Abstract of the Dissertation

MANAGEMENT ASSESSMENT METHODS IN VENTURE CAPITAL:

TOWARD A THEORY OF HUMAN CAPITAL VALUATION

by

Geoffrey H. Smart

Claremont Graduate University: 1998

This study examines the methods that venture capitalists use to assess the senior managers of new ventures prior to making an investment decision. The lack of theory and empirical research in this area has led scholars to call for studies to examine the process of human capital valuation (HCV) in venture capital due diligence (Siegel, Siegel, & MacMillan, 1993; Timmons & Sapienza, 1992). This study heeded their call and combined field research (N = 86 cases) with theory from psychology and economics to attempt to generate new theoretical and empirical insights. The core research questions in this study were: 1) What methods do venture capitalists use to conduct human capital valuations? 2) What relationships exist between the methods that are used and the resulting accuracy of human capital valuation? 3) Why do venture capitalists use different methods? An *a priori* conceptual model was tested that accounted for over 70% of the variance in HCV accuracy. Venture capitalists allocated the most hours to the "work sample" method on average. However, the "past-oriented interview" represented the strongest predictor of HCV accuracy. Inductive analysis yielded several distinct typologies of venture capital approaches to the process of human capital valuation. These typologies represent fundamental differences in assumptions and

beliefs about the process of human capital valuation. This study presents a platform from which to launch future research to advance a theory of human capital valuation. Implications for scholars and practitioners are discussed.

MANAGEMENT ASSESSMENT METHODS IN VENTURE CAPITAL: TOWARD A THEORY OF HUMAN CAPITAL VALUATION

BY

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A Dissertation submitted to the Faculty of Claremont Graduate University in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Graduate Faculty of Psychology.

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We, the undersigned, certify that we have read the dissertation of Geoffrey H. Smart and approve it as adequate in scope and in quality for the degree of Doctor of Philosophy.

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For Pop

and the other men and women on this planet who contribute to the advancement of the art and science of entrepreneurship.

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CHAPTER I

BACKGROUND AND SIGNIFICANCE

"Nearly every mistake I've made has been in picking the wrong people, not the wrong idea."

--Arthur Rock, venture capitalist, cited in Bygrave & Timmons (1992, p.6).

Introduction

When a venture capitalist makes a decision to invest in an entrepreneur, one of two things is likely to happen. The new venture will use the funding to grow, create jobs, and contribute to economic prosperity. Or the venture will die, waste the scarce funding dollars, destroy jobs, and fail to create value. Venture capitalists realize that often, they are betting on people when they make investment decisions. They hope that their assessments of the people are accurate. How do venture capitalists assess people? Advancing our understanding of this important process, which is given the term "human capital valuation," is the focus of this study.

This study has three main research questions: 1) What methods do venture capitalists use to conduct human capital valuations? 2) What relationships exist between the methods that venture capitalists use and the resulting accuracy of their human capital valuations? 3) Why do venture capitalists use certain methods? In the field of industrial/organizational psychology, research on assessment began with the need to match people with jobs during the military buildup during World War II. The first 30 years of research in this area were focused almost exclusively on selecting people for entry-level or middle-management jobs in large organizations (Campbell, Dunnette,

Lawler, & Weick, 1970). Very few studies exist that examine the methods used to assess senior managers (DeVries, 1993). Of these studies that included senior managers, nearly all were limited to large, traditional corporations like AT&T (Howard & Bray, 1988). Not one empirical study in the industrial/organizational psychology body of literature has examined the specific methods that are used to assess senior managers in the context of a venture capital due diligence process. Due diligence is the research process that venture capitalists typically conduct before making a decision of whether to invest in a young company called a new venture.

The context of venture capital is an interesting place to continue to advance our understanding of senior-level management assessment. The first reason to study venture capital is that small organizations are becoming an increasingly important force in our society, yet our study of assessment has been limited to large, traditional corporate contexts. Echoing the words of Peter Drucker (1985), Wetzel (1995, p. 52) described a transition in the United States from a "decaying industrial economy to an emerging entrepreneurial economy." The entrepreneurial economy, made up of small organizations, is providing American society with a larger source of jobs than larger organizations. Since 1979, companies in the Fortune 500 have had a net decrease in employment by 4 million jobs; the entrepreneurial economy has created a net increase of 20 million jobs during the same time frame (Bygrave & Timmons, 1992). Venture capital firms provide direct investments to small, entrepreneurial companies. This money is often used to develop new technologies and allow companies to increase its number of employees. The first reason to study this context is that it is becoming an increasingly important part of society.

The second reason to study management assessment in venture capital is because there is less "noise" in this context, compared to large corporations. Researchers often choose to study phenomena in laboratories in order to reduce the number of potentially confounding variables. Venture capital due diligence is more like a laboratory because of its small size, compared to examining the same phenomenon in a $5 billion company with 10,000 employees in 60 countries. The researcher can "put his or her hands around" a small venture, account for behaviors more easily, and potentially produce more vivid insights into cause-and-effect relationships, processes, and outcomes.

Finally, by examining the context of venture capital, we can bridge theory and research on management assessment with the existing body of literature on new venture creation to make progress in both areas. Management assessment researchers tend to lament the fact that so few practitioners follow the lessons learned over the past half-century in the assessment literature (DeVries, 1993). However, it is possible that practitioners have been slow to adopt advanced assessment methods because the language and theory of psychology has not been properly blended with theory that is more familiar to them, such as the area of economics.

Consider the state of the new venture literature. Over the past 20 years, scholars have asked the question "What factors lead to the success of new ventures?" They have examined this question from many angles. They have measured the effects of various factors directly (Cooper, Gimeno-Gascon, & Woo, 1994), identified criteria that venture capitalists use to evaluate new ventures for investment (MacMillan, Siegel, & Narasimha, 1985), recorded retrospective ratings by venture capitalists of factors

leading to success or failure (MacMillan, Zemann, & Subbanarasimha, 1987), and have used self-reports of venture managers that were correlated with financial performance (Chandler & Jansen, 1992; Stuart & Abetti, 1990). After all of this scholarly work, many scholars agree that the human capital is a very important--if not the most important--determinant of new venture performance (Timmons, 1990; Stuart & Abetti, 1990; Gladstone, 1988; MacMillan, Siegel, & Narasimha, 1985). Some researchers suggest that human capital is important but maybe is not the most important factor (Cooper, Gimeno-Gascon, & Woo, 1994; Hall & Hofer, 1993).

Progress in this field has been plagued by one persistent problem. It is not clear how to accurately assess the human capital of a venture factor prior to making an investment decision. Scholars have expressed frustration over the difficult challenge of assessing the human capital. The three other primary factors that are assessed during venture capital due diligence (product, market, money) each have models to aid in their measurement, but no models exist in this field for assessing human capital. Porter's (1985) models for analyzing industries help to assess product and market factors. These models provide a framework for analyzing suppliers, buyers, competitors, and possible new entrants. To assess financial factors, basic accounting models and business valuation models are available (Higgins, 1995). These models rely on assessing the value of an enterprise through making forecasts and calculations about future cash flows.

Scholars in neither the psychology literature, nor the entrepreneurship literature, have provided models or methods for conducting human capital valuations in the context of venture capital due diligence. Perhaps one reason for this void in the

literature is that human capital has been considered an "intangible" factor for many years by economists and finance scholars--meaning that it cannot be accurately assessed during due diligence (Eskew & Jensen, 1992). Why study it, since it cannot be measured? Other scholars believe that it can be assessed accurately (Harvey & Lusch, 1995), but do not provide any theoretical models or methods to suggest how such an accurate assessment might take place. One scholar expressed frustration that--although good management is so universally believed to be of paramount importance--our knowledge of how to accurately assess this factor is limited (Stuteville, 1988, p. 211).

Leaders in the field of entrepreneurship have recently called for research to address the question of how venture capitalists assess human capital in the context of venture capital due diligence (Timmons & Sapienza, 1992). Ian MacMillan, the Founding Editor of the Journal of Business Venturing and colleagues wrote: "Research and practice [on management assessment] suggest this can be quite a challenge. . . a method of systematically selecting successful entrepreneurs has yet to be developed (emphasis added, Siegel, Siegel, & MacMillan, 1993, pp. 178-179)."

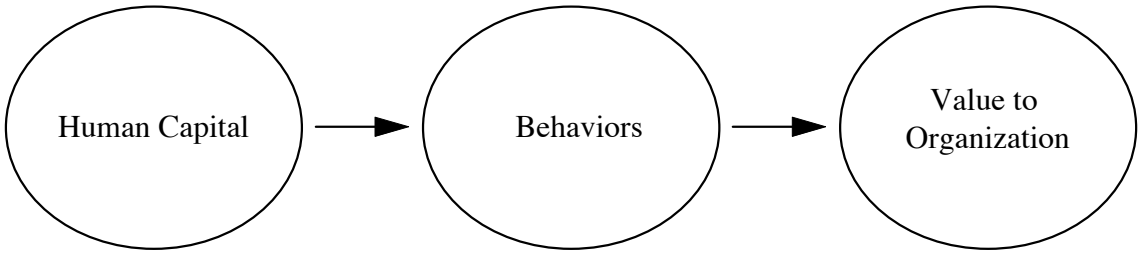
What is surprising is that no scholar has gone out into the field yet to examine how venture capitalists actually conduct management assessments. What methods do venture capitalists use to assess the human capital? Which ones are related to accuracy? Why do venture capitalists use these methods?

To sharpen the precision of the discussion of this phenomenon, I propose replacing the term "management assessment"--which suffers from inconsistent definitions and measurement--with "human capital valuation." Human capital, as it is defined for this study, is the propensity of a person or group to perform behaviors that

are valued by an organization. It has several dimensions that are discussed in Chapter VI. Human capital influences the behaviors that are performed by the members of an organization. These behaviors have economic value to the organization. Venture capitalists attempt to assess the degree to which the human capital embodied in the company's managers is likely to lead to the behaviors that are valued by the organization. Figure 1 describes the conceptual link between human capital, behaviors, and value to an organization (see Figure 1). A more detailed discussion of the construct of human capital is provided in Chapter VI.

Figure 1.

Human Capital, Behaviors, and Value to Organization



Organization of the Dissertation

This dissertation is organized into seven chapters. Chapter I provides the entry point where this study fits into the literature. In Chapter II, background information is given on venture capital firms as well as existing research on assessment methods. Towards the end of this chapter, several hypotheses are presented that address the second research question in this study: what relationships exist between the methods that are used and the resulting accuracy of human capital valuations? In Chapter III, the

research methodology is explained. Quantitative results on research questions #1 and #2 are presented in Chapter IV. In Chapter V, qualitative results are presented that address research question #3, which is why do venture capitalists use certain methods to conduct human capital valuations? Chapter VI explores the construct of human capital in the context of venture capital. A discussion of conclusions, results, limitations, and future directions is presented in Chapter VII. Since readers from several different fields will be reading this dissertation, a glossary of terms is provided in Appendix A. Note that the use of the terms "the author," "primary investigator," and singular personal pronoun all refer to the author of this dissertation.

CHAPTER II

LITERATURE REVIEW AND HYPOTHESES

About Venture Capital Firms

The primary goal of venture capitalists is to make a wise investment decision based on their assessment of a new venture during due diligence. A wise investment decision is investing in a company that succeeds and grows. An unwise investment decision is investing in a company that performs poorly. From a societal standpoint, venture capitalists provide scarce financial resources needed to fuel early business inception and growth. They create an "acceleration effect" by compressing the time span and increasing the velocity at which new technologies are brought to societal utility (Timmons & Bygrave, 1986). The field of venture capital is relatively young. It was launched soon after World War II by General Georges Doriot, who founded the first venture capital fund, called ARD on June 6, 1946 (Bygrave & Timmons, 1992).

Venture capital firms specialize in several ways. One difference is the "stage" of development of their investees (how old the venture is). The most common stages are from earliest to latest: Seed, startup, first stage, second stage, third stage, and fourth stage (which is also called mezzanine, or bridge-financing). Seed financing refers to capital provided by a venture capitalist to an entrepreneur to develop a concept. It rarely exceeds $500,000. Start-up financing is used to produce the product or service and initially market it. First-stage financing is provided to companies that require funds to initiate larger-scale manufacturing and sales. Second-stage financing is working

capital used for the early expansion of a company that is producing and shipping a product but perhaps is not yet profitable. Third-stage financing funds major expansions (i.e., building new plants, improving marketing, etc.) Finally, fourth stage financing is used to help a company "go public" through an initial public offering or IPO (Kozmetsky, Gill, & Smilor, 1985). Going public refers to the transfer of ownership from private to public through the sale of the company's shares of stock to the public.

In making investment decisions, venture capitalists are very selective. Typically, a venture capital firm may receive over 200 business proposals annually. Only about 20 make it past the initial screening process. Then, approximately 5-10 of these are funded per year (Kozmetsky, Gill, & Smilor, 1985).

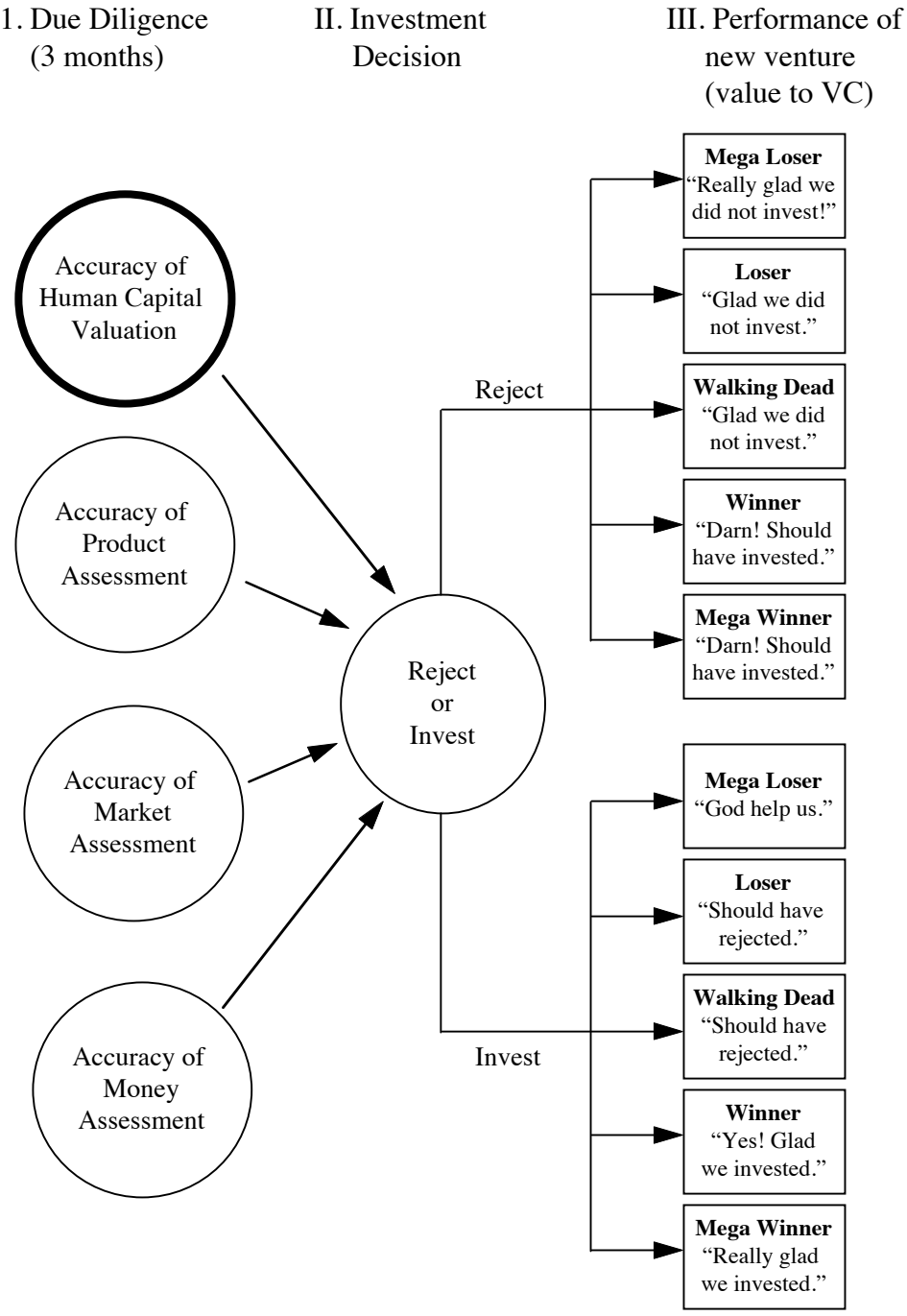
Due diligence is the term to describe the process of investigation that venture capitalists conduct to decide whether or not to invest in a company. At this stage, a systematic tool that venture capitalists use to assess product, market, and money factors is an approach called "business valuation" in the financial economics literature (Higgins, 1995). The human capital valuation model is framed in this study in the spirit of business valuation. Consider the parallels. Business valuation has to do with making projections of future cash in-flows and then figuring out what these future streams of cash in-flows are worth today. Human capital valuation has to do with making projections of future behaviors that human capital is likely to perform, and then figuring out the present value of that future stream of behaviors. Business valuations typically use past financial performance as a guide in making estimates of future performance. Human capital valuations may use past behaviors as a guide in making estimates of future behaviors. An accurate human capital valuation is expected to help contribute to

the overall accuracy of the business valuation and therefore help venture capitalists make better investment decisions.

Investment decisions have several possible outcomes. The outcome of an investment decision either produces a very high level of value (called a mega winner), high level of value (called a winner), fails to produce value (called walking dead), destroys a high level of value (called a loser), or destroys a very high level of value (called a mega loser). See Figure 2 for a flow diagram of this process.

Figure 2.

Flow Chart of Venture Capital Due Diligence, Investment Decision, and Performance



Two kinds of errors may occur when venture capitalists conduct human capital valuations. These errors are analogous to Type I and Type II errors in statistics (Howell, 1992). Type I error in human capital valuation is rejecting human capital that should not have been rejected. To use financial terms, this would be an example of "undervaluing the human capital." This type of error can influence a venture capitalist to decline an opportunity to invest in a company that, in reality, has sufficiently strong human capital.

In contrast, Type II error in human capital valuation is failing to reject a management team that should have been rejected. This comes from overvaluing the human capital. The consequence of committing a Type II error for the venture capitalist is enduring the frustration associated with management-related problems, and owning a venture that delivers disappointing financial performance.

HPMM Model of Factors Influencing Venture Capital Firm Performance

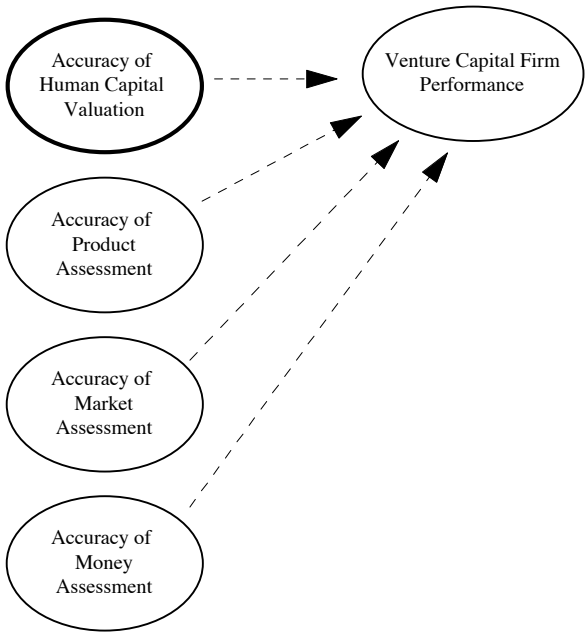
To put into context the research questions in this study, I will briefly review the factors that venture capitalists assess when making an investment decision. After reviewing the literature on new ventures, one is struck by the lack of consistency in describing factors that affect venture capital firm performance. In an attempt to "standardize" the discussion in this domain, I suggest a parsimonious four-factor model based on the work of Roure and Keeley (1990), Dubini (1989), Kozmetsky, Gill, and Smilor (1985), and MacMillan, Siegel, and Narasimha (1985).

When deciding whether to invest in a young company, venture capitalists assess the four main factors that are expected to influence the performance of the new venture. This four-factor, or HPMM model is comprised of factors relating to: 1) the human capital, 2) the product, 3) the market, and 4) the money. The human capital has to do with the characteristics of the people in the venture. It is the propensity of a person or group to perform behaviors that are valued by an organization. The product assessment is comprised of elements associated with the technology, design, patents, and production of venture's products or services--what it is that the company is selling or plans to sell. The market assessment has to do with any elements external to the firm in the marketplace (Porter, 1985). These include issues related to customers, competitors, distributors, industry trends, and the growth in gross domestic product of a nation or global geographic region. The money assessment addresses any issues related to the financial position of the new venture (assets, liabilities, equity, income, expenses, cash flow, size of the investment required, etc.). Money also includes capital requirements, the cost of capital, structure of ownership, legal issues, and issues related to the firm's ability to secure short- and long term financing. Each of these four factors is typically assessed by venture capitalists before they decided whether to invest.

Venture capitalists have rigorous methods for assessing the product, market, and money factors, but no real model for assessing the human capital factor. This would not be a problem if the human capital factor had a trivial effect on the performance of new ventures. However, the evidence in the literature, which is discussed later in this chapter, suggests that human capital is an important factor with a large effect on the performance of new ventures, and thus venture capital firm. See Figure 3.

Figure 3.

The HPMM Model of Factors Predicting Venture Capital Firm Performance



The arrows connecting the four factors to the outcome are depicted as dotted lines because these relationships were not the focus of this study. We present this figure for the sole purpose of clarifying what has been discussed already in the literature on venture capital.

In their study of 150 ventures, MacMillan and colleagues (1987) found that when venture capitalists perceive a critical weakness in any one of the four major factors, they make a rejection decision. This is described as a non-compensatory decision rule, meaning that a minimum threshold must be attained on each of the four factors in order for a venture capitalist to decide to invest. It is reasonable to suggest

that in order to make wise investment decisions, venture capitalists need an accurate assessment of all four factors that predict performance--not just two or three factors.

Human Capital and Hypotheses

What is human capital? What is the evidence that it influences the performance of a new venture? In this section, the origin of the construct of human capital in the literature is presented. Then the evidence is evaluated that suggests that this factor plays a substantial role in new venture performance. In subsequent chapters, a modified version of human capital based on the findings of this study is presented.

The term "human capital" was originally used by Nobel economist Gary Becker (1964) to refer to the "stored value" of knowledge and skills of members of the U.S. work force. Workers could increase their human capital through education (which referred to formal education) and training (which referred to formal training programs and on-the-job training). He attempted to use regression equations to measure salary differences in the labor force as a function of knowledge. He operationalized knowledge to be years of schooling. What he found was not surprising. The more years of schooling, the higher the salary. At the core of the concept of human capital is the idea that people possess potentials that manifest themselves in behaviors that have economic value to organizations. Up to now, "knowledge" and "skills" have been the primary dimensions of the construct of human capital. Knowledge is defined as a body of information that can be directly applied to the performance of tasks (Heneman & Heneman, 1994). This is also called "declarative knowledge" by Campbell (1990),

which refers to technical knowledge of facts and figures. Knowledge in this paper does not include what is called "procedural knowledge" or knowledge of a process (Campbell, 1990). Procedural knowledge is considered a skill in this paper. Skill refers to an observable competence to perform a particular task. Also, see Timmons (1990) for text that describes the "entrepreneurial mind," which is relevant to this context. In this work, he describes the personality and skill variables that are characteristic of entrepreneurs.

Human Capital and New Venture Performance

How strong is the effect of human capital on new venture performance, or the performance of their venture capital investors? Performance is often measured as financial performance (i.e. commonly expressed as what is called internal rate of return). The consensus among scholars who study the performance of organizations is that human capital contributes to the performance of a venture (Elango, Fried, Hisrich, & Polonchek, 1995; Stuart & Abetti, 1990; Dubini, 1989; Stuteville, 1988; Kozmetsky, Gill, & Smilor, 1985; Porter, 1985; MacMillan, Siegel, & Narasimha, 1985). The following studies can be categorized into two types. One type of study measures directly the effect of human capital on new venture performance. The other type of study is where venture capitalists respond to surveys or interviews in which they provide retrospective attributions for the success or failure of ventures. It should be noted that the latter type of research is more vulnerable to respondent bias than the former.

In their classic study of 102 venture capital firms, MacMillan, Siegel, and Narasimha (1985) found that the top two criteria that venture capitalists considered "essential" when making an investment decision pertained to human capital. These two elements were: 1) the entrepreneur's capability of sustaining intense effort (cited by 64% of the respondents), and 2) the entrepreneur's familiarity with the market targeted by the venture (62%). The first element is neither knowledge nor a skill. It is included in the new "motivation" dimension of human capital that I discuss in Chapter VI. The second element is a type of knowledge. Rated less important than these dimensions of human capital were factors relating to product, market, and money. In his review, Sandberg (1986) concluded that venture capitalists agree that the human capital embodied by the lead entrepreneur is the primary criterion for evaluating a proposed venture. However, Sandberg was not able to empirically report a statistically significant effect of the entrepreneur's management competence on new venture financial performance. This absence of an effect may be due to small sample size (N=17) and instrument insensitivity due to a survey questionnaire with modest content validity.

In their study of 52 entrepreneurial firms in New England, Stuart and Abetti (1990) found that the human capital was a stronger predictor of venture performance than factors related to the product or service of the new venture. Human capital was defined as the "entrepreneurial experience of the leader." Basically, they found that the presence of an entrepreneur with prior senior management experience in new ventures was the best predictor of financial performance of the new venture. Taking the contrapositive angle on this issue, the causes of <u>poor</u> performance in new ventures were widely attributed to <u>deficiencies</u> in human capital. Gorman and Sahlman (1989) mailed

surveys to 100 U.S.-based venture capitalists. They received data from 49 respondents. One section of the survey dealt with identifying reasons for "troubled investments" in new ventures. Ninety-five percent of the respondents reported that a reason for the poor performance was related to deficiencies in human capital. Deficiencies in human capital were defined as "ineffective senior management." In contrast to the human capital factor, other factors in the HPMM model were cited far less often: 43% cited market factors, and only 18% cited product factors as a cause of poor performance. The top two reasons for failure dealt with human capital. The next eight reasons (in decreasing rank) were: the market failed to materialize, distribution problems, competition, poor product/market fit, development delayed or unsuccessful, manufacturing failure, poor product performance, and inadequate quality control. Translated into the HPMM framework, the ten most important factors in this study influencing performance from most to least important were: human capital, human capital, market, market, market, product, product, product, product, and product. The "money" factor was not included in the top ten reasons for success or failure of new ventures.

Having reviewed an estimated 90,000 new venture proposals in his career, venture capitalist Arthur Rock wrote that human capital is critical to a new venture's success. Good ideas and good products are a "dime a dozen"; good management and good execution are rare (Rock, 1987). Veteran venture capitalist David Gladstone (1988) hypothesized that human capital accounts for at least 20% of the financial performance of the business, and in most circumstances 50% of the performance of the companies in which he has been involved. Empirical evidence to support or reject these last two hypotheses was not provided.

In their empirical study of 73 venture capital firms, Ruhnka and Young (1991) found that concerns about the human capital were ranked among the top concerns about investing in later-stage ventures. A subsequent empirical study involving eighty venture capital firms found that the primary reason cited for the stagnation of financial performance of both high- and low-technology firms was the human capital (Ruhnka, Feldman, & Dean, 1992) as opposed to product, market, or money factors. This study looked at the "living dead phenomenon" which describes the situation in which new ventures cease to grow, but do not die either. These studies suggest that human capital is an important factor in determining venture performance.

But what specific human capital attributes are universally important for new ventures? This is a seductive but potentially unproductive road to explore. Much of the scholarly work done by psychologists in the domain of entrepreneurship has sought to describe characteristics of entrepreneurs. McClelland's (1965) work suggests that entrepreneurs are more likely than the average population to have higher need for achievement. Brockhaus' work tells us that entrepreneurs tend to have a higher internal locus of control (Brockhaus, 1980a, 1980b). However, this line of research has failed to identify psychological dimensions that distinguish successful from unsuccessful entrepreneurs. Greenberger and Sexton (1987) concluded that this particular research stream generally is inadequate. Besides, venture capitalists do not need to know how to identify an entrepreneur. They see many entrepreneurs in a year whether they care to or not. What they do need is to know how to accurately assess an entrepreneur who is likely to succeed rather than fail. Since new venture situations differ so greatly, it is not

clear--theoretically nor empirically--that a generic set of psychological qualities defines successful v. unsuccessful entrepreneurs (Sandberg, 1986).

The line of research of psychology in entrepreneurship mirrors the difficulties that were associated with leadership research throughout this century. Early in the century, scholars attempted to identify certain psychological traits that determined leadership effectiveness across all situations. Shortly after WWII, Ralph Stogdill (1948) completed a large study and concluded that the trait approach was not advancing leadership theory. This led to the genesis of the well-known Ohio State Leadership Studies (Stogdill & Coons, 1957) that attempted to characterize behaviors of effective leaders across all situations. Again, researchers were unable to come up with a fixed set of behaviors that predicted leader success. Finally from the late 1960s until present, contingency theories dominate the literature with their mantra, "It depends on the situation!" (Chemers, 1984). Indeed, in light of the extraordinary complexity of situational factors (i.e., products, markets, competitive environments, etc.), it is reasonable to suggest that the specific human capital that is needed to succeed in any given situation probably depends on the situation.

Heeding this advice, this study does not focus on universal traits or behaviors. The focus of this study is to examine the venture capitalist's methods of human capital valuation. Consider the following metaphor. When purchasing a vehicle, is it "better" to have four wheels, two wheels, two doors, four doors, a sliding side door, big tires, small tires, a hatch back, a flat-bed, etc.? The answer will depend largely on what the need is. Is one planning to ride on narrow trails, transport a group of children to soccer practice, or transport large containers? Only then can we say that the purchaser may

need a motorcycle, mini-van, or pickup truck. Sensible traits for one scenario are not always sensible traits for another scenario. However, whatever the scenario, it is always better to identify what is needed, and then gather accurate and complete information about the vehicle. Similarly, when buying a company, it is better to identify what human capital is needed for a certain situation, and then gather accurate and complete information on the new venture's human capital rather than rely on inaccurate and incomplete information.

Despite my criticism of studies that focus on "universally important" dimensions of human capital, it is interesting to consider what human capital attributes are frequently cited as important in new venture performance. Elango and colleagues (1995) identified human capital attributes which venture capitalists generally considered most important across situations. In decreasing order of importance they were: whether the managers are capable of sustained effort, able to evaluate and react well to risk, articulate in discussing the venture, have demonstrated leadership ability, are thoroughly familiar with the market, and have a track record relevant to the venture. In one study including responses from 95 CEOs, Hall (1992) found that basic "operations management" (as opposed to specific functional management) topped the list of desired competencies in the leaders of new ventures. In their study of newly-founded U.S. semiconductor firms, Eisenhardt and Schoonhoven (1990) found that the following human capital factors influenced the survival and growth of new firms: a senior management team that had worked previously together prior to starting the venture, larger founding teams, and heterogeneity of industry experience of founders. Jeffry Timmons (1990) offered an extensive summary list of what he called "management

competencies," which were skills considered by researchers and practitioners to be important for new ventures. The categories of skills that he identified were: leadership/vision/influence, helping/coaching and conflict management, teamwork and people management, administration, law and taxes, marketing, operations/production, finance, computers, and technical skills.

Not all studies suggest that human capital affects new venture performance or is of interest to venture capitalists during due diligence. Roure and Keeley (1990) did not find that human capital predicted success in new ventures. However, these researchers admit that the distribution of variables measuring human capital had very high means and low standard deviations, making an effect less visible. Hall and Hofer (1993) suggested that venture capitalists are not very concerned with human capital in screening deals. However, two large weakness in this study exist. First, the time frame in this study was limited to preliminary screening of proposals only--not final investment decisions. Therefore, this study only measured how much venture capitalists cared about human capital in the very early phases of deal screening. Did the venture capitalists care about the human capital at the later stages of the deal screening process? The study does not say. The second limitation of this study was that it included only N= 4 venture capital firms and therefore its claims of external validity are very weak.

Some studies concluded that only certain dimensions of human capital matter, while other dimensions of human capital do not influence new venture performance. In their study, Cooper and colleagues (1994) found that the following human capital factors had an impact on the performance of new ventures: 1) industry experience 2) the

number of founding partners, and 3) what they called "general human capital," which included education. But in this same study, the researchers claimed that knowledge of how to manage effectively had little or no effect on the performance of new ventures in their sample. However, upon closer inspection, one finds that the operationalization of the "general management know-how" variable was rather obscure and indirect. Two variables that were used to measure management know-how were: 1) whether the entrepreneur worked previously at a non-profit organization, and 2) whether he or she has previously managed one person or more. To what extent is this measuring the strength of a person's management know-how by measuring whether he or she worked for a non-profit and whether he or she has managed one person previously?

To summarize: first, what is clear is that human capital has to do with the "stored potential" of people, typically in the form of knowledge or skills. Second, there is a high level of consensus among researchers that human capital has an influence on new venture performance. There is some disagreement about the size of the effect. Third, consensus is low on which specific attributes of human capital always deliver value to a new venture. Fourth, neither the ways in which the human capital needs are analyzed by venture capitalists, nor the methods with which human capital is assessed in new ventures have been empirically addressed in the literature. Before presenting the method and results of this study, it is worthwhile to review the industrial psychology literature to review what is known about methods for assessing people in the traditional context of employment interviewing in established organizations. The reader is reminded that this next section provides a review of only what is known about methods

of assessing human capital in the context of lower- to middle-management positions in large organizations.

Assessing Human Capital

Assessing human capital is difficult for venture capitalists. Though no prior research exists to suggest what are venture capital "accuracy rates" when assessing human capital, anecdotal evidence suggests that this is the most troublesome factor of the four HPMM factors to assess accurately (Harvey & Lusch, 1995; Dubini, 1989). "The talent criteria [human capital], perhaps the most important quality a venture capitalist looks for in a portfolio company, is also one of the most difficult areas to assess" (Kozmetsky, Gill, & Smilor, 1985, p. 5). David Gladstone (1988), when president of the largest public venture capital firm in the United States concluded, "The problem with the venture capital business is that when we analyze people, our perceptions of others are usually wrong (p.30)." Some in the new venture literature seems to suggest that the "management" (as they call it) is a factor that is simply impossible to assess accurately. The literature on assessment, as well as the findings from this study, challenge the assumption that it is impossible to assess human capital accurately.

The majority of the research on assessment has focused on samples of entry-level to middle-level supervisors in large organizations. We know what methods are available with which to assess people for these jobs, and we know how valid these methods are. However, few studies have examined the methods used to assess senior

managers in any context (DeVries, 1993). The author of this dissertation could not find one study on what methods are used to assess human capital in the context of venture capital due diligence. Therefore, one of the main research aims of this study is to gather empirical evidence to discover what methods are used by venture capitalists. I will examine the frequency and average hours of use of the universe of possible methods for assessment, according to two chapters in The Handbook of Industrial & Organizational Psychology, Vol. 1 and Vol. 2 (Guion, 1991; Campbell, 1990). The available categories of methods are: job analysis, resumes, different formats of interviews, work sample, assessment center, reference interviews, and psychological tests. The first two research questions in this study are motivated by the need in various bodies of literature for an examination of the methods that are used by venture capitalists to conduct human capital valuation.

Research Question 1: What methods do venture capitalists use to conduct human capital valuations?

Research Question 2: What relationships exist between the methods that are used and the resulting accuracy of human capital valuation?

For this study, data were collected on what methods are used by venture capitalists across a sample of actual cases (what % of venture capitalists used which methods and for how many hours on average).

This population has not been studied by assessment scholars. So it is appropriate to consider what assessment methods have been studied in the traditional context and discuss how these methods might look if employed during venture capital due diligence. Researchers claim that the most frequently-used method to assess people in traditional organizations is the "informal, unstructured selection interview" (Dipboye, 1994; Fear, 1990). Many journal articles on assessment begin with the customary comment that the most widely-used method that practitioners use is the informal interview. However, I was unable to find one study that empirically measured the frequency of use of this method in the United States. In a survey done in the U.K., Clark (1992) found that 100% of the large companies in the sample (N=55) used the informal interview as well as reference checks.

The irony is that this apparently widely-used method is considered the least valid of all assessment methods. The informal interviewer does not identify critical behaviors that are required for a position. He or she also tends to ask haphazard questions that often do not measure a candidate's actual past behaviors (Fear, 1990). According to Heneman and Heneman (1994), the average unstructured interview may include one or more of the following characteristics:

1. It is unplanned (e.g., just sit down and "wing it" with the candidate).
2. It is "quick and dirty" (e.g., under an hour).
3. It consists of casual questioning (e.g., Tell me a little bit about yourself.)
4. It has obtuse questions (e.g., What type of animal would you most like to be and why?)
5. It has highly speculative questions (e.g., Where do you see yourself ten years from now?)
6. The interviewer is unprepared (e.g., forgot to review the job analysis or failed to perform one in the first place).
7. The interviewer makes a quick and final evaluation of the candidate (e.g., often in the first couple of minutes).

These informal interviewers seem to think that they can "get a gut feel for" a candidate and make an accurate assessment simply by conversing casually. The validity coefficient for this type of interview is low. The validity coefficient refers to the degree to which the performance predictions made by interviewers before a person is on the job correspond to the person's subsequent on-the-job performance ratings. The validity coefficient for this type of informal interview tends to be between $\underline{r} = .15$ to $\underline{r} = .20$ and is usually not statistically significant (Van Clieaf, 1991). In the context of venture capital due diligence, an informal interview was expected to resemble an informal interview in the traditional context. Venture capitalists have, in many cases, weeks or months of interaction with the people in a venture. There is ample opportunity for informal interviewing to occur during meetings, or lunches and dinners. This method of assessment was not expected to be any more valid in the context of venture capital due diligence than it is in the traditional context.

For many years, social scientists were skeptical of any kind of pre-employment interviewing (Roth & Campion, 1992). Interviews were thought to be invalid. However, by 1988, researchers began distinguishing among various types of interviewing formats, as opposed to grouping all interviewing into one category, and some interesting findings resulted. A major distinction emerged between the unstructured interview format and the structured interview format. Researchers in the late 1980s and 1990s consistently suggest that structured interviews are considered to be the most valid of all assessment methods, and unstructured interviews (which include informal interviews) are considered the least valid of all methods.

The evidence that structured interviews are more valid than unstructured interviews is compelling. A meta-analysis by Wiesner and Cronshaw (1988) found that structured interviews produced mean validity coefficients over three times as high as unstructured interviews. These two researchers reviewed a total of 150 validities with a sample size of 51,459. Unstructured individual interviews had a mean corrected validity of .20. In contrast, structured individual interviews had a mean corrected validity of .63. A later meta-analysis by Wright, Lichtenfels and Pursell (1989) also supported the claim that the structured interview was a valid selection approach and that the unstructured interview was a far inferior predictor.

The most recent meta-analysis published on this (N=86,311 cases) supported claims that the structured interview is a more valid assessment method for predicting future job performance than the unstructured interview (McDaniel and colleagues, 1994). Dipboye's review of the literature concludes that structured interviews are effective, and unstructured interviews are not effective for predicting future job performance (Dipboye, 1994). It is important to remember that these studies included only interviews of lower-level employees for specific jobs.

What do structured interviewing methods look like? The following components are typically included in a structured interviewing process: a written job analysis of what important human capital dimensions are needed to succeed in the job, asking questions during the interview that specifically cover key dimensions that were identified in the job analysis, having a consistent pattern of questions across candidates, and recording ratings of each person along the behavioral attributes identified in the job analysis. Additionally, using skilled interviewers and having multiple interviewers have

been shown to increase criterion related validity when predicting job performance. Each of these components will be discussed in greater detail.

One very important component of "structure" in the structured interview is performing a job analysis prior to the interview (Pulakos et al., 1996). A job analysis is typically thought of as a process of identifying "what traits are required in the job (Dipboye, 1994)." Makers of pizza dough need a different set of traits to succeed, compared to hospital technicians, so the argument goes. However, for venture capital due diligence, there is no "job" per se. There is a company in its environment that needs human capital in order to survive and grow. Therefore, I modify the conceptualization of the job analysis for the context of venture capital due diligence. Rather than discussing "traits" and "requirements for a job," perhaps it is better to use the terms "behaviors" and "value." This reframes the conception of a job analysis into being a step used to identify the behaviors that deliver value to an organization. In performing a job analysis, venture capitalists would identify behaviors that are expected to deliver value in a specific new venture. This would mean asking the question, "Given the current product, market, and money factors, as well as the stage of development of this venture, what behaviors are expected to deliver value to this organization?" These (10-50) behavioral attributes can be listed on a "blank scorecard" against which human capital is later rated. This method allows the assessor to systematically identify key human capital attributes that are needed in the venture as well as record strengths and weaker areas in the human capital rather than relying entirely on intuition and memory. Performing the disciplined job analysis is expected to

positively impact the accuracy of the human capital valuation. Therefore, the first hypothesis that will be tested in this study is:

Hypothesis #1: There will be a positive relationship between the hours spent performing a job analysis and the accuracy of human capital valuation.

In the traditional context, written documentation may be analyzed after the job analysis is performed. This takes the form of application forms, resumes, or other biographical data. However, there are more possible sources of written documentation in the context of venture capital due diligence compared to the traditional context. First, resumes of senior managers can be reviewed. Resumes of second-tier and junior members can also be reviewed. Legal records can be checked to determine if the group, or members of the group have committed legal violations. On-line media services can be used to search for articles on the company in question and learn about the past behaviors of its members. Venture capitalists who spend more time reviewing written documentation on the human capital are expected to achieve more accurate human capital valuations than venture capitalists who spend less time utilizing this method.

Hypothesis #2: There will be a positive relationship between the hours spent analyzing written documentation about the target managers and the accuracy of human capital valuation.

Following the dichotomy in the literature, there will be two categories of interviews in this study: past-oriented interviews and work samples. Past-oriented formats ask questions about actual experiences and behaviors. Questions in a past-oriented interview measure behaviors that a person or group has actually demonstrated. In contrast, work sample formats do not measure past behaviors, they measure present behaviors in a sort of "audition" format. These interactions are also called "hypothetical" or "situational" interviews and measure responses to hypothetical questions about what a candidate "would do" in certain situations. It is possible that hypothetical questions are more easy for candidates to "fake," since the desired answer is typically transparent, and the candidate is not held accountable for answering accurately (since there is no reference to confirm or disconfirm what a person might do in a hypothetical situation).

Examples of past-oriented questions are "Let's talk about your first job. What were some high points and specific accomplishments? How about some specific low points and failures. What might your supervisor tell me were your strengths and weaker areas during that job if I called her? Tell me about a time in that job in which you organized and planned a project. How many hours did you work per week on average in your first job?" Indeed, Hough (1984) found that past-focused questions aimed at uncovering a candidate's "accomplishment record" were highly predictive of future performance. An accomplishment record is simply a record of a candidate's past accomplishments that are relevant to the job for which he or she is interviewing. The underlying notion is that the best predictor of future performance is past performance.

Following this logic, it makes more sense to ask questions about actual past behaviors rather than hypothetical future behaviors.

In contrast to past-oriented interviews, hypothetical interviews or work samples ask job applicants to picture a set of imaginary circumstances and then indicate how they would respond in that situation. For example, "How would you approach resolving a conflict between coworkers? How would you go about organizing and planning a project? How many hours would you work in this job per week?" In a study by Pulakos & Schmitt (1995) with N=216 incumbents in a "large federal organization," the hypothetical method of interviewing was shown to be a poor predictor of job performance whereas the past-focused interviewing format method was a valid predictor of job performance. Correlations between the assessment score and the person's subsequent performance rating score were an unimpressive $r = -.02$ (ns) for the hypothetical interview and a more robust $r = .32$ ($p < .05$) for the past-oriented interview. A similar study with N=70 lower-level pulp mill employees reported criterion-related validities of $r = .51$ for the past-oriented question format and $r = .39$ for hypothetical questions for predicting individual performance (Campion et al., 1994). This last study's difference was not statistically significant, however.

The debate over past-oriented v. hypothetical interviewing format types is not one-sided. In their meta-analysis, McDaniel and colleagues (1994) found evidence that is contrary to the norm. They found that past-oriented interviews were slightly less valid than hypothetical interviews. However, there may be semantic problems in attempting to compare this study to other studies. The terms they used were "job-related" to mean past-oriented and "situational" to describe hypothetical interview

formats. Unlike other papers in this area, it is not clear how the researchers decided to group studies into one category or the other. The authors wrote that they struggled with what to do with "behavioral" interview formats, which greatly resemble my definition of past-oriented interviews. They said that too few of these types of studies were available, but for future research, behavioral interviews should be analyzed separate from job-related and situational. I would argue for abandoning the term "job related" and instead focus on comparing "past-oriented" and "non-past-oriented" interview formats. There is value in studying whether people's actual past behaviors are the best predictors of future behaviors, or whether their responses to hypothetical questions are better predictors of future behaviors.

In this study, I compare the use and validity of past-oriented interviews and non-past-oriented discussions (work samples) to assess senior managers in the context of venture capital due diligence. In this context, past-oriented interviews would perhaps resemble those in the traditional context. However, non-past-oriented interviews may appear somewhat different. In the traditional context, hypothetical questions are focused on discrete, narrowly-defined situations like "how would you help a customer pick out shoes in a shoe store?" The non-past-oriented interview questions in the venture capital context might be: "Tell us what your plans are for growing this company over the next five years. How do you plan to increase revenues? What would you do if a competitor began offering the same products that you currently offer?" So in this study, non-past-oriented interviews are work sample discussions between the venture capitalist and senior management team in which issues are discussed that do not cover actual, past behaviors, but instead are characterized by speculation about the future.

Watching slick presentations and hearing entrepreneurs speculate about future hypothetical situations is expected to provide venture capitalists with less accurate human capital valuations than using past-oriented interviews, which measure patterns of real behaviors that occurred in the past.

Hypothesis #3a: There will be a positive relationship between the number of hours spent conducting past-oriented interviews and the accuracy of human capital valuation.

Hypothesis #3b: The strength of the relationship between the time spent in past-oriented interviews and the accuracy of human capital valuation will be greater than the strength of the relationship between the time spent in work sample discussions and accuracy of human capital valuation.

One method that is not empirically examined in the literature but appears often in practice is the use of reference interviews. Discussing past behaviors of a person (or group) with people who have previously worked with him (them) is expected to yield insights that would lead to more accurate human capital valuations. Therefore, it is hypothesized that reference interviews would be associated with higher human capital valuations.

Hypothesis #4: There will be a positive relationship between the number of hours spent conducting reference interviews and the accuracy of human capital valuation.

The use of multiple rather than individual interviewers was expected to be positively related to the accuracy of human capital valuation.

Hypothesis #5: There will be a positive relationship between the use of multiple interviewers and the accuracy of human capital valuation.

Work samples are activities or discussions designed to measure how well people perform tasks that are relevant to the job. For people at levels slightly higher than entry level, this style of job simulation is called the assessment center (Bray, 1964). In assessment centers, middle managers participate in role playing exercises that simulate job situations and are rated by observers (Campbell & Bray, 1993). Assessment centers typically deliver a validity of $\underline{r} = .36$ (Van Clieaf, 1991). This method is used for entry- to low-level managers and is not recommended for senior executives because it is often too cumbersome and expensive (DeVries, 1993; Sackett, 1987). Assessment centers would be additionally problematic for the context of venture capital due diligence because the context of the simulation would have to be changed in every case to reflect the different human capital needs of different ventures in different industries in different stages of development. Therefore, because of the senior level of the managers, as well as the dynamism of the venture capital context, the use of assessment centers in their traditional form was not expected to be found in practice for human capital valuation in venture capital.

However, one cannot completely dismiss the idea of a work sample or assessment center in venture capital. A hybrid form is quite common. During the

weeks and sometimes months of intense interaction between a venture capitalist and new venture management team, a form of work sample takes place. In the traditional sense of a work sample, a pizza dough maker would be asked to make some pizza dough, since this is what his or her job would entail.

So what would be a work sample for a senior management team? During due diligence, venture capitalists have an opportunity to view "work samples" when they watch senior managers give presentations, discuss strategies among each other, solve problems, collaborate with other team members, organize and facilitate meetings, and prepare written reports called business plans. So perhaps a work sample/assessment center approach really is being utilized by venture capitalists, though it does not resemble its cousin that is used in screening lower-level managers in the traditional context. This style of work sample was expected to be related to the accuracy of the human capital valuation. However, to what extent is "best behavior" predictive of future behavior? It was expected that work samples would not be as predictive of future behavior as past-oriented interview formats. Work samples measure what a person "can do." Past-oriented interviews measure what a person "does do." That is why hypothesis 3b states that the strength of the relationship between time spent conducting work samples and the accuracy of human capital valuation is weaker than the relationship between time spent administering past-oriented interviews and the accuracy of human capital valuation. Nevertheless, a positive (albeit weak) relationship was expected between work samples and accuracy.

Hypothesis #6. There will be a positive relationship between the time spent conducting work samples and the accuracy of human capital valuation.

Finally, an aggregate model was used to predict the accuracy of human capital valuation. Therefore, hypothesis #7 addresses the question of to what degree the "whole package" of methods is predictive of the accuracy of human capital valuation.

Hypothesis #7: The following group of methods will predict the accuracy of human capital valuation: job analysis, documentation analysis, past-oriented interviews, reference interviews, and work samples.

Psychological testing has been used to measure personality characteristics and/or cognitive abilities. These tests rarely surpass the $r = .53$ level of validity in predicting job performance for lower- to middle-level positions (Van Clieaf, 1991). For senior-level positions that are arguably more complex than narrowly-defined jobs, the use of psychological testing is even more problematic. In his Handbook article, Guion (1991) concluded that it is difficult to advocate the use of personality measures in most situations in which assessment decisions are made. Venture capitalists suggested in early interviews that CEOs of new ventures would not agree to taking lengthy psychological tests because these tests are perceived to lack face validity. There is the risk that a venture capital firm will lose a potential investee to another venture capital firm. The CEO might chose to work with a different venture capital firm if he or she views the assessment process as too invasive or irritating. "What does this have to do

with my leading this company?" a CEO may ask. Additionally, many tests require professional administration and scoring. Therefore, this assessment method is not as readily available to venture capitalists as other methods. It should be noted that candidates tend to prefer interviewing methods to approaches such as pencil-and-paper psychological testing or assessment centers. The latter two methods are perceived to have less face validity and are more threatening (Janz, Hellervik, & Gilmore, 1986). Tables 1 provides a summary of the methods that are available to assess human capital as well as a comparison between the contexts of traditional large-organization hiring v. venture capital due diligence.

Table 1

Assessment Methods in the Traditional Context v. Venture Capital Due Diligence

	Traditional Context	**Venture Capital Due Diligence**
Contextual Factors		
Populations studied	Entry level to middle-management positions in large organizations.	CEOs and other senior managers in small, entrepreneurial organizations.
Nature of the assessment process.	Discrete interactions among assessor and assessee (i.e. rounds of interviews).	Continual, high-frequency interactions for many weeks or months.
Nature of the decision.	Whether or not to hire a person for a specific job. Job requirements are known. What salary?	Whether or not to invest in a company or continue the due diligence research process. "Job requirements" need to be re-evaluated for each unique venture situation. How much to pay for the company based on assessment of all factors?
Level of analysis	Individual level	Individual, group, and/or organizational level
Available Methods		
Job analysis	What traits are required for this job? Does not need to be performed for every candidate (since there are typically multiple people who are hired for the same job).	What human capital is needed to succeed in this industry with this product mix at this time in these market conditions, etc.? Must be performed for each unique situation.
Documentation analysis	Reviewing applications and resumes is standard.	Application form takes the shape of a business plan; resumes of all players; legal search.
Work sample/assessment center	Used for lower-level to middle-management positions. Like an "audition." Infrequent usage; moderate validity. Measures "best behavior."	Venture capitalists can observe the management in action (planning, communicating, strategizing, etc.); this approximates a work sample.
Interviews	Short, discrete interview time available. Structured, past-oriented interviews are highly valid. Disagreement over validity of past-oriented vs. non-past-oriented discussion formats.	Discussions can be more continuous since due diligence often lasts weeks or months.
Reference checks	Can talk with a person's personal references or past supervisors.	Can talk with all key players' personal references, past supervisors, industry players, current employees, suppliers, customers, lawyers, accountants, bankers, investors, etc.
Psychometric tests	Have moderate validity for specific entry-to middle-level jobs but less validity for predicting senior management performance (Guion, 1991).	Not frequently used for senior managers; candidates resist their usage.

Other Variables

Other variables in addition to assessment methods were measured in this study. These variables were expected to be associated with the accuracy of human capital valuation. Since these factors are not methods (they are characteristics of the assessor and the venture capital firm), they will be considered variables to be statistically controlled in order to isolate the effects derived from the methods used in human capital valuation. Respondent interviews during the pilot phase of this research suggested that these would be important variables for which to statistically control.

1) Venture capital years of experience. One hour of human capital valuation conducted by an industry veteran is expected to lead to more accurate valuations than one hour spent by someone less experienced.

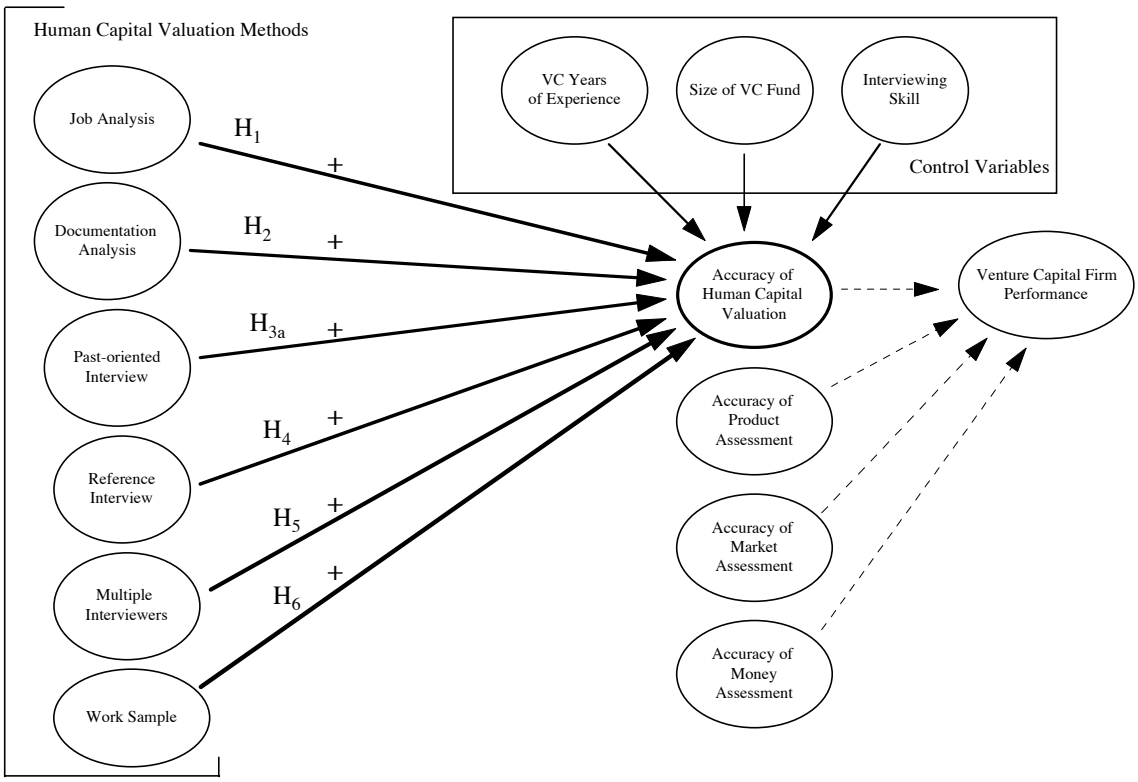
2) VC fund size. This variable measures and controls for the size of the venture capital fund. Larger funds are associated with more prestigious venture capital firms and may have advantages in the human capital valuation process (more resources, etc.) By controlling for this variable, we essentially standardize the discussion with regard to fund size.

3) Degree of interviewing skill possessed by assessors. This study is concerned with methods used, not the skill possessed by interviewers. Therefore, I will measure and control for this variable.

The model of constructs predicting the accuracy of human capital valuation is provided in Figure 4. Additionally, "downstream" construct relationships that are supported in the literature were included in the model, but not tested in this study (dotted lines). These constructs were included in order to identify the scope of this study. The following figure also helps to pinpoint where this study fits into the existing body of literature.

Figure 4.

Conceptual Model of Variables Predicting Accuracy of Human Capital Valuation



Note. The dotted lines indicate construct relationships that have been studied in the body of literature which are beyond the scope of this study.

CHAPTER III

RESEARCH METHODOLOGY

Sample

The participants in this dissertation study were venture capitalists at United States-based venture capital firms. The unit of analysis is the "deal." A deal is a transaction in which a venture capital firm invested in a new venture. N = 115 venture capitalists were contacted to participate in the study. Fifty-one venture capitalists participated, yielding a response rate of 44%. The respondents represented forty-eight different venture capital organizations across the United States. Since several respondents agreed to discuss more than one deal, the total number of cases in the study is N = 86 cases. Additionally, 28 separate interviews took place with colleagues of the respondents to provide corroborating data on 28 cases to test the inter-rater reliability of several measures (33% of total cases). These interviews covered items #127-139 in the questionnaire in Appendix B. The items represent the scale that comprises the dependent measure, as well as a sample of independent variables.

Procedure

Early in the design of this project, it was unclear whether a mailed questionnaire or a verbally-administered questionnaire would be more effective. After a pilot study, the decision became clear. Despite its appeal of being a less expensive way to collect

data, a written questionnaire would have been inappropriate for this study for several reasons. First, venture capitalists are very, very busy. They work long hours at a furious pace and it was less likely that they would have responded to a written questionnaire (Babbie, 1990). Second, if they did respond to a written questionnaire, it was feared that they would not answer with the care and thoughtfulness required for valid responses. Third, some of the terminology required explanation for the venture capitalists to understand the question. A written questionnaire cannot answer respondent questions. Fourth, the amount of qualitative data from open-ended questions was expected to be significantly lower for a written questionnaire compared to a verbal administration. Since this is primarily an exploratory study examining a new context, it did not make sense to lose the qualitative data. Fifth, the verbal format allowed the interviewer to ask probing questions to verify the validity of responses. Many times during the interview, the primary investigator politely challenged respondents' answers and asked for additional information in order to make sure that valid data was being recorded.

A 12-page questionnaire (See Appendix B) was administered verbally to all of the respondents. Twenty-five case interviews were conducted in person, and 61 were conducted by telephone. Though the response rate was relatively high (44%), the process of inviting and scheduling each venture capitalist for the 1.5-hour verbal administration of the questionnaire was highly labor-intensive. Examining N = 86 cases from the same venture capital firm would have been more efficient, though less interesting from a research standpoint. This study has greater external validity because forty-eight different organizations were sampled. For a typical respondent, at least one

fax which described the study was sent and then approximately three separate telephone calls were placed to try to answer questions and schedule the interview. When appropriate, e-mail and in-person meetings were used to secure participation. Approximately 25% of the VCs canceled the meeting with no notice and requested to be rescheduled. In one case, 5 separate meetings were scheduled and then canceled last minute. In another case, the author traveled to the scheduled interview, waited for one hour, and then was told that the VC was out of town. This was far from a "captive audience." Getting respondents to participate in the 90-minute interview was like trying to catch a greased pig. Future researchers in this area who want to conduct multi-site venture capital studies are advised to expect disappointments and hassles associated with scheduling meeting times.

Each respondent was asked to provide responses to questions on two past deals in which they were involved. A decision had to be made. Would it have been better to ask the respondent about hypothetical cases, typical cases, or actual cases? This is the difference between asking respondents "What would you do?" v. "What do you typically do," v. "What *did* you do?" The margin for measurement error and subjective perception in the first two seemed too great. Also, the first two are not verifiable with a second source. Therefore, I asked to discuss *actual* deals that transpired. During the study, many respondents referenced large binders of information on the specific deals we discussed in order to provide the most accurate and valid responses possible. This would not have been possible with hypothetical deals.

Another decision point in selecting cases was choosing which deals to request. An early draft of the questionnaire requested that the respondent select the two most

recent deals. There are two problems with this approach. The first problem is that the most recent deals may have happened in the past few weeks. Therefore, the respondent would not be able to answer questions about the degree to which the management team performed relative to expectations. Second, and equally as important, was that venture capitalists may not have felt comfortable discussing failures, so they may have inflated their reported accuracies of the human capital valuations. An alternative case selection approach was used, in order to make the respondents feel more comfortable about discussing failures. I requested that they discuss two recent deals--one in which the human capital valuation was considered more accurate, and one in which the human capital valuation was considered less accurate. That way, we would be able to learn from the accurate deals as well as the inaccurate deals. As it turned out, respondents demonstrated high levels of candor and self-criticism. Especially the qualitative findings of this study are enhanced due to the frank discussion of failed human capital valuations. Also, this approach guaranteed that there would be some variance in the dependent variable, so that hypotheses could be tested. Inferential statistics are not helpful if there is no variance in the dependent variable.

Another area of concern in the procedure was whether the imperfect memories of the respondents would reduce the validity of the measures. This potential problem was addresses several ways. First, in the questionnaire, I expressed a preference for "the more recent the deals, the better." Second, venture capitalists who assembled documentation on the deal (usually in the form of 3-ring binders) were requested to refer to it as they provided their responses. Third, respondents were not asked to provide sweeping estimates of time spent on various methods. They were asked for

specific time spent on certain activities, and then these values were summed together to arrive at the time allocation per method. Fourth, yet another venture capitalist was contacted to provide responses for the same deal. This bi-rater "quality check" provided an inter-rater reliability statistic and increased the motivation of the primary respondent to be as precise as possible, since he or she knew that I would be interviewing another person about the same deal. The statistical analysis indicated that significant differences did not exist between primary and second-source reports on time allocation for deals that closed within 5 years v. those that occurred more than 5 years ago.

The sampling process for this study was non-random. With this large-N sample of hard-to-reach participants, a snowball or convenience sample was considered to be most appropriate (Babbie, 1990). A convenience sample has been the most common sampling strategy in the field of venture capital because of the challenge of accessing this population. Early respondents were asked to provide referrals to several other venture capitalists, who were contacted by telephone, and so on. This strategy worked and produced a 44% response rate. In contrast, an attempt to attain anything resembling a probability sample was expected to yield a far inferior response rate. Many studies with actual venture capital firms in their sample have between N=5 and N=20 firms in the sample. Having as many as 48 different venture capital firms in one study is rare, so the size of the sample is considered to be toward the high end compared to past research on venture capital.

Questionnaire

A pilot study was conducted with N=13 cases to validate the questionnaire instrument. Only small modifications were needed, so the results were included with the main study. After the main study questionnaire was completed, the pilot sample VCs were contacted again to fill in any "holes" that existed in their data. For the main study, responses were recorded on questionnaires and were entered electronically into a dataset at a later time, in order to ensure that a hard copy as well as electronic copy existed of the data. Prior to participation, all respondents were read the terms of "informed consent." This statement communicated that the respondent had voluntarily chosen to participate in the study, that they had been made aware of foreseeable risks, and understood that they could discontinue participation at any time without penalty. Permission was requested to audiotape the interview, and was granted in all cases. Respondents were offered a copy of a summary report of the results at the conclusion of the study. Their participation was voluntary and was not compensated monetarily.

Most of the interview was spent accounting for what methods the venture capitalist used to assess the human capital of a venture during due diligence. Most of the items were closed-ended and aimed to record factual data. It would have been a mistake to ask a question like "How thorough and systematic was your human capital valuation?" This type of question relies too much on the subjective opinions of the respondent. What is "thorough" to one person may be very different from what another person would call "thorough." Therefore, to reduce this subjectivity, approximately 40 possible activities were identified that comprise the categories of methods. Respondents were asked whether or not they performed each action, and if yes, for approximately how many hours? This approach is characterized by Fowler (1995) as using questions

"designed to gather factual data" as opposed to questions "designed to measure subjective states." The respondents in the pilot study did not struggle with isolating the amount of time spent performing the discrete actions. They were thoughtful and occasionally asked clarifying questions to make sure that their estimates were as precise as possible.

The questionnaire contained primarily closed-ended questions, with some open-ended responses. The analysis was primarily driven by the responses to closed-ended questions. Open-ended responses were content analyzed as a test of convergence with the quantitative data as well as to provide rich case examples.

The procedure of this study adhered to the highest ethical and professional standards as articulated by the American Psychological Association (1992). The design of this study was approved prior to the administration of the questionnaire by the Claremont Graduate University Institutional Review Board.

Follow-up Study

After the pilot study and main study were conducted, a brief follow-up study was conducted. The purpose of the follow-up study was to re-engage several participants in the main study to discuss one unexpected finding. The strength of the relationships between methods and accuracy were stronger and more positive for early-stage cases than later-stage cases. The main study was not designed to collect data on why this finding might have occurred. So the follow-up study sought to provide additional data that were missing. The single question in the follow-up study was,

"What is it about the nature of early-stage cases compared to later-stage cases that might influence the size and direction of the methods-accuracy relationships?" Sixteen venture capital firms were contacted. VCs were selected based on their level of cooperation they demonstrated during the main study. The 16 most cooperative VCs were re-contacted, with a response rate of 56%. Representatives from N = 9 venture capital firms responded by telephone and provided additional data in the form of 30-minute exploratory telephone interviews.

Measures

The questionnaire is provided in Appendix B. A multitude of variables and sub-categories of variables were measured to address research question #1, "What methods do venture capitalists use to conduct human capital valuations?" Rather than just ask respondents, "How many hours of reference discussions took place?", the questions were designed to be more precise. I asked "How many hours were spent conducting reference discussions with senior management's *personal references*?" Then I went through 10 more categories of possible references. Finally, these variables were summed to measure the aggregate number of hours that were spent on this method. This way, the component activities were more precisely measured that comprised the methods of human capital valuation rather than relying on the respondent to compute the summations in his or her head.

The broad categories of the methods variables were selected to address research question #2, "What relationships exist between the methods that are used and the

resulting accuracy of human capital valuations?" The operationalizations of these variables are provided in Table 2.

Table 2

Variable Operationalizations

Dependent variable:	
Accuracy (of human capital valuation)	Scale comprised of the mean responses on 6 items: items #17-22; 4 indicates a high level of accuracy, 1 is low.
Independent variables:	
Job analysis	Total person-hours spent conducting job analysis. Item #43 (continuous variable).
Documentation Analysis on	Total person-hours spent analyzing written documentation the human capital. Sum of #54-#61 (continuous variable).
Past-oriented interview interviews.	Total person-hours spent conducting past-oriented Sum of #63, #65, #68, #69 (continuous variable).
Reference interview	Total person-hours spent conducting reference interviews. Sum of #72-#82 (continuous variable).
Multiple interviewers	1 if no multiple interviewers were used. 2 if multiple interviewers were used.
Work sample discussions	Total person-hours spent conducting work samples. Sum of #89-#91 (continuous variable).
Control variables:	
VC years	Number of years that the respondent had been in the venture capital industry. #9 (continuous variable).
Interviewing skill	Self-report of interviewing skill at the time of the case. #114 (4 = high, 1 = low).
Size of VC fund	Size of the VC fund measured in dollars. The VC fund is the pool of capital from which the venture capitalist makes an investment. #41 (continuous variable).

Note. Continuous variables in this study are variables with values that range from 0 to infinity. In contrast, categorical variables have discrete values (i.e. x = 1 or x = 2).

Since the scale items are too numerous to list here, please see Appendix B for specific items.

Threats of bias in the measures were reduced in several ways. First the design of the survey does not allow respondents much "wiggle room." These questions asked for very few attributions, opinions, attitudes, or other subjective data. Instead, the questionnaire is primarily "fact-based." Second, respondents were additionally motivated to be truthful because they knew that a second member of their team would be interviewed to confirm and/or elaborate on their responses. Finally, discriminant validity--the ability of respondents to distinguish among separate constructs--was tested by examining the degree to which respondents distinguished between the accuracy of human capital valuation and other variables such as the accuracies of product, market, or money factors. The correlations between accuracy and these other variables was relatively low and respondents confirmed that they understood that they were discussing only the "human element" and not the overall deal financial success.

Construction of the Dependent Variable

As mentioned earlier, most of the variables in this study are estimates of factual data, not subjective responses. This is true for all of the variables in which the respondent was asked to report how many hours were spent doing different activities or using different methods. One variable that includes some subjectivity is the dependent variable. The dependent variable is the accuracy of the human capital valuation. An accurate human capital valuation means that the venture capitalist's predictions of the

behaviors of the people in a new venture matched their actual on-the-job performance. Several precautions were taken to try to make the validity of this variable as high as possible. First, this variable was not measured with one sole item. Instead, a multi-item scale was constructed. Second, face validity was directly addressed in the pilot phase. Respondents offered suggestions to improve the face validity of this variable. One of their suggestions was to add two more objective items (#20 and #21) to this scale that do not rely on subjective perception. In total, this scale had six items (#17-#22). The assumption is that very accurate human capital valuations would lead respondents to report that their assessments were "very accurate," that they were not at all surprised by the performance of the management, that other partners in the firm were not at all surprised by the performance of the management, that the CEO was not removed for incompetence, that other members of management were not removed for incompetence, and finally, that the respondent's pre-close assessment of the overall strength of the management team was identical to the post-close on-the-job performance of the managers. For "very inaccurate" human capital valuations, the opposite is true.

The third precaution that was used to ensure the high reliability and validity of the dependent measure was a second rater. For each case, an attempt was made to interview a second venture capitalist who participated in the same deal to attain inter-rater reliability statistics. In approximately one-third of the cases, "second-source" data are available. The reliability of the accuracy scale is $\alpha = .82$ and its inter-rater reliability is $\alpha = .64$, $\underline{p} < .01$. This scale offers a level of reliability and validity that meets conventional standards for social science research. See Table 3.

Table 3

Univariate Statistics and Reliability of Accuracy of Human Capital Valuation Scale and Items

	Mean (SD)	Min.	Max.	Item: Total Correlation	Alpha if Item Deleted	Cronbach Alpha
Accuracy of HCV						.82
Items:						
Accuracy	2.91	1	4	.75	.76	
Surprise1	2.78	1	4	.78	.76	
Surprise2	2.77	1	4	.72	.78	
Remove CEO	2.93	1	4	.52	.82	
Remove Others	2.82	1	4	.31	.87	
Pre vs. post	3.13	1	4	.76	.76	

Memory posed a concern, since many deals happened several years in the past. As a test of the memory of respondents, the correlation between elapsed time and the difference between primary and second-source respondents was positive, though statistically nonsignificant, $r = .14$, ns. This suggests that the farther back in time a deal occurred, the greater the was the difference in accuracy ratings between primary respondents and second-source respondents. However, this correlation was too small and statistically nonsignificant to cause alarm.

Another concern was whether using two cases from the same respondent would produce an "interviewee effect" that would bias the results. To test for the presence of interviewee effect, a one-way analysis of variance was conducted, $F(49,35) = .76$, $p = .81$ which is nonsignificant. This suggests that the interviewee effect, though present, is not significantly large.

Analysis Strategy

Prior to performing statistical analyses, the data screening procedure recommended by Tabachnick & Fidell (1989) was used. Data were screened for out-of-range values, plausible means and standard deviations, coefficients of variation, univariate outliers, skew, kurtosis, etc. No statistical transformations were performed.

The entire sample of 86 cases was used for most of the analyses. However, different sub-samples were also analyzed. Thirty cases out of the 86 were slightly "tainted." In these cases, the venture capitalists had previously worked with members of the target management team. This prior exposure to the managers confounds my attempts to examine the relationship between time spent on human capital valuation and accuracy. Essentially, there were hundreds of hours of exposure (from prior experience working together) that were not measured. So a "clean" sample was constructed that had only cases in which the venture capitalists were exposed to the target managers for the first time. The second way in which the data were split was based on the stage, or maturity of the target company. Early-stage companies (which are defined as so-called "seed" or "1st stage" companies) are different from later-stage companies because the former has little to no track record and the latter has a track record. Assessing managers in a company that has existed for only two months is arguably more challenging than assessing managers in a company who has a performance record that can be examined. Several VCs during the study urged me to run separate analyses for early v. later-stage

cases because of these differences. Indeed, differences in the results existed according to company stage.

Research Question #1: What Methods Do Venture Capitalists Use to Conduct Human Capital Valuations?

To address this research question, descriptive statistics were analyzed. The mean number of hours that venture capitalists allocated or each method--as well as each component activity in each method--are examined, as well as standard deviations. Also, the highest and lowest number of hours are presented that were spent on each activity and method. These analyses tell us which of the assessment methods venture capitalists tend to favor and which ones they do not use. This analysis was performed on the entire sample of 86 cases.

Research Question #2: What Relationships Exist between the Methods That Are Used and the Resulting Accuracy of Human Capital Valuation?

This research question required more complicated statistical analyses. Hypotheses #1, 2, 3a, 4, 5, and 6 all test whether the specific methods that venture capitalists used were related to the accuracies of their human capital valuations. This set of hypotheses was tested two ways. First, the Pearson product-moment correlation coefficient (r), or simple correlation, was calculated between the independent variable and dependent variable. This statistic provides insight into the question, "How much is

the accuracy of the human capital valuation associated with a given method that was used?" A high correlation indicates a high degree of association between the independent and dependent variables.

Second, a hierarchical regression analysis was performed to statistically control for the variables listed in step 1 below. The hierarchical regression model is:

Step 1:
- Venture capitalist's years of experience in venture capital industry
- Interviewing skill of VC
- Size of the VC fund

Step 2:
- Independent variables (e.g., hours spent performing a job analysis)

The beta coefficient for the independent variable indicates the size of the effect: the amount of variance of the dependent variable uniquely explained by the independent variable (Cohen & Cohen, 1983) over and beyond any effects of the control variables.

Hypothesis #3b was tested as follows. This hypothesis tests whether the relationship between past-oriented interviews and the accuracy of human capital valuation will be greater than the relationship between work sample discussions and the accuracy of the human capital valuation. This requires a test of difference between two correlations. The way I tested this hypothesis was to follow Cohen and Cohen (1983) and use Fischer's transformation of the Pearson r to z' and then perform a test for significant difference. This analysis provided evidence to reject or fail to reject the hypothesis that past-oriented interviews are more valid than work sample discussions in influencing the accuracy of human capital valuations.

Hypothesis #7 tests the degree to which a "package of methods" can predict the accuracy of human capital valuation. The R^2 added in step two of the hierarchical

regression will suggest how much of the variance in the dependent variable is predicted by the package of methods over and beyond the control variables.

These analyses were performed on several samples. The entire sample was examined, as well as the "clean sample" as well as the sub-samples based on company stage.

Research Question #3: Why Do Venture Capitalists Use Certain Methods to Conduct Human Capital Valuations?

This question was explored using the explanation-building process described in Yin (1994). Since this question had not been addressed in the literature, and because the primary researcher had very little prior exposure to the context of venture capital, no *a priori* propositions were made about why venture capitalists use different methods. Instead, the typologies that are presented in this paper were inducted from the data. Yin (1994) also calls this "explanation-building in a multiple-case study." The goal is to build a general explanation or model that fits individual cases. This process included the iterative process of re-categorizing cases into different groups or typologies until the evidence for each case's assignment to a group became clear and distinct. Many of the items that produced the qualitative data were open ended: #29, "How would you describe your approach to assessing the human capital prior to doing the deal?; #97, "In assessing the people part of the deal, what do you wish you would have done differently?; #105-111, "What do you think about the following methods?"; #113, The methods you used in this case differed from the ones you used in the other case, why the

difference?" The differences in typologies did not appear to be stage-dependent, so the entire sample of 86 cases was examined for this section of the paper.

Human Capital

In addition to the three main research questions, data related to the construct of human capital were analyzed. The primary questions were: item #44, "What specific qualities or competencies in the human capital did you seek to assess?", #120, "In looking back on your pre-deal assessment of management compared to their on-the-job performance, what were the most salient weaknesses or limitations in the management that you did not detect during due diligence?" Responses to these questions were analyzed using simple descriptive statistics. This allowed me to rank-order the most commonly-assessed dimensions to the least commonly-assessed dimensions, as well as dimensions that VCs fail to assess accurately. These analyses provided several small insights into the elusive construct of human capital in the context of new venture creation.

CHAPTER IV

QUANTITATIVE RESULTS

The purpose of this chapter is to present the findings related to two of the three main research questions: 1) what methods do venture capitalists use to conduct human capital valuations, and 2) what relationship exists between the methods that are used and the resulting accuracy of human capital valuation? First, descriptive statistics are presented on the background of the participants in the study and the cases we discussed.

Background Statistics on Respondents and Cases

This section provides background statistics on the venture capitalists who participated in this study as well as general background information on the cases. The respondents tended to be experienced male venture capitalists from across the continental United States representing both large and small VC funds. Table 4 provides background statistics on the respondents.

Table 4

Characteristics of the Venture Capitalist Respondents in Each Case

Characteristics	N	%
Geography		
West	24	28
Middle-West	38	44
South	7	8
East	17	20
Years of experience in venture capital		
Less than 3 years	13	15
3 to 6 years	30	36
7 to 10 years	22	23
Greater than 10 years	18	26
Number of deals completed by each respondent		
1 to 5	19	24
6 to 9	18	22
10 to 18	23	29
Greater than 18	19	25
Gender		
Female	10	12
Male	76	82
Size of VC Fund		
Less $50 million	14	20
$60 to 99 million	18	26
$100-199 million	18	26
Greater than $199 million	19	25

See Table 5 for statistics on the target companies. Target companies are the companies in which the venture capitalists invested. Manufacturing companies represent such a high percentage of cases (63%) partially because software companies were included in this category. Approximately one-half (53%) of the target companies

were considered "high technology." Target companies at various stages of maturity (from early-stage to later-stage) are represented.

Table 5

Characteristics of the Target Companies

Characteristics	N	%
Sector		
Service	32	37
Manufacturing	53	63
Industries represented		
Information technology	28	33
Healthcare	21	25
General retail	6	7
Other	30	35
Level of technology		
High technology company	45	53
Low technology company	40	47
Stage of maturity of target company		
Seed[1]	16	19
Startup or first stage	26	31
Second stage	12	14
Third stage, "bridge," or "buyout"	29	35
Size of target company in number of employees		
10 or less	20	24
11-29	18	22
30-80	23	28
Greater than 80	21	26

[1]See glossary for definitions of stages.

Background information on financial data on the cases is provided in Table 6. Approximately one-half of the investments were under $7 million. For the deals in this study, over half failed to meet the return-on-investment expectations of the venture

capital investors. In approximately one-third of the cases for which financial data were available, the venture capitalist lost 50% or more of his or her investment.

Table 6

Financial Data for the Cases

Category	N	%
Size of investment		
$2 million or less	21	25
$3 to $7 million	41	48
$8 to $20 million	15	18
Greater than $20 million	7	8
Investment performance of deal		
Failed to meet expectations	41	53
Met expectations	20	26
Exceeded expectations	17	22
Deal success		
Mega-winner	9	18
Winner	21	41
Neutral	6	12
Loser	8	16
Mega-loser	7	14
Internal rate of return		
Zero IRR	16	35
10% to 20% IRR	8	18
30% to 60% IRR	12	26
Greater than 60% IRR	10	22
Earnings multiple		
Zero to 0.5 times the initial investment	12	25
0.6 to 2.0 times	13	27
2.1 to 9.0 times	14	29
Greater than 9.1 times	9	19
Not yet available	38	44

In this study, far more venture capitalists overestimated the value of the human capital (51.2%) than underestimated it (17.9%). In only 31% of the cases, respondents

"perfectly" estimated the value of the target company's human capital. This means that in only 31% of the cases, the venture capitalist's pre-close expectations of the behaviors of the managers and the value of those behaviors matched the actual on-the-job behaviors demonstrated by the managers. Table 7 provides accuracy data.

Table 7

Accuracy of Human Capital Valuations of Cases

Category	n	% of cases
Errors in valuing the human capital		
Underestimated value of the human capital	15	17.9%
Overestimated value of the human capital	43	51.2
Perfectly estimated value of human capital	26	31.0

Note. Since case selection was not random, this table does not necessarily reflect accuracy rates in the population. For accuracy rates in the population, see Table 8.

To learn the average HCV accuracy rates or "track record" of venture capitalists, the reader may see Table 8. This table provides data on the question, "In the past 10 deals in which you were closely involved, how many of your human capital valuations fell into the following four categories of accuracy?" It is interesting to note that less than half (43.5%) of their human capital valuations were considered "very accurate." And nearly a quarter of their deals (23%) achieved HCVs that were described as "more inaccurate than accurate" or "very inaccurate." Venture capitalists like to be very

accurate in their assessment of components to a deal. In the case of assessing the human capital, they are less than very accurate in nearly 60% of the cases. This empirical finding supports the anecdotal assertions by venture capitalists that the assessment of the human capital is very challenging.

Table 8

Accuracy Rates of Venture Capitalists

Degree of Accuracy	M	SD
Very accurate (% of last 10 deals)	43.5%	27.9%
More accurate than inaccurate	28.9	22.5
More inaccurate than accurate	16.6	11.9
Very inaccurate	7.7	10.0

Note. Venture capitalists were asked "In the past 10 deals in which you were closely involved, how many of your human capital valuations fell into the following four categories of accuracy?" (e.g. The average venture capitalist reported that 43.5% of his or her deals fell into the "very accurate" category.)

Methods that Venture Capitalists Use to Conduct Human Capital Valuations (HCVs)

This section provides the first empirical findings that address the first main research question of this study, "What methods do venture capitalists use to conduct human capital valuations?"

Table 9 provides a summary of the number of hours that were allocated to eight different methods of human capital valuation. Each method is comprised of several activities, which are presented in subsequent tables. Work sample discussions were by far the most heavily-used method. Work sample discussions are direct interactions between venture capitalist and management team in which the former "quizzes" the latter on the business. Venture capitalists allocated a mean 63.9 hours per case to work samples. The second most extensively-used method was reference interviewing. Reference interviews are discussions that the venture capitalist initiates with people who have worked with members of the senior management team. The mean number of hours allocated to reference interviews was 19.9 hours. The least-used methods were formal assessment centers (used by no venture capitalists), psychological testing, and job analysis.

The range in time allocated to human capital valuation is quite large. This finding suggests that there is considerable variation in how venture capitalists conduct human capital valuations. The lowest amount of time a venture capitalist spent valuing the human capital was 14.9 hours. The highest amount of time was 448 hours--which is over 30 times greater than the lowest value. Some possible reasons for the range in approaches to human capital valuation are explored in subsequent chapters. See Table 9.

Table 9

Summary Table of Time Allocated to Human Capital Valuation Methods By Venture Capitalists

Method (hours)	M	SD	n	Low	High
Job analysis	3.6	15.8	80	0.0	100.0
Documentation analysis	3.7	4.4	84	0.0	22.0
Past-oriented interviewing	16.8	19.9	84	0.0	100.0
Reference interviewing	19.8	22.1	84	0.0	134.5
Psychological testing	0.1	0.9	85	0.0	8.0
Formal assessment center	0.0	0.0	84	0.0	0.0
Work sample	63.9	60.6	84	4.0	290.0
Total time allocated to human capital valuation methods	120.1	100.2	75	14.9	448.0

Note. Respondents performed written job analyses in 21.4% of the cases, non-written job analyses in 53.6% of the cases, and no job analysis at all in 25.0% of the cases. Psychological tests were used in 3.0% of the cases.

Documentation analysis is comprised of several activities. Table 10 provides the number of hours that were allocated to these activities. The documentation analysis

activity that was allocated the highest mean number of hours was reading the resumes of the senior management team.

Table 10

Hours Venture Capitalists Allocate to Documentation Analysis

Activity (hours)	M	SD	n	Low	High
Reviewing resumes of senior management team	0.9	0.9	84	0.0	4.0
Reviewing resumes of 2nd tier officers	0.45	0.7	84	0.0	4.0
Reviewing resumes of junior members	0.0	0.1	84	0.0	0.5
Reviewing credit check of senior management	0.3	0.9	84	0.0	5.0
Verifying written documentation	0.4	1.2	84	0.0	6.0
Reviewing articles on key people	0.9	1.7	83	0.0	10.0
Performing a "name search" in legal records	0.3	1.2	83	0.0	10.0
Using on-line or other media	0.4	2.2	84	0.0	20.0
Total hours spent gathering written documentation	3.7	4.4	84	0.0	22.0

Note. Venture capitalists in 96.4% of the cases performed some form of a documentation analysis.

Past-oriented interviews are direct interactions with managers that focus on past behaviors, past accomplishments, past failures, and any other relevant occurrences in

the person's past. These interviews do not include discussions about present industry trends, or strategic planning for the future. Past-oriented interviews do not cover what a person *can do, or would do or may do*. The purpose of these interviews is to measure what a person *has done*. The most time-intensive action in this method was interviewing the CEO, which took eight hours on average. Venture capitalists spent far less time in past-oriented interviews with lower-ranking people in the companies than senior people. See Table 11 for the amount of time that venture capitalists allocated to various activities included in this method.

Table 11

Hours Venture Capitalists Allocate to Past-oriented Interviewing

Activity (hours)	M	SD	n	Low	High
CEO	8.0	11.1	83	0.0	80.0
Other senior managers (average of two other senior managers)	7.1	10.3	83	0.0	60.0
Second-tier managers (average of four second-tier managers)	1.8	5.1	84	0.0	40.0
Junior employees (average of twelve juniors)	0.4	1.2	84	0.0	6.0
Total hours allocated to past-oriented interviews	16.8	19.9	84	0.0	100.0

Note. Venture capitalists in 96.4% of the cases performed some form of a past-oriented interview.

Venture capitalists spent a considerable amount of time in reference interviews. The reference source that received the greatest time investment was the category of interviewing past supervisors and coworkers. It appears that venture capitalists were most interested in talking with people who had previously worked very closely with the target manager. The reference sources on which venture capitalists spent the least amount of time were bankers and accountants. See Table 12 for the amount of time that venture capitalists allocated to various activities included in this method.

Table 12

Hours Venture Capitalists Allocate to Reference Interviewing

Activity (hours)	M	SD	n	Low	High
Senior management's personal references	2.8	4.3	84	0.0	20.0
Past supervisors and coworkers	5.8	6.8	84	0.0	32.0
Industry players	2.6	4.1	84	0.0	28.0
Current employees	1.4	3.4	84	0.0	25.0
Suppliers	0.9	1.9	84	0.0	10.0
Customers	1.5	3.1	84	0.0	15.0
Lawyers	0.7	1.9	84	0.0	12.0
Accountants	0.4	0.9	84	0.0	5.0
Bankers	0.6	1.1	84	0.0	5.0
Other investors	2.6	11.1	84	0.0	100.0
Other sources	1.0	3.0	83	0.0	22.0
Total hours allocated to reference interviewing	19.8	22.1	84	0.0	134.5

Note. Venture capitalists in 96.4% of the cases spent time on reference interviewing.

In work sample discussions, the most time-intensive activity was talking about product and market issues. Venture capitalists allocated a mean number of 31.9 hours

to this activity during due diligence. Several venture capitalists indicated that the reason that they spent so much time on this activity was not necessarily because they were interested in testing the managers' product and market knowledge. Rather, work sample discussions about these topics allowed the venture capitalist to gather "indirect" data on how well the management team collaborated to answer questions, their confidence, listening skills, and conceptual skills. See Table 13.

Table 13

Hours Venture Capitalists Allocate to Work Samples

Activity (hours)	M	SD	n	Low	High
Discussions about financial issues	23.3	28.8	83	0.0	120.0
Discussions about product and market issues	31.9	34.8	83	0.0	160.0
Discussions about other issues	10.1	21.5	82	0.0	140.0
Total time allocated to work samples	63.9	60.6	84	4.0	290.0

Note. Venture capitalists in 98.8% of the cases performed some form of a work sample.

Hypothesis Tests: What Relationships Exist between the Methods that Are Used and the Resulting Accuracy of Human Capital Valuation?

This dissertation would be incomplete if it only provided descriptive statistics on the usage of various methods of human capital valuation. This section provides a first attempt to measure the strength of some relationships between methods of human

capital valuation and accuracy. At first glance, there does not appear to be a relationship between the hours spent on different human capital valuation methods and the accuracy of human capital valuation. Analyzing the entire sample, we find small nonsignificant correlations between human capital valuation methods and accuracy.

Table 14

Correlations between Accuracy of Human Capital Valuation and Methods: Entire Sample

Method	Entire sample	Early-stage cases (seed + 1st stage)	Later-stage cases (later than 1st stage)	Seed stage	1st Stage	2nd Stage	3rd Stage	4th Stage
n	83	42	41	16	26	12	7	22
Job analysis	-.12	-.23	-.10	-.59*	-.17	-.08	.08	-.14
Documentation analysis	.03	.13	-.13	.26	.00	-.11	-.26	-.17
Past-oriented interviewing	.12	.12	.11	.08	.26	.05	.16	.05
Reference interviewing	.04	.24	-.17	.35	.20	.23	-.05	-.38
Work samples	.08	.17	-.01	.15	.31	-.46	-.20	.22

Note. No cases were excluded from this table.

*$p \leq .05$

**$p \leq .01$

In the above chart, several cases were included in the analysis which should not be included. When selecting cases with the venture capitalist, the author requested cases in which the target management team was *unknown* to the venture capitalists. The idea is that a venture capitalist may assess a manager differently during due diligence if the manager is totally unknown v. if the venture capitalist had previously worked with the manager for 15 years. Therefore, an attempt was made to select only cases in which the target managers were unknown to the venture capitalist. However, in 29 cases, it was discovered that a member of the venture capital due diligence team had previously worked with a member of the target management team.

Item #94 provides this information. In examining the methods - accuracy relationships, internal validity is increased if we exclude cases of prior exposure. This revised sample without the prior exposure cases is called the "clean sample." The clean sample includes 54 cases. These cases were selected by a response of "No" to item #94: "Had any member of the VC due diligence team previously worked with any member of the senior management team?"

Upon analyzing the revised sample, patterns of relationships begin to emerge among the variables. However, only one human capital valuation method is found to be positively and statistically-significantly related to the accuracy of human capital valuation--past-oriented interviewing. See Table 15.

Table 15

Correlations between Accuracy of Human Capital Valuation and Methods: "Clean Sample"

Method	Clean sample	Early-stage cases (seed + 1st stage)	Later-stage cases (later than 1st stage)	Seed stage	1st Stage	2nd Stage	3rd Stage	4th Stage
n	54	26	28	10	16	9	4	15
Job analysis	-.16	-.16	-.18	-.44	-.16	NA	.22	-.30
Documentation analysis	-.02	.03	-.11	.06	.01	-.06	.17	-.27
Past-oriented interviewing	.28*	.39*	.18	.39	.42	0.0	.13	.16
Reference interviewing	.14	.33	-.10	.50	.29	.18	-.03	-.35
Work samples	.15	.34	-.09	.16	.52	-.64	-.74	.22

Note. The "clean sample" has 29 cases removed. The cases were removed because venture capitalists had previously worked with the target management team. These hours of human capital

valuation that were spent prior to due diligence are not able to be recorded. In the "clean sample," no venture capitalists had previously worked with the management team. This eliminates some measurement error from prior exposure.

*$p \leq .05$

This exploratory analysis uncovers a moderator effect that was not hypothesized. It appears that the stage of development of the target venture is related to the strength of the methods - accuracy relationships. The stage represents the level of maturity of a target company. Early-stage companies are typically smaller and less developed than later-stage companies. Both past-oriented interviewing and reference interviewing appear to become less and less associated with accuracy for each subsequent stage of development. For past-oriented interviewing, the correlations with accuracy decreases as follows from seed to 4th stage: $\underline{r} = .39, \underline{r} = .42, \underline{r} = 0, \underline{r} = .13, \underline{r} = .16$. Note that no correlations are negative for past-oriented interviewing. The correlation between reference interviewing and accuracy decreases in a linear fashion and even turns negative as stage increases. From seed to fourth-stage cases, the correlations between reference interviewing and accuracy are: $\underline{r} = .50, \underline{r} = .29, \underline{r} = .18, \underline{r} = -.03, \underline{r} = -.35$. Possible explanations for this moderator stage effect are provided in the last section of this chapter.

Since the stage of the target company is associated with the strength of the relationships between methods and accuracy, it is important to analyze early-stage and later-stage cases separately. Therefore, the *a priori* hypotheses will be tested for both samples separately in the following section.

Hypothesis Tests: What Relationships Exist between the Methods that Are Used and the Resulting Accuracy of Human Capital Valuation in Early-stage Cases

This section addresses the second main research question of this study: what relationships exist between the methods that venture capitalists use and the resulting accuracy of the human capital valuation (HCV)? Early-stage cases will be examined first. Early-stage cases are either "seed" or "1st stage" cases in the "clean" sample. These are cases in which the venture is young and underdeveloped in its lifecycle. The total number of useable early stage cases is 26 (10 seed + 16 1st stage cases). A summary of the results of the hypothesis-tests is provided in Table 16. The results of specific statistical tests are provided later in this section. For most of the hypotheses, two different tests were performed: correlational analysis and hierarchical regression analysis. See Table 16.

Table 16

Results of Hypothesis Tests in Early-stage Cases

Hypothesis	Pearson Product Moment Correlational Analysis	Hierarchical Regression Analysis
1. There will be a positive relationship between the hours spent performing a job analysis and the accuracy of human capital valuation.	Not supported. Statistically-nonsignificant negative correlation.	Not supported. Statistically-nonsignificant negative beta coefficient.
2. There will be a positive relationship between the hours spent performing a documentation analysis and the accuracy of human capital valuation.	Not supported. Statistically-nonsignificant positive correlation.	Not supported. Statistically-nonsignificant negative correlation.
3a. There will be a positive relationship between the hours spent performing a past-oriented interview and the accuracy of human capital valuation.	Supported.	Supported.
3b. The relationship between the time spent in past-oriented interviews and the accuracy of human capital valuation will be greater than the strength of the relationship between the time spent in work samples and accuracy of human capital valuation.	Some support, but not statistically significant.	Some support, but not statistically significant.
4. There will be a positive relationship between the time spent conducting reference interviews and the accuracy of human capital valuation.	Some support, but not statistically significant.	Not supported. Statistically-nonsignificant negative beta coefficient.

	Pearson Product Moment Correlational Analysis	Hierarchical Regression Analysis
5. There will be a positive relationship between the use of multiple interviewers and the accuracy of human capital valuation.	Not applicable. Nearly all VCs used multiple interviewers.	--
6. There will be a positive relationship between the time spent conducting work samples and the accuracy of human capital valuation.	Some support, but not statistically significant.	Supported.
7. The following group of methods will predict the accuracy of human capital valuation: job analysis, documentation analysis, past-oriented interviews, reference interviews, and work samples.	--	Supported.

Correlational Analysis

Examining the Pearson product moment correlations of the variables, only one method was statistically significantly related to the accuracy of the human capital valuation. The hours spent past-oriented interviewing (hypothesis 3a) and the resulting accuracy of HCV had a correlation, $\underline{r} = .39$, $p < .05$. Reference interviewing and work samples were slightly less strongly related to accuracy. The size of the VC fund (which indicates the size of the VC firm) did not appear to be related to the accuracy of HCV. This suggests that big firms are not any more likely to accurately value the human capital than small firms. Job analysis was negatively correlated with accuracy of HCV. This finding is counter-intuitive. However, it may be due to range restriction. Very few

venture capitalists conducted a written job analysis, and of those who did one, they spent very little time on it.

Finally, it appears that venture capitalists who tended to allocate a lot of time to one method tended to allocate a lot of time to other methods. They use several methods or very few methods. One example is the strong association between the hours that were spent performing past-oriented interviews and the hours spent conducting reference interviews. The correlation between the time allocated to past-oriented interviews and reference interviews was $\underline{r} = .68$, $\underline{p} < .01$. VCs did not use one method in lieu of the other. They tended to use a lot of both methods--or very little of either method. Perhaps this finding is due to the differences in assumptions about the process of human capital valuation that are explored in subsequent chapters. See Table 17 for more correlational results.

Table 17

Correlations Matrix of Variables in Early-Stage Cases (N = 26).

Variable	1	2	3	4	5	6	7	8	9
1. VC Years	--								
2. Interviewing Skill	.37	--							
3. Accuracy of HCV	.17	.54[a]*	--						
4. Job Analysis	-.06	-.39	-.16	--					
5. Documentation	.16	.24	.03	.34	--				
6. Past-orient. Interview	.24	.50*	.39*	-.22	.64[a]**	--			
7. Reference Interview	-.12	.40	.33	-.16	.49*	.68[a]**	--		
8. Work Sample	-.05	.28	.34	-.16[a]	.40*	.25	.29	--	
9. Size of VC Fund	.02[a]	.29	-.12[a]	-.20	.41*	.46[a]*	.09	.44*	--

[a]Significant difference exists between early- and later-stage cases, $\underline{p} < .05$.

*$p \leq .05$.
**$p \leq .01$.

Regression Analysis

Statistically controlling for some alternative explanations, we find that the hours allocated to past-oriented interviewing is still related to the accuracy of the human capital valuation, $\beta = .80$, $p < .05$. In addition, the time spent in work sample discussions was also statistically significantly related to the accuracy of human capital valuation, $\beta = .63$,

$p < .01$, though this beta coefficient was smaller than the one for past-oriented interviewing.

One other finding is worth noting. The combined model with all of the methods offers a contribution to explaining the variance in the accuracy of human capital valuation that is over and beyond the contributions of the control variables, $\Delta R^2 = .41$, $p < .05$. Finally, the entire model that predicts the accuracy of human capital valuation accounts for 83% of the variance, $R^2 = .83$, $p < .01$. This suggests that most of the variables that are relevant to the accuracy of a human capital valuation are included in this model. See Table 18 for the results of the hierarchical regression analysis.

Table 18

Hierarchical Regression Analysis of Variables Predicting Accuracy of Human Capital Valuation in Early-stage Cases (N = 18)

Variable	B	SE B	β
Step 1			
VC years of experience	.02	.02	.14
Size of VC fund	-.00	.00	-.57*
Interviewing skill	.26	.20	.23
Step 2			
Job analysis	-.03	.08	-.11
Documentation analysis	-.05	.05	-.41
Past-oriented interviews	.02	.01	.80*
Reference interviews	-.00	.00	-.17
Work sample	.01	.00	.63**

Note: Final βs are presented above. R^2 = .42* for Step 1; ΔR^2 = .41* for Step 2. Final R^2 = .83**.

*$p < .05$.

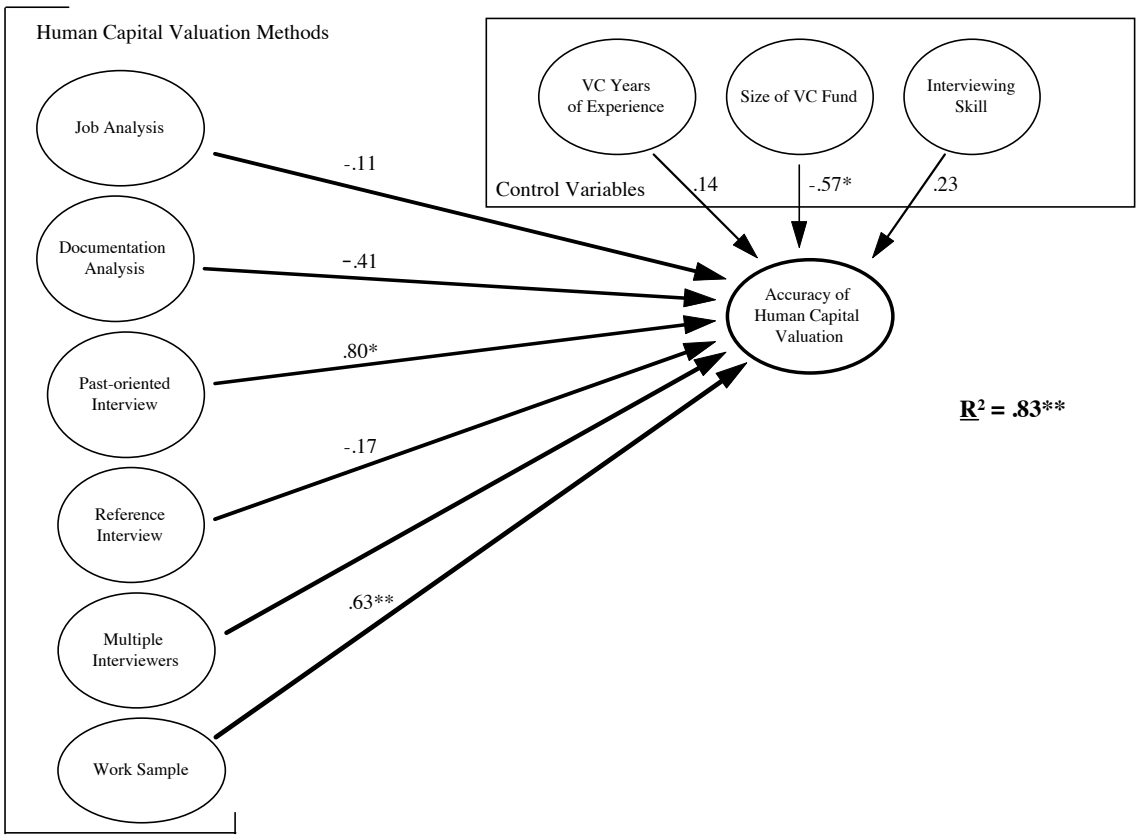
**$p < .01$.

See Figure 5 for a visual summary of the path model representing the results of the hierarchical regression analysis.

Figure 5.

Path Model for Early-stage Cases of Variables Predicting

Accuracy of Human Capital Valuation



Comparison of Time Allocated to Human Capital Valuation for Accurate v. Inaccurate Cases

Analyzing statistics of association is one way to approach the question of how methods are related to accuracy. Another way to explore these relationships is to compare the mean number of hours that were allocated to various methods for cases that were considered accurate human capital valuations v. inaccurate human capital valuations. If a method has an influence on the accuracy of human capital valuation, then we would expect to find different usage rates in accurate vs. inaccurate cases. The accurate and inaccurate human capital valuation groups were determined by a median

split on the values of the accuracy of human capital valuation scale. A median split may not have been appropriate if the median were 1.3 or 3.8 on the 4.0 scale. However, because the median was 2.8, which is right between "more accurate than inaccurate" and "more inaccurate than accurate," it was an appropriate place to split the samples. The top 50%--those with scores above 2.8--were considered "accurate" and the bottom 50%--those with accuracy scores equal to or below 2.8 were considered "inaccurate."

No significant differences were found in time spent on human capital valuation for accurate v. inaccurate cases. The only exception was past-oriented interviewing. Venture capitalists allocated over four times as many hours to past-oriented interviewing in accurate cases, compared to inaccurate cases. The mean number of hours that VCs allocated to past-oriented interviews was $\underline{M}$ = 27 hours for accurate cases and $\underline{M}$ = 6.3 hours for inaccurate cases. This difference had a $t_{24} = 2.54$, $\underline{p} < .05$ (two-tailed). As for the other methods, it is possible that small sample sizes and large standard deviations made the power of this exercise inadequate to conclude that such a relationship does not exist. The total time allocated to human capital valuation was 81 hours in the inaccurate group, compared to 140 hours in the accurate group. See Table 19.

Table 19

Summary Table: Comparison of Time Allocated to Methods for Accurate v. Inaccurate Human Capital Valuations in Early-stage Cases

	Accurate			Inaccurate		
Method	M	SD	n	M	SD	n
Job analysis	1.3	4.3	12	1.6	3.1	11
Documentation analysis	4.9	6.2	14	3.8	4.2	12
Past-oriented interviewing[a]	27.0	27.6	14	6.3	5.7	12
Reference interviewing	33.6	35.0	13	14.8	11.4	12
Psychological testing	0.0	0.0	14	0.1	0.29	12
Formal assessment center	0.0	0.0	14	0.0	0.0	12
Work sample	70.4	65.0	14	44.0	81.1	12
Casual, informal interactions (meals, etc.)	14.3	26.5	13	9.3	22.4	12
Total time allocated to human capital valuation methods	140.2	112.8	13	81.1	118.2	12

Note.

[a] Past-oriented interview time in accurate cases was significantly greater than in inaccurate cases, $p < .05$.

Now, each method of human capital valuation will be examined. Table 20 presents the difference in hours that venture capitalists spent on various activities related

to documentation analysis. The difference in time for accurate and inaccurate cases is not large for any activity in this method.

Table 20

Comparison of Time Allocated to Documentation Analysis for Accurate v. Inaccurate Human Capital Valuations in Early-Stage Cases

	Accurate			Inaccurate		
Activity (hours)	M	SD	n	M	SD	n
Reviewing resumes of sr. mgt.	0.8	1.1	14	1.1	0.9	12
Reviewing resumes of 2nd tier	0.04	0.6	14	0.5	0.8	12
Reviewing resumes of juniors	0.0	0.1	14	0.0	0.0	12
Reviewing credit check of sr. mgt.	0.5	1.4	14	0.2	0.3	12
Verifying written documentation	0.1	0.3	14	0.6	1.0	12
Reviewing articles on key people	1.8	2.5	14	0.6	0.6	12
Performing a legal "name search"	0.3	0.7	14	0.5	1.2	12
Using on-line or other media	1.4	5.4	14	0.3	0.7	12
Total hours allocated to documentation analysis	4.9	6.2	14	3.8	4.2	12

The hours that venture capitalists allocated to past-oriented interviewing was substantially different in accurate v. inaccurate cases. Venture capitalists who achieved accurate human capital valuations allocated over four times more hours to past-oriented interviewing activities on average than venture capitalists who experienced inaccurate human capital valuations. See Table 21.

Table 21

Comparison of Time Allocated to Past-oriented Interviewing for Accurate vs. Inaccurate Human Capital Valuations in Early-stage Cases

	Accurate			Inaccurate		
Activity (hours)	M	SD	n	M	SD	n
CEO	14.1	20.7	14	3.8	2.6	12
Other members of senior management	7.3	7.3	14	3.8	4.0	12
2nd tier officers	5.1	11.6	14	0.9	1.8	12
Employees	0.1	0.5	14	0.3	0.6	12
Total hours allocated to past-oriented interviewing	27.0	27.6	14	6.3	5.7	12

Venture capitalists who experienced accurate human capital valuations spent twice as much time performing activities related to reference interviewing than venture capitalists who achieved inaccurate human capital valuations. For 10 out of 11 sources of references, "accurate" VCs spent more time talking to people than "inaccurate" VCs, though these differences were not statistically significant. See Table 22.

Table 22

Comparison of Time Allocated to Reference Interviewing for Accurate vs. Inaccurate Human Capital Valuations in Early-stage Cases

	Accurate			Inaccurate		
Activity (hours)	M	SD	n	M	SD	n
Sr. mgt.'s personal references	4.3	4.3	13	2.4	4.2	12
Past supervisors and coworkers	8.3	5.2	13	5.1	3.1	12
Industry players	3.1	3.9	13	2.7	3.4	12
Current employees	0.6	1.1	13	0.8	1.0	12
Suppliers	1.9	3.0	13	0.2	0.6	12
Customers	2.0	4.0	13	0.9	1.0	12
Lawyers	1.4	3.4	13	0.4	0.8	12
Accountants	1.0	1.7	13	0.0	0.0	12
Bankers	0.9	0.9	13	0.2	0.4	12
Other investors	8.7	27.5	13	2.3	2.7	12
Other sources	1.5	2.9	13	0.0	0.1	12
Total hours allocated to reference interviewing	33.6	35.0	13	14.8	11.4	12

Venture capitalists who achieved accurate human capital valuations allocated more time to work sample activities than venture capitalists who experienced inaccurate human capital valuations. See Table 23.

Table 23

Comparison of Time Allocated to Work Samples for Accurate v. Inaccurate Human Capital Valuations in Early-stage Cases

	Accurate			Inaccurate		
Activity (hours)	M	SD	n	M	SD	n
Discussions about financial issues	22.0	27.7	14	12.6	23.8	12
Discussions about product and market issues	39.2	45.6	14	24.0	44.4	12
Discussions about other issues	2.9	6.1	14	7.4	14.9	12
Total time allocated to work sample discussions	70.4	65.0	14	44.0	81.1	12

Hypothesis Tests: What Relationships Exist between the Methods Used and the Resulting Accuracy of Human Capital Valuation in Later-stage Cases

The hypothesized relationships between methods and accuracy were not the same for later-stage cases and early-stage cases. Overall, the direction of the relationships was similar. However, the strength of the relationships was weaker or more negative for later-stage cases. The most striking difference between early- and later-stage cases was the role of work sample. In early stage cases, the number of hours that venture capitalists spent in work sample discussions was positively related to the accuracy of the human capital valuation. In later-stage cases, the relationship between work sample and accuracy was significantly negative. I expected past-oriented

interviewing to be a stronger predictor of accuracy than work sample, but did not expect work samples to have a statistically significant *negative* beta in the hierarchical regression analysis. Possible explanations for this finding are described in the section at the end of this chapter.

Table 24

Results of Hypothesis Tests in Later-stage Cases

Hypothesis	Pearson Product Moment Correlational Analysis	Hierarchical Regression Analysis
1. There will be a positive relationship between the hours spent performing a job analysis and the accuracy of human capital valuation.	Not supported. Statistically-nonsignificant negative correlation.	Not supported. Statistically-nonsignificant positive beta.
2. There will be a positive relationship between the hours spent performing a documentation analysis and the accuracy of human capital valuation.	Not supported. Statistically-nonsignificant negative correlation.	Not supported. Statistically-nonsignificant positive beta.
3a. There will be a positive relationship between the hours spent performing a past-oriented interview and the accuracy of human capital valuation.	Some support, but not statistically significant.	Some support, but not statistically significant.
3b. The relationship between the time spent in past-oriented interviews and the accuracy of human capital valuation will be greater than the strength of the relationship between the time spent in work samples and accuracy of human capital valuation.	Some support, but not statistically significant.	Some support, but not statistically significant.

4. There will be a positive relationship between the time spent conducting reference interviews and the accuracy of human capital valuation.	Not supported. Statistically-nonsignificant negative correlation.	Not supported. Statistically-nonsignificant negative beta.

	Pearson Product Moment Correlational Analysis	Hierarchical Regression Analysis
5. There will be a positive relationship between the use of multiple interviewers and the accuracy of human capital valuation.	Not applicable. Nearly all VCs used multiple interviewers.	--
6. There will be a positive relationship between the time spent conducting work samples and the accuracy of human capital valuation.	Not supported. Statistically-nonsignificant negative correlation..	Not supported. Statistically-significant negative beta.
7. The following group of methods will predict the accuracy of human capital valuation: job analysis, documentation analysis, past-oriented interviews, reference interviews, and work samples.	--	Some support, but not statistically significant.

Correlational Analysis

The Pearson product moment correlations between the accuracy of human capital valuations and methods were small and negative except for the past-oriented interview,

r = .18, ns. None of the hypotheses was supported via correlational analysis. See Table 25 for a correlations matrix.

Table 25

Correlations Matrix of Variables in Later-Stage Cases (N = 28).

Variable	1	2	3	4	5	6	7	8	9
1. VC Years	--								
2. Interviewing Skill	.02	--							
3. Accuracy of HCV	.19	.19[a]	--						
4. Job Analysis	-.03	-.06	-.18	--					
5. Documentation	.08	.02	-.11	.60**	--				
6. Past-orient. Interview	-.14	.36	.18	-.01	.12[a]	--			
7. Reference Interview	.04	.04	-.10	-.09	.48*	.39[a]*	--		
8. Work Sample	.18	. 06	-.09	.41[a]*	.33	.40*	.12	--	
9. Size of VC Fund	.49[a]*	.00	.30[a]	-.08	-.01	-.07[a]	-.18	.49*	. --

[a]significant difference exists between early and later stage cases, $p < .05$.

*$p \leq .05$. **$p \leq .01$.

Regression Analysis

Next, the hierarchical regression analysis is presented. After statistically controlling for three variables, the sign on the documentation analysis beta coefficient flipped from negative to positive. Other than that, the only other finding that is surprising is that the work sample beta coefficient is so large, negative, and statistically significant. This finding suggests that the more time that venture capitalists allocated to work samples, the less accurate their assessment was of the human capital. This counter-intuitive finding is discussed later in this chapter. See Table 26 for the hierarchical regression analysis.

Table 26

Hierarchical Regression Analysis of Variables Predicting Accuracy of Human Capital Valuation in Later-stage Cases (N = 19)

Variable	B	SE B	β
Step 1			
VC years of experience	.02	.03	.13
Size of VC fund	-.00	.00	-.20
Interviewing skill	.53	.49	.26
Step 2			
Job analysis	.00	.01	.01
Documentation analysis	.12	.11	.52
Past-oriented interviews	.03	.03	.31
Reference interviews	-.00	.01	-.09
Work sample	-.02	.01	-1.06*

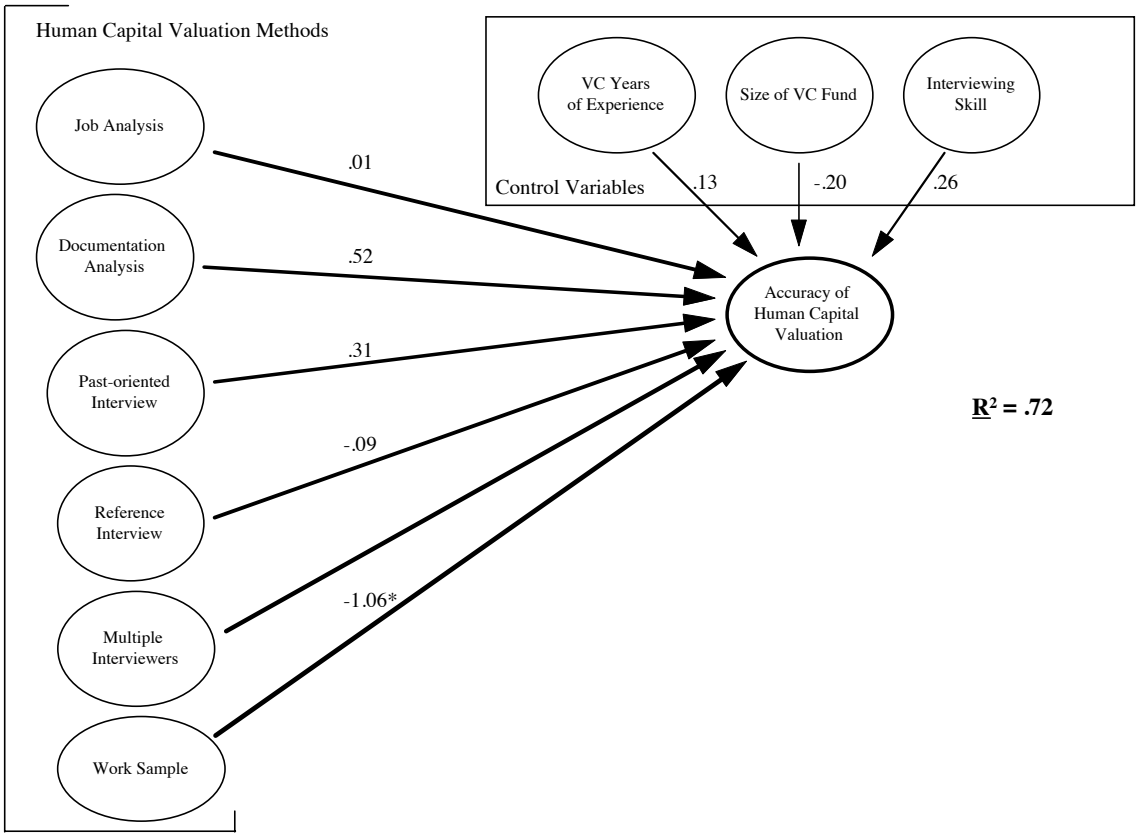
Note: Final β s are presented above. R^2 = .08. for Step 1; ΔR^2 = .64 for Step 2. Final R^2 = .72.

*$p < .05$.

See Figure 6 for a visual summary of the path model representing the results of the hierarchical regression analysis. The dependent variable is the accuracy of human capital valuation. The control variables are the VC years of experience, size of VC fund, and interviewer skill. The independent variables are the six categories of human capital valuation methods.

Figure 6.

Path Model for Later-stage Cases of Variables Predicting Accuracy of Human Capital Valuation



Re-Analysis Using Objective Dependent Measure

One concern in this study was the construct validity of the dependent measure, the accuracy of human capital valuation. To reduce the chance that respondent bias would be present, several precautions were taken including 1) using a 6-item scale which had a Cronbach's alpha = .82, 2) pilot-testing questions about the measure which supported face validity, and 3) using a second rater to provide a test of inter-rater reliability for a third of the cases. Despite these efforts, some degree of respondent bias is probably present. A bias-free dependent measure would be preferable.

It is possible to remove respondent bias from the measure of accuracy of human capital valuation. This is done by using the two objective variables in the scale and ignoring the other 4 items: 1) whether the CEO was removed after the close of the deal, and 2) whether any other member of senior management was removed. Such removals of managers are objectively verifiable. The notion is that a removal (termination) of a manager may indicate that an inaccurate human capital valuation took place. Venture capitalists who invest in companies and then have to remove managers are assumed to have made a mistake about the value of the existing human capital.

Re-analyzing all of the correlation and regression equations against this objective 2-item measure of accuracy does not yield many surprises. A re-analysis of the data show no new findings for the later-stage sample. There were several decreases in effect size in the early-stage sample. The correlation between accuracy and past-oriented interviewing drops from $\underline{r} = .39, \underline{p} < .05$ to $\underline{r} = .23, \underline{ns}$. The corresponding beta coefficient in the regression analysis actually increases to $\underline{\beta} = .93$, but is nonsignificant because of increased standard error variance. The beta coefficient for work sample decreases from $\underline{\beta} = .63, \underline{p} < .01$ to $\underline{\beta} = .28, \underline{ns}$. Likewise, the $\underline{R}^2$ change and Final $\underline{R}^2$

drop just below the conventional significance threshold as well. To summarize, the past-oriented interview and work sample methods were significantly positively related to accuracy in the 6-item scale for accuracy. These methods fall below conventional levels of significance in the 2-item scale for accuracy in early-stage cases. No changes were experienced between the two measures of accuracy for the later-stage sample.

Though the 2-item measure of accuracy is objective, it does not necessarily mean it offers better construct validity than the 6-item measure. It could be objectively measuring the wrong construct! It is possible that in several cases, removal of managers did *not* indicate that an inaccurate human capital valuation took place. It is possible that a venture capitalist knew that he or she would remove managers prior to the close of the deal. In fact, VC#10 explicitly said that she knew that at least one of the senior managers would have to be removed. This provides an illustrative example of how an accurate human capital valuation was paired with the removal of a manager, and emphasizes the limitations of the 2-item objective measure. To conclude, despite the allure of an objective measure, it seems more sensible to use what appears to be the more construct-valid, though imperfect, 6-item scale to measure the accuracy of human capital valuation.

Discussion of Quantitative Findings

Several points are worth summarizing and discussing. For the first time, we now have an glimpse of how much time venture capitalists allocate to various methods and activities during human capital valuation. It appears that venture capitalists think

that the human capital is an important enough factor that they allocate a substantial amount of time to its assessment. The mean amount of time that venture capitalists allocated to all methods of human capital valuation was 120 hours. The method that venture capitalists favored the most was the work sample, to which they allocated 64 hours on average. None used an assessment center, and very few venture capitalists used psychological testing. Only 21.4% conducted a written job analysis. These results suggest that venture capitalists prefer to spend time in face-to-face discussions about business-related topics (work samples) rather than allocating time to job analyses, reading about the management team members (documentation analyses), intense discussions about career experiences (past-oriented interviews), or talking with other people (reference interviews).

We might have found that venture capitalists all tend to use a similar approach to human capital valuation. However, the data suggest that the opposite is true--there are vast differences in the way in which venture capitalists conduct human capital valuations. First, the standard deviation and wide range in the hours spent on each method were both high. For example, the highest number of hours a venture capitalist spent on work sample discussions was 290 hours, compared to the low of 4 hours. Past-oriented interviewing ranged from 0.0 hours to 100 hours. This wide range suggests that different venture capitalists have different approaches to the process of human capital valuation. Another indicator that venture capitalists used dramatically different methods was the high correlation among the use of methods. It seems that venture capitalists do not use one method to substitute for another method. It is <u>not</u> an "either-or" sort of choice. Rather, it appears that VCs make more of an "all or nothing" choice

in selecting methods to assess management. For example, those who allocated time to past-oriented interviewing also tended to allocate time to reference interviewing. Those who did not spend much time on past-oriented interviewing did not spend much time on reference interviewing.

There is some empirical support that suggests that positive relationships may exist between certain methods and the accuracy of human capital valuations. For example, the method of past-oriented interviewing was positively related to accuracy in both early-stage and later-stage cases. The more hours of past-oriented interviewing, the more accurate the human capital valuation. This finding supports the empirical results of previous studies in the literature which were performed with samples of entry-level people and lower-level managers. However, the strength of this relationship, as well as other relationships, is stronger and more positive in early-stage cases compared to later-stage cases. Possible reasons for this "stage effect" moderator are explored in subsequent paragraphs.

As hypothesized, the past-oriented interview appears to be more closely associated with the accuracy of human capital valuation than the work sample method. This finding was most strong in the hierarchical regression equations that controlled for the effects of other variables. Work samples provide the interviewee with the opportunity to "audition" in front of the interviewer. Work samples can be thought of measuring "best behavior." This method relies on the assumption that a person's "best behavior" is predictive of how they will actually perform on the job. However, findings of this study suggest that "past behavior" is a better predictor of future behavior than "best behavior."

Work samples were expected to be weaker predictors of accuracy than past-oriented interviewing. However, what is surprising is that work samples--though positively related to accuracy in early-stage cases--were so negatively associated with accuracy in later-stage cases. In early-stage cases, work sample's beta coefficient was $\beta = .63$, $p < .01$ whereas it was $\beta = -1.06$, $p < .05$ in later-stage cases. This finding is counter-intuitive. It suggests that spending more time in work samples is associated with less accurate human capital valuations. Discussion of this "stage effect" is presented in the following section.

Stage Effect

This section explores possible explanations for the stage effect. The stage effect was the unexpected finding that the stage of a venture moderates the relationship between the time the venture capitalists allocate to various methods and the accuracy of their human capital valuation. The methods-accuracy relationships for past-oriented interviews and work samples were weaker or more negative in the later-stage cases than in early-stage cases.

Since the author was relatively new to the field of venture capital, he was unable to generate many explanations for the stage effect. Since this topic has never been researched, no studies exist that could provide additional insights or explanation. Therefore, a brief follow-up study was conducted with a small sample of venture capitalists to attempt to generate explanations for the stage effect finding. Sixteen venture capitalists were contacted to discuss this unexpected finding. Seven were

unreachable, but venture capitalists from nine different venture capital firms participated in the follow-up interviews about the stage effect. Two main patterns emerged from the interviews, which are discussed below.

1. The "Baseline" Explanation

The baseline explanation says that the stage effect can be explained by the reality that venture capitalists begin the due diligence process with a higher baseline of data on the human capital in later stage v. early stage cases. Therefore, each additional unit of time carries far less impact on the accuracy of the human capital valuation in later-stage cases. Later-stage companies are, by definition, more mature companies with longer track records of performance. Several of the venture capitalists indicated that the *baseline* of information that the venture capitalist has is higher in later-stage cases. In contrast, early-stage companies do not have histories or track records. These VCs are more blind to the value of the human capital than in later-stage deals. VCs referred to early-stage ventures as having a "blank slate." In the absence of information, any additional unit of information carries a lot of weight . The more you know, the less valuable a new unit of information is. VC#25, an economist, called this phenomenon "diminishing marginal utility." This simply means that each additional unit of input produces a smaller and smaller unit of output. Each additional unit of input (time) produces a smaller and smaller unit of output (accuracy). This would explain why an hour seems to "count more" in predicting accuracy in early-stage v. later-stage cases.

Typically, when venture capitalists talk about "track records," they are referring to past financial performance of the company. VC#56 said that one can infer from

looking at the financial statements whether the management team is competent or incompetent. A track record of strong earnings and sales growth indicates a stronger management team than a record of losses and stagnating sales growth. Financial statements are available for later-stage companies but often not for early-stage companies. VC#50 said, "With later-stage deals, the conventional wisdom about the management team is already there for you; but with early-stage deals, you are collecting primary data on your own."

VC#23 said,

> In early-stage cases, management has no track record. Anything you learn from them is new information. But in later-stage cases, management already has a track record. Spending more time is not apt to give you more insights.

The baseline explanation offers one plausible reason to explain why the methods-accuracy relationships are stronger in early-stage cases compared to later-stage cases. An alternative explanation has less to do with the baseline of data. It addresses the possibility that the methods actually look different--or are applied differently--in early- v. later-stage cases.

2. The "Methods Look Different" Explanation

It is possible that venture capitalists apply the same methods *differently* in early-stage and later-stage cases. For example, a reference interview or past-oriented interview for an early-stage deal may cover different topics than a reference interview for a later-stage deal. There appears to be early evidence that venture capitalists focus more on "the individual" during early-stage cases. These questions cover such topics as the character and integrity of the founder, and his or her emotional stability. In contrast,

questions during later-stage deals tend to focus more on "the business." Such questions would include topics like industry information, competitor information, customers, etc. VC#54 and VC#56 said that they focus much more heavily on individual-level questions for early-stage cases and business-level questions for later-stage cases. Venture capitalists often cannot talk about the business in early-stage cases, since the business may not exist yet. So, they spend time focusing on the individual entrepreneur or managers. VC#54 said, "You need to dig into the character stuff more in early-stage cases." VC#56 put it colorfully when he said,

> In an early-stage deal, if the entrepreneur goes bonkers, I am screwed. Therefore, I had better get into the person's *mind* to figure out what makes the person tick.

Perhaps the more individual-focused questions yield insights that are more predictive of the accuracy of human capital than the company-level questions. This would explain if the relationships between methods and accuracy are stronger and more positive in early-stage cases. Further study is needed to focus on the application of various methods across stages to generate and test additional explanations for the stage effect.

<u>The "Flip-flop" of the Work Sample Method</u>

One method's association with the accuracy of human capital valuation changed sign from early- to later-stage cases. The work sample method was positively related to accuracy in early-stage cases and significantly negatively related to accuracy in later-stage cases. This finding is counter-intuitive at first glance. Having more data (in the form of work samples) leads a venture capitalist to experience less accurate human

capital valuations? Two explanations are possible: 1) spurious correlation, or 2) work samples are inherently misleading in later-stage cases.

The spurious correlation explanation is fairly straightforward. It is possible that venture capitalists allocate more work sample time when they examine "troubled companies" compared to healthy companies. They would do this to assuage their concerns about the company prior to buying. VC#54 said that he spends more time evaluating a management team "when I smell something that does not fit." Venture capitalists tend to overestimate the value of the human capital, as shown earlier in this chapter. Therefore, it is conceivable that higher levels of work sample do not *cause* inaccurate human capital valuations. Rather, it is possible that "troubled companies" are associated with inaccurate human capital valuations, which are associated with higher hours of work samples. A metaphor would be that individual instruction by teachers in an elementary school classroom is associated with poor grades. Of course, individual instruction may not cause poor grades. But students who are struggling might require more individual instruction. Therefore, there might be a spurious negative correlation between the hours a teacher devotes to a student's needs, and his or her grades.

An alternative explanation for the work sample "flip-flop" effect is the degree to which data are misleading in later-stage cases. Misleading data could explain why more hours of work sample could be negatively related to accuracy of human capital valuation in later-stage cases. What might make work sample data misleading in later-stage cases? In early-stage cases, there is often no company. The entrepreneur and venture capitalist often sit figuratively on the same side of the table and work

collaboratively to figure out how to design and build a company. This collaboration during due diligence may provide revealing insights about the human capital that make work samples positively related to accuracy in early-stage cases.

However, in later-stage cases, a company has already been established. Work samples may be more formal, rigid, and superficial. During work samples in later-stage cases, senior managers sit on the figurative opposite side of the table from the venture capitalist. Work sample discussions include formal presentations that have been rehearsed and practiced. VC#62, a later-stage case, illustrated this point. He spent over 100 hours in work samples (which is high) and was very inaccurate in his assessment of the management. He suggested that the work sample discussions were very misleading. An investment banking firm was hired by the target company managers to represent them. The investment bankers had coached the target managers to look more competent and professional than they really were. Therefore, every hour that VC#62 spent watching their impressive presentations further and further misled him and influenced him to make an inaccurate human capital valuation.

This chapter provides a first look at what methods venture capitalists use to conduct human capital valuations. It also provides early insights into the nature of relationships between various methods and the accuracy of human capital valuation. What is missing is insight into why venture capitalists use different methods. The next chapter provides a step beyond the numbers to explore the reasons why venture capitalists use certain methods to conduct human capital valuations.

Chapter Summary

There is a wide range in approaches to human capital valuation. This is seen in the high standard deviations in the hours allocated to various methods. The method of human capital valuation used most by venture capitalists is the work sample. Paradoxically, this method is significantly negatively related to the accuracy of human capital valuation in later-stage cases. The method that is most consistently related to the accuracy of human capital valuation is past-oriented interviewing. The conceptual model of variables predicting the accuracy of human capital valuation in this study demonstrated an $\underline{R}^2 = .83$, $\underline{p} < .01$ for early-stage cases, and $\underline{R}^2 = .72$ for later-stage cases. This suggests that the proposed model in this study captures the lion's share of the important factors that are related to the accuracy of a venture capitalist's human capital valuation.

CHAPTER V

QUALITATIVE RESULTS AND INTERPRETATION

The purpose of this chapter is to present qualitative analyses that address the third research question in this study, "Why do venture capitalists use certain methods to conduct human capital valuations?" As presented on the preceding pages, it is clear that different venture capitalists use different methods to conduct human capital valuations. This was shown in the high standard deviations in time allocated to each method of human capital valuation. This chapter presents an exploration of various factors which may influence how venture capitalists conduct human capital valuations.

Since prior assessment research had not been conducted on this population, and due to the primary investigator's lack of experience in the field, it was not sensible to offer *a priori* hypotheses about different approaches to human capital valuation. Instead, the following *post hoc* observations emerged from the data. This inductive reasoning represents a first step to categorizing different approaches to human capital valuation into typologies.

Typologies of Human Capital Valuation

After many iterations of content analysis, four key factors emerged as the points of distinction among cases. The factors are: 1) the assumption of whether it is possible or impossible to achieve an accurate human capital valuation, 2) quantity of data collected,

3) balanced use of multiple methods, and 4) degree of systematic data analysis. The qualitative data were analyzed in the following manner. Respondent quotations were analyzed for evidence of a belief that accuracy was possible or was not possible. The quantity of data collected was measured by the total number of hours spent on human capital valuation. The balanced use of multiple methods was indicated by the extent to which respondents used multiple methods of human capital valuation, rather than concentrating on just one or two methods. Finally, the degree of systematic data analysis was measured by the presence of point-by-point ratings of the human capital (following a job analysis), as well as the use of written documentation (usually in the form of 3-ring binders). Several different approaches to human capital valuation were identified and were given names. These typologies reflect differences in the assumptions and beliefs of venture capitalists that are manifested into behavior. The behavior in this case, is selecting which methods to use and how much time to allocate to them. The seven typologies that emerged from the data were: airline captain, art critic, sponge, infiltrator, prosecutor, suitor, and terminator. Before discussing each typology in detail, Table 27 provides an overview of the primary factors that differentiate the approaches to human capital valuation.

Table 27

Typologies of VC Approaches to Human Capital Valuation

	Belief that Accuracy is Possible	Quantity of Data Collected	Balanced use of Multiple Methods	Degree of Systematic Data Analysis
1. Airline Captain	Yes	Medium	High	High
2. Art Critic	Yes	Low	Low	Low

3. Sponge	Yes	Medium	Medium	Medium
4. Infiltrator	Yes	High	Medium	Medium
5. Prosecutor	Yes	Medium	Low	Medium
6. Suitor	NA[1]	Low	Low	Low
7. Terminator	No	Low	Low	Low

[1]The suitor does not intend to achieve an accurate human capital valuation; he or she intends to "woo" management.

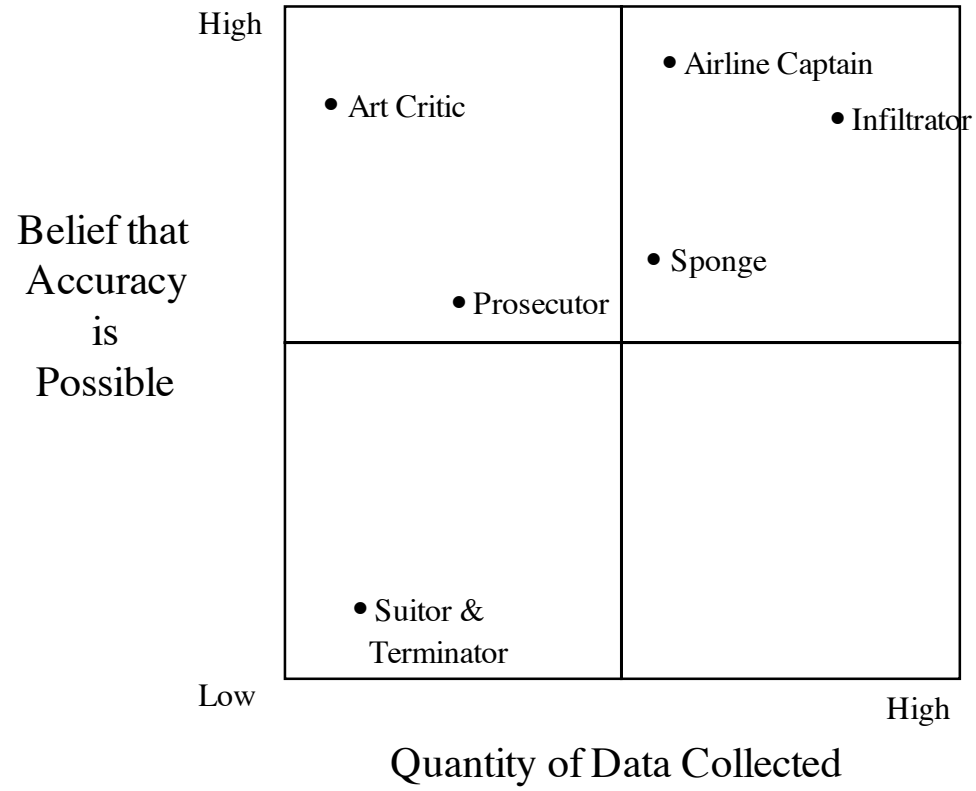
Beliefs about the Feasibility of Achieving Accurate Human Capital Valuations and Quantity of Data Collected

Is it possible to conduct an accurate human capital valuation? Most typologies believe that it is possible to achieve an accurate human capital valuation. The exception is the terminator, who does not believe that accurate human capital valuations are possible. The typologies ranged in their orientation towards the quantity of data they collect on human capital. The time allocated to human capital valuation was used to measure this dimension. The infiltrator allocates the most time to human capital valuation because he or she nearly lives at the target venture site for months at a time in the hopes of becoming an adjunct member of the target management team. Airline captains and sponges allocate a large amount of time to human capital valuation. The rest of the typologies do not allocate as much time: prosecutors (because they think that a few Q&A sessions is all that is needed), art critics (because they think that they can "size up" people almost immediately), suitors (because they do not want to spend time harassing management, just wooing them), and terminators (because they think that it is impossible to conduct accurate human capital valuations, so why spend any time trying?). See Figure 7.

Figure 7.

Beliefs about Human Capital Valuation and

Quantity of Data Collected



Balanced Use of Methods and Degree of Systematic Data Analysis

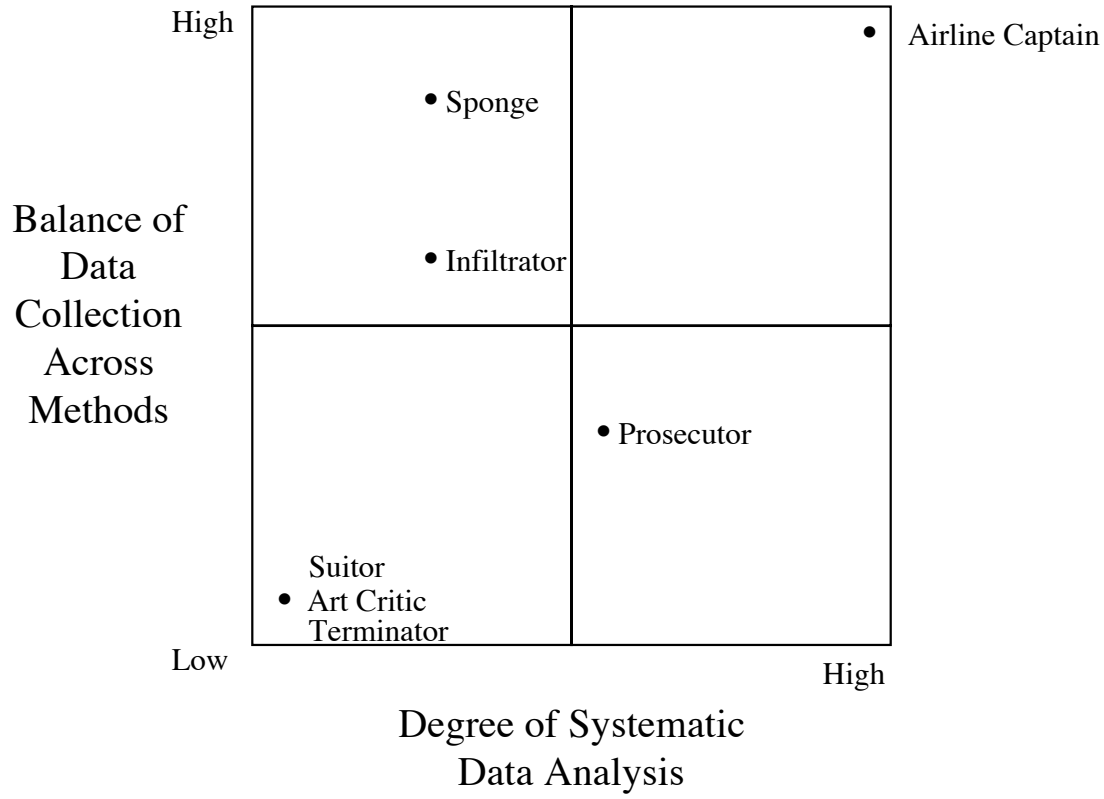
The typologies differed along two other dimensions. Some venture capitalists preferred to spread their time across many different methods. Airline captains used a very "balanced" approach to data collection. Most of the other typologies relied heavily on one or two methods only. Again, airline captains used the most systematic approach

to analyzing data, whereas the others ranged from medium to low in their degree of systematic data analysis. See Figure 8.

Figure 8.

Balanced Use of Methods for Data Collection and

Degree of Systematic Data Analysis



The following sections provide illustrative cases and a discussion of each typology. All 86 cases were reviewed. The cases that best fit the characterization of each typology were selected.

Airline Captain: VC#11

Airline captains are venture capitalists who demonstrate a systematic and disciplined approach to human capital valuation--the way an airline captain assesses a

plane's safety prior to takeoff. The core assumptions that airline captains make about human capital valuation are that 1) it is possible to assess human capital accurately, 2) in order to achieve an accurate assessment, it is important to be systematic and rigorous in data collection as well as analysis, and 3) they rely more on data than on intuition. The discipline of a checklist increases the chances that important dimensions are not overlooked in the data collection and analysis steps of due diligence. Then they collect data on human capital through documentation analysis, past-oriented interviews, reference checking discussions, and work samples. They tend to allocate an above-average amount of time to these multiple methods. Finally, their documentation allows them to make systematic assessments and judgments.

VC#11 was an airline captain in the case we discussed. This venture capitalist made a $10 million investment in a later-stage manufacturing company. At the beginning of the five-month due diligence process, he spent two hours creating a written job analysis based on an early examination of the written business plan. He then allocated a lot of time across the major methods: past-oriented interviews, reference interviews, and work samples. In total, he spent 214 hours conducting his human capital valuation, which was higher than the mean of 120 hours. He said that during the interactions with the management team members, he constantly goes back to the job analysis checklist and modifies his ratings of the management as new data become available. His accuracy rating was a perfect 4.0/4.0 on the deal we discussed. The investment performance on the deal exceeded expectations.

When asked why other VCs do not conduct as rigorous a human capital valuation as he does, VC#11 offered three hypotheses: 1) Venture capitalists think that

they have a 6th sense that allows them to accurately assess someone after a short visit and very little data (which describes the art critic typology), 2) They rely too much on one or two positive reference interviews (halo effect), and 3) They think that they can simply remove the management if they do not perform well (which describes the terminator typology).

VC#32 articulated the airline captain's approach to the job analysis. He said, "We try to list and rank the skills-sets that will be required to accomplish the plan." Often, this VC and his partners at the firm use the job analysis as a centerpiece for discussion. They point to specific dimensions on the analysis and have a debate about how high to rate the managers. VC#13 performed a written job analysis to identify "what our expectations were for good characteristics." This job analysis took 10 hours to complete. This sort of disciplined, focused communication is possible if a written job analysis is conducted.

VC#84 also demonstrated an airline captain approach to human capital valuation. He said that the only way to create what he called a "composite image" of the human capital is to take a very rigorous approach to data collection. Whereas most VCs only talk with references from perhaps two or three sources, this VC spent a full 21 hours talking with references from the highest number of separate reference categories (11 in all): personal references, past supervisors, industry players, suppliers, customers, lawyers, accountants, bankers, other investors, former directors, and investment analysts. The accuracy rating on this deal was also a perfect 4.0/4.0.

VC#42, also an airline captain, likes to document her human capital valuation. She, like many other airline pilots, assembled the data on the human capital in a formal

binder. The report was full of the job analysis, notes from the past-oriented interviews, reference interviews, and work sample discussions. The report also "helps us evaluate later where we went wrong," she said. The formal binder allows this VC an additional feedback loop to help her continue to learn from successes and failures and improve her human capital valuation process.

Airline captains value data, specificity, and checklists. More than other typologies, airline captains favor the scientific approach called *critical multiplism*. This term describes an approach to research that favors critical inquiry to passive acceptance of assumptions. It also advocates the use of multiple methods rather than a single source of data.

Art Critic: VC#53

The art critic's assumptions about the process of human capital valuation are completely different from those of the airline captain. The art critic believes that he or she can approach human capital valuation the way an art critic judges a painting--quickly, and intuitively. Art critics do not make checklists of any kind, so they do not perform a job analysis. They do not spend a lot of hours gathering data. They rely on a small quantity of data. They feel that they can usually "size someone up" in a few minutes or hours. Therefore, to spend more time would be a waste of time. While the airline captain collects and analyzes data in a systematic and thorough way, the art critic is far more informal and cursory in his or her approach. Art critics were identified by their belief that an accurate human capital valuation is possible, a low quantity of data (measured by total hours of human capital valuation), the use of few methods, the absence of a job analysis, and quotations during their interviews that indicate that their data analysis was done intuitively rather than using a systematic approach.

VC#53 was an art critic. The case we discussed was a $3 million investment in a later-stage mail-order company. This VC said that he thought that the key to accurate human capital valuations is using his "*gut feel* based on experience." In other words, this VC suggested that his venture capital experience would allow him to form an accurate gut feel about the senior managers. He spent very little time on human capital valuation. He did not perform a written job analysis or spend much time on the major methods of human capital valuation. In total, he spent 38 hours on human capital valuation. In this case, this VC's gut feel was wrong. His accuracy rating was 2.2 / 4.0,

which is below the mean. He said that he was "very surprised" by the behaviors of the senior managers after the close of the deal. During due diligence, he rated the human capital a 7 out of 10. Several months after the close of the deal, he said he rated them a 3 out of 10. The VC said that the CEO was good at marketing, as expected. However, the CEO proved to be far weaker at general management and operations than what was assessed. An example of this problem is that the CEO let inventory get too low. Low inventory led to a high number of backorders. This led to higher shipping costs, because the catalog company had to ship customers various components of their orders separately. Customers were not pleased with the delay in receiving their complete orders.

There were several art critics in this study. In order to further illustrate the assumptions and behaviors of art critics, fragments of additional cases will be presented. VC#18 indicated that he was an art critic when he described his approach as "more art than science." What also interesting is that this VC said, "You always know more a year and a half later" about the human capital. At least three other art critics said the same thing. However, no airline captains suggested that they learned a lot more about the management a year after the close of the deal.

The "fast pace of deals" was cited by one VC as the reason she was an art critic. VC#41 said that at her firm, "We are all art critics." When asked why that was the case, she replied that in her geographical region (Silicon Valley, CA), "Most deals these days are move it or lose it." She meant that if an investment decision is not reached quickly, the senior managers at the target company will find another VC to invest in them. "Besides," VC#41 said, "my gut is more valuable than data." The accuracy rating for

her case was a 3.0 / 4.0, which was 2/10ths above the mean. One of the key human capital deficiencies that the VC said she failed to assess was the VP of Marketing's highly confrontational management style. Apparently, this combative person disguised his explosive temper during the brief interactions with the venture capitalist.

A different kind of art critic, VC#81 prefers to run the companies he buys himself. Therefore, an accurate valuation of the human capital is not as important--because he will not rely on the existing managers to lead the company. He described his approach to human capital valuation as "shooting from the hip." He says he makes his judgment relatively quickly--often after only one hour of interaction with a person. Many venture capitalists wish to remain in "the passenger's seat" and let the management team be in the "driver's seat." That is, many VCs prefers to serve as an investor and advisor but not a manager. In contrast, VC#81, who has run successful companies himself in the past, likes to "pitch in and help run the business," he said. Therefore, he is less dependent on the human capital he is acquiring since he has confidence in his *own* human capital.

Two other reasons account for his not having to spend a lot of time on human capital valuation. First, he invests in very early-stage deals which often need to add managers. Therefore, he has his search firms find the best candidates possible to augment the talent of the management team once he buys the company and does not worry too much about the strength of the one or two existing managers. Second, his company is a very highly-visible venture capital firm that has a very strong network of contacts. This means in relatively little time, he can call on someone he knows to give him a candid assessment of a senior manager of a target company. As he said, "I know

everybody in the industry." This may allow him to get valuable reference interview information more quickly than a venture capitalist who does not have a strong network in an industry at his or her disposal. To summarize, this art critic spends little time on human capital valuation because: 1) he thinks he can assess people quickly, 2) he does not rely on the original management team to build the company--he relies on himself or hires additional managers (so why bother assessing the existing team?) and 3) his company's enormous network allows him to be able to make surgically-placed reference interview calls to people he trusts to gain valuable insights into people in a short period of time.

Sponge: VC#62

The sponge's assumptions about human capital valuation are very similar to those of the art critic. Both groups assume that an accurate human capital valuation is possible. Both approach data analysis in an intuitive way. They feel that humans can be best assessed using gut feel rather than systems and checklists. However, the art critic and sponge disagree on their approaches to data collection. Art critics do not collect much data. Sponges gather a high quantity of data. They "soak it up" like a sponge in a non-systematic way and then analyze it in a non-systematic way. Additionally, sponges are identified by their moderate distribution of time across multiple methods, failure to perform a job analysis, and intuitive data analysis.

VC#62 articulately described the sponge approach to human capital valuation when he said he did "due diligence by mucking around." This reflects the sponge's

need for data, but lack of interest in systematic data collection or data analysis. VC#62 did not perform a job analysis. In total, he allocated 207 hours to human capital valuation, which is greater than the mean of 120 hours. The accuracy rating for this deal was a low 1.7 / 4.0. The VC said that he missed many important human capital dimensions. It seems that the CEO was much better than expected at marketing, and much worse than expected at managing operations and finance. Also, VC#62 said that the CEO's ego was unbearable. It was very difficult to work with the CEO. This case supports the idea that a high quantity of data may not produce an accurate human capital valuation if it is unsystematically collected and analyzed.

Infiltrator: VC#50

The infiltrator approach is based on the idea that working with someone for an extended period of time is the best way to assess him or her. Infiltrators are less disciplined and systematic than airline captains. However, they are less willing to rely on first impressions than art critics. The goal of infiltrators is to become a quasi part of the management team. Infiltrators become "one of them" in order assess the human capital. In psychology, this is called a "participant observation" research methodology. The way that this approach looks in practice is for the venture capitalist to allocate a high number of hours to work samples in which the VC exudes the attitude "Hey, let's develop the plans for this business together." It is a collaborative style of performing due diligence, as opposed to the more combative prosecutor typology which is discussed next. Infiltrators are identified by their belief that an accurate human capital

valuation is possible, very high quantity of data (from months of constant interaction with the management team), modest balance across multiple methods, failure to perform a job analysis, and moderately systematic data analysis which is based partially on "gut feel" and partially on data.

VC#50 coined the term "infiltrator" when describing his approach to human capital valuation. The deal we discussed was a $5 million investment in a telecommunications software company. He said, "I was an infiltrator because I became a quasi member of their team." This VC is very committed to conducting accurate human capital valuations. He said, "I think that evaluating people is the most important factor of all." Like other infiltrators, VC#50 did not conduct a written job analysis. However, he allocated an extremely high number of hours to work samples--275 hours. The due diligence period was 11 months. His total time allocation to human capital valuation was 406 hours. This VC and the target company managers traveled through Asia together visiting customers and living out of a suitcase for weeks. He said that this total immersion, seeing the managers in so many different life situations, helped him achieve an accurate human capital valuation. He appreciated the time he spent talking casually with the managers "over a beer" during this long infiltration period. His accuracy rating was a perfect 4.0 / 4.0 for this deal. However, VC#50 said that he does not always have the time to use the infiltrator typology. Extrinsic factors like time pressure sometimes make the infiltrator model less appropriate, he said. This and other extrinsic factors are discussed later in this chapter.

This VC said something counter-intuitive about the very high number of hours he allocated to human capital valuation. Other VCs said that taking a lot of time to

evaluate the management team leads to irritation and impatience on the part of the managers. This irritation increases the likelihood that the managers will go elsewhere to find venture capital investment, so conventional wisdom dictates. However, this VC said the opposite was true in the case we discussed. He said that he finds that when he uses the infiltrator typology (which takes a lot of time), the managers form a stronger bond with him that decreases the likelihood that they will go to a different VC firm. Perhaps the moderating variable here is the affability of the VC. A combative and nasty venture capitalist might find that the chances that his target company defects are increased with more hours of exposure. A friendly and collaborative VC (like VC#50, whom I found very affable) might find that the chances of defection are decreased with more hours of exposure. This hypothesis can be tested in future studies. It is safe to say for this study that it is not clear whether a high allocation of hours to human capital valuation increases or decreases the chance of defection by the target company.

Prosecutor: VC#19

The prosecutor seeks to gather data on a person by pulling it out of him or her directly--like a prosecuting attorney. Where infiltrators collaborate, prosecutors confront the target management team. In a word, prosecutors are suspicious. Prosecutors do not conduct many reference interviews because they like to "see it to believe it" and are unwilling to rely on someone else's data. They want to talk about the present and future plans, right now, live, in a rapid exchange of questions and answers. As a result, prosecutors tend to spend a high proportion of time in work sample

discussions rather than in past-oriented interviews or reference discussions. An assumption that prosecutors seem to make is that target company managers know what their strengths and weaker areas are and it is the prosecutor's role to expose these through aggressive questioning. Prosecutors talk about managers whom are "honest with them" v. those whom are not honest in portraying their strengths and weaker areas. As one VC said, "You look them in the eye, and either you believe them, or you don't." In contrast, airline captains would say that HCV is not a matter of believing or not believing the managers, it is about gathering data because the managers themselves may not be aware of the human capital dimensions that are needed for a specific venture to succeed. Prosecutors are identified by their belief that accurate human capital valuations are possible, moderate quantity of data, moderate balance across multiple methods (with a weighting on confrontational work samples), and a moderate degree of systematic data analysis.

VC#19 is a prosecutor. The deal we discussed was an $8 million investment in a later-stage industrial engineering company. The due diligence period lasted 8 months. The VC spent a lot of time in work sample discussions-- 125 hours. We would not be able to differentiate whether he is a prosecutor or an infiltrator by looking at the number of work sample hours alone. We need to know whether those work sample hours were spent in collaboration or a more confrontational setting. In this case, the VC aggressively quizzed the managers in a confrontational way--testing their knowledge of issues related to financial factors, product factors, market factors, and staffing issues. The accuracy rating for this deal was 3.0 / 4.0.

The prosecutor's thirst for primary data may influence their selection of the work sample approach. VC#19 said that he likes to "see them in action." However, this quotation begs the question of whether the VC can measure the human capital "in action" more accurately via a confrontational work sample, or through other methods (such as past-oriented interviews). According to the hierarchical regression analyses in this study, the relationship between work samples and accuracy was negative for later-stage cases, and positive for early-stage cases. This suggests that the "jury is out" on the effectiveness of work samples. However, the past-oriented interview method was positively related to accuracy in both categories. The prosecutor relies on the work sample and not on past-oriented interviews.

A second prosecutor offered some colorful quotations. VC#44 distrusts reference interviews and past-oriented interviews and prefers direct work sample interactions with target managers. He said,

> We can tell a lot ourselves by talking. How well do they know the business? What are their thoughts? I'd rather do that than get any reference checks. I'm more concerned about what the guy is doing and seeing it myself first hand.

This VC implied that he is unwilling to rely on alternative methods because he wants to experience the human capital first hand. To him, human capital valuation is very important. He said, "That's the key to it...good management. It is the one thing that you are picking; and when you pick the wrong guy, he can really screw up a company." Because human capital valuation is so important, the prosecutor says that he or she cannot rely on anybody else's data. That is perhaps why they favor the work sample.

Suitor: VC#1

The suitor is more concerned with "wooing" or "courting" the target managers rather than trying to assess them. These VCs even joke about "dating" the management team prior to the close of a deal. To the suitor, the thought of rigorously assessing a management team would be "demeaning," according to VC#1, and might repel the company rather than attract them. Suitors are identified by their lack of concern for accurate human capital valuations, intense concern for wooing management, absence of a job analysis, low need for data, low balanced use of multiple methods, and unsystematic or non-existent data analysis.

VC#1 was very concerned with pleasing the management team rather than assessing them. He said, "We try to win them over." He added, "[Human capital valuation] is the most difficult aspect of evaluation. . . We have less comfort there. . . We are sensitive to not pissing them off." The deal we discussed was a $100 million investment in a later-stage grocery company. The VC did not do a written job analysis. He spent a lot of time in work samples, trying to make a favorable impression on the management team. This high time allocation can hardly be considered "data," even though the total time allocated to interacting with the management was slightly above the mean. The reason is that the time interacting with management was designed to make a favorable impression rather than collect meaningful data. The accuracy rating for this deal was 1.7 / 4.0. The VC attributes his losing $40 million on this deal to his inaccurate assessment of the human capital. The managers turned out to be much more tired, traditional, and slow-moving in their management style than he assessed, he said.

Terminator: VC#73

Terminators would rather terminate senior managers after the close of a deal than invest time assessing them during the due diligence research period. They believe that it is just too difficult to gain accurate human capital valuations, so why bother. These VCs spent very little time on human capital valuation. If senior managers turn out to lack sufficient human capital, the VC terminates them and replaces them. Terminators are identified by their belief that accurate human capital valuations are impossible, low quantity of data collected, low balance across multiple methods, low degree of systematic data analysis, and willingness to terminate low-performing managers soon after the close.

VC#73 is a terminator who allocates his due diligence time to evaluating markets, not people. He said, "I focus most of my time on the market opportunity; you can always change the people." "Change the people" means to terminate them. This VC spent very little time assessing the management during due diligence. The deal we discussed was a $3 million investment in an early-stage medical device company. The due diligence period lasted three months. In total, this VC spent 37.6 hours on human capital valuation. The accuracy rating for this deal was low-- 2.2 / 4.0. Ironically, the VC lamented, "I wish I could have found a way to figure out that [the target company managers] could not manage." This statement is ironic because he demonstrated one of the least rigorous human capital valuations on record for this study. When asked whether he could have modified his approach to human capital valuation, the VC replied "I do not think I could have done anything different." These quotations reflect

the reality that many VCs are not aware of the way in which other VCs conduct human capital valuations.

VC#79 is also a terminator who tends to replace people rather than assess them during due diligence. He said, "I recognize the difficulty in accurately assessing management." Therefore, he opts to spend very little time doing it. One year after the close of the deal we discussed, the VC realized that the CEO was not as competent as the VC had originally thought. The VC characterized the CEO as severely lacking the following human capital dimensions: communication skills, leadership, organizational skills, strategy, vision, tactical competence. So one year after the close of the deal, the VC#79 terminated the CEO and sought a replacement. This VC said that in 90% of the cases, he makes what he called "major changes in the management." He said that his due diligence strategy is to focus on markets that are growing quickly and replace low-performing managers rather than to try to spot high-performing managers from the start. This VC was categorized as a terminator for three reasons: 1) he thinks that it is very difficult to conduct accurate human capital valuations (so why waste the time), 2) he stated that he prefers to focus his efforts on assessing market opportunities since these are easier to assess than people, and 3) he prefers to terminate managers if they fail to meet his expectations rather than invest time assessing them prior to the deal.

The above cases provide an illustration of different typologies or approaches to human capital valuation. Across the different typologies, time is allocated differently. See Table 28 for a summary of the time allocations for the above illustrative cases.

Table 28

Time Allocated to Human Capital Valuation by Typology

	Written Job Analysis	Document. Analysis	Past-oriented Interviews	Reference Interviews	Work Samples	Total HCV Time[1]	Accuracy 1=low 4 = high
Mean	*No*	*4 hrs.*	*17 hrs.*	*20 hrs.*	*64 hrs.*	*120 hrs.*	*2.8*
Airline Captain VC#11	Yes	5	28	37	100	214	4.0
Art Critic VC#53	No	0.3	9	3	15	38	2.2
Sponge VC#62	No	2	20	42	140	207	1.7
Infiltrator VC#50	No	11	52	68	275	406	4.0
Prosecutor VC#19	No	16	4	10	125	275	3.0
Suitor VC#1	No	4	5	26	100	135	1.7
Terminator VC#73	No	0.1	2	4	30	38	2.2

Note. These cases are illustrative and do not represent mean values.

[1] Total HCV time does not always equal sum of these five main methods, since other minor methods that were used are not presented in this table.

Summary of Typologies

The risk in proposing typologies of any sort is that mutual exclusivity is implied. It is possible that certain hybrid typologies exist. For example, a combination of airline captain-infiltrator is possible. This would be a VC who conducts a written job analysis, then spends a large amount of time collecting a wide range of data including the use of direct work sample interactions over a long period of time. The VC would collaborate with the management as a quasi member of the team. Data on these interactions would have to be recorded then systematically analyzed to form the human capital valuation.

There are several hybrid combinations that are <u>not</u> possible. The airline captain-art critic combination is not possible. Airline captains believe in systematic and thorough data collection and analysis, whereas the art critic believes in intuition and "gut feel." Likewise, the airline captain-sponge combination and the airline captain-terminator combination do not make sense since sponges do not believe in systematic analysis of data and terminators do not believe that accurate human capital valuations are possible.

The typologies reflect assumptions and beliefs about human capital valuation. However, these are not the sole factors that influence how venture capitalists conduct human capital valuations. The following section explores additional factors that influence the way in which VCs conduct human capital valuations.

Additional Factors that Influence Why VCs Use Certain Methods to Conduct Human Capital Valuations

This section provides an analysis of additional factors that influence VC method selection. These factors were identified as mistakes that VCs made that influenced them to modify their approach to human capital valuation during specific cases. The sources of the most common mistakes are: allowing time pressure to rush due diligence, halo effect, fundamental attribution error (Ross, 1977), diffusion of responsibility, and groupthink.

Allowing Time Pressure to Rush Due Diligence

Venture capitalists rush to complete deals at times. This study did not specifically measure the frequency of this occurrence. However, as discussed in the next paragraph, it is clear that this phenomenon occurs and that it may influence the amount of time that venture capitalists allocate to human capital valuation. Rushing to close a deal caused VCs to reduce the number of hours they spent on human capital valuation. Common reasons why they rush are because: 1) they fear that other VCs will "swoop in and steal" the target company if they do not complete it soon, 2) they are pressured by co-investors to make a decision to invest or not, or 3) they feel that the market opportunity is so "hot" that the window of opportunity may close. Sometimes a co-investor finds a target company and invites several other VCs to invest in the company. When this happens, the original VC may put pressure on the subsequent VCs to shorten their due diligence research period and make the investment. The original VC has already allocated funding to the venture, and is motivated to get the other VCs to contribute their investment dollars as soon as possible.

VC#42 rushed to close a deal. Her co-investor was putting pressure on the VC to finish due diligence and make an investment decision. In this study, it was generally not measured whether an investor was a lead investor or not. Her co-investor was serving as a strong advocate for the management team. "Come on, they will be great," they told her. She closed the deal, and soon realized that she had completely overestimated the value of the human capital. The investment return was disappointing. She lost 100% of the $5 million investment in the target company. Two other VCs

indicated that time pressure plays a role in their human capital valuations. VC#54 said that "time crunch forces you to be less rigorous" in conducting human capital valuations. VC#62 said, "I do as much as I can for as much time as I have. Or else the deal goes on without you."

Halo Effect and Fundamental Attribution Error

A halo effect occurs when a person gives too much weight to positive data and ignores or underweight negative data. Positive data on one of the four components in the HPMM model (human capital, product, market, and money) can lead venture capitalists to be less critical in their assessment of other areas. They can get "rose colored glasses." They way that venture capitalists talk about halo bias is by saying they "fell in love with" some aspect of the target company, while ignoring other aspects. Falling in love with the product, market, or past financial performance explains why some venture capitalists spend less time on human capital valuation than they would otherwise. The venture capitalist thinks that the product or market opportunity is so good that it would outweigh any human capital deficiencies. Therefore, why bother spending time on assessing the management?

The second cognitive error is fundamental attribution error (Ross, 1977). Fundamental attribution error is when someone attributes the occurrence of an event to the person or persons who are involved rather than attributing it correctly to the situational factors. The most common example of attribution error in this study was the venture capitalist mistakenly attributing the company's strong past financial performance to superior human capital when favorable market forces explained the performance.

Some illustrative examples of halo effect and fundamental attribution error in the study are provided. VC#76 said that it is common for venture capitalists to become enamored by a company's strong past financial performance and falsely attribute it to

management talent. He warned, "Don't confuse brains with a bull market!" He meant that a "bull market," or favorable market conditions, may account for the strong financial performance while masking human capital deficiencies. Indeed, in his case we discussed, VC#76 fell victim to his own admonishment. In the deal, he said that he overestimated the capabilities of the managers because of the company's strong past financial performance. He learned after the deal was closed that the senior managers were technical people, but that they could not manage people well. Likewise, VC#80 said that he ignored negative data about the management because he fell in love with the company's financial performance. "The evidence was there [that the managers were not talented]." "If we had listened to what we heard, we would not have invested," he said. It was not until after the close of the deal that the VC discovered that the target CEO had a "huge ego, poor listening skills, and a control freak mentality." The CEO was so hard to work with that several key personnel left the company. The VC lost money on this investment. Another VC said, "We were buying into the numbers. The financial performance was like a rocket ship going up." Therefore, this halo bias prevented the VC from evaluating the human capital. This proved problematic when the market changed rapidly, and the VC discovered that the human capital was too weak to react effectively.

In contrast to the above cases of halo effect centered around past financial performance, VC#13's halo bias was due to the exciting technical aspects of the product. He admitted that "we were enamored with the technology." This led the VC to conduct a more superficial human capital valuation. He said that he was surprised by what he described as their very weak leadership behaviors demonstrated by the

managers. VC#76, who holds an M.D., said, "Technology rarely sells itself." He added that it takes competent human capital to turn technology into a product that customers will buy.

Another source of halo effect was receiving a very positive reference interview early in the due diligence process. This led several venture capitalists to end their human capital valuation earlier than they felt they should have, in retrospect. Several venture capitalists said that they regretted having relied on a positive recommendation about the human capital from only one source. VC #76 said that he relied on the positive endorsements of "very promotional, close-knit advocates" of the senior management team. This was a mistake, he admitted, since he failed to detect many significant shortcomings in the human capital prior to the close of the deal. This venture capitalist expressed mild outrage towards the references who provided falsely-inflated appraisals of the human capital. However, he also felt responsible for his error since he relied almost exclusively on this positive endorsement rather than gathering more data himself. Likewise, VC#6 and VC#26 said that they should not have relied so much on a strong positive recommendation by a trusted advisor. This led the venture capitalist to allocate less time to collecting data on the human capital. Finally, VC#42 said that she regretted picking the wrong CEO. She said she wishes that she had not relied on another investor who gave the CEO a strong endorsement. It appears that venture capitalists, like other humans, are susceptible to demonstrating halo bias and committing fundamental attribution error. Both factors put downward pressure on the number of hours that venture capitalists allocated to human capital valuation.

Diffusion of Responsibility and Groupthink

In some cases, only a single venture capitalist invests in a target company. In other cases, several venture capital firms invest at the same time in the same company. In this study, several cases had multiple venture capital investors. In some of these cases, the venture capitalist who was interviewed for the study said that he or she felt that the large number investors diffused the responsibility for properly assessing the human capital. VC#23 said, "I wish we did not have so many other VCs around." He suggested that it is more difficult to assess management when the task is diffused to so many co-investors. This phenomenon is described as "diffusion of responsibility" in social psychology. The idea is that when many people are present, no one person feels particularly responsible for the outcome. This may lead a venture capitalist to allocate fewer hours to human capital valuation than in a case where he or she alone is responsible for conducting a human capital valuation.

VC#15 also blamed the high number of co-investors on the failure of a deal. Ten venture capital firms all had two partners conducting due diligence. That means twenty people shared the responsibility of human capital valuation. This VC hypothesized that "groupthink" (Janis, 1982) played a role in overestimating the human capital. That is, group members strive to seek consensus at the expense of achieving an accurate assessment of the human capital. This VC said that nobody really assessed the management thoroughly, but everybody felt comfortable that everybody else seemed comfortable with the strength of the human capital. This case illustrates both the diffusion of responsibility and groupthink phenomena. Both of these phenomena

influenced the venture capitalist to reduce the number of hours that were allocated to human capital valuation.

Chapter Summary

This chapter introduces seven typologies of human capital valuation. Airline captains are systematic and thorough. Art critics make snap judgments based on intuition. Sponges soak up data in a nonsystematic way. Infiltrators try to become a quasi member of the management team. Prosecutors aggressively question the target managers in a formal setting. Suitors are more concerned with wooing management than assessing them. Finally, terminators are convinced that it is impossible to achieve accurate human capital valuations, so they terminate underperforming managers after purchasing the company rather than invest time assessing the human capital during due diligence. In addition to these typologies of fundamental approaches to human capital valuation, several other factors affect the way in which VCs assess the human capital. VCs allocate fewer hours to human capital valuation when they fall victim to time pressure, halo effect, fundamental attribution error, diffusion of responsibility, and groupthink.

CHAPTER VI

HUMAN CAPITAL

This chapter examines the construct of human capital. In this dissertation, the methods of human capital valuation have been examined. However, it would be unsatisfying to fail to include a brief discussion of the construct of human capital. Human capital, as conceptualized in this study, is the propensity of a person or group to perform behaviors that are valued by an organization. Up to this point, the construct has been treated like a block of granite--a monodimentional construct without complexity of its own. But the construct does have complexities which are worth examining up close. The main purpose of this study is *not* to examine specific dimensions of human capital in great detail. It is beyond the scope of this project. A separate research project could be conducted for each dimension of human capital. However, several small discoveries about human capital were made that are worth mentioning. After all, scholars benefit from knowledge about what is being assessed in addition to knowledge of the methods that are used to assess it. This chapter provides an overview of human capital in the context of new venture creation. Specifically, it explores three topics: 1) what were the most common human capital attributes that venture capitalists sought to assess during due diligence, 2) what attributes they failed to assess accurately, and 3) what broader categories or dimensions of human capital attributes need to be added to the economic conceptualization of human capital, based on the findings of this study.

This chapter's findings are based on several items from the questionnaire (see the analysis section in Chapter III). The items were open-ended questions about human

capital attributes. The human capital attributes that were most frequently mentioned by the respondents were analyzed by frequency and rank-ordered. The chapter is broken into early-stage cases and later-stage cases, as in Chapter IV. The reason for presenting the analyses in two groups is that the groups demonstrated different results.

Early-stage Cases

Human Capital Attributes that Venture Capitalists Seek to Assess

Venture capitalists in early stage cases tended to be most concerned with the technical knowledge and skills of the target managers they were assessing. Technical knowledge and skills refer to a person's in-depth understanding of cutting-edge technology--usually in the fields of computers or healthcare. Forty percent of the venture capitalists in early-stage cases sought to assess the human capital's technical knowledge and skills. Perhaps venture capitalists were so concerned with this attribute of human capital in early-stage cases because these ventures are often in the process of developing new technologies or product/service innovations. Making a product that works is a large concern for companies in their earliest stages. Venture capitalists could conceivably use any of the major methods of human capital valuation to gather data on the human capital's technical knowledge and skills: documentation analysis (in the form of technical papers or publications), past-oriented interviews (which focus on past technical achievements), reference interviews, and work samples (quizzing the target managers on their technical knowledge and skills). See Table 29.

Table 29

Most Commonly-cited Human Capital Attributes Assessed by Venture Capitalists in Early-stage Cases (N = 42)

Attribute	n	%
1. Technical knowledge and skills	17	40
2. Knowledge of the industry	11	26
3. General management/operations	11	26
4. Sales/marketing skills	10	24
5. Leadership skills	7	17

Human Capital Attributes that Venture Capitalists Fail to Assess Accurately

Overall, the dimensions that venture capitalists fail to assess are the same dimensions that they are attempting to assess. This suggests that venture capitalists are focusing on the "right dimensions." It is not as if the VCs are looking at a completely unrelated set of human capital attributes. However, this finding suggests that the methods used by VCs may be inadequate. In other words, they may be looking in the right place, but not using powerful enough instrumentation to achieve accurate valuations.

Venture capitalists are not very good at assessing two key human capital attributes: "general management/operations" and whether the target managers "can work well with others." In 29 percent of the early-stage cases, venture capitalists failed

to accurately detect a deficiency in human capital related to general management/operations. In 24 percent of the early-stage cases, they failed to detect a problem in the human capital related to working well with others. Possible explanations for these findings are explored. One reason may be related to venture capitalists' heavy use of the work sample method. Venture capitalists allocate more hours to the work sample method than to any other method. It is possible that work samples are inherently ineffective for accurately measuring a person or group's skills related to general management/operations or ability to get along with others. Work samples are like auditions. It is possible that people, when on their best behavior, appear more strong in certain areas than they actually are. For example, it is conceivable that target managers who want the venture capitalist's investment dollars, will act very polite and collaborative during the work samples. It may be easier to "fake" one's ability to work well with others than it is to fake one's technical skills. In contrast, work samples may be effective for evaluating technical skills. After all, only 10% of the VCs failed to detect shortcomings in technical skills. It is easier to quiz someone on their technical understanding than it is to quiz him or her on how well they get along with others.

There is a second possible explanation for why VCs failed to accurately assess general management/operations skills and the ability to work well with others. Perhaps in this population, that are simply more cases of deficient human capital in these areas. This explanation would not reflect the methods used by venture capitalists, but would be a reflection of frequency in the problems in the population. For a summary of the human capital attributes that VCs fail to assess accurately, see Table 30.

Table 30

Human Capital Attributes that VCs Fail to Assess Accurately in Early-stage Cases (N = 42)

Attribute	n	%
1. General management/operations	12	29
2. Can work well with others	10	24
3. Sales/marketing skills	8	19
4. Technical knowledge and skills	4	10
5. Ability to build a team	4	10

Later-stage Cases

Human Capital Attributes that Venture Capitalists Seek to Assess

Venture capitalists tend to be concerned about different human capital attributes in early- vs. later-stage cases. In early-stage cases, when managers are often attempting to develop a new product or technology, it is clear why technical skills are very important. This is perhaps why technical skills were the #1 most often-cited dimension that VCs assessed in early stage cases. However, technical skills, which were assessed by 40% of early-stage VCs, were assessed by only 19% of later-stage VCs. It appears that the focus of venture capitalists shifts for later-stage cases from technical skills to skills related to general management/operations and marketing. Once the product has

been developed, it is now time to try to sell it and build an organization to support growth in sales. Discussions with later-stage venture capitalists commonly revolved around whether the target managers could demonstrate sufficient sales/marketing skills, now that they have demonstrated the technical skills to develop the product. Several venture capitalists expressed that in their experience, people who possess strong technical skills tend to lack sales/marketing and general management/operations skills. Their concern about these two human capital attributes are reflected in the high rankings in Table 31. See Table 31.

Table 31

Most Commonly-cited Human Capital Attributes Assessed by Venture Capitalists in Later-stage Cases (N = 43)

Attribute	n	%
1. Sales/marketing skills	16	37
2. General management/operations	11	26
3. Technical knowledge and skills	8	19
4. Leadership skills	8	19
5. Can work well with others	8	19

Human Capital Attributes that Venture Capitalists Fail to Assess Accurately

The most common dimension that venture capitalists in later-stage deals failed to assess accurately was the work ethic of the CEO or team. Work ethic can be measured by the number of hours a person works per week and the intensity with which

they work during that time. In 28% of the cases, VCs failed to assess deficiency in this area. Again, this failure could be due to shortcomings in VC human capital valuation methods, or due to a high frequency of this human capital deficiency in the population.

Different methods might provide data on the attribute of work ethic in different ways. Documentation analysis might not be able to detect a problem in work ethic, unless public records show that a CEO was sued for spending too few hours at work. This is unlikely, so we would not expect this method to be effective for measuring this human capital deficiency. Past-oriented interviews may be more effective. Using a past-oriented interview, a VC can simply ask a CEO how many hours he or she worked per week in job 1, job 2, job 3, job 4, etc. It is clear what the trend is. The CEO tends to work long hours, or he or she does not. Also, reference interviews can provide confirmatory data on this attribute. "How many hours per week would you estimate Fred spent working when he was your subordinate?" a VC might ask six former supervisors. So past-oriented interviews and reference checking interviews are expected to detect a shortcoming in work ethic. What about work samples? It is not clear how the work sample would be able to assess work ethic. During a work sample, a target manager could fake enthusiasm and dedication quite easily. It is far easier to sustain a seemingly strong work ethic during formal presentations to venture capitalists than it is to sustain it over the course of several years. But the work sample was the most favored method used by VCs. Also, it was only method in later-stage cases to be significantly negatively related to accuracy. It is possible that use of this method in the absence of other methods can lead venture capitalists to fail to detect shortcomings like work ethic.

This hypothesis can be tested in future studies. See Table 32 for a summary of the human capital attributes that VCs fail to assess accurately in later-stage cases.

Table 32

Human Capital Attributes that VCs Fail to Assess Accurately in Later-stage Cases (N = 43)

Attribute	n	%
1. Strong work ethic	12	28
2. General management/operations	10	23
3. Leadership	8	19
4. Finance	7	16
5. Integrity/honesty	6	14

Dimensions of Human Capital

Several new dimensions of human capital can be added to the existing economic model of the construct. Based on the findings of this study, it is possible that there is more to human capital than just knowledge and skills, as identified by Becker (1964). The hundreds of human capital attributes that the VCs mentioned were reduced to the fewest number of categories that reflected common themes. Recall that human capital is defined in this study as the propensity of a person or group to perform behaviors that are valued by an organization. Economists like Becker have not included several dimensions of human capital that psychologists have studied for years, such as abilities, motivations, individual values, and organizational culture. This study has not "discovered" these dimensions. Rather, the empirical results remind us that these

dimensions exist and that they do affect human behavior, so they should naturally be included in a model of human capital. The one dimension that is not mentioned in the various literatures is a person's professional network. A person's professional reputation or professional network is something he or she brings to any organization which possesses economic value. It affects behavior, as well as the value of the outcomes of the behavior. For example, all things held constant, a person with a vast network of customer contacts is far more valuable to an organization than a person without many professional contacts. Venture capitalists were cognizant of this as well as articulated it, so "network" is added to the dimensions of human capital. The revised model of human capital is:

Human capital of a venture = f [(k,s,a,m,v,n) + (c)],

where k = knowledge, s = skills, a = abilities, m = motivations, v = individual values, n = network, and c = organizational culture.

I will now summarize how each of these dimensions is defined by various scholars. Knowledge is a body of information that can be directly applied to the performance of tasks (Heneman & Heneman, 1994). This is also called "declarative knowledge" by Campbell (1990), which refers to technical knowledge of facts and figures. Knowledge in this paper does <u>not</u> includes what is called "procedural knowledge" or knowledge of a process (Campbell, 1990). Procedural knowledge is considered a skill in this paper. Skill refers to an observable competence to perform a particular task. An ability is an underlying capacity to perform a task (Heneman & Heneman, 1994). General intelligence, g, is an example of an ability. Motivations refer to the extent to which a person is driven to perform specified behaviors. In this way, it

is both a level (how motivated are they?) as well as a direction (motivated to do what?). Values refer to preferences that people have that relate to work (i.e. interpersonal styles, honesty standards, openness, etc.). For example, a preference for formality vs. informality at work is considered a value in this paper. Next, a network refers to the professional relationships a person possesses.

The human capital of an organization is typically conceived of as the aggregate or sum of the human capital of the individual members. However, this fails to pick up the experience effects that may occur when organizational members have worked together previously. Organizational culture (Schein, 1992; Sathe, 1985)--or organizational learning (Senge, 1990)--affect the behaviors that people perform. That is why an organizational-level dimension of human capital may be appropriate to include in this paper. Culture is defined as the set of important assumptions that members of a community share in common (Sathe, 1985). Organizational culture influences the propensity of individuals and groups to perform behaviors that are valued (or not valued) by an organization. Some of these behaviors may be beneficial and create value, some may destroy value in the organization (Sathe, 1985, 1996; Denison, 1984, 1990). For example, the presence of negative elements in an organization's culture has been called a "viscous cycle" by Sathe (1996), a set of "core rigidities" (opposite of competencies) by Leonard-Barton (1992), and "core incompetencies" by Dougherty (1995). Kotter and Heskett (1992) and Denison (1984) empirically demonstrate a link between culture and the overall performance of organizations. Deal and Kennedy (1982) and Sathe (1985) offer theoretical and empirical research that suggests that culture affects organizational performance. So culture is included in the discussion of

human capital if the venture is old enough to have a culture. However, many early-stage companies are weeks old, and therefore have not yet formed what could be considered an organizational culture.

The following table provides a list of some commonly-cited attributes of human capital. There may be an infinite number of attributes of human capital. However, it appears that each attribute can be described as being comprised of several broad dimensions of the construct of human capital. Knowledge and skills appear to be the most dominant dimensions, since they are the most frequently-occurring dimensions in the attributes that were cited.

Table 33

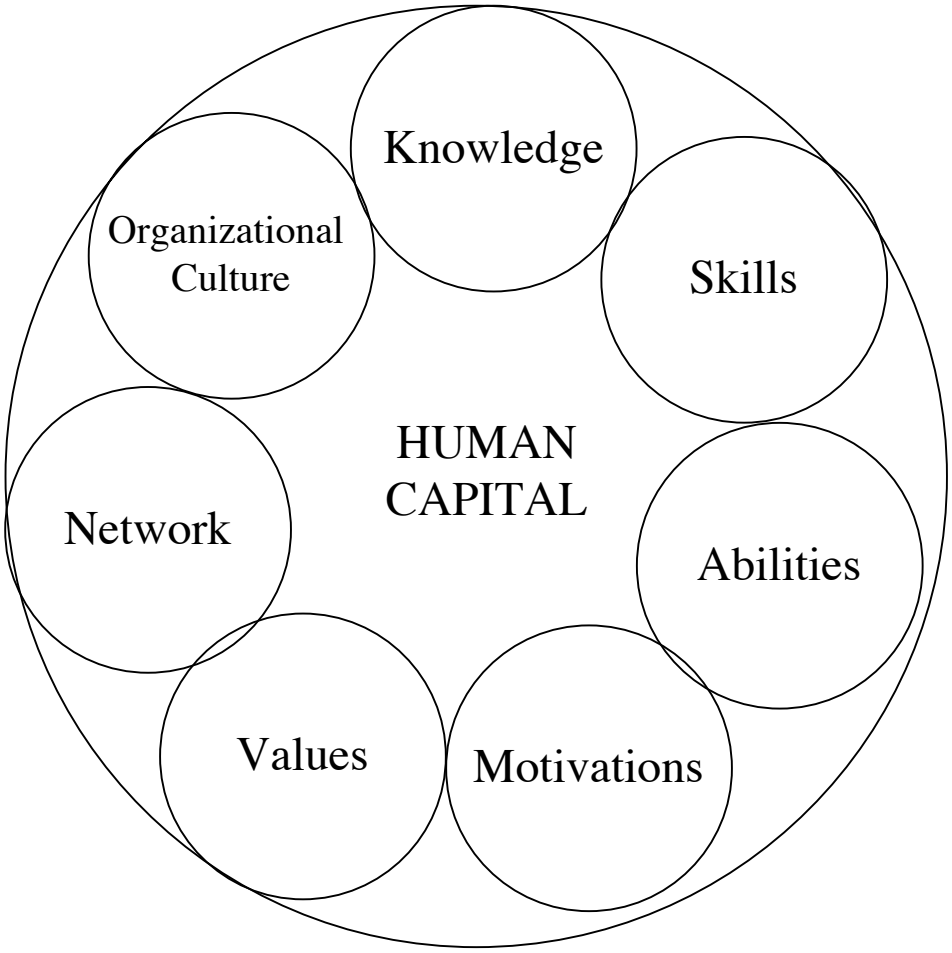
Human Capital Attributes and Corresponding Dimensions

Human Capital Attribute Cited in Study	Dimension(s) of Human Capital
Technical knowledge	Knowledge, skills, abilities
Industry knowledge	Knowledge
General management	Knowledge, skills
Sales skills	Knowledge, skills, abilities, motivations, values, network
Leadership	All dimensions
Strategic thinking	Knowledge, skills, abilities
Finance	Knowledge, skills
Ability to build a team	All dimensions
Integrity	Motivations, values
Openness	Values
Strong work ethic	Motivations, values
Can work well with others	Skills, abilities, motivations, values, organizational culture
Charisma	Skills, abilities, values
Passion	Motivations
Frugality	Values
Analytical ability	Knowledge, skills, abilities
Entrepreneurial skills	All dimensions
Personality compatibility with VC	Motivations, values
Listening skills	Skills, motivations, values

The following model is the result of inductive analysis from this study. However, it is not as if these dimensions have never been observed before now. Rather, the model assembles important constructs from psychology and organizational behavior that have not been included in the construct of human capital in the field of economics.

Figure 9.

Dimensions of Human Capital



Chapter Summary

The human capital attribute that venture capitalists most commonly seek to assess in early-stage cases is technical knowledge and skills. The attribute that these venture capitalists most often fail to assess accurately is general management/operations. In later-stage cases, the attribute that they seek to assess most often is sales/marketing skills. The attribute that VCs in later-stage cases most often fail

to assess accurately is the work ethic of the manager(s). It is possible that certain human capital valuation methods are more appropriate for measuring specific dimensions of human capital than other methods, though this issue is beyond the scope of this study. All of the attributes identified by venture capitalists were categorized into seven categories: knowledge, skills, abilities, motivations, values, network, and organizational culture. The last five dimensions, though commonly discussed in the field of psychology, have not previously been included in the conceptualization of human capital by economists.

CHAPTER VII

CONCLUSIONS

This study offers an empirical first look at the human capital valuation methods that are used by venture capitalists. However, like many studies that are exploratory in nature, this study raises more questions than it answers. First, the lessons that were learned about each of the three main research questions will be presented. Then areas for future research will be discussed.

1) What methods do venture capitalists use to conduct human capital valuations? Venture capitalists use the work sample method the most. This method is characterized by direct interactions between venture capitalist an target managers in which the former "quizzes" the latter on various aspects of the enterprise. As one venture capitalist said, "We like to see it to believe it." On average, venture capitalists allocate three times as many hours to the work sample as they do to the second most heavily-used method, reference interviews. In third place was past-oriented interviewing, followed by documentation analysis, and then job analysis. Psychological testing was used in only 3.0% of the cases. Venture capitalists did not use a formal assessment center in any case. Another finding that is related to this research question was the presence of high standard deviations in the use of various methods. Nearly every method's standard deviation was at least equal to 100% of the mean value. These high standard deviations suggest that the use of methods varies considerably between cases. Venture capitalists do <u>not</u> use the same methods across cases. Why do they use different methods? See research question number three.

2) What relationships exist between the methods that are used and the resulting accuracy of human capital valuation? Past-oriented interviewing was the method that was most strongly related to the accuracy of the human capital valuation. This finding supports research by Roth & Campion (1992) and Hough (1984) discussed in Chapter II. Their research suggests that interviews that focus on recording past behaviors and possess structure tend to produce more accurate assessments than interviews that lack structure or do not focus on past behaviors. These findings support the notion that past behavior is a better predictor of future behavior than the "hypothetical behavior" found in a work sample. This point contradicts claims made by McDaniel and colleagues (1994) that hypothetical interviews (such as work samples) produce more accurate assessments than past-oriented interviews. In fact, the opposite was true in this study. The hypothetical interview format--the work sample--was significantly negatively related to accuracy, at least in later-stage cases. It is not hard to imagine why auditions like the work sample produce less accurate assessments than fact-based interview formats like past-oriented interviewing. One way to think of the difference between work samples and past-oriented interviews is to consider the idea which I will call "behavior sampling." Work samples record a sample of behaviors in the present. Past-oriented interviews record or sample behaviors across many years of a person's career. Based on the findings of this study, it appears that a sample of behaviors across a person's career is a more "representative sample" of their human capital than a sample across several hours or weeks.

3) Why do venture capitalists use certain methods to conduct human capital valuations? Venture capitalists approach the task of human capital valuation

differently. Part of the reason for the difference in approaches is attributable to differences in fundamental assumptions. *Post hoc* inductive analysis in this study identified seven distinct typologies of human capital valuation: airline captain, art critic, sponge, infiltrator, prosecutor, suitor, and terminator. In research question number one, we observe the high standard deviations in the methods used. Also, many of the methods were correlated to each other. This suggests an "all or nothing" sort of mentality that venture capitalists demonstrate when choosing a human capital valuation methodology. Which typologies allocate a large amount of time to multiple methods? Airline captains, sponges, and infiltrators allocate a high number of hours across multiple methods. In contrast, art critics, prosecutors, suitors, and terminators allocate fewer hours across fewer methods.

The typologies may also provide insights into one of the puzzling findings of this study--why the work sample method was positively related to accuracy in early-stage cases, but negatively related to accuracy in later-stage cases. It is important to recognize the differences between early- and later-stage cases. In early-stage cases, the target company is very new and may be comprised of only two managers and a product idea. Later-stage companies often have products developed and a longer track record of performance.

One possible reason for the difference in sign in the work sample-accuracy relationship across stages is that the work sample method may look different when used in early-stage v. later-stage cases. The main study was not specifically designed to measure these differences. However, the follow-up study with N = 9 venture capital firms provided additional insights into this topic. It is possible that early-stage work

samples may resemble the infiltrator typology. Later-stage work samples may resemble the prosecutor typology. Venture capitalists "get more personal" as one VC said, with the target managers in early-stage cases, because they do not have a company history to talk about. So VCs want to "get into their mind" as another VC said, to befriend them, to become one of them. VCs may act more collaboratively with the target managers in early stage cases, because the tone is often "let's put our heads together and figure out how to build this company." Discussions seem more open, candid, and frank in early-stage cases. These data points all sound consistent with the infiltrator typology. In contrast, the tone around work samples in later-stage cases is "Give me few presentations and answer my 150 questions about this business and your company's history of performance." This tone resembles the prosecutor typology. It is possible that the infiltrator typology produces more accurate assessments than the stilted and formal prosecutor typology. In other words, it is possible that hours that are allocated to "infiltrator work samples" are more strongly associated with accuracy than hours allocated to "prosecutor work samples." This might explain why the sign on the work sample-accuracy relationship flips from positive to negative when the cases change from early-stage to later-stage. Again, future research is needed to examine this hypothesis, but early indications suggest that this is one plausible explanation.

Another puzzling finding was related to the job analysis method. Job analysis is the process of articulating the behaviors that are valued by an organization for a given position or role. Job analysis was expected to be positively related to the accuracy of human capital valuation. Instead, the relationship between job analysis and accuracy was small, nonsignificant, and negative. There are three possible explanations for this

counter-intuitive finding. The first possible explanation is that there is no relationship between job analysis and accuracy. It is hard to imagine that an added degree of discipline in the human capital valuation process could be harmful or exactly neutral, but it is possible. The second possible explanation is a coding issue. Written job analyses as well as verbal job analyses were counted in this study. It is possible that written job analyses alone may have demonstrated a more positive relationship to accuracy compared to the more intuitive and informal verbal job analysis. Perhaps the benefits of performing a job analysis are experienced only when it is written down, and not when it is only verbalized. The reason for this would be that a written job analysis can serve as a scorecard used for analysis, whereas a verbal job analysis is more fleeting. The third possible explanation is that there may be a difference between "good" job analyses and "bad" job analyses, which were not distinguished in this study. The former would reflect the human capital dimensions that really are important for the success of any given venture. The latter might lead a venture capitalist to focus on assessing the "wrong" dimensions of human capital. For example, a job analysis for a computer software company that did not include technical dimensions of human capital might point the VC's inquiry in the wrong direction.

The dimensions of human capital were briefly examined in this study. One finding contradicts research by MacMillan, Siegel, and Narasimha (1985). Their work identified the human capital attributes that are considered most important by venture capitalists. These researchers concluded that venture capitalists are most concerned with assessing the human capital's ability to "sustain intense effort." The idea is that building a new company requires tremendous effort and founding managers had better

sustain intense effort if it is to survive and thrive. In this study, sustaining intense effort was given the term "strong work ethic." But strong work ethic was not the most frequently assessed human capital attribute. Only 7% of the venture capitalists in early-stage cases sought to specifically assess the target managers on this attribute. Fourteen percent of venture capitalists in later-stage cases sought to assess target managers on this attribute. Interestingly, work ethic was the #1 most often-cited human capital attribute that later-stage venture capitalists said they *failed* to assess accurately. In 28 percent of the later-stage cases, venture capitalists indicated that they failed to accurately detect a deficiency in the human capital's work ethic. What this finding calls into question is whether MacMillan and colleagues accurately measured work ethic as the "most important" human capital attribute in venture capital. Or, perhaps work ethic is simply the attribute that venture capitalists most frequently fail to assess accurately. More research is needed to more precisely measure what work ethic means to venture capitalists. However, it is safe to conclude that venture capitalists can improve their assessments of "work ethic"--since this human capital attribute was mis-assessed most frequently during due diligence.

The findings of this study contradict research by Hall and Hofer (1993). Their main point was that venture capitalists are not concerned with the human capital of the companies in which they invest. Perhaps their findings were due to the design of their study, which examined only the earliest phase of deal screening. This is where venture capitalists are sifting through hundreds of proposals by target company managers. By the time the venture capitalists move to the in-depth due diligence research phase, it is very clear from the results of this dissertation that venture capitalists are concerned with

human capital. They allocate a large amount of time to human capital valuation--120 hours on average. A second explanation for their findings may be due to sampling error and generalizing from their limited sample size. The Hall and Hofer study had a sample of

N = 4 venture capital firms. This dissertation had a sample of N = 48 different venture capital firms. Perhaps their study included only the suitor and terminator typologies. These two typologies are not very concerned with assessing the human capital of a prospective target company. However, the other five typologies appeared very concerned with assessing the human capital, as shown by their high time allocations (120 hours) to human capital valuation, and quotations that emphasize the importance of the human capital in the performance of their investments.

Limitations

This study provides a first step into the field to account for the methods used by venture capitalists to conduct human capital valuations. Several possible limitations exist, however. One challenge in conducting survey research is crafting construct-valid measures. The dependent variable in this study is difficult to measure. The accuracy of a human capital valuation is largely "in the eye of the beholder." However, several precautions were taken to ensure a minimum level of construct validity. To reduce bias in this measure, two objective items were used, in addition to the four subjective items, at the recommendation of several respondents in the pilot study. The two items are whether or not the CEO was later removed for incompetence and whether or not other

members of the senior management team were removed for incompetence. The idea is that removing senior managers is often considered a "desperate act" that signals that an inaccurate human capital valuation took place. Indeed, these two variables hang together quite well with the other more subjective measures of accuracy of human capital valuation. As presented in Chapter III, the accuracy scale demonstrated a Chronbach's alpha = .82. Additionally, respondents in the pilot study indicated that they understood that the items were measuring accuracy of human capital valuation, as opposed to measuring some other construct. Finally, a second rater was contacted to provide a response to the items that measured this construct. In the 33% of the cases for which this "second source" interview was available, the correlation between primary and second source was

$\underline{r} = .64, p < .01$. This all suggests that the measure of this construct, though imperfect, is sufficiently reliable and valid for this study.

Second, the non-random sampling strategy limits the generalizability of the results of this study. The non-random sampling strategy is commonly used in this field because of the hard-to-reach nature of this population. However, the purpose of this study is to begin a new line of inquiry into the conceptualization of venture capital due diligence. The purpose was to provide some interesting insights from the field and raise new questions, not provide definitive answers.

Third, this is cross-sectional research; therefore it is impossible to infer causation. This study provides empirical evidence that encourages further development and testing of the hypotheses in research question #2. Since the study is not longitudinal, the hypotheses in this study test degrees of association, not causation. It is

interesting to discover that certain methods are associated with accuracy, but even more interesting to be able to make causal inferences.

Fourth, the strength of the relationships between methods and accuracy may be understated in this study. The reason has to do with case selection. The decision to select one accurate and one inaccurate case to discuss with many of the venture capitalists resulted in an overweighing of inaccurate cases. To make this point clearer, an example is provided. VC#32 used roughly the same very extensive methods in the first and second case we discussed. He spent over 300 hours in both cases on human capital valuation. One case was an "accurate" human capital valuation, and the other was "inaccurate." However, in reality, his extensive human capital valuation methods produced 9 very accurate HCVs out of the past 10 deals and one inaccurate HCV. His true track record is 9 out of 10 accurate cases, but we only talked about one accurate and one inaccurate case. Thus, the "true" weighting of the inaccurate case should be 10%, but it carries a weight of 50% in my study because of the sampling procedure. In this way, the size of the association between methods and accuracy may be larger than what was measured for research question #2 in this study.

Finally, this study suffers somewhat from being too broad. The complex construct of human capital received only cursory attention. Each assessment method is only briefly discussed. The chapter on the different typologies of human capital valuation provides a fuzzy depiction of what these typologies look like in practice. In the design phase of this study, there was a choice between focusing on one aspect of human capital valuation or focusing on the gestalt. The author opted for the latter. The option of "closing the book" on one narrow topic was not so appealing. The option of

initiating a line of scientific inquiry into the influential and somewhat unknown world of venture capital was far more appealing. Perhaps this study provides scholars of psychology or entrepreneurship or economics with sufficient orientation into this context to continue making progress in this line of research.

Directions for Future Research

This study has uncovered many questions that require further examination. This study is like an unfinished mural on the side of a building. One can see the sketch marks of the overall design, but only some of the parts have been painted. Multiple opportunities exist for future research.

This study discovered an unexpected moderator effect in the methods-accuracy relationship. The moderator variable, the stage of the target venture, influenced the direction and strength of the relationship between the methods and the accuracy of human capital valuation. In early-stage cases, the strength of the relationships between some methods and accuracy was larger and more positive than the strength of the relationships in later-stage cases. This was true for the past-oriented interviews, reference interviews, and work samples. Several explanations were offered, but disciplined inquiry is needed to shed further light on this issue. Research on the "stage phenomenon" would need to explore the several questions: 1) how exactly are early stage companies different from later stage companies, 2) what are the mechanisms by which those differences translate into differences in the methods - accuracy relationships? With respect to work samples, it will be valuable to improve the

measurement of what exactly happens in work samples in early-stage cases v. later-stage cases. In this dissertation, it was impossible to distinguish what was happening during the work sample: whether it was a formal work sample, casual conversation, hypothetical/situational questioning, etc. Since the work sample accounted for the highest time allocation in this study, it makes sense to break it into more categories to increase the precision of measurement and further elucidate its properties.

Future studies could make a contribution by focusing a microscope on an individual method. For example, the topic of a study could be, "The use of past-oriented interviews in venture capital due diligence." This would provide greater insights into what each method looks like in practice, as well as the assumptions of the venture capitalists who use them. Or, another topic could focus on "packages" of methods and approaches. Perhaps a study could use the typologies that emerged from this study to test for differences in accuracy rates across the typologies. Or, to take it one step further, it would be interesting to learn which typologies are most effective for measuring which dimensions or attributes of human capital. For example, say that a venture capitalist performs a job analysis and concludes that the target company need a strong work ethic, software technical skills, and knowledge of sales via a catalog. Which methods should he or she use to assess these human capital attributes? The implications of this line of research would be to further illuminate the mechanisms by which data from various streams contribute to the accuracy of a human capital valuation. Ultimately, research in this area should answer the question, "Which specific methods of human capital valuation are best suited for measuring which specific

dimensions of human capital?" This level of specificity might be attainable after this line of research becomes more developed.

The cross-sectional methodology used in this study is appropriate for measuring the frequency of use of assessment methods, but is a less powerful methodology for make causal inferences than a longitudinal study. The purpose of a longitudinal study would be to focus only on relationships between methods and the resulting accuracy of human capital valuation. Further research would be especially interesting that included the following: a measure of what assessment method(s) were used at time (t-1 to t), scoring of the human capital on a scorecard at time (t), then follow-up scoring of the human capital at time (t+ 3 years) to test for criterion-related validity of the methods. The primary advantage is that this approach reduces the risk of respondent retrospective memory bias. However, one possible problem with this proposed design is the Heisenberg Uncertainty Principle (or its psychology cousin the Hawthorne Effect). This principle states that the very act of measuring something might affect what you find. If venture capitalists know that they are being measured, they may change their human capital valuation behaviors. However, overall, this proposed longitudinal study would offer a more robust test of criterion-related validities of various assessment methods than what was used to test research question #2 in this dissertation.

Another area for future research is time efficiency. Conceivably, a venture capitalist could achieve an accurate human capital valuation if she studied a person in-depth for 6,000 hours. However, in this population, time is very important. It would be interesting to research which methods deliver the highest accuracy units per hour of use. For example, it is possible that the infiltrator typology is very accurate. Infiltrators

follow around a person or group for many months and become one of them. However, this typology may be prohibitively time consuming. Infiltrators may be wasting a lot of time.

In contrast, other typologies may deliver more accuracy per hour than infiltrators.

A final area that may interest scholars of industrial psychology is entrepreneur self-assessment. I hope that industrial psychologists widen their inquiry in this area to include more dimensions of human capital than just those related to personality. "Needs and motivations" are important, but insufficient variables in predicting entrepreneur success, as seen in McClelland's work. It would be valuable to inquire into what knowledge, skills, abilities, values, network, and organizational culture are critical for survival and effectiveness in entrepreneurial populations. This research could help encourage people to become entrepreneurs who have the human capital to succeed. It could also help would-be entrepreneurs focus on what skills or knowledges would be valuable to develop prior to starting their risky entrepreneurial career. Finally, further research in this area would help venture capitalists make better job analyses when they are identifying what human capital is needed for a venture to thrive. After all, for an assessment methodology to provide accurate assessments, it must be focused on the right human capital dimensions or attributes.

Economists or other entrepreneurship scholars could take a different approach to advancing this field of research. They could focus on "downstream" causal relationships in the nomological net of constructs. To what extent is the accuracy of human capital valuation related to such things financial performance of venture capital

firms or job creation for society? This line of research could illuminate the effects or consequences of accurate vs. inaccurate human capital valuations on people's lives.

Implications for Practitioners

Venture capitalists may learn several things from this study. First, the past-oriented interview appears to be a more robust method for achieving accurate human capital valuations than other methods. If a venture capitalist found himself or herself failing to use this method, they may want to consider using it. Next, this study identifies the dimensions of human capital that venture capitalists most commonly fail to assess accurately during due diligence. This finding raises awareness of this and other common mistakes about the process of human capital valuation according to VCs. Finally, the study offers a preliminary theoretical framework to describe the factors that affect the accuracy of a human capital valuation. This framework may be used as a diagnostic model or checklist to help them plan their human capital valuation processes.

Entrepreneurs may find useful the list of most commonly-assessed human capital attributes by venture capitalists. This could help someone identify their own strengths and weaker areas. Identification of one's strengths and weaker areas could lead to a better decision to become an entrepreneur or not. Or it may help an entrepreneur diagnose what "holes" exist in his or her management team that need to be filled in terms of human capital.

The ultimate application of human capital valuation theory is to develop methods for human capital valuation that achieve the most accurate valuation possible, while consuming the fewest resources possible (time, money, energy). The goal is to minimize the probability of Type 1 error (undervaluing the human capital leading to a

false rejection) or Type 2 error (overvaluing the human capital leading to a false acceptance).

Afterward

The only regret I have about this conceptualization of human capital valuation is the depersonalization of the human element. By calling a person's capabilities "human capital," it conjures up images of robotic beings rather than images of living, breathing people. However, from a theoretical standpoint, this conceptualization allows the body of knowledge on personnel assessment to be blended with the body of knowledge of economics and venture capital. I hope that a greater understanding and respect for the human element in new venture creation is the result.

What are the implications of this research for society? All too often, venture capitalists make mistakes about the human capital and invest scarce funding dollars in new ventures that fail. Forty-two percent of the cases were considered by the respondents either "neutral, losers, or mega-losers." One possible reason for the failed investment decisions is that venture capitalists have neither theory nor empirical research to suggest what methods are most effective in assessing people during due diligence. So they make mistakes. The paper began with the quotation by Arthur Rock, the venture capitalist, who said, "Nearly every mistake I've made has been in picking the wrong people, not the wrong idea (Bygrave & Timmons 1992, p.6)." When new ventures fail, not only are investors negatively affected, but jobs are lost, and new technologies are not innovated. In contrast, an advancement of our understanding of methods for human capital valuation is expected to lead to fewer mistakes. Fewer mistakes mean that scarce funding dollars may be allocated towards new ventures that survive, grow, and generate new technologies and jobs for society.

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APPENDIX A

GLOSSARY OF TERMS

Ability

An underlying capacity to perform a task (Heneman & Heneman, 1994). General intelligence is an example of ability.

Activity or Action

A component of a method. For example, the method of past-oriented interviewing is made up of several possible activities: interviews with the CEO, interviews with other members of senior management, etc.

Attribute

A human capital attribute is a characteristic of a person or group that may include one or more dimensions of human capital. For example, "strong work ethic" may include a combination of motivations and values. "Software development" may include dimensions related to knowledge, skills, abilities, and professional network.

CEO

Chief Executive Officer. Typically the most senior executive in a company. The CEO reports to the board of directors.

Close (of a deal)

The close of deal is the transaction in which the venture capitalist purchases equity (ownership) in the company. The close of the deal follows the due diligence research period.

COO

Chief Operating Officer. This person in charge of the day-to-day operation of the company and usually reports to the CEO.

Due diligence

The venture capitalist's practice of conducting research prior to making a decision of whether to invest in a new venture. This typically lasts several weeks to several months and usually covers each factor in the HPMM model (human capital, product, market, and money).

Deal

An economic transaction in which a venture capitalists invests in a new venture. In this study, the term is used synonymously with "case."

Documentation analysis

An method that a venture capitalist may use in human capital valuation by reviewing written documentation. Reviewing resumes of senior managers, 2nd tier managers, and employees, litigation checks, credit reports, on-line media services and a verification of academic degrees all are included in documentation analysis.

Early-stage deals or cases or companies

Early-stage deals are investments in companies that are less mature than later-stage deals. Early-stage deals are operationalized as deals that are either in the "seed stage" or "1st stage" as indicated by item #14 on the questionnaire. In the seed stage, the venture is little more than an idea. At the startup stage, the company may have developed a product or service but revenue may be very small or non-existent.

Entrepreneur

In the context of this paper, the entrepreneur is the person who seeks funding from venture capitalists to make his or her "dream" a reality and grow the company. This term is used in this paper to describe a position, not a bundle of "entrepreneurial"

traits or behaviors. Also known as the venture's "management" "senior management," or "chief executive officer" (CEO).

General partner (GP)

General partners are venture capitalists who are charged with selecting target companies in which to invest and managing these investments on behalf of limited partners.

HPMM model of factors affecting venture capital firm performance

1) Accuracy of human capital valuation. The accuracy of human capital valuation is the degree to which the pre-deal valuation of the human capital matches the post-deal valuation after the venture capitalist has seen the human capital "on the job."
2) Accuracy of product assessment. Elements associated with the technology, design, and production of venture's products or services. This is the degree to which the pre-deal assessment of product factors of a venture match post deal assessments.
3) Accuracy of market assessment. Any elements external to the firm in the marketplace. These include issues related to customers, competitors, distributors, industry trends, and the growth in gross domestic product of a nation or global geographic region. This is the degree to which the pre-deal assessment of market factors of a venture match post-deal assessments.
4) Accuracy of money assessment. Any elements related to the financial position of the new venture (assets, liabilities, equity, income, expenses, cash flow, etc.). This also includes capital requirements, the cost of capital, structure of ownership, legal issues, and issues related to the firm's ability to

secure short- and long-term financing. This is the degree to which the pre-deal assessment of money factors of a venture match post-deal assessments.

Human capital

The propensity of a person or group to perform behaviors that are valued by an organization.

Human capital valuation

The process by which the venture capitalist appraises the value of the human capital of a venture.

Job analysis

The process of articulating the behaviors that are valued by an organization for a given position or role. A formal job analysis may be a list of 10-50 specific behavioral dimensions that serve as a "blank scorecard" against which candidates are rated.

Knowledge

A body of information that can be directly applied to the performance of tasks (Heneman & Heneman, 1994).

Later-stage deals or cases or companies

Later stage deals are investments in companies that are more mature than early-stage deals. Later-stage deals are operationalized as deals that are beyond response category #2 (1st stage) as indicated by item #14 on the questionnaire. These are typically companies that are already selling a product or service and that need venture capital financing in order to expand, build new factories, etc.

Limited partner

An investor who provides funds to be invested by a general partner. Limited partners take a passive role, compared to general partners, in selecting targets companies in which to invest.

Management

The term in the new venture creation literature to refer to human capital. In this literature, management usually refers to the characteristics of the person or people associated with a venture (relevant industry experience, level of motivation, etc.) The term in this context refers to the managers themselves, not the practice of management.

Motivations

Refers to the extent to which a person is driven to perform specified behaviors. In this way, it is both a level (how motivated are they?) as well as a direction (motivated to do what?).

Multiple assessors

When more than one person interviewed senior management during due diligence.

Network

The professional relationships a person possesses.

Non-past-oriented interactions

Interactions between the venture capitalist and senior management team that cover topics other than the actual career experiences of the senior management. Work samples and informal discussions are included in non-past-oriented interactions. These discussions seek not to gather actual past behavioral data, but gather data on present behaviors or "best behaviors."

Organizational culture

The set of important assumptions that members of a community share in common (Sathe, 1985).

Past-oriented interview

An interview format that focuses on a candidate's actual career experiences and seeks to record actual behaviors that were performed. The assumption with this format of interviewing is that past behavior is the best predictor of future behavior. This format is different from "hypothetical," "situational" or "future-oriented" formats which ask

questions not about the person's actual experiences, but what they "would do" in imaginary situations. Past-oriented interviews are grounded in reality.

Reference interview

A discussion intended to transfer behavioral data from a person (key informant) who has previously worked with a person or group to a member of a venture capital due diligence team. Examples are discussions with the candidate's personal references, past employers, past coworkers, current coworkers, industry players/competitors, suppliers, customers, lawyers, accountants, bankers, or other investors.

Skill

Skill refers to an observable competence to perform a particular task.

Stage

The level of development or maturity of a venture. In this study, "early stage" is defined as the "seed" or "startup" stage. In the seed stage, the venture is little more than an idea. At the startup stage, the company may have developed a product or service but revenue may be very small or non-existent. "Later stage" deals in this study include companies that are beyond the startup stage. These companies may be requesting venture financing in order to fund major expansions or acquisitions.

Target company

A company in which a venture capitalist is considering making an investment. Also known as a prospective portfolio company.

Values

Refer to preferences that people have that relate to work. Interpersonal styles, honesty standards, and openness are all examples of work-related values.

Venture (or new venture)

A company or proposal or idea for a company that needs outside financing in order to grow. The difference between a new venture and a "small business" is that the former is more often driven by growth whereas the latter will remain small (Timmons, 1990). A venture is also known as a "portfolio company" once it is owned by a venture capitalist.

Venture capitalist

An investor who is a member of a venture capital firm.

Venture capital firm

A person or group of persons who provide young companies with financial capital and know-how in exchange for stock or debt (less often) in order to help them grow and prosper. Synonyms are venture capitalists, venture capital funds or venture capital partnerships. I use the term venture capitalist in the broadest sense to refer to private equity investors who are involved in seed, 1st-stage, 2nd-stage, 3rd-stage, or leveraged buy-out (LBO) or bridge transactions. Venture capitalists are motivated to maximize the financial performance of their companies since the financial performance of venture capital firm is a function of the performance of the ventures in which they invest.

Venture capital firm performance

The amount of value a venture capital firm creates. Operationalized, it is what is called the internal rate of return (IRR), expressed as a percentage. The internal rate of return is essentially the interest rate that reflects the growth in the value of one's investment per year. A 5% IRR is roughly equivalent to a savings account at a bank in which the investor receives some interest every period and then reinvests it into the savings account. Venture capitalists expect a higher IRR (upwards of 20%), since investing in new ventures is more risky than investing in one's savings account at a bank.

In their study of 130 venture capital partnerships, Bygrave and colleagues (1989) found mean IRRs for venture capital firms ranging from 6% to 32% per year, which varied greatly by calendar year.

VC fund

A pool of cash that a venture capitalist is charged with investing on behalf of limited partners.

Work sample

A method of assessment where the assessor observes the assessee performing behaviors that are relevant to the job. In the context of venture capital due diligence, work samples take the form of interactions between venture capitalist and senior management in which the former observes how well the latter performs relevant behaviors like making presentations, communicating in writing, formulating strategy, goal-setting, organizing, facilitating meetings, answering questions about topics related to finance, markets, products, or any other part of the business, etc.

APPENDIX B

TELEPHONE INTERVIEW QUESTIONNAIRE

1. CASE #_____

Paragraph of Informed Consent

Thank you for participating in this study on management assessment in venture capital. The data from this interview will not be connected with your name, the name of your firm, nor the names of the portfolio companies in any publications resulting from this study without your prior written permission. The only caveat to confidentiality is if a U.S. Court subpoenas the information, which in our estimation is highly unlikely. You may discontinue participation at any time if you wish without penalty. Your participation indicates that you have been made aware of foreseeable risks and that you voluntarily agree to be interviewed for this study.

Print Name_____

Signed_____ or (O Agreed on phone)

Date_____

May I have your permission to audiotape this interview? O Yes O No

Intro:
Thank you for participating in this project.

Let us talk about two deals in which you were involved. Both will be deals where 1) you had a significant role in overseeing the due diligence process 2) had not previously backed the entrepreneur or management team, and 3) enough time has passed since the close of the deal to know how accurate your assessment of the management was during due diligence (e.g. 6 months or so). The more recent the deals, the better. Finally, if possible, pick one deal in which the management assessment was considered to be more on the accurate side, and one in which it was more inaccurate.

2. VC firm name _____

3. Address _____

_____

4. Telephone (_____)_____

5. Interviewee name _____

_____

6. Size of your investment in this deal ($): _____

7. Portfolio company's industry or type _____

I. Background Information

8. What was your role in this deal?

9. How long had you been in the venture capital industry at the time of the close?
_____**Years**.

10. _____# of deals you had been involved in at that point

11. Would you characterize the company in this deal as (1) Not high tech (2) High tech?

12. Date when interest in the venture began. _____ yy/mm/dd

13. Date the deal was closed. _____ yy/mm/dd

14. Type of deal stage. (1) Seed (2) 1st stage (3) 2nd (4) 3rd (5) Bridge +

15. Date today. _____ yy/mm/dd

16. After this interview, I would like to contact another member of the due diligence team, with your permission. This second interview lasts only about 5 minutes, and it covers just a fraction of the questions we will discuss. It helps make the study more robust since it will be based on two sources rather than just one for each deal. Who else was closely involved in this deal?

Second Source: _____

II. Accuracy of Human Capital Valuation

17. In light of the subsequent on-the-job performance of the manager(s), how accurate was the assessment of them during due diligence in this deal? Accurate means the degree to which the pre-deal performance predictions matched the post-deal on-the-job performance of the management (not to be confused with the overall success or failure of the deal).
(4) Very Accurate (3) More accurate than inaccurate (2) More inaccurate than accurate (1) Very Inaccurate.

18. To what extent were you surprised (either positively or negatively) by the performance of the management?
(4) Not at all surprised (3) Slightly Surprised (2) Very Surprised (1) Completely Surprised.

19. To what extent were other partners in your firm surprised by the performance of the management?
(4) Not at all surprised (3) Slightly Surprised (2) Very Surprised (1) Completely Surprised.

20. Did you remove or are you planning on removing the entrepreneur/CEO (for incompetence)?
(4) No (1) Yes

21. Did you remove or are you planning on removing other members of the senior management team?
(4) No (1) Yes What positions?_____

During due diligence and before the deal was closed, how did you rate the overall strength of the management team?

O 1 O 2 O 3 O 4 O 5 O 6 O 7 O 8 O 9 O 10
Very weak Very Strong

After the deal was closed, and you saw the management in action, how did you rate the overall strength of the management team?

O 1 O 2 O 3 O 4 O 5 O 6 O 7 O 8 O 9 O 10
Very weak Very Strong

22. Difference between preceding two scores = (4) if diff. = 0 or 1 (3) if 2 or 3 (2) if 4 or 5 (1) if 6+.

III. Deal Performance

23. Is financial performance data available for this deal? (2) Yes (1) No

If yes,

24. Please rate the financial performance of this deal:
(5) mega-winner (4) winner (3) neutral (walking dead) (2) loser (1) mega-loser

25. Compared to expectations, the performance of this deal:
(3) exceeded expectations (2) met (1) failed to meet expectations

26. What was the annualized IRR for this deal? IRR = _____%

27. Earnings Multiple (% of initial investment)=___

28. Date financial performance was calculated _____(yymmdd)

IV. Human Capital Valuation Methods

29. How would you describe your approach to assessing the human capital of the venture prior to doing the deal (not the product, market, or money factors, but just the people in the company)? What did you do and why? Art Critic? Airline Captain? Suitor? Other?

30. Number of members in company senior management team N=_____

31. Number of members in company 2nd tier N=_____

32. Number of members in company junior level N=_____

33. Total company members *N=* _____

Number of due diligence people on venture capital side of the deal:

34. VC (those from respondent's firm on DD team) N=_____

35. Accountants N=_____

36. Lawyers N=_____

37. Consultants N=_____

38. Other investors collaborating on DD (+ not collaborating) N=_____( )

39. Other N=_____

40. Total due diligence people on VC side *N=*_____

41. Size of VC fund for this deal: $ _____ pool of capital.

Now for the checklist of actions. For the ones you did, tell me approximately how many person-hours on VC side were spent doing it.

VC Due Diligence Person Hours

Job Analysis

42. Prior to talking with the senior management, did you identify the specific qualities or competencies that were considered important for the key people in that venture to possess? (3) Yes on paper (2) Yes but not on paper (1) No

43. If yes, how many hours were spent doing this? _____

44. If yes, what specific qualities did you <u>seek</u> to assess? (Can be at the individual, group, or organizational level).

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

Did you specifically seek to assess any of these? Which ones?
45. Demonstrates sustained and intense effort (2) Yes (1) No

46. Evaluates and reacts well to risk (2) Yes (1) No

47. Articulate in discussing venture (2) Yes (1) No

48. Attends to detail (2) Yes (1) No

49. Operates with a style that is compatible with mine (2) Yes (1) No

50. Demonstrates a thorough familiarity with the market targeted by the venture (2) Yes (1) No

51. Demonstrates leadership (2) Yes (1) No

52. Utilizes knowledge base gained from a track record relevant to venture (2) Yes (1) No

VC Due Diligence Person Hours

53. If you responded "yes" to conducting the job analysis part on paper, how much time was spent assigning ratings of each person on the specific behavioral dimensions? _____

Documentation Analysis

54. Time spent reviewing resumes of senior management team? _____

55. Reviewing resumes of 2nd tier people (VPs)? _____

56. Reviewing resumes of juniors? _____

57. Reviewing credit check of senior management? _____

58.Verifying written documentation? (i.e. degrees, etc.)? _____

59. Reviewing articles on key people? _____

60. Performing a "name search" in legal records? _____

61. Using on-line or other media to gather info on key people? _____

62. Total hours documentation analysis _____

Past-Oriented Interview

63. Talking with entrepreneur/CEO about his/her actual past experiences? _____

64. Was this discussion chronological in format? (2) Yes (1) No

65. Talking with other members of senior management about their actual experiences? _____

66. Were these discussions chronological in format? (2) Yes (1) No

67**. Multiple interviewers** of senior management? (2) Yes (1) No

68. Talking with 2nd tier about their actual experiences? _____

69. Talking with junior members about their actual experiences? _____

70. Take a lot of notes during the above interactions? (2) Yes (1) No

71. Total hours past-oriented interviewing _____

Reference Checking Discussions on Senior Management's Human Capital
How many person-hours on the VC side were spent conducting reference checking discussions on senior management with the following sources?

VC Due Diligence Person Hours

72. With senior management's personal references? _____

73. With past supervisors? _____

74. With industry players? _____

75. With current employees? _____

76. With suppliers? _____

77. With customers? _____

78. With lawyers? _____

79. With accountants? _____

80. With bankers? _____

81. With other investors? _____

82. Other?_____ _____

83. Total hours reference checking _____

84. How extensive was your network relevant to this deal at the time? How many people could you have called to learn about the senior management team?
_____ # in relevant network.

85. Hours **Psychological Testing** senior managers. _____
If so, types of tests: _____

86. Was an outside professional used to conduct an assessment of the human capital?
(2) Yes (1) No

If yes, what did he or she do and how much time was spent on each method?

Method	Time
_____	_____
_____	_____
_____	_____

Note: This time should be entirely included in the previous items.

87. Was a private investigator used to investigate senior management?
(2) Yes (1) No

If yes, what did he or she do and how much time was spent on each method?

Method	Time
_____	_____
_____	_____
_____	_____

Note: This time should be entirely included in the previous items.

Work Sample: Evaluating senior managers by direct observation and interactions.

88. Hours spent administering formal assessment center? _____
(Assessment center is a formal group of exercises or simulations designed to observe the senior management's performance.

Person-hours on VC side talking formally with senior management about:
89. Financial issues _____

90. Product and market issues _____

91. Other_____ _____

92. Total hours work sample _____

93. Casual, informal interactions (meal time discussions, etc.) _____

94. Had any member of the VC due diligence team previously worked with any member of the senior management team?
(2) Yes (1) No If yes, whom and in what capacity?

95. Other methods used to conduct human capital valuation?
_____
If yes, what?

Method	Time
_____	_____
_____	_____
_____	_____

96. **TOTAL Time Conducting Human Capital Valuation =_____**

97. (If less than perfect HCV). In assessing the people part of the deal, what do you wish you would have done differently?

98. In retrospect, do you wish you spent more time or less time assessing the people (or just the right amount of time)?
(3) More (2) Less (1) Just the right amount of time

Overall, why did you chose to not perform more of the actions we discussed?
99. perception that it would not have been worth the time (2) Yes (1) No
100. did not want to irritate the venture's senior management (2) Yes (1) No
101. not aware of the various methods (2) Yes (1) No
102. not comfortable doing it (2) Yes (1) No

103. fear of legal action (2) Yes (1) No
104. other_____ (2) Yes (1) No
_____

I am interested in what you think about a few of the methods or actions we discussed. For this deal, tell me how useful a method was from 1 (not useful) to 10 (very useful). If you did not use a method, tell me in words what you think about it.

105. How about job analysis? (1-10)

106. How about documentation analysis? (1-10)

107. How about past-oriented interviews? (1-10)

108. How about reference checking? (1-10)

109. How about sending senior managers through a formal assessment center? (1-10)

110. How about observing and interacting with senior management directly? (1-10)

111. How about psychological tests? (1-10)

112. In this deal, to what extent did you rely on gut feel vs. a data-driven approach to assessing management?
(4) All data, no gut (3) Mostly data, some gut (2) Mostly gut, some data (1) All gut

113. (If applies). The methods you used in this case differed from the ones you used in the other case (provide examples to the respondent). Why the difference?

V. Control Variables

Interviewer Skill

114. How would the interviewers rate their interviewing skills at the time of the deal? (Skills do not refer to the methods used, but factors such as rapport building, appropriate time spent listening, ability to ask probing questions, read non-verbal behaviors, etc.)
(4) Very High (3) High (2) Low (1) Very Low

115. How would other members of your firm rate the interviewers' skills?
(4) Very High (3) High (2) Low (1) Very Low

Industry Experience

116. How many years of experience did the venture capital due diligence team have in the industry relevant to this deal at the time of close?
_____Combined years of venture capitalist due diligence team members

How accurate were your assessments of:
117. Product factors (design, production, etc.)
(4) Very Accurate (3) More accurate than inaccurate (2) More inaccurate than accurate
(1) Very Inaccurate.

118. Market factors (customers, competitors, etc.)
(4) Very Accurate (3) More accurate than inaccurate (2) More inaccurate than accurate
(1) Very Inaccurate.

119. Financial factors
(4) Very Accurate (3) More accurate than inaccurate (2) More inaccurate than accurate
(1) Very Inaccurate.

VI. Human Capital Deficiencies.

120. In looking back on your pre-deal assessment of management compared to their on-the-job performance, what were their most salient weaknesses or limitations in the human capital that you did not detect during due diligence? (Can be at the individual, group, or organization level).

_____ _____ _____

_____ _____ _____

_____ _____ _____

121. Now chose one of the dimensions you just mentioned. Describe an example of if and/or how this human capital dimension negatively affected the company's performance.

HC Dimension	Behavior	Effect on New Venture Performance
_____	_____	_____

VII. Track Record of Accuracy of Human Capital Valuation.

In the past 10 deals in which you were closely involved, tell me how many human capital valuations were:

122. ____% Very accurate (Absolute number = _____).

123. ____% More accurate than inaccurate (Absolute number = _____).

124. ____% More inaccurate than accurate (Absolute number = _____).

125. ____% Very inaccurate. (Absolute number = _____).
100%.

_____

Now, go onto the second case and repeat the questionnaire, or if this is the second case, thank them for their participation and ask if they would like a summary of the results of the study.

126. (2) Yes, send them the report (1) No, do not send the report.

Second Source Interview

127. Name of interviewee _____.

128. Role in deal_____.

Accuracy of Human Capital Valuation and Other Items

129. In light of the subsequent on-the-job performance of the manager(s), how accurate was the assessment of them during due diligence in this deal? Accurate means the degree to which the pre-deal performance predictions matched the post-deal on-the-job performance of the management (not to be confused with the overall success or failure of the deal).
(4) Very Accurate (3) More accurate than inaccurate (2) More inaccurate than accurate (1) Very Inaccurate.

130. To what extent were you surprised (either positively or negatively) by the performance of the management?
(4) Not at all surprised (3) Slightly Surprised (2) Very Surprised (1) Completely Surprised.

131. To what extent were other partners in your firm surprised by the performance of the management?
(4) Not at all surprised (3) Slightly Surprised (2) Very Surprised (1) Completely Surprised.

132. Did you remove or are you planning on removing the entrepreneur/CEO (for incompetence)?
(4) No (1) Yes

133. Did you remove or are you planning on removing other members of the senior management team?
(4) No (1) Yes Position?_____

During due diligence and before the deal was closed, how did you rate the overall strength of the management team?

O 1 O 2 O 3 O 4 O 5 O 6 O 7 O 8 O 9 O 10
Very weak Very Strong

After the deal was closed, and you saw the management in action, how did you rate the overall strength of the management team?

O 1 O 2 O 3 O 4 O 5 O 6 O 7 O 8 O 9 O 10
Very weak Very Strong

134. Difference between preceding two scores = (4) if diff. = 0 or 1 (3) if 2 or 3 (2) if 4 or 5 (1) if 6+.

135. Prior to talking with the senior management, did you identify the specific qualities or competencies that were considered important for the key people in that venture to possess? (3) Yes on paper (2) Yes but not on paper (1) No

136. How would you rate the interviewing skills of the interviewers in this deal? (4) Very High (3) High (2) Low (1) Very Low

VC Due Diligence Person Hours

137. Time spent reviewing resumes of senior management team? _____

138. Reference checking senior management's personal references? _____

139. Hours psychological testing senior managers? _____

APPENDIX C

FACSIMILE OF INVITATION TO PARTICIPANTS

Date: Date, 1997
To:
Company:
Pages: 1 (including this one)

From: Geoffrey Smart
Program in Psychology
Claremont Graduate University

RE: Ph.D. Dissertation Study on Management Assessment Methods Used During Due Diligence

Dear xxxxxxxx,

xxxxx participated in this study and referred me to you because xxxxx thought you would find it worthwhile as well. I am a Ph.D. student working on a major research project on management assessment during venture capital due diligence. You are invited to participate. The purpose of this study is to advance our understanding of how to achieve the most accurate management assessments possible during due diligence. The time commitment is a 90-minute interview in which we will discuss two deals in which you were involved. Each VC thus far has considered it time well-spent. David Gladstone, formerly president of the largest public venture capital company in the U.S., called the study "a gigantic first step" and referred me to several of his colleagues. GPs from over 40 private equity firms have participated including: Mayfield, TA, Battery, Frontenac, KKR, and Bessemer. Why participate?

You will receive a copy of the only "best practices" study ever conducted on this important topic; learn what others do to assess management; contribute to scholarly research in your field; help out a student; possibly sharpen the accuracy of your management assessments and reduce the time it takes. Please ask xxxxxxxx to phone me with your interest and availability: (773) 327-3398. Thank you in advance for your help.

Sincerely,
[signed]

APPENDIX D
NORMATIVE MODEL FOR ACCURATE HUMAN CAPITAL VALUATION: VC#33

Venture capitalist #33 follows a process of human capital valuation that has allowed him to achieve a strong track record. He has achieved a "very accurate" human capital valuation in 9 out of the last 10 deals in which he was involved. Only one deal was considered more inaccurate than accurate. This appendix illustrates his methods and overall process of human capital valuation. Venture capitalist #33 has been in the venture capital industry for 15 years. He said that he views human capital valuation as one of the most difficult and most important parts of his job.

Typology

VC#33's approach to human capital valuation can be categorized as the airline captain typology. He believes that it is possible to achieve an accurate human capital valuation, he uses a written job analysis, collects a lot of data, uses multiple methods, and has a systematic data collection and analysis process.

Job analysis, 1 hour.

At the beginning of every due diligence process, VC#33 makes a written job analysis. This document is based on the written business plan for the company. Since VC#33 specializes in a specific stage firm in a specific industry, it does not take him long to assemble a job analysis. He will identify the key competencies or human capital attributes that are considered important for the success of the venture. As he said, "I try to list and rank skills-sets that will be required to accomplish the plan." VC#33 refers to the document as "the checklist." The nine primary skills-sets that he identified for the case we discussed were: team-building skills (to grow the company), specific industry knowledge, financial skills, entrepreneurial skills, analytical skills, strategic thinking, planning, skills related to operating retail stores, and knowledge of how to purchase real estate. This job analysis was used at the end of the six-month due diligence period to help guide the discussions he had with his partners about the human capital. He said

that they debated about where limitations were in the human capital and whether these were critical or not. The job analysis provided the focus for the debate.

Documentation analysis, 22 hours

In the case we discussed, VC#33 hired his law firm to conduct an in-depth background check on the target managers, including a name search in legal records, using on-line media to gather information on key people, and searching for published articles written about or by members of the management team.

Past-oriented interviews, 100 hours

This venture capitalist has very lengthy discussions with individual members of the target management team about their actual past experiences and behaviors. He said that he likes to "probe for specifics." In total, across 6 months of due diligence, he estimated that he and his partner on the deal spent 80 hours in past-oriented interviews with the CEO, and 10 hours each with the remaining 3 members of management. These discussions were described as "chronological," and the VC said that he took a lot of notes during these interviews.

Reference interviews, 54 hours

VC#33 was very enthusiastic about the usefulness of reference interviews. He does not just call people to whom he is referred by the target managers. He calls everybody he can who may have insights into the target managers. VC#33 and his partner called 9 different categories of references: personal references (1 hour), past supervisors and coworkers (12 hours), industry players (12 hours), suppliers (10 hours), lawyers (1 hour), accountants (1 hour), bankers (2 hours), other investors (5 hours), and past employees (10 hours).

Work samples, 145 hours

VC#33 spent a lot of time in work samples as well. He and his partner allocated a total of 145 hours to discussions with the management about the following topics:

financial issues (25 hours), product and market issues (100 hours), and government regulatory issues (20 hours).

Human capital valuation, 328 hours

The entire process took 328 hours. His accuracy rating on the deal we discussed was "very accurate." VC#33 said that he believes that a rigorous and thorough human capital valuation process is needed every time in order to ensure a high level of accuracy.