



The Use of Effectuation in Venture Capitalist Early-Stage Investment Decision Making in China

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Glossary of Terms

Term	Definition
Agency problem	A conflict of interest arising between creditors, shareholders, and management because of differing goals. It could be aggregated concern of separation of ownership and control in a corporation, as the agents, who do not own the corporation's resources, may commit moral hazards (such as shirking duties to enjoy leisure and hiding inefficiency to avoid loss of rewards), merely to enhance their own personal wealth at the cost of their principals.
Angel investor	A wealthy individual who acts as an informal venture capitalist, placing his or her own money directly into early stage new ventures.
Bounded rationality	The idea that in decision-making, rationality of individuals is limited by the information they have, the cognitive limitations of their minds, and the finite amount of time they have to make a decision.
Carried interest	A share of any profits that the general partners of private equity receive as compensation, as a means to motivate the general partner (fund manager) to work toward improving the fund's performance.
Effectual logic	The logic of effectuation.
Effectuation	A new idea in entrepreneurship, holding that the future is unpredictable yet certain elements are controllable; focusing on intangible resources, the co-creation of value, and relationships and evolving out of the resources at disposal. It expands by forming relationships with others which are nurtured in an effort to co-create a future which rewards both parties. It welcomes surprises, taking advantage of unexpected events to transform them into new opportunities. The process takes a set of means as given and focus on selecting between possible effects that can be created with the set of means.
Equity financing	The act of raising money for company activities by selling common or preferred stock to individual or institutional investors. In return for the money paid, investors receive ownership interests in the corporation.
Expected utility	An economic term summarising the utility that an entity or aggregate economy is expected to reach under any number of circumstances; calculated by taking the weighted average of all possible outcomes under certain circumstances, with the weights being assigned by the likelihood, or probability, that any particular event will occur.
Heuristic	Experience-based technique for problem solving, learning, and discovery; a strategy using readily accessible, though loosely applicable, information to control problem solving in human

	beings and machines.
Information asymmetry	A situation in which one party in a transaction has more or superior information compared to another, which often happens in transactions where the seller knows more than the buyer, although the reverse can happen as well. Potentially, one party can take advantage of the other party's lack of knowledge.
Initial public offering	The first sale of stock by a private company to the public.
Normative economics	A perspective on economics that incorporates subjectivity within its analyses; the study or presentation of "what ought to be" rather than what actually is.
Real option	An alternative or choice that becomes available with a business investment opportunity. It can include opportunities to expand and cease projects if certain conditions arise, amongst other options. It is referred to as "real" because it usually pertains to tangible assets, such as capital equipment, rather than financial instruments.
Satisfice	Decide on and pursue a course of action satisfying the minimum requirements to achieve a goal; a decision-making strategy that attempts to meet criteria for adequacy, rather than to identify an optimal solution.

Abstract

This study investigates how venture capitalists in China make early-stage investment decisions under uncertainty. Within this context, it examines why early-stage venture capitalists use effectuation (involving emergent strategy) in contrast to prediction (concerned with planned strategy) and how the experts and novices differ in their use of effectuation.

Venture capital is important for entrepreneurship development. The topic of how venture capitalists make investment decisions has attracted extensive research efforts over the last few decades. The majority of these studies assume venture capitalists' decision making is a rational process based on prediction. However, early-stage venture development is fraught with uncertainty and ambiguity. Prediction does not work effectively in such a context. Several recent studies have shown expert entrepreneurs use effectuation, which consists of a specific set of heuristics, to tackle uncertainty. This knowledge about entrepreneurs is relevant to venture capitalists as they participate in a similar environment.

This study develops a theoretical framework based on early-stage venture investment expertise and proposes a series of hypotheses along five specific dimensions contrasting effectuation and prediction. An extensively used qualitative method for researching expertise—Protocol analysis—was adopted in this study. 62 participants, including 32 expert early-stage venture capitalists and 30 novices, were asked to think aloud continuously as they solved problems associated with early-stage venture investment decision making.

The findings supported the central hypothesis that expert venture capitalists use effectuation to a significantly higher extent than novices. Specifically, expert venture capitalists are more likely than novices to emphasise execution, be sceptical about market data, and emphasise own personal knowledge of the product. Experts place significantly more emphasis on entrepreneurs' resources and on how venture capitalists' own means could add value to the venture. In addition, experts are more likely to consider the business development cost and partnership. They are more aware of unexpected contingencies and among the participants who acknowledged so, experts are more likely to emphasise the importance of exploiting opportunities

arising from contingencies.

This study also found that expert venture capitalists do not completely abandon prediction in early-stage venture investment decision making. Expert venture capitalists do not differ from novices in emphasising entrepreneurs' goal setting and competition. It is also found that experts place even more emphasis on expected return than novices do. Overall, this study suggests that expert venture capitalists' thinking process is more comprehensive, elaborated, and complex than novices'.

The study makes a significant contribution to the literature by challenging the conventional wisdom about how venture capitalists think and what actions they intend to take in relation to early-stage investment decision making. The knowledge generated may not only help early-stage venture capitalists improve their decision process and investment outcomes, but also allow entrepreneurs to secure venture capital more effectively and efficiently. Learnable elements are identified for training novice venture capitalists and fresh perspectives are presented to venture capital limited partners and entrepreneurship policy-makers for consideration. A future research agenda is proposed at the end of the thesis.

Declaration

I, Zhiqiang Xia, certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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Chapter 1 Introduction

The VC task is one that requires decisions be made in a highly uncertain environment, placing a strain on information processing capabilities and involving high levels of emotion and extreme time constraints (Zacharakis & Shepherd, 2001, p. 314).

1.1 Research Background

Venture capital commonly refers to equity financing of unquoted ventures ranging from the seed stage to the late stage of pre-initial public offering (IPO) (Haemmig, 2003). Venture capital is important for entrepreneurship development (Arthurs & Busenitz, 2003). It plays a catalytic role in the entrepreneurial process, with significant contributions to job creation, innovative products and services, competitive vibrancy, and the dissemination of the entrepreneurial spirit (Bygrave & Timmons, 1992b).

The availability of venture capital to new high-potential businesses has been viewed as critical in supporting a vibrant modern information economy (Kortum & Lerner, 2000). The scale and sophistication of the venture capital industry in the United States has made significant contribution to the U.S. economy's exceptional ability to propel innovation and technology commercialization (Maula, Autio, & Murray, 2005).

Venture capital is “patient and brave” money (Bygrave & Timmons, 1992b). For startup and early-stage firms, venture capital is an important source of funding because these companies cannot easily get access to the public securities market or institutional lenders (Gupta & Sapienza, 1992). The early-stage companies may not have created a product with a stable revenue stream and could suffer from the liability of newness in organizational development (Choi, Levesque, & Shepherd, 2008). For these companies, negative cash flows could prevail for several years before the original capital can be recovered. Some empirical data show that venture capital investment normally takes 30 months to reach a breakeven cash flow and 75 months

to recover the initial equity investment.

Without venture capital support from the early stage, the success of many world-class technology-based ventures, including Sun Microsystems, Intel, Microsoft, Amazon, Google, and more recently Facebook and LinkedIn, may not be possible as they could have been aborted or succumbed in early infancy.

