business plans or private placement memoranda (49 of these also included separate executive summaries) and 276 requests

included executive summaries without full business plans or private placement memoranda. We coded all information associated with these requests for funding. There are an additional 97 solicitations in which we observe other types of documents (such as press kits, PowerPoint presentations etc.) but do not observe a business plan, private placement memorandum, or an executive summary. Beyond the nature of the document(s) associated with the funding request and the revenue model (see below), further information was not coded for these 97 requests. There were an additional 125 requests for funding that included no company-generated documents. Records of these requests were generally one page, handwritten forms completed by the FVC summarizing the basic elements of the business.¹⁶

Table 2 reports the count values of different types of submitted documents associated with the 598 solicitations that included documents, along with the eventual funding success rates. It would appear from the table that requests with public

¹⁶One might be concerned that the documents were not submitted by the entrepreneur, but rather requested by the venture capitalist. We know from the FVC's records that there were three such cases in our data. In none of these cases did the company eventually receive funding. Omitting these observations from the analysis does not affect any of our results.

relations materials, investment information, and product information were eventually more successful than others. The observed variance suggests that many entrepreneurs believe either that strict conformity to a solicitation protocol is counterproductive or that such a protocol does not exist.

First, we created a dummy variable D.DOCS to indicate if a funding request included documents. To facilitate interpretation and increase parsimony, we aggregated the request characteristics into three mutually exclusive categories. If a business plan or private placement memorandum was included in the request, the variable BUS PLAN took the value one and zero otherwise. If an executive summary was submitted but a business plan or private placement memorandum was not submitted, EXEC SUM took the value one and zero otherwise. Those requests that failed to meet these two conditions made up the third group of funding proposals. Note that proposals in this third group may have included other types of documents.

Plan completeness

To measure structural conformity we identified whether any of the following eight elements (or their equivalents) were in the plan: a description of the product/process, a description of the target market/industry analysis, the value proposition (i.e., why the product or process was a solution to a problem in the target market), the firm's competitive advantage, the business stage, a description of the team, the marketing plan, financials and the revenue model. These are the sections commonly referred to in entrepreneurship textbooks (cf. Timmons and Spinelli, 2007: 229; or Baron and Shane, 2005: 169). PLAN COMPLETE is the number of these sections identifiable in the plan. In coding this information, we used only business plans, private placement memoranda, or executive summaries because our goal was to measure conformity to document conventions rather than the existence of the underlying information in the request. The mean number of sections identifiable in the plans was 4.7. A standard deviation of 3.6 indicates significant variation in this variable.¹⁷

¹⁷ We also experimented with a measure of quality of the presentation, the clarity and precision of communication, and the style of presentation. We note that these assessments are inherently subjective. Keeping with the purpose of the document, if

Human capital

We collected basic information about every person listed as a member of the management team, board of directors, or advisory board. For each person we directly coded information contained in the business plan: name, title, and other attributes, such as educational and professional background and prior entrepreneurial experience. Where information was not reported in the plan, we made inferences based on the information that was included. For instance, if an individual claimed to have an advanced degree, but there was no mention of a bachelor's degree, we assume that a bachelor's degree was earned as a prerequisite.

Although our unit of analysis is the request, much of our information pertains to individual team members. To aggregate information about team members, we took either team means, maximums, or alternatively, we used dummy variables that took the value of one if any of the team members had a particular attribute. For example, as described below, we used the mean number of prior companies in a team member's work experience, and used a dummy variable to indicate whether *any* of the members reported receiving an MBA degree. These aggregation decisions are arbitrary, and hence we explore the robustness of our results to different aggregation assumptions in the Results section.

Educational human capital

We code whether educational attainment was reported, and if so, the degrees attained. Educational attainment was not generally disclosed in the documents. Only 18 percent of the solicitations report any BA experience of team members.

the coder was able to understand what the product/process was, what the target market and targeted industry were, what the value proposition was, the firm's described competitive advantage, business stage, team composition, marketing plan, and financials, then the plan received a high score. The coders were not asked to evaluate the quality of the ideas, rather whether they understood what they were. Quality was measured on a scale of one to five, with five being highest. To control for differences in scaling among coders, scores were normalized by coder. We emphasize, we explicitly did not ask coders to rate the strategic viability of the plan. We found no relationship between this variable and the dependent variable, nor did it affect any of the other regressors.

Similarly, only 18 percent report any MBA experience and 16 percent report advanced technological degrees (D_BACH, D_MBA, D_MASTTECH, respectively, Table 3).¹⁸

Absolute size

We record the total number of named executives listed in the business planning documents. We exclude individuals associated solely with the board of directors or other advisory roles. The distribution of team size is skewed; hence, in the regressions we use the natural log of (1+) team size. For brevity we refer to this as TEAM SIZE. Since we are interested in whether the inclusion of information is also predictive, we include a dummy variable D_MGMT_TEAM. This also eliminates problems associated with arbitrary scaling when taking the natural log, as the dummy distinguishes between 0 and ln(1).

Entrepreneurial experience

From the summary biographies we extract work histories, prior entrepreneurial experience, and

¹⁸ We investigated whether there were any systematic differences in venture outcomes as a function of status or ranking for those that reported such information. The relative status of the granting institution was determined from the *U.S. News & World Report* yearly university rankings. We used the 1999 *U.S. News & World Report* university rankings for several reasons. First, *U.S. News & World Report* ranks undergraduate, graduate, MBA, engineering, and liberal art schools. Other rankings (i.e., *Business Week* and the *Financial Times*) are restricted to only MBA programs. Second, *U.S. News & World Report* has a yearly ranking survey, and was conducted during the time the sample business plans were submitted to the FVC. Additionally the survey ranks schools in both individual and tier fashions. Some individuals reported graduating from nonranked programs. When this occurred, we assigned these individuals to a ranking one below the lowest *U.S. News & World Report* ranking. For example, *U.S. News & World Report* ranks the top 50 MBA programs. Each *U.S. News & World Report* ranked MBA program received a ranking ranging from 50 as best to one as worst, while each unranked program received a ranking of zero. (Parsimony dictated this approach even though it implies assigning cardinal values to an ordinal ranking.) In our analysis we used the mean ranking of team members' MBA program status. We did the same for all degree types: national undergrad, and liberal arts institutions, MBA, and engineering. Following Burton *et al.* (2002), we also explored the entrepreneurial prominence of the institution. Prominence is defined as the number of times a certain program was represented in our sample. We tested prominence both separately per type of degree and per school, that is, regardless of the degree type. One concern is that a school might be prominent simply because it is large. Hence, we adjusted the prominence scores by size-based measures, where available. Our empirical analysis failed to reveal any measurable patterns. For further discussion of the importance of educational institutions' reputations, see Storey (1994).

entrepreneurial prominence of former employers. According to the statements in the planning documents, we recorded which of the managers' former employers were start-ups. ENTREP EXP was calculated as the total number of past claimed start-up experiences. Of those solicitations that included team information, 36 percent failed to report any start-up experience (D_ENTREP_EXP). Conditional on reporting, the mean number of prior entrepreneurial companies averaged over all management team members per solicitation was 0.94.

Professional experience

We coded the total reported number of companies at which management team members worked prior to the venture described in the request. Of those solicitations that included team information, only 18 percent failed to report any prior company experience (D_PRIOR_COS). The average number of prior companies reported by team members in each solicitation was 2.26 (NB PRIOR COS). That is, team members generally had three times more corporate experience than start-up experience.

Entrepreneurial prominence

Burton *et al.* (2002) find that firms that possess high entrepreneurial prominence are also more likely to generate start-ups. Following their work, ENTREP PROMINENCE is measured as the relative frequency that a former employer appears in the dataset. Entrepreneurs hailing from these companies may be more highly qualified or have greater legitimacy. To calculate ENTREP PROMINENCE, we generate a list of all former employers referenced in the planning documents and then count the number of times they appear. For example, if 10 of the 3,773 individuals in the dataset reported that they had prior working experience at Cisco, then each of these 10 individuals received an ENTREP PROMINENCE score of 10. The assumption is that if a firm is more likely to generate spin-offs in general, then to the degree that our sample is representative of the general population of technology start-ups seeking funding, this measure should pick up the relative propensity of firms to spin-off start-ups. The mean entrepreneurial prominence averaged over management team members was 6.42.

Table 3. Descriptive statistics

		<i>General request characteristics</i>				
		Obs	Mean	Std. dev.	Min	Max
a	D_PRE_BUST	761	0.50	0.50	0	1
b	D_DOCS	761	0.79	0.41	0	1
c	EXEC SUM	601	0.46	0.50	0	1
d	BUS PLAN	601	0.38	0.49	0	1
e	BP COMPLETE	601	5.51	3.32	0	9
		<i>General planning document characteristics</i>				
		Obs	Mean	Std. Dev.	Min	Max
f	D_ANGEL	601	0.76	0.43	0	1
g	ANGEL AMOUNT	165	7.23	1.36	3.91	10.49
h	D_AMOUNT_REQ	761	0.51	0.50	0	1
i	AMOUNT REQ	373	1.81	0.75	0.03	4.11
		<i>Full management teams (mean of means) - conditional on team information reported</i>				
		Obs	Mean	Std. Dev.	Min	Max
j	TEAM SIZE	467	1.08	0.76	0.00	3.43
k	D_MGMT_TEAM	761	0.46	0.50	0	1
l	TEAM COMPLETE	467	2.86	2.28	0	11
m	TEAM SPECIAL	368	1.38	0.98	0.4	9
n	D_EDU	761	0.54	0.50	0	1
o	D_BACH	412	0.18	0.39	0	1
p	D_MASTTECH	412	0.16	0.37	0	1
q	D_MBA	412	0.18	0.39	0	1
r	D_ENTREP_EXP	761	0.64	0.48	0	1
s	ENTREP EXP	274	0.94	0.84	0	6
t	D_PRIOR_COS	761	0.46	0.50	0	1
u	NB_PRIOR_COS	341	2.26	1.26	0.14	8
v	ENTREP PROMINENCE	341	6.42	6.65	0	45.75

That is, the mean management team reportedly held jobs from companies at which five to six other management team members in the *dataset* worked.

Team completeness and specialization

Following Sine *et al.* (2006), we measure team completeness (TEAM COMPLETE) as the number of the following managerial roles reported in the planning documents (out of 17): chairman, chief executive officer, business administration, chief financial officer, marketing, corporate development, chief engineering officer, human resources, international sales, manufacturing, management and information systems, purchasing, quality control, research and development, sales, strategic

planning, technology transfer, non-isomorphic role, or insufficient information provided for classification. A higher score reflects higher team completeness. Conditional on reporting team information, the mean score in the sample was 2.86. Our measure of team specialization, TEAM SPECIAL, is measured as the number of management team members divided by the number of roles filled. A low number indicates less specialization. For example, a score below one indicates that a single individual is filling multiple roles. The results indicate a substantial degree of role duplication (mean = 1.38).¹⁹

¹⁹ Because many documents do not articulate roles of team members, these individuals' roles are classified as non-isomorphic

Table 4. Revenue models

Revenue model explanations:		Examples*	Means**
Commission-based	A fee that is imposed on a transaction by a third party (usually an intermediary)	Inst-cash International Unibarter.com	0.22
Fee-for-service	Pay as you go option, charged for professional service as you use it	Metalogics, Inc. Flash Gordon	0.50
Advertising	Business of attracting public attention to a good or service, achieved through banner ads, pop ups, permanent buttons, etc.	RealTraveling.com	0.36
Subscription	Company charges a flat rate to use a service for a certain period of time	Fidget Tendersys.com Homesmart.com	0.22
Referral	Fees for steering customers to another company—can either be a flat fee or a fee per click-through.	E-sitting Insureconnection	0.11
Production	Manufacturer sells directly over the Internet, cuts out middleman	Games Interactive 100x.com	0.21
Mark-up based	The middleman, business not in production but in resale	RealLegends.com Smartenergy	0.18
Other	Either not enough information to classify, or the revenue model was outside the scheme of an Internet business	Avatar Project	1.20

* Given examples are not part of the current study

** Means are based on current sample of 786 observations

Commitment of resources

Many of the solicitations came from companies that had already received financial support of one kind or another. D-ANGEL takes the value of one if a non-VC round is reported in the funding request. For the 117 firms that reported private equity amounts, the mean prior investment amount (ANGEL AMOUNT) was \$3.3M. ANGEL AMOUNT is highly skewed; hence we use the natural log of ANGEL AMOUNT (measured in thousands of dollars) in the regression analysis.

role or insufficient information. Non-isomorphic role and insufficient information are not included in the set of possible roles (i.e., the denominator). This inflates the numerator as these individuals are counted as part of the team. This increases our measure above one and leads to our suggestion in the text that roles are duplicated. When we include non-isomorphic and insufficient information in the denominator, the mean falls to 0.88. The results of our regression analysis are unchanged when we substitute this alternate measure.

Amount requested

The amount requested, AMOUNT REQ, was extracted either from the planning documents or from communications between the FVC and the requesting firm. Forty percent of firms did not request a specific amount of money. The dummy variable D-AMOUNT-REQ took the value one if the planning document contained a specific request and zero otherwise. Conditional on the presence of an amount, the average request sought \$3.47M. Because this variable is highly skewed (the maximum is \$60M), we use the natural log of the amount requested (measured in thousands of dollars) in our regression analysis.

Control variables

Proposed revenue model

Due to high uncertainty in the context of the emerging Internet marketplace, we coded the revenue model of each solicitation using a taxonomy

developed by Afuah and Tucci (2003). In addition to demarcating the boundaries of the emerging industry, the revenue model describes how the founding team proposed to exploit the purported opportunity. The revenue model coding also tracks how many different revenue models a given firm chooses to exploit. We describe the revenue models and their relative incidence in Table 4.

Firm age and timing of request

We measure the timing of the date of funding request. If the request occurred before or during March 2000, the variable *D_PRE_BUST* took the value one. If the request occurred after March 2000, the variable *D_PRE_BUST* took the value 0.50 percent of the firms requested funding before March 2000.²⁰

RESULTS

We now analyze the form and content of the planning documents. As mentioned in the Data section, we condition the remainder of the analysis on the request being socially mediated and drop the 302 unsolicited requests.²¹ This leaves 761 requests in the sample. We report pairwise correlations in Table 5 and our central regression results in Tables 6 and 7. We use a rare-events logit methodology: Only 31 of the 601 firms (5.2%) that submitted any planning document eventually received funding. Moreover, only 20 of the 329 firms (6.1%) that included management team information in their solicitations eventually received funding.

²⁰ We also tried controlling for firm vintage. The reported founding dates are highly correlated with the date of request, so we are unable to simultaneously control for each. We report results using the solicitation measure, but our results are robust to this decision.

²¹ As noted above, 302 of the 428 requests for funding that arrived after 11 November, 2000 were not socially mediated. Including these observations would expand the sample by adding a group of observations for which there is no variation in the dependent variable. Moreover, social mediation is uncorrelated with other independent variables. Therefore, adding these observations will introduce noise and weaken any patterns we see in the data. This would work to reinforce our central conclusion that business plans do not predict venture decision making. In an unreported regression similar to Model 1 that includes this subsample, the inclusion of the planning documents no longer predicts venture outcome and all other results are qualitatively similar. As a conservative test, we exclude the nonsocially mediated funding requests.

In Table 6 Model 1, we test Hypothesis 1. The regression model controls for revenue models (described in Table 4). The dummy variable *D_DOCS* is positive, but almost significant at the 10 percent level ($\beta_{D_Docs} = 1.01$). Thus it may be beneficial to include a document in a request for funding, as opposed to leaving the venture capitalist with a simple introductory email or memo. The coefficients, *BUS PLAN* and *EXEC SUM* measure the incremental value of including a business plan/private placement memorandum or an executive summary, respectively. These groups are mutually exclusive. It appears that submitting an executive summary is less beneficial than other types of documents ($\beta_{EXEC_SUM} = -0.99$). In Model 2, we repeat the regression without control variables. The results are similar, although submission of any planning document no longer significantly predicts eventual venture funding. These results provide inconsistent support of Hypothesis 1: submission of *any* business planning document may be helpful, so long as it is not an executive summary.²² It appears that our prior belief that an executive summary is a 'standard' submission document in the eyes of venture capitalists is wrong.

In Model 3 we include *PLAN COMPLETE* and test Hypothesis 1a. Following the empirical strategy summarized in Table 1, we drop *EXEC SUM* and *D_DOCS* from the regressions, as this model includes only those requests that included an executive summary, a business plan, or a private placement memorandum. That is, our test

²² One might be concerned that our business plan result is related to the amount of information contained in the proposal. In unreported regressions, we find a) no relationship between the length of the documents (in pages) and funding outcomes, and b) no relationship when number of pages is interacted with plan completeness or type of document along the business plan-executive summary dimension. One might also be concerned that not all businesses have a similar propensity to include all 'standard' sections in the plan. In this case, *PLAN COMPLETE* would measure underlying opportunity heterogeneity as opposed to conformity to a standard norm. To test if this is the case, in a series of unreported regressions we predicted the likelihood of the inclusion of individual sections as a function of the underlying revenue model proposed in the venture. We found two significant correlations: The revenue model section of the plan tended to be included when the proposed business included an advertising-based business model or a fee-for-service-based business model. To see if this fact mattered for our result, in unreported regressions we included a dummy variable that took the value of one when the business associated with the request for funding was advertising-based or fee-for-service-based and the plan included a revenue model section. The variable was insignificant and did not influence our results.

of Hypothesis 1a relies on variation among only those requests for which we observe a business plan/private placement memorandum or an executive summary.

Conformity, as proxied by PLAN COMPLETE, does not predict successful funding outcomes. In unreported regressions we find that this result is not sensitive to the omission of a pre-bust dummy and revenue model controls. We do not find support for Hypothesis H1a. Following the logic in Table 1, our results weakly suggest that planning documents serve a ceremonial role.

In Models 4 and 5 we test Hypotheses 2 and 2a. We find no evidence that reporting prior equity funding is related to VC funding outcomes. The coefficient on D_ANGEL is not statistically distinguishable from zero. In Model 5 we condition the analysis on reporting private equity funding. We find that the (natural log of the) amount of private equity is positively associated with venture financing outcomes, but not significant at conventional levels; hence, Hypothesis 2a is not supported. Following Table 1, this result suggests that previous funding amounts are not important cues.

In Model 6 we test Hypotheses 3 and 3a. We find that the inclusion of the requested funding amount AMOUNT REQ does not affect outcomes. Further, in Model 7 we see that conditional on inclusion of the amount, the amount is not predictive of outcomes. Thus, neither Hypothesis 3 nor 3a are supported. Following Table 1, this suggests that the requested funding amount is not a cue for VC decision makers. In further unreported regressions, we found that none of the results regarding previous financing amounts or requested funding amounts were sensitive to the omission of control variables.

We test Hypothesis 4 in Model 8. We fail to find a relationship between the inclusion of team information and attainment of funding. There is little evidence to support Hypothesis 4. In Model 9, conditional on reporting team information, we find support for Hypothesis 4a. TEAM SIZE is positive and significant at conventional levels.²³ In Model 9a, we report a baseline logit model.

²³ We report the natural log of team size as opposed to the absolute number as this variable has a long right tail. The results reported are the *strongest* we found in the data. Including a team size variable without taking the natural log is not significant. We also experimented with a quadratic form and failed to find a relationship.

Econometric theory predicts that the precision of our estimates will increase when we take into account the rare-event nature of our dependent variable. Indeed, in this model TEAM SIZE is not significant. The results of Models 1–8 do not depend upon the use of the rare-events logit technique. To test Hypothesis 4b, in Model 10 we include TEAM COMPLETE and TEAM SPECIAL. TEAM SIZE and TEAM COMPLETE are highly correlated (see Table 5), and both coefficients tend toward zero when included simultaneously. Therefore, TEAM SIZE is excluded from this regression. The results do not reveal any significant patterns in the data. Moreover, a Wald test that all variables in the regression are jointly zero cannot be rejected ($\chi^2(11) = 17.2$; $p > \chi^2 = 0.10$). Thus, we find no support for Hypothesis 4b. Following the logic of Table 1, these results suggest that (a) team size is an important cue, but it is not learned from the planning documents; and (b) team formalization is not an important cue.

In Table 7, we report results of regressions testing the remainder of the hypotheses. In each of these models, we do not include revenue model dummies. Wald tests failed to reject the hypothesis that the revenue model dummies were jointly insignificant for these subsamples.

In Model 11 we test Hypothesis 5. We find that including information about educational attainment does not predict VC outcomes. In Model 12 we find that the level of attainment (as proxied by attaining a bachelor's degree, an engineering degree or a master's of business administration) does not predict funding. Hypothesis 5a is not supported. Following Table 1, we conclude that educational human capital is not an important cue for VC decision making.

We test Hypothesis 6 in Model 13. We find that including information on start-up experience is not related to outcomes. However, we do find support for Hypothesis 6a: the number of prior start-ups with which team members were involved predicts funding outcomes at the six percent level of significance (Model 14; $\beta_{\text{ENTREP_EXP}} = 0.39$, $p > |z| = 0.06$). Following the logic in Table 1, we interpret this to imply that the number of prior start-ups is an

Table 5. Correlation coefficients

	a	b	c	d	e	F	h	g	i	j	k	l	m	n	o	p	q	r	s	t	u	v
a D.PRE-BUST	1.00																					
b D.DOCS	0.12*	1.00																				
c EXEC SUM	0.04		1.00																			
d BUS PLAN	-0.04		-0.73*	1.00																		
e BP COMPLETE	0.05		0.38*	0.13*	1.00																	
f D-ANGEL	-0.10*		-0.00	-0.03	-0.07	1.00																
g ANGEL AMOUNT	0.02	-0.08	-0.21*	0.07	-0.24*		1.00															
h D-AMOUNT-REQ	-0.07	-0.10*	-0.10*	-0.08*	-0.26*	0.13*	0.12	1.00														
i AMOUNT REQ	-0.00	0.06	-0.06	0.00	-0.15*	-0.04	0.53*		1.00													
j TEAM SIZE	0.11*		-0.22*	0.22*	0.31*	-0.21*	0.17	-0.00	0.12*	1.00												
k D-MGMT-TEAM	-0.05	-0.56*	-0.27*	-0.19*	-0.80*	0.07	0.25*	0.23*	0.01	-0.51*	1.00											
l TEAM COMPLETE	0.13*		-0.31*	0.31*	0.29*	-0.17*	0.23*	0.00	0.15*	0.74*	-0.45*	1.00										
m TEAM SPECIAL	0.00		0.08	-0.08	-0.05	-0.05	-0.02	0.00	-0.01	0.41*	-0.26*	1.00										
n D-EDU	0.05	0.56*	0.27*	0.19*	0.80*	-0.07	-0.25*	-0.23*	-0.01	0.51*	-1	0.45*	1.00									
o D-BACH	-0.03		-0.17*	0.17*	0.12*	0.04	-0.22*	-0.05	-0.10	-0.13*	-0.05	-0.07	1.00									
p D-MASITTECH	0.00		-0.13*	0.13*	0.11*	-0.18*	-0.09	-0.01	-0.03	0.20*	0.16*	0.07	0.18*	1.00								
q D-MBA	-0.12*		-0.21*	0.21*	0.04	-0.06	0.14	0.05	0.02	0.14*	0.08	0.01	0.14*	0.12*	1.00							
r D-ENTREP-EXP	-0.05	-0.38*	-0.01	-0.28*	-0.52*	0.05	0.15*	0.15*	0.01	-0.44*	0.68*	-0.36*	-0.68*	-0.10*	-0.17*	1.00						
s ENTREP-EXP	-0.00		-0.07	0.07	0.07	0.11	0.07	0.00	-0.10	-0.00	-0.01	0.02	0.02	-0.05	0.00	0.02	1.00					
t D-PRIOR-COS	-0.05	-0.56*	-0.27*	-0.19*	-0.80*	0.07	0.25*	0.23*	0.01	-0.51*	1.00*	-0.45*	-1	0.20*	0.04	0.06	0.68*	1.00				
u NB PRIOR COS	-0.02		-0.12*	0.12*	-0.03	0.05	0.01	-0.02	-0.07	-0.14*	-0.02	-0.16*	-0.02	0.06	0.08	0.02	-0.13*	0.14*	1.00			
v ENTREP PROMINANCE	-0.02		0.02	-0.02	0.00	-0.01	0.12	-0.00	-0.08	0.05	0.09	-0.05	0.09	0.06	0.08	0.02	0.01	0.13*	0.25	1.00		

* Significant at the 5% level. Blanks indicate when the coefficients cannot be calculated because observation implies a value of the other variable.

Table 6. Rare events logit regressions—request characteristics Dependent variable: VC acquisition

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(9a)	(10)
D_DOCS	1.01 (1.6)	0.85 (0.6)									
BUS PLAN	-0.15 (-0.3)	-0.067 (0.5)	0.57 (1.1)	0.62 (1.2)		0.60 (1.2)	-0.27 (-0.5)	0.57 (1.2)	0.59 (1.1)	0.66 (1.2)	0.61 (1.0)
EXEC SUM	-0.99* (-1.8)	-0.96* (0.5)									
PLAN COMPLETE			0.035 (0.2)								
D_ANGEL				0.45 (0.7)							
ANGEL AMOUNT					0.43 (0.9)						
D_AMOUNT_REQUEST						0.40 (0.8)					
AMOUNT REQ							0.26 (0.7)				
D_MGMT_TEAM								0.050 (0.07)			
TEAM SIZE									0.67** (2.5)	0.72 (1.6)	
TEAM COMPLETE											0.15 (1.4)
TEAM SPECIAL											0.13 (0.5)
Revenue model controls	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES
Pre-dot.com bust control	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	761	761	467	467	117	467	272	467	412	412	368
Chi2	19.9	6.15	20.1	19.3	0.81	20.4	16.6	19.4	17.1	15.5	17.2
DF	11	3	10	10	2	10	10	10	10	10	11
Prob > Chi2	0.047	0.10	0.028	0.037	0.67	0.026	0.084	0.035	0.073	0.12	0.10

Robust z statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Model 9a is a Logit specification.

Table 7. Rare events logit regressions—management team characteristics Dependent variable: VC acquisition

	(11)	(12)	(13)	(14)	(15)	(16)
BUS PLAN	0.586 (1.13)	0.955 (0.81)	0.609 (1.16)	0.637 (0.95)	0.639 (1.18)	0.665 (1.05)
PRE BUST SOL	-1.444 (2.40)*	-1.225 (1.61)	-1.448 (2.36)*	-0.794 (1.25)	-1.425 (2.38)*	-1.126 (1.86) ⁺
TEAM SIZE	0.536 (2.72)**	0.801 (2.49)*	0.587 (2.13)*	0.069 (0.24)	0.601 (2.61)**	0.385 (1.30)
D.EDU	-0.142 (0.28)					
D.BACH		0.049 (0.09)				
D.MASTTECH		-0.325 (0.30)				
D.MBA		-0.845 (0.76)				
D.ENTREP_EXP			-0.395 (0.63)			
ENTREP EXP				0.386 (1.91) ⁺		
D.PRIOR COS					-0.681 (0.97)	
NB PRIOR COS						0.091 (0.55)
ENTREP PROMINENCE						0.063 (1.78) ⁺
Observations	405	156	405	270	405	337
Chi2	11.73	12.20	12.03	8.13	10.71	9.81
DF	4.000	6.000	4.000	4.000	4.000	5.000
Prob > Chi2	0.019	0.058	0.017	0.087	0.030	0.081

Robust z statistics in parentheses. ⁺ significant at 10%; * significant at 5%; ** significant at 1%

important cue, but that this information is learned independently of its inclusion in the business planning documents.

We do not find support for Hypothesis 7. In Model 15 we find that including information about prior work experience is not related to funding outcomes. In Model 16, we do not find support for Hypothesis 7a, the number of prior companies an individual worked at is not related to funding outcomes; however, we do find support for Hypothesis 7b, the entrepreneurial prominence of those companies predicts funding outcomes at the 10 percent level. However, the entrepreneurial prominence variable is skewed. Statistical significance of this result is not robust to using the natural log of ENTREP PROMINENCE, although the sign is unchanged and approaches the 10 percent level. Interestingly, in Model 16, team size is no longer a predictor of venture outcomes, suggesting that

larger teams were more likely to contain individuals with entrepreneurial human capital. Following Table 1, we cautiously interpret these results as follows: when management team members hail from more entrepreneurially prominent organizations, VCs interpret this as a positive cue. However, this information is learned independently of its inclusion in the business planning documents.

Robustness checks

As described in the Data section, we likely under-sample high-quality firms and, therefore, underestimate the population success rate of successful VC fund-raising. The rare-events logit technique allows us to explore how the results vary if we change our assumption about the population likelihood of a positive event. Intuitively, when we specify that the population success rate is higher than the sample success rate, we increase

the weights on the positive events in the sample—further magnifying their importance in the estimation procedure. In unreported regressions we experimented by setting the population success rate to 10 percent and 2.5 percent. This had no effect on the significance level of any of the coefficients in our regressions, and the magnitude of the significant effects, as measured by the proportional change in the baseline probability of funding (that is, quasi-elasticities), was identical to reported specifications. The undersampling of high-quality requests does not appear to influence our inference.

We made two additional assumptions in our analysis that are somewhat arbitrary. First, we used characteristics of the full management team as opposed to the founding team. It is conceivable that venture capitalists are most concerned with the founding team alone. Second, we used averaged human capital measures across team members. It is plausible that the maximum values are more important. To investigate the robustness of our results to these assumptions, we repeated Models 12, 14, and 16 using different aggregation techniques. In the interest of brevity, we only summarize the regression results. When we use the maximum values for top management team members (that is, the very highest values across all team members), the results are qualitatively unchanged, although the entrepreneurial prominence variable is significant at the five percent level in the model similar to Model 16. We also test the mean values and maximum values for founding teams. Founding teams are only specifically identified in 264 of the requests. Reporting MBA experience of any founding team member completely determines a (negative) funding outcome, and neither of the other two educational human capital variables are significant, nor do they affect any of the other coefficients. For the subsample that reports founding teams, both maximum and mean entrepreneurial experience predicts funding outcomes, but entrepreneurial prominence does not.

To summarize: Businesses associated with submissions that include any documentation are more likely to receive VC funding unless they submit an executive summary without supporting documentation. This is supportive of the ceremonial view. Inclusion of any information pertaining to known success factors is not predictive of funding decisions. However, conditional on the

inclusion of such information, greater values are positively related to venture funding. Following the logic summarized in Table 1, this information is learned elsewhere and not from the planning documents.

DISCUSSION

Our results suggest that some information in business planning solicitations and artifacts predicts funding. However, the results also suggest that this information is not learned from business planning documents.

Our empirical strategy uses results based on conditioned samples to distinguish between the competing views (see Table 1). Our inferential strategy relies heavily on the assumption that the entrepreneur only includes information when it is above a certain quality threshold. This strategy will fail if VCs only care if a particular attribute of the venture is ‘good enough’ and if entrepreneurs accurately estimate how much is ‘good enough.’ In this case, conditional on the inclusion of information, the values of the attribute will not predict venture funding outcomes. However, our empirical results are not consistent with this premise. In fact, at times, entrepreneurs include information that is not particularly helpful to their cause as evidenced by the significant coefficients in the conditional regressions. We suspect that in these cases, entrepreneurs err in judging what it is VCs wish to hear.

Nevertheless, to further explore this concern we exploited one source of information that we systematically observe for firms that did not submit business planning documents. We thereby avoided conditioning the sample on observability. In particular, we estimated a model that predicted successful attainment of second round VC financing for 93 firms that had received at least one round of venture investment prior to their request of the FVC. In this unreported regression, we distinguished between VC funding amounts that were reported in the planning documents and those that were reported exclusively in public databases (VentureXpert). Not surprisingly, both measures of previous funding are positive, significant and large. However, the coefficients of these variables are statistically (and numerically almost) identical. This suggests that information about previous funding is collected and processed by venture capitalists

independently of whether the entrepreneurs choose to include it in a planning document. More generally this finding is consistent with our conclusion that business planning artifacts are not important sources of information for venture decision makers. This result is consistent with our other statistical findings: the submission of planning documents is, at best, a ceremonial act.

It is possible that if we had conducted this study using a sample from an earlier period we might have found different results. Producing a business plan has become easier: business plan writing is routinely taught in university courses, sample business plans are readily available, and business plan writing software has proliferated. Following signaling theory, when the cost of producing a business plan is low, its production is an unreliable cue for would-be investors.

Our results may generalize to other settings of high uncertainty, particularly when decision makers must screen many possibilities in a limited amount of time. For example, our results may be applicable to bank lending decisions, as well as screening efforts of angel investors. More broadly, we suspect that ceremonial aspects of exchange may be important when there is little basis to evaluate consequences of a decision within a reasonable amount of time and thereby rule out inefficient behavior.

There are five important limitations to our study. First, our theory is incomplete: additional cues almost certainly exist. Second, our findings suggest that characteristics of plans are learned through alternative channels. These alternative channels may be mediators who affect how the information is interpreted. For example, information may be viewed differently when received from a trusted source. This would be problematic if some information systematically came from such channels.

Third, the identified cues may be correlated with unobservable characteristics of the business opportunities or actions taken by the entrepreneur. For example, entrepreneurial experience may be associated with an understanding of the venture funding process. If the best way to attain VC funding is to get to know individuals in the VC community, and experienced entrepreneurs are most aware of this and best able to implement it, we might still find a correlation between funding outcomes and experience. But the interpretation of experience as a cue would be erroneous; rather, it would best be interpreted as a proxy for a particular type

of entrepreneurial behavior. Unfortunately, we are unable to address this possibility with our data. At the very least, even if venture capitalists ignore all information in planning documents, and this information is correlated with other unobservables or learned from other sources, our results indicate that social mediation and planning documents include information that is weakly predictive of venture funding decisions.

Fourth, we analyze a convenience sample. Although we go to significant lengths to understand its representativeness, we cannot know if these results would be replicated using data from a different time frame or a different industry. We leave this to future research.

Finally, we are likely understating the value of the information contained in planning documents due to the retrospective nature of the sample. Information about the proposed business idea is likely important to venture decision makers. Unhappily, after the fact it is not possible to reliably evaluate the quality of business planning materials of pre-dot-com bust companies—as any such evaluation would be colored by one's experience of the events of the intervening years. An alternative research design would examine proposals as they arrived across a sample of venture capitalists. For every proposal that was eventually funded, a matched proposal that was rejected would be chosen. At that point, either an internal evaluation of the proposals would be collected or, alternatively, the proposal would be rated by an unbiased panel. A central problem with this proposed design is that very few solicitations are actually funded. Hence, the study would require the recruitment of a fair number of participants. While we do not believe this to be impossible, it would be challenging.

CONCLUSION

In this study we have advanced understanding of the use of cues in strategic settings by empirically identifying and characterizing the validity of cues associated with successful resource acquisition in the context of VC funding, a particularly important instance of fast decision making under uncertainty. We have exploited a large sample of funding requests of known representativeness to address liabilities of prior studies.

We evaluated whether the cues are *ceremonial* (i.e., their presence is predictive of VC decision making) or *communicative* (i.e., their content is predictive of VC decision making). We found that neither the presence of business planning documents nor their content serve a communicative role for venture capitalists. We found that business planning documents may serve a limited ceremonial role.

We evaluated an important class of signals: the presentation and content of business planning documents. Although our results suggest that the inclusion of a business planning document in a request for funding is weakly predictive of funding decisions, the actual content of the document does not inform venture capitalists. Critical information is learned through alternative channels.

Our results are most supportive of the premise that planning documents play, at best, a minor ceremonial role and do not inform venture capitalists. Therefore, we conclude that planning documents do not play an important role in VC opportunity screening.

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APPENDIX

Goldfarb *et al.* (2005) find that:

The focal VC round sizes were about 30% lower than the VC Industry mean; [I]nternet companies financed by the focal VC received less than half the average amount of [I]nternet VC targets, the total fund size was much smaller than the industry mean, and the focal VC financed a similar number of companies as the average VC management firm. Given the additional information that this was the only VC fund ever affiliated with this company, we conclude that this was not a top-tier VC and would have likely received lower-quality solicitations than high-status VCs. (Goldfarb *et al.*, 2005: 10).

We engage in two comparisons. First, we compare 36 VC-backed companies from the sample to the general population of entrepreneurial focused VC deals (see Footnote 11; moreover, including non-PWC deals does not change the results of the comparison). Second, we compare the 85 VC investors that invested in the sample companies with the general population of information technology VC investors. In this way we determine if the funded requests in our sample are measurably different from the funded requests as judged by the venture community, and whether our 'judges' themselves are representative.

Comparison of VC-backed companies

Given that our sample is (a) focused on firms seeking first round funding between 1998 and 2002, and (b) none of our sample firms received funding before 1998, the relevant subset of the general population comprises those firms that received first rounds between 1998 and 2003. This choice is validated in Table A2 where we see that the mean founding year of the sample is not statistically different from the mean founding date of the general population, and the mean first round date for the sample is not statistically different from the general population.

We also exploit the venture economics industry classification (VEIC) and compare the studied sample to the general population by industry category. Table A1 reports sample and non-sample VC investment targets by primary and

secondary VEIC. A nonsample target is a company that did not solicit funding from the FVC, while a sample target is one that did. Subtotals are implied by indentations, for example, there were 4,832 information technology investments, 1,183 of which had a secondary VEIC of 'communications and media,' 559 of which had a tertiary VEIC classification of 'Internet specific.' Just over 42.1 percent of the sample firms are categorized in the 'Internet-specific' subcategory of the broader 'communications and media' or 'computer related' categories. These two groups represent only 35.2 percent of the nonsample firms. Two of the sample firms were unclassified. Because all but four of the funded firms in the sample were information technology (IT) firms, to make the comparison meaningful, we compare summary statistics of only VC-funded IT firms.

Table A2 compares funding round attributes of the population IT firms to the sample IT firms. Population IT firms are all VC target IT companies that did not solicit funding from the FVC. Sample IT firms are all VC IT target companies that requested funding from the FVC. There are no statistically significant differences between the two samples in the number of first round investors, the average founding date, date of first round, first round amount, first round valuations, and the number of days from founding to first investment. The number of rounds and total invested are lower and date of last investment is earlier for sample firms, and these differences are statistically significant. The table suggests that sample firms were less likely to receive follow-up funding than the general population, which presumably reflects the Internet-specific nature of our sample. We also explore the comparison in a multivariate framework. We use a rare-events logit regression where the dependent variable is a dummy variable that takes the value of 1 if the funded company is in the sample. The multivariate framework produces similar conclusions with the exception that, all else being equal, the first round dates of the sample companies were later than the general population. This regression is omitted for the sake of brevity.

Comparison of VC investors

We compare the investment patterns of the 85 VC firms in our sample with the 5,938 VC firms that invested in information technology companies and are included in the Venture Economics

Table A1. Industry classifications of VC-backed companies

Industry major group	Population firms		Sample firms		
	Industry minor group	#	as % of population firms	#	as % of sample firms
Information technology		4,832	39.3%	34	89.5%
Communication and media		1,183	19.7%	8	21.1%
Communication and media		624	10.4%	5	13.2%
Internet specific		559	9.3%	3	7.9%
Computer related		3,195	53.1%	24	63.2%
Computer hardware		206	3.4%	0	0.0%
Computer software and services		1,433	23.8%	11	28.9%
Internet specific		1,556	25.9%	13	34.2%
Semiconductors/other electronic		454	7.5%	2	5.3%
Medical/health/life sciences		683	11.4%	1	2.6%
Biotechnology		272	4.5%	0	0.0%
Medical/health/life Sciences		411	6.8%	1	2.6%
Non high technology		500	8.3%	3	7.9%
Consumer related		126	2.1%	1	2.6%
Industrial/energy		100	1.7%	0	0.0%
Other products		274	4.6%	2	5.3%

Source: *Venture Economics, Business Plan Archive*

Table A2. Comparison of the population and sample IT companies

Variable	Population IT firms	Sample IT firms	$ \Delta $	Ha: diff \neq 0, t-statistic	No. pop. IT firms	No. sample IT firms
Company rounds	2.76	1.79	0.97	3.96**	4,832	34
No. first round investors	2.51	2.71	0.20	-0.52	4,832	32
Total invested (\$k)	26,046.00	12,632.00	13,414.00	5.02**	4,720	34
Founding date	9/15/05	9/10/05	5 days	0.05	4,832	34
First round date	10/31/00	12/2/00	31 days	0.04	4,832	34
Time from founding to first investment (days)	587.60	726.95	139.35	1.16	4,644	22
First round amount (\$k)	7,543.08	6,968.77	574.31	0.45	4,654	34
Date of last investment (through 2004)	6/3/02	6/13/01	354 days	3.50**	4,832	34
Company 1st round valuation	27,251.52	26,884.63	366.89	0.05	1,713	8

Notes: Significant at the 95% level, ** significant at the 99% level

Source: *Venture Economics, Business Plan Archive*

(VentureXpert) database. Our results are reported in Table A3. There is no statistical difference in founding dates of population VC firms and VC firms that invested in sample companies. We also compare performance of portfolio companies. We report three groups: share that exited through shutdown or bankruptcy, share that were acquired or merged, and share that went public. The omitted group is share of firms that are ongoing investments, as reported by *Venture Economics*. We find that a greater share of portfolio firms of VCs that

backed sample companies exited, and a smaller share went public. We also find that a greater share were acquired or merged. None of these differences are significant at the 5 percent level, although the difference in exit rates is significant at the 10 percent level. We find that VCs that backed sample companies were involved in later rounds, averaging round 2.84 as opposed to 2.49. This difference is significant at the 5 percent level. There is no statistical difference in the round amounts or the number of investors in the average syndicate. In

Table A3. Comparison of the population of VC-firms backing sample companies to VC population

Variable	VC population	VCs backing sample companies	Δ	Ha: diff ~ = 0, t-statistic	VC pop. (n)	VCs backing sample cos. (n)
Founding date	11/25/91	12/23/91	28 days	-0.07	5,780	85
Share of investment targets that exited	0.10	0.15	0.05	-1.85	5,938	85
Share of investment targets that were acquired or merged	0.25	0.29	0.04	-1.17	5,938	85
Share of investment targets that went public	0.09	0.06	0.03	1.18	5,938	85
VC's average round number	2.49	2.84	0.35	-2.27**	5,938	85
Round amounts (\$ mil)	5.02	4.80	0.22	-0.80	2,368	64
# of investors/round	4.58	4.57	0.01	0.01	5,938	85

Notes: Significant at the 95% level, ** significant at the 99% level
 Source: *Venture Economics, Business Plan Archive*

Table A4. Predicting sample-backing VC-firm (rare-events logit)

	(1)	(2)
	DV: funded sample firm = 1	
Share of investment targets that exited	0.868 (3.54)**	0.806 (2.01)*
Share of investment targets that were acquired or merged	0.451 (1.85)	-0.015 (0.04)
Share of investment targets that went public	-0.565 (1.47)	-1.213 (1.47)
VC's average round number	0.147 (4.65)**	0.148 (2.75)**
# of investors/round	-0.044 (2.32)*	0.076 (1.94)
Round amounts (\$ mil)		0.000 (0.70)
Constant	-4.586 (28.58)**	-4.450 (13.95)**
Observations	6023	2460

Robust z statistics in parentheses
 * significant at 5%; ** significant at 1%

Table A4 we explore the robustness of the results in Table A3 to multivariate regression. Given the low proportion of VCs that backed sample companies, we employ a rare-events logit technique. We find that VCs that backed sample companies were more likely to have a larger share of portfolio companies exit, participate in later rounds, and perhaps have fewer investors per round.

Though not definitive, our results suggest that the VCs that funded sample companies, and perhaps the companies themselves, were of lower quality than the general population of VCs and target companies.