The success of venture capital is partially owed to the unique way of its structure and operating process. A typical venture capital firm is organised as a limited partnership. Venture capitalists serve as general partners. They raise capital from various parties (institutional investors, pension funds, or wealthy families) and form investment funds. The suppliers of capital become limited partners of the fund. In order to maintain limited liability for tax and regulatory reasons, limited partners play a passive role and do not get directly involved in specific investment decisions or daily operations.

As general partners, venture capitalists are involved in the day-to-day operations and have full personal responsibility and legal liability for fund management. Venture capitalists typically contribute 1 percent of the fund capital. They receive an annual management fee of 1 to 2.5 percent of the fund's committed capital and 15% to 25% of any realised capital gains, which are referred to as carried interest. This arrangement creates a significant economic incentive for venture capitalists to align their interests with those of the limited partners in achieving high investment returns.

Figure 1 represents the core activities of limited partners, general partners (venture capitalists), and entrepreneurs in a typical venture capital process. Venture capitalists are expected to make good investment decisions on behalf of their limited partners. They need to collaborate with entrepreneurs and provide equity financing for promising business opportunities that can eventually generate high returns. However, more than just money, venture capitalists can bring value to ventures that is a unique mix of "capital and consulting" (Warne, 1988). Consulting refers to nonfinancial assistance such as strategic advice or connections to industry networks shared with the entrepreneurs to enhance the ventures' chances for success (Gupta & Sapienza, 1992).

Figure 1: The Venture Capital Flow

NOTE:
This figure is included on page 3
of the print copy of the thesis held in
the University of Adelaide Library.

Adapted from Bygrave and Timmons (1992b)

A venture capital fund can be a specialist or a generalist fund. A specialist fund may focus on certain industries, such as information technology, clean-tech, health care, or life science while a generalist fund may not constrain itself to any particular industries. The choice of which type primarily depends on the maturity of the target market rather than diversification considerations from the fund partners or subscribers' perspective. It is generally more sensible to create specialist funds in a more mature or sophisticated market due to the greater importance of specialised skills required for selecting and managing venture deals, whereas generalist funds are more prevalent in immature markets (Grabenwarter & Weidig, 2005).

Most venture funds have limited life spans (typically 10 years) and each venture capital firm commonly has several funds under management concurrently. With reference to the funds' operational mode, there are open-end and closed-end options. An open-end fund is available for subscription with newly issued quotas and/or for redemption at any time. With a closed-end fund, subscribers can exit only at a

pre-determined date specified in the fund information prospectus. The closed-end structure is preferred by venture capitalists when they establish funds, given the assured patience of the subscribers (investors) to this type of fund.

Venture capitalists provide capital and other resources to entrepreneurs in businesses with high growth potential in hopes of achieving a high rate of return on their investment (Sahlman & Soussou, 1981). In order to achieve this, venture capitalists select the most promising ventures to invest in.

How venture capitalists make investment decisions, therefore, has attracted extensive research efforts. It is believed that such knowledge not only helps venture capitalists improve their decision processes and investment outcomes (Zacharakis & Meyer, 2000), but also allows entrepreneurs to secure venture capital more effectively and efficiently. As a result, a large number of studies have emerged over the last few decades (e.g. Macmillan, Siegel, & Narasimha, 1985; Macmillan, Zemann, & Subbanarasimha, 1987; Muzyka, Birley, & Leleux, 1996; Shepherd, Ettenson, & Crouch, 2000; Zacharakis & Meyer, 1998) that focus on venture capitalist investment decision-making behaviour.

Underlying these studies are several perspectives about venture capitalist decision making. The majority of the studies assume their decision-making is a rational process enabled by criteria identification and the comparison of real information with the criteria (e.g. Hoban, 1976; Tyebjee & Bruno, 1984). Some researchers (Roure & Keeley, 1990) even assert that a venture's potential success can be predicted from the information contained in the business plan. That is to say, if you know the venture capitalists' decision criteria, you are likely to be able to predict if they will invest in a venture. Driven by this perception, many earlier studies have attempted to examine the criteria used by venture capitalists. The findings, however, are not satisfactory.

Zacharakis and Meyer (1998) review the relevant literature and find strong heterogeneity in the investment decision criteria employed by venture capitalists. This heterogeneity may be caused by many factors, including variances in the venture life cycle, nature of the industry, human cognitive differences, and different methods used. In rethinking the larger context of decision making, some researchers recognise that

merely looking at venture capitalist investment decision criteria alone is insufficient to understand the relevant subject matter (Zacharakis & Shepherd, 2007). Instead, they believe that it is more fruitful to examine the underlying investment decision process. In this regard, information processing theory (Anderson, 1990; Lord & Maher, 1990) is relevant. Barr et al. (1992) identified a model of information processing theory that may be relevant to venture capitalist investment decision making. It consists of three stages: information capture, information interpretation, and follow-up action. However, this theory appears overly rational and insufficient to help understand the actual venture capitalist decision process that occurs in the field.

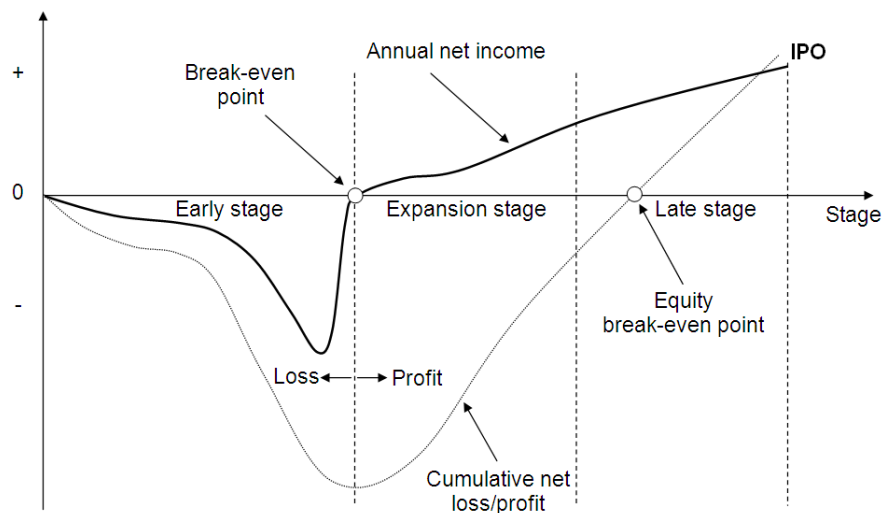
In a new venture setting, entrepreneurs and venture capitalists are often confronted with information overload, high uncertainty regarding success, novel situations, and time pressures (Baron, 1998). This environment is highly complex and full of information noise (Zacharakis & Meyer, 1998). Moreover, venture capitalists are human after all and have bounded rationality (Simon, 1959). In other words, it is impossible for venture capitalists to capture all relevant information and evaluate all options fully. In support of this notion, the existing literature has reported that venture capitalists are over-confident about their prediction abilities (Zacharakis & Shepherd, 2001) and might not really understand their own underlying decision processes (Zacharakis & Meyer, 1998). This may explain why researchers' persistent endeavours to develop predictive models for venture capitalist decision making may not generally reflect real venture capitalist investment decision making behaviour.

With environmental complexity and bounded rationality providing important contextual influences upon venture capitalist investment decision-making, heuristics—rules of thumb that are developed through experience over time, can assist (Tversky & Kahneman, 1973; Tversky & Kahneman, 1974). Heuristics allow people to make decisions based upon selective information from various attributes surrounding a decision (Eisenhardt, 1989). Zacharakis and Shepherd (2007) point out that the use of heuristics enables venture capitalists to cope with uncertainty. However, they do not identify, specifically, what heuristics venture capitalists use to tackle the central issue of uncertainty in this study and how those heuristics may be employed by the venture capitalists. These are underlying questions driving this study.

Among the various variables that make venture capitalist investment decision making complex (such as environmental complexity, information overload, information noise, bounded rationality, and uncertainty), the most challenging part is probably uncertainty. According to Knight (1921), uncertainty can be categorised into three types: (1) the known- that consisting of a known distribution of outcomes and unknown draws; 2) the unknown- that consisting of an unknown distribution and unknown draws; and 3) the unknowable- that consisting of a non-existent distribution where the very instances are unclassifiable (known as true uncertainty or Knightian uncertainty). Using Knight's (1921) classifications, venture capitalist investment decision making may fall within the unknown category.

Zacharakis and Shepherd (2001) highlight the high decision-making uncertainty that venture capitalists face. This situation is exacerbated when venture capitalist decision making occurs in relation to investment in early-stage ventures that are in the process of exploring ideas for which there may be no fully developed commercial products or tested markets yet (Dimov, Shepherd, & Sutcliffe, 2007). Figure 2 provides insights into the problem during the early stages of venture development.

Figure 2: Venture Development Financing Stages



Early stage	the time period before the venture achieves break-even (getting out from the survival challenge)
Expansion stage	the time period after the venture has achieved break-even and is experiencing high growth
Late stage	the time when the venture has relatively stabilised growth and is seeking IPO or leveraged buy-out

Adapted from Haemming (2003: 29) and Timmons & Spinelli (2009: 427)

Early-stage venture development is typically fraught with uncertainty and ambiguity (Afuah, 1998; Garud & Van De Ven, 1992). For early-stage technology commercialization, the instability of a new technology cannot be readily eliminated from the decision-making process. This type of uncertainty may offer no ‘valid basis of any kind for classifying instances’ (Knight, 1921; p. 225) and could be intimidating to decision makers.

Mr Foo Jixun, Managing Partner, GGV Capital, who was previously the Director of Draper Fisher Jurvetson ePlanet Ventures where he led investment in Asia such as Baidu (NASDAQ: BIDU) and Longcheer (SGX:L28), acknowledged the challenges of uncertainty faced by venture capitalists in early-stage investment decision making:

*A team, a business plan; just started with a so called business model...almost no data to analyse... this is what I call ‘early-stage’. Because there are no data, especially in an emerging market, the road in front is unclear. When I invested in Baidu, I had no idea about the future of online searching businesses. If I tell you I had, I would be lying.*¹

In such a decision-making context, although researchers think heuristics may help venture capitalists tackle uncertainty, little progress has been made in examining early-stage venture capitalist investment decision making in particular. That is partly due to the limited knowledge of heuristics in general and the inadequate attention paid to the nature and impact of uncertainty in early-stage venture investment decision making. Instead, research on heuristics in the entrepreneurship literature has primarily focused on those used by entrepreneurs (Zacharakis & Shepherd, 2007). For example, Baron (2000) examined the impact of cognitive and social factors on entrepreneurs’ success.

The new venture environment encourages the use of heuristics as entrepreneurs and venture capitalists face many similar challenges of uncertainty (Baron, 1998). Moesel et al. (2001) point out that much of the knowledge acquired through heuristics

¹ Extracted from the transcripts of a personal interview with Mr Foo Jixun, 30 November, 2009, in Shanghai.

research on entrepreneur decision making is relevant to venture capitalists as they participate in a similar environment. Therefore, what has been found about entrepreneurs' decision making under uncertainty may shed light on the understanding of early-stage venture capital decision making.

The theory of effectuation (Dew, Read, Sarasvathy, & Wiltbank, 2009; Sarasvathy, 2001a; Sarasvathy, 2001b, 2008) can provide important insights in this regard. Recent studies on entrepreneurial decision making have made significant progress through the theorizing and empirical testing of effectuation. Effectuation inverts the overall logic and several fundamental principles that are central to normative theories of predictive rationality (Read, Dew, Sarasvathy, Song, & Wiltbank, 2009a). Although effectuation consists of a specific set of heuristics (Dew et al., 2009), it is not simply a deviation from rationality. It integrates a variety of heuristics used by entrepreneurs into a thorough going logic of choice (Dew & Sarasvathy, 2002). Read et al. (2009a) argue that effectuation even goes beyond the use of heuristics and provides an alternative way of thinking in decision making based on predictive rationality.

Prior to the establishment of effectuation theory, the entrepreneurship process was more or less understood as a rationally planned, risk-taking, and/or linear process of opportunity recognition and exploitation (e.g., Bhava, 1994; Bird, 1988; Jenkins & Johnson, 1997; Shane & Venkataraman, 2000). Effectuation challenges the validity of the normative model of predictive rationality with a fundamental question: "Where do we find rationality when the environment does not independently influence outcomes or even rules of the game ... (when) the future is truly unpredictable, and the decision-maker is unsure of his/her own preferences?" (Read et al., 2009a: 2). Effectuation enables researchers to gain insights into the fundamental principles and actions undertaken by entrepreneurs that may occur in the field. It is not to say that predictive logic is not applied in the field; however, at times effectual logic may be just as (or more) relevant depending on the decision-making context at hand.

Because early-stage venture capitalists may face similar types of Knightian uncertainty that entrepreneurs face, they will need to make decisions under conditions where there are no historical trends of a possible investee venture, no previous levels of investee performance, and little market information. The underlying issue is not

whether early-stage venture capitalists act rationally or not, but how they can find rationality and make predictions in the face of multidimensional uncertainties?

Prior studies provide some insight into this question. For example, Sarasvathy (2007) finds that the more experienced venture capitalists are, the more likely they use effectual logic. Wiltbank et al.'s (2009) empirical study shows that angel investors employ effectual logic and that those angels who use it more widely benefit from experiencing a reduction in the number of negative exits without reduction in their rate of positive exits.

The following comments from Mr John Wu, Venture Partner, Northern Light Venture Capital and former Chief Technology Officer of Alibaba, support the conjecture that effectuation may be used as an alternative to predictive logic in early-stage venture capitalist investment decision making²:

Alibaba didn't know what business model to have in the beginning. Learning by doing, it took three years from 2000 to 2003 to figure that out. Honestly, it's just so difficult to predict the future. That's why for early-stage deals, I invest in people.

To summarise, there are still many questions requiring answers to explain how venture capitalists tackle uncertainty in their decision making. This issue becomes more prominent when we focus our interest on early-stage venture capitalist decision making where uncertainty is especially high. Effectuation theory originates in research on entrepreneurial expertise but that does not mean the use of effectual logic is restricted to entrepreneurs. Sarasvathy (2008) points out that effectuation is an integral part of human reasoning and it is especially relevant to decision making under uncertainty. This research is motivated to examine the application of effectuation in early-stage venture capitalist investment decision-making settings.

² Interview with Mr John Wu, 05 December, 2009, in Shanghai.

1.2 Research Questions

Within the context presented above, this research addresses the following three key questions:

- (1) *Do venture capitalists use effectuation in early-stage investment decision making?*
- (2) *In what ways do early-stage venture capitalists use effectuation?*
- (3) *How do expert and novice venture capitalists differ in their use of effectuation in early-stage investment decision making?*

1.3 Research Aim and Objectives

This research aims to contribute to a better understanding of venture capitalist early-stage investment decision making by examining the application of effectual (and predictive) logics and the differential use by expert and novice venture capitalists. In particular, the research addresses the following objectives:

1. To explore why venture capitalists may use effectuation and why expert and novice venture capitalists may differ in their use of effectuation;
2. To develop a theoretical framework based on venture capitalist early-stage investment expertise and the specific dimensions contrasting effectuation and prediction;
3. To empirically test the differences in the use of effectuation between expert and novice venture capitalists in early-stage investment decision making, analyse and explain the differences.

1.4 Significance of the Study

Given the importance of venture capital to new venture growth and technology commercialization, it is critical to understand how early-stage venture capitalists make investment decisions. Specifically, this study contributes to theory development by investigating how early-stage venture capitalists make investment decisions under uncertainty. Within this context, it examines why early-stage venture capitalists use

effectuation in contrast to prediction and how the experts and novices differ in their use of effectuation. The empirical findings makes a significant contribution to the literature by challenging the conventional wisdom about how venture capitalists think and what actions they intend to take in relation to early-stage investment decision making.

The close involvement of venture capitalists with startups suggests that the role of venture capital involves more than just selecting ventures to invest in; there is great opportunity for venture capitalists to add value to the investee firms in addition to providing financial capital. In other words, early-stage venture capital investment may contribute to a transformation process of new product or market creation rather than taking merely a passive approach of venture selection. The transformation perspective provides the basis for effectuation being applied by venture capitalists in making the decision of whether to invest in early-stage ventures to cope with the uncertainty. The findings from this study may not only help early-stage venture capitalists improve their decision process and investment outcomes, but also allow entrepreneurs to secure venture capital more effectively and efficiently at early stage.

Effectuation is textured and systematic, with eminently learnable and teachable principles and practical prescriptions of its own (Dew & Sarasvathy, 2002). The findings also provide the basis to formulate learnable techniques to train novice venture capitalists in decision making and problem solving that would otherwise take them longer to acquire via on-the-job experience. In addition, fresh perspectives are brought forward to venture capital limited partners and entrepreneurship policy-makers for consideration.

1.5 China as the Research Context

China is chosen as an appropriate research setting for several important reasons.

First, the special characteristics of China's institutional environment make China particularly suitable for this study. Investment in startups is full of challenges. In mature economies, venture capitalists have ways to reduce the risk associated with

new venture investment by focusing on non-systematic investment risk (Christensen, 2000b). Due diligence, strategy advice, management and personnel assistance, performance monitoring and exit planning are all available approaches for venture capitalists operating in developed economies. However, institutional stability and predictability in developing economies are typically not well present and China is no exception to this (Ahlstrom, Bruton, & Yeh, 2007). Startups in emerging economies share the liability of newness common to all new ventures, but bear further risk when operating in an unpredictable and volatile environment (Bruton & Ahlstrom, 2003). For example, venture capitalists in China need to play more roles and are faced with a broader set of tasks than is typical, further complicating their work (Liu, Zhang, & Hu, 2006). Effectuation works well especially in contexts of high uncertainty and ambiguity. China's business environment and particularly its fast growing but immature entrepreneurial activities plus relatively under-regulated nature of venture capital sector suggest that effectuation may be more relevant for understanding decision making by early-stage venture capitalists in China.

Second, venture capitalists operating in China have shown some distinctive behavioural characteristics, which are partly reflected in their investment decision preferences. Zacharakis et al. (2007) argue that venture capitalists' professional institution dictates what information is included in investment decision policies and the extent to which the information is emphasised is determined partly by the economic institution in which the venture capitalists operate. They find that venture capitalists in China (categorised as transitional economy) weight human capital factors more heavily than their counterparts in either the United States (mature market economy) or Korea (emerging economy). They conjecture that Chinese venture capitalists may use human capital information not only to assess entrepreneurs' trustworthiness, but also to assess their essential competence to succeed. Other studies find that entrepreneurs' social capital (Batjargal & Liu, 2004) and track record (Bruton & Ahlstrom, 2003) are critical for entrepreneurs to seek venture capital financing in China. Further to that, culture may also affect venture capitalists' investment behaviour. Kropp, Lindsay, and Hancock (2011) argue that national culture will influence venture capitalists' decision to invest in entrepreneurial ventures but a professional institution of venture capitalists may minimise some of the differences. In examining the influence of institutions which include cultural norms, customs and

traditions upon venture capitalists' decision preferences in China, Xia, Lindsay, Seet, and Goodman (2010) find significant differences in decision preferences between Chinese venture capitalists and their counterparties in Western countries. The finding suggests that institutions, and culture in particular, affect not only how venture capitalists use information but also what information they use.

While such significant differences do exist, to date few studies have been done on venture capitalist investment decision making in China. The literature has largely focused on North America and European venture capitalist decision-making environments and that may result in a biased view of the use of decision-making processes (Zacharakis & Shepherd, 2007). Ahlstrom, Bruton, and Yeh (2007) suggest that more exploration is needed of venture capitalist decision making in emerging economies that are increasingly becoming more free-market orientated and which are seeking to rapidly advance economically. This research fills such a gap in the literature.

Third, China has already become the second largest economy in the world and it has a fastest growing market for venture capital investment. In 2008 when this study started, the capital raised by venture capital funds in China increased from US\$1.30 billion in 2002 to US\$7.31 billion (Zero2IPO, 2009). Today the venture capital industry in China is growing at an even faster pace and the year 2011 saw a dramatic increase. In 2011 alone, from January to November, a total of 323 funds were raised by foreign and domestic institutions, up 118.2% year-on-year (in terms of the same period in 2010), hitting a historic high. The capital raised during this period reached US\$26.46 billion, up 162.0% year-on-year (Zero2IPO, 2011). The number of new funds and the amount raised each year in China from 2002 to 2011 are presented in Figure 3, which shows a clear trend of growth in the last 10 years.

Figure 3: Venture Capital Fundraising in China

NOTE:
This figure is included on page 14
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Source: Zero2IPO (2011)

In the past this growth in funds was largely traced to the foreign capital particularly from the United State where venture funds had raised large amounts of capital but the opportunities to invest the capital in the United States were limited after the Internet crash. As these foreign venture capitalists began looking for alternative domains to invest, the growth opportunities associated with the “China story” quickly caught their attention. As a result, many foreign venture capital firms have invested part of their portfolio in China (Ahlstrom et al., 2007). As shown in Figure 4, the amount of raised by USD funds had prevailed over RMB funds from 2004 to 2008. In 2009, Chinese government adopted a series of macro-control policies to cope with the international financial crisis, some of which greatly encouraged the growth of Chinese domestic venture capital funds (Wang, Zhang, & Liang, 2010). As a result, RMB funds started to overtake USD funds in both number and amount of fundraising from 2009. 2011 saw the rapid development of domestic limited partners contributing to the highest fundraising boom of RMB funds in the history . Of the 323 new funds raised during January-November 2011, 295 (91.3%) are RMB funds, closing a total capital amount equivalent to US\$19.8 billion (74.8%), up 219.6% year-on-year respectively, in terms of the number and amount of fundraising.

Figure 4: Comparison of Venture Capital Fundraising between RMB Funds and USD Funds in China

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the University of Adelaide Library.

Source: Zero2IPO (2011)

Spurred by fundraising boom, venture capital investment hit a new high in terms of both the number and amount. A total of 1,401 deals were closed in January-November 2011 and the investment amount disclosed reached US\$11.73 billion, a year-on-year upsurge of 98.2% and 163.8% respectively. In terms of geographic distribution of venture capital investments in this period, Beijing, Shanghai, and Shenzhen remain as the top three cities. The early-stage investments surged up to 316 deals capitalised at US\$1.8 billion, accounting for approximately 20% of the investments across all stages in 2011 (Zero2IPO, 2011).

Given China's economic impact resulting from its absolute economic worth and the fast-growing entrepreneurship and venture capital investment activities, apparently this country is an attractive point to study venture capitalist investment decision making.

Fourth, I have access to a significant number of experienced early-stage venture capitalists practicing in China, which is an added advantage to field data collection in relation to the nature of an empirical study on venture capital investment decision making.

1.6 Methodology Considerations

Concurrent verbal protocols are collected and analysed to examine the differences in the use of effectual versus predictive logics by expert and novice venture capitalists in early-stage venture investment. This method requires subjects to think aloud continuously as they solve problems. It is designed to minimize the bias associated with retrospective recall such as interviews and to gain insight into the decision-making process which can be obscured using stimulus–response methods such as questionnaires (Ericsson & Simon, 1993) Verbal protocol analysis has been extensively used in analysing the decision-making processes of experts in areas such as accounting (Riahi-Belkaoui, 1989), management consulting (Young, 1988), medical diagnosis (Johnson, 1988), scientific discovery (Qin & Simon, 1990), venture capital investment criteria (Hall & Hofer, 1993), and entrepreneurial decision framing (Dew et al., 2009). In essence, concurrent verbalization allows a researcher to look directly inside the black box of the cognitive processes of an individual (Ericsson & Simon, 1980), while generating rigorously valid data about a participant’s decision-making processes (Ericsson, 2006). Therefore, protocol analysis is well suited for exploring the research questions.

In this study, I used a research instrument developed by Dew et al. (2009) to collect participants' verbal protocols about the use of effectual logic. The original instrument was adapted to present a representative early-stage venture investment scenario with relevant decision tasks for participants to solve, thereby generating data for capture. The protocols were coded and analysed, and the results reported.

The sample included expert early-stage venture capitalists who, either as individuals or as part of a team, have more than 10 years of early-stage investment (or equivalent) experience, invested in more than two early-stage companies, and achieved at least one company they invested in being listed publicly or bought out profitably by another investor. The sample also included novice venture capitalists, individuals who had basic business and investment knowledge and who worked as associates or junior managers in institutional venture capital firms.

1.7 Organisation of Thesis

The thesis is organised into six chapters. This chapter presents the research background, research questions, research aim and objectives, and a brief discussion of the methodology. Justification is given for why China is chosen as the research context. Chapter 2 provides a literature review on venture capitalist decision making to set the research ground and identify the gaps in the literature. It also introduces effectuation theory and explores how effectuation is relevant to venture capitalist early stage investment decision making. Chapter 3 develops a theoretical framework based on early-stage venture investment expertise and proposes a series of hypotheses along five specific dimensions contrasting effectuation and prediction. Chapter 4 presents a detailed description of the research method adopted in this study as well as data collection and analysis. Chapter 5 presents the research findings and discusses the results. Chapter 6 concludes the thesis with a discussion of the theoretical and practical implications of the findings, comments on the limitations of the research, and suggestions for future research. Figure 5 provides an overview of the thesis structure.

Figure 5: Thesis Structure

	Introduction (Ch.1)	
	<ul style="list-style-type: none"> • Research background • Research questions • Aim and objectives • Significance of the study • China as the research context • Methodology consideration 	
Theoretical Framework (Ch.3)		Literature Review (Ch.2)
Theoretical framework of effectuation for early-stage venture investment decision making	<div style="border: 1px solid black; display: inline-block; padding: 5px;">?</div>	Context of venture capitalist early-stage investment decision making
<ul style="list-style-type: none"> • Expected differences between experts and novices in early-stage venture investment decision making <ul style="list-style-type: none"> ○ Creation vs Prediction ○ Means Driven vs Goal Driven ○ Downside Protection vs Upside Attractiveness ○ Partnership vs Competition ○ Contingency ○ Acknowledging vs Ignoring 	<ul style="list-style-type: none"> • Do VCs use effectuation in early-stage venture investment decision making? • In what ways do early-stage venture capitalists use effectuation? • How do expert and novice venture capitalists differ in their use of effectuation in early-stage investment decision making? 	<ul style="list-style-type: none"> • VC decision making (overview of VC investment; normative perspective; information processing; information asymmetry; bounded rationality, heuristics and biases; risk versus uncertainty) • Decision making under Uncertainty (decision techniques to address uncertainty; search for a new paradigm) • Effectuation (effectuation vs prediction; effectuation & over-trust; effectuation & performance) • Applicability of effectuation in early-stage venture investment: (revisiting the problem space; VCs' non-predictive control, early-stage venture investment expertise, value-added activities, transformation)
	Methodology/ Data Collection (Ch.4)	
	<ul style="list-style-type: none"> • Methodology justification (methodology discussion, protocol analysis method, data validity) • Research design (protocol instrument, sampling criteria, pilot study) • Participants and data collection participant description, protocol experiment) • Data analysis (data transcription, coding process) 	
	Findings & Discussions (Ch.5)	
	<ul style="list-style-type: none"> • Results of hypotheses testing/discussions 	
	Conclusion (Ch.6)	
	<ul style="list-style-type: none"> • Theoretical implications • Practical implications • Limitations of the study • Directions for further research 	

Chapter 2 Literature Review

2.1 Introduction

Researchers holding the normative view of decision making assume that venture capitalists' decision making is a rational process based on prediction. However, evidence from empirical studies shows that venture capitalists suffer from bounded rationality, just like other human beings. Using the information-processing lens to examine venture capitalists' decision making, studies show that venture capitalists do not have a good understanding on their own decision-making process.

Facing information asymmetry and information overload, venture capitalists tend to use heuristics to resolve decision problems, even though heuristics may not generate the optimal solutions. Many researchers and institutions have expended extensive efforts to develop techniques to improve the accuracy of decision making under uncertainty, but their results are unsatisfactory because their fundamental assumptions are not valid. In general, these techniques try to assign subjective probability to decision alternatives but there is no way to estimate probability under uncertainty.

Heuristics allow decision makers to derive decisions based on fragments of information (Eisenhardt, 1989). It may help decision makers tackle complex decision problems efficiently. Along this line, a new paradigm is worth exploring to advance the knowledge of early-stage venture capitalist decision making which is fraught with complexity and uncertainty. Against this backdrop, effectuation emerges as an appropriate theory to address the gap in the literature.

Following a focused review of effectuation in contrast with prediction (causality) and the concern about overtrust which may possibly result from effectuation, this study discusses the applicability of effectuation in the context of early-stage venture investment decision making. I revisit the problem space and review venture capitalists' non-predictive control in relation to early-stage venture investment. With these being put in place, literature on early-stage venture investment expertise, venture capital value-added activities and transformation in the setting of early-stage

venture investment is reviewed, which also begins to address the first research question on whether effectuation is applicable to early-stage venture capital decision making.

2.2 Literature on Venture Capitalist Decision Making

2.2.1 Overview of Venture Capital Investment

Venture capital investment can be classified according to the different stages of venture development. These stages are normally referred to as seed, start-up, expansion and buyout or pre-IPO. The seed and start-up phases are considered early stage, as shown in Figure 2. Venture capitalists may invest in all stages but some choose to focus only on earlier or later stages. In terms of the early stage, especially the seed stage, venture capitalists invest modestly as the venture is typically still developing its technology and/or business concept. During the startup stage, the management team begins to form and the venture may have some products ready for marketing. However, most often the entrepreneurs do not yet have a clear business strategy due to various uncertainties within the company or in the external environment.

In recent years the preference of many venture capital firms has shifted to investing in later-stage or more established ventures. In the United States, the 1987 stock crash is one of the main factors pushing the investment focus away from early-stage ventures to mature firms and leveraged buyouts as well as mergers and acquisitions (Van Osnabrugge & Robinson, 2000). In China, starting from mid-2001, new investment funds became scarcer and many domestic venture capital firms were under pressure to generate profits, pushing them to shift priority from earlier to later stages such as growth and pre-Initial Public Offering (Tan, Wei, & Xia, 2008). Foreign venture capitalists tend to invest at earlier stages in China than their Chinese domestic counterparts (Tan et al., 2008; White, Gao, & Zhang, 2004). However, it is observed that some foreign venture capitalists have also become more concerned about time to realise returns on investment. They get more sensitive to the inherent risk and uncertainty in early-stage projects. To entrepreneurs and the development of entrepreneurship, it is therefore more important than ever to understand the decision

making of venture capitalists who do continue to invest in early-stage ventures. That is part of the motivation for this study focusing on early-stage venture financing.

For venture capital investing, the process comprises a series of activities from the time a venture is proposed to venture capitalists until the fund exits from the venture (Zacharakis & Shepherd, 2007). A model of the venture capital investment process proposed by Tyebjee and Bruno (1984) identifies five stages: (1) deal origination, (2) deal screening, (3) deal evaluation, (4) deal structuring, and (5) post-investment (see Figure 6).

Figure 6: Venture Capital Investment Process

NOTE:
This figure is included on page 21
of the print copy of the thesis held in
the University of Adelaide Library.

Source: Tyebjee and Bruno (1984)

An investment opportunity may come to the attention of venture capitalists through entrepreneurs' own initiative of cold calling or through referrals. Venture capitalists also actively approach targeted entrepreneurs whose technologies or inventions are of high commercial value. After initial identification of a venture, the venture capitalists will quickly review the business opportunity and make an initial decision on whether to drop the opportunity or investigate further. Time is a precious asset for venture capitalists. If a venture gets through the initial screening, it will be analysed in more depth at the evaluation stage. The management team, market factors, business models, and financials will be examined in detail. Due diligence will be conducted through

reference checks and formal market analysis. When necessary, professional consultancy services by technological or legal specialists will be engaged. If a deal successfully passes this juncture, the investment contract (term sheet) will be established through negotiation between the investor and investee. Finally, value-added services such as serving on the board, co-developing business strategies, and advising on further investment will follow up to enhance the success of the venture (Zacharakis & Shepherd, 2007).

Venture capitalists' key objective is to achieve significant capital gains for the fund under management. However, such success is unlikely if venture capitalists only invest in marginal ventures. Venture capitalists make many decisions across various stages of investment process described above. Selecting which ventures to invest in is critical to venture capitalists' investment performance (Zacharakis & Meyer, 2000; Zacharakis & Shepherd, 2007). In the multi-stage of new venture proposal evaluation, an important stage is proposal screening where the decision is made whether to reject the proposal outright or to pursue it further. This study mainly focuses on this stage as the basis for the decision experiment.

2.2.2 Normative Perspective of Venture Capitalist Decision Making

Decision making can be defined as the process of selecting a course of action among several alternatives based on the decision maker's values and preferences. The classical perspective of decision making is deeply rooted in the field of economics with most of the founding research initiated by economic researchers (e.g. Allais, 1953; Edwards, 1954; Ellsberg, 1961; Keeney & Raiffa, 1976; Lichtenstein & Slovic, 1971; Luce, 1959; Markowitz, 1952; Savage, 1954; Simon, 1959; Tversky & Kahneman, 1974; von Neumann & Morgenstern, 1947).

Within the domain of normative decision making, decision makers are assumed to be able to mathematically calculate and compare the economic utility of all alternatives and choose the one with maximum utility. Another implicit assumption is that all information required for a complete assessment of the alternatives is available.

While many models have been developed within this domain, decision-making

process typically comprises three key stages: (1) information acquisition, (2) information processing, and (3) choice.

The expected utility theory proposed by von Neumann and Morgenstern (1947) is one of the first normative decision-making theories to motivate extensive research on its generalisability. In advancing this work, however, researchers encounter two issues associated with expected utility computation. The first is subjective probability (Savage, 1954). The alternatives are difficult to weigh if the outcome has never occurred before and therefore the weighting is unknown. To the utmost, what decision makers can do is using subjective probability based on beliefs, instead of relative frequencies of the actual outcomes.

The second issue is randomness. The expected utility theory assumes stable preferences held in decision making. However, decision makers are found to be inconsistent in making choices at different times. This puzzle is only partly resolved by Luce (1959), who uses the randomness concept, explaining that importance weight is a probabilistic rather than fixed single value.

Following the normative decision-making perspective, determining the expected utility (von Neumann & Morgenstern, 1947) of each alternative is the central issue of decision making. In order to do this, rational decision makers should possess a list of predefined criteria. As such, the practice-oriented models have largely concentrated on how to define alternatives (Howard, 1988; McNamee & Celona, 1987) and specifying decision criteria (Keeney, 1988; Keeney & Raiffa, 1976) in real decision problems.

This line of thinking has significantly influenced the vast majority of early research on venture capitalist decision making. Because decision criteria are critical to determining utilities and the ultimate choices, much research effort has been exerted in finding what criteria venture capitalists use and how they use those criteria in decision making. Underlying such efforts is an assumption that venture capitalists are rational and their decision criteria are homogeneous throughout the venture capitalist group.

However, extensive research on venture capitalist decision making reveals strong heterogeneity in the criteria. A single study typically reports a list of anywhere from 10 to 30 criteria. The total number of criteria reported as being important by the whole literature easily exceeds one hundred. Several reasons have been identified to explain such heterogeneity. First, venture capitalists use different criteria at different stages of decision making (Tyebjee & Bruno, 1984; Wells, 1974). From screening to evaluation, venture capitalists' focus switches from a small set of rules to a wide range of preferred and compensatory attributes. Second, venture capitalists have different expectations at different venture growth stages. For example, entrepreneurs' dynamic capability in reacting to environmental challenges is considered important for an early startup, while entrepreneurs' performance within the firm is more heavily weighted for a late-stage venture. Third, venture capitalists' criteria may differ according to the ventures' industry type (Zacharakis & Shepherd, 2007). A high-tech venture can be evaluated quite differently from a traditional service-based firm due to different risk exposure pertaining to product, technology, venture life cycle, and industrial competitiveness. Therefore, the use and the weighting of specific criteria are highly contextual (e.g. Tyebjee & Bruno, 1984; Zacharakis & Shepherd, 2007). Even if a study focuses only on one of the basic criteria categories (such as entrepreneur, market, product, financial), there is not even consensus among venture capitalists on the perceived importance of a specific attribute.

Motivated to develop a better understanding of venture capitalists' decision making, and specifically the criteria being used, some researchers attempt to construct models to examine the problem. One of the early attempts is the discriminant coefficients function model proposed by Tyebjee and Bruno (1984). This model predicts a set of criteria based on venture capitalists' risk and return perceptions. The results show that managerial capabilities and resistance to environmental threats significantly influence perceived risk. Market attractiveness and product differentiation are found to affect the expected rate of return. In a follow-up interview after their survey, Tyebjee et al. (1984) found considerable disagreement among their respondents with respect to the influence of managerial capabilities. Some respondents commented that managerial capabilities are an indicator of potential return instead of risk. One interviewee even asserted that venture capitalists may not formally distinguish between risk and return. In view of the diversity in the responses and heterogeneity in venture capitalists'

practices, Tyebjee and Bruno concede that their model is “highly descriptive and lacks a theoretical basis” (Tyebjee & Bruno, 1984, p. 1065).

Recently, some researchers have attempted to investigate venture capitalists’ decision-making criteria from theoretical perspectives. Specifically they investigated whether the information used by venture capitalists in assessing new venture survival or profitability is consistent with that arising from the established strategy theories. Their reasoning is that what drives venture performance is what that is deemed important by venture capitalists. In such efforts, industry organisation strategy and the resource-based view emerge as two major theories to address the research questions. Shepherd and colleagues (2000) find industry-related competence is the most important criterion that venture capitalists use in assessing venture profitability. Shepherd (1999a) examined to what extent the decision criteria derived from industrial organization and ecological theory can predict new venture survival. Zacharakis and Shepherd (2005) derive their hypotheses from the resource-based view of strategy to test whether venture capitalists use nonadditive decision criteria when making investment decisions. These researchers argue that their results demonstrate the effectiveness and strength of using established theories for studying venture capitalist decision making. However, the industrial organization theory and resource-based view have long been seen as conflicting to theories providing different explanations of venture performance. Both theoretical perspectives are explicitly built into strong causal logic as to the mechanisms of rent generation (Spanos & Lioukas, 2001). The first theory argues that performance is determined by the firm’s positioning in the industry environment (McGahan & Porter, 1997), while the second suggests that performance is a function of distinctive resources possessed by the company (Barney, 1986a, b, 1991). Though Spanos and Lioukas have proposed a composite model which incorporates the effects of strategy, industry, and firm, no further progress has been made in terms of how the venture capital investment decision criteria can be further examined with this model.

Venture capitalists are believed to be experts in identifying promising ventures for investment (Zacharakis & Shepherd, 2001). According to Sahlman (1990), however, the performance of criteria used by venture capitalists to select projects reveals high rates of failure. Approximately 20 percent of business plans can pass an initial

screening and only 2-5 percent may ultimately reach the negotiation table for deal structuring. Such a rigorous process does not generate superior outcomes as expected. Thirty-five percent of the projects funded through venture capital disappear within 5 years (Ruhnka, Feldman, & Dean, 1992). About 80 percent of the venture capital-backed ventures end up with marginal survival or failure (Zider, 1998).

More recently, Zacharakis et al. (2007) shifted their research focus from the homogeneity of venture capitalists' decision making to explaining the variability of the criteria. They find that economic institutions have an impact on venture capitalists' use of decision criteria. Their study shows that venture capitalists in a rule-based market economy rely upon market information to a greater extent than venture capitalists in emerging economies. They also found that Chinese venture capitalists weigh human capital factors more heavily than both US and Korea venture capitalists.

Though the latest studies on venture capitalist' decision making are driven by theories, almost all of them adopt a normative approach. These studies assume that venture capitalists have good insight into their decision process, knowing well what criteria to use and how important they are. However, this assumption is challenged by studies using more sophisticated real-time experimental methods, such as verbal protocols and conjoint analysis (Shepherd & Zacharakis, 1999). Results from verbal protocol studies (Hall & Hofer, 1993; Sandberg, Schweiger, & Hofer, 1988; Zacharakis & Meyer, 1995) and conjoint analysis (Shepherd, 1999b; Zacharakis & Meyer, 1998) find that venture capitalists' espoused criteria differ from the criteria they actually use. These researchers argue that venture capitalists are not good at introspecting their decision process or perhaps they do not even understand their decision process. In order to develop a better understanding of venture capital decision making, it is sensible to examine this issue with a focus on information processing.

2.2.3 Information Processing

From a normative decision-making perspective, venture capitalists assess a venture's success potential by evaluating all kinds of information surrounding the venture. However, social judgment theory (Brunswik, 1956) from cognitive psychology holds that real information is always hard to get. Instead, decision makers need to read

information through proximal cues.

Zacharakis and Meyer (1998) suggest that the Brunswick lens model (Brunswick, 1955) provides a good framework for understanding venture capitalists' decision process. As depicted in a simplified form in Figure 7, this model comprises two symmetric submodels: the human judgement (cognitive model) and the environment in which the results of the judgment are determined (environmental model). The cognitive model provides an understanding of how the venture capitalist makes the decision in relation to the decision cues. The environmental model provides an understanding of what actually happened in relation to the decision cues. The proximal information cues (X_1, X_2, X_3, X_4, X_5) sit in the middle. In a new venture investment decision context, Y_s represents venture capitalists' judgment on the investment opportunity. r_{si} represents the correlation between the cues and the judgment. The larger the standardised r_{si} , the heavier the weight is assigned to the cue in influencing the decision (Stewart, 1988; Zacharakis & Meyer, 1998). Y_e represents the actual outcome and r_{ei} represents the predictive value (correlation) of the cues to the outcome.

Figure 7: Brunswick Lens Model

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This figure is included on page 27
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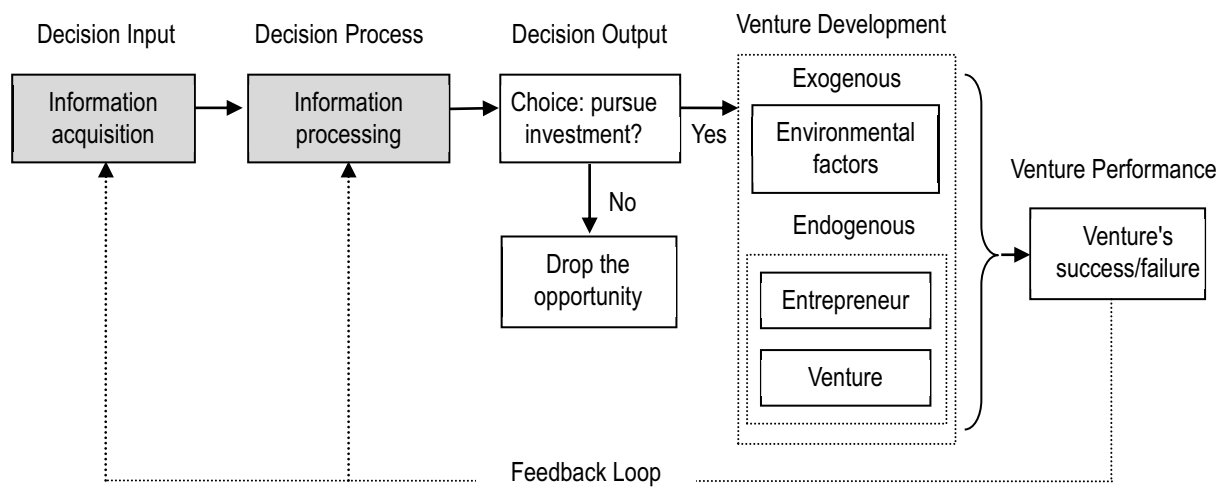
Adapted from Brunswick (1955)

In examining a new venture, the venture capitalist makes a judgment (Y_s , invest or not) about the venture's potential (Y_e , success or failure) based on the information cues (Wright, Liu, Buck, & Filatotchev, 2008). As the venture success or failure is ex post

investment and not directly observable, the outcome is inferred via tangible cues.

Figure 8 outlines the flow and dynamics of the venture capital investment decision-making process, the decision outcome in terms of the decision output and the eventual venture performance, and the feedback loop which enables venture capitalists to develop and adjust the perceived correlation between the information cues and the decision.

Figure 8: Venture Capital Investment Decision-Making Process, Outcome and Feedback Loop



Given an investment opportunity, the venture capitalists may search information cues consciously or unconsciously according to the categories such as market, product, management team and financials. Market information concerns anything related to customers, competitors, distributors, industry trends, economic growth and so on. Product elements comprise technology, design, patents, production, and so on. Within the management team category there are attributes such as, age of team members, level of education, field of education, prior job experience, relevant industry experience; and acquaintance among team members (Franke, Gruber, Harhoff, & Henkel, 2006). These attributes have not included other important factors such as the lead entrepreneur's leadership style, personal integrity, and capital contribution to the venture. Therefore, venture capitalists have to address tough challenges related to information overload and ambiguity (the non-observable nature of many attributes). Moreover, each venture capitalist has his or her differential perception and

understanding of venture performance factors. The interaction among various factors and the relationship between each factor to the ultimate decision outcome is highly contextual. With insufficient knowledge about the effects of the factors on the outcome of venture performance, the venture capitalist would not be able to tell whether certain information is really essential or merely noise. As such, the importance weight assigned to each cue is highly subjective, with the salient attributes being frequently overweighted (Fiske & Taylor, 1991; Zacharakis & Meyer, 1998). For example, entrepreneur characteristics might be thought to be more important than they actually are (Hall & Hofer, 1993). The reason is that a venture capitalist may be overly impressed by the lead entrepreneur's dynamic personality in a past success that he/she fixates on that attribute. As such, the investor may unconsciously build in his mind a cause-and-effect logic between entrepreneur characteristics and venture performance.

It should be noted that a feedback loop from the decision input and process to decision quality cannot be materialised until the venture capitalists actually observe whether the invested venture succeeds or fails, which can easily take years. Therefore, an inexperienced venture capitalist may not have enough opportunities to experience the feedback loops due to insufficient deal experience. As a result, the venture capitalists can only create subjective probabilities about the possible outcomes of the investment and attribute weighting lacks strong practical reference. It is thus not difficult to explain why some, if not all, venture capitalists do not have a comprehensive understanding of their investment decision process.

2.2.4 Information Asymmetry

Prior to information processing, venture capitalists must gather information about the venture and the entrepreneur before deciding whether or not to invest. In venture evaluation, they typically conduct due diligence to assess the venture as well as the entrepreneur (Tyebjee & Bruno, 1984).

Venture capitalists are concerned with making the following two types of errors in selecting ventures to invest in: (1) investing in a failing venture, or (2) failing to invest in a successful venture. Both errors will negatively impact venture capitalists'

investment performance. Although it is difficult to measure which mistake has a greater impact, from the psychology perspective, the venture capitalists are more concerned with the first type of mistake because they are more motivated to avoid losers (bad investments) rather than pick winners. In this respect, venture capitalists behave very similarly to angel investors (Lindsay, 2004; Mason & Harrison, 2002).

Two major factors may lead to these two errors: lack of decision ability and lack of good information. If the venture capitalists do not have adequate decision competency, good information will not warrant good decisions. Furthermore, without good information, it is almost impossible for venture capitalists to make good decisions.

At the time of information acquisition for investment decision making, venture capitalists are outsiders to the venture. The critical information is primarily controlled by the entrepreneurs who are the venture owners. There is also information that cannot be obtained in written form, such as entrepreneur personality, leadership style, and the details of former experience that would be useful to venture capitalists. In order to attract venture capital investment or secure better investment terms, the entrepreneurs have motives to be selective in the information they provide. In other words, they may hide certain weaknesses or overstate certain strengths. By doing so, they benefit from adverse selection through deliberate information misrepresentation at the cost of the venture capitalists' interests.

From the venture capitalists' point of view, entrepreneurs' trustworthiness is an intangible attribute that cannot be fully observed and verified when the investment decision is being made. Moreover, in addition to the role of information provider, entrepreneurs manage and develop ventures. After venture capitalists invest in a company, they become the principals and the entrepreneurs become the agents. According to Jensen and Meckling (1976), the agency problem is a common one:

The problem of inducing an "agent" to behave as if he were maximizing the "principal" welfare is quite general. It exists in all organizations and in all cooperative efforts-at every level of management in firms, in universities, in mutual companies, in

cooperatives, in governmental authorities and bureaus, in unions, and in relationships normally classified as agency relationships such as are common in the performing arts and the market for real estate (p.309).

When making investment decisions, venture capitalists must be forward looking and judge whether the entrepreneurs are competent and trustworthy for the long term rather than just the short term. Otherwise, the information asymmetry and agency problems concerning incentive and monitoring would surely enter into the picture. For example, the entrepreneur may choose not to put forth the effort originally agreed upon. Even when venture capitalists and entrepreneurs have the same information and are equally committed to the venture development, they may have disagreements about prioritising operating goals, including if and when to abandon a venture as well as how and when to cash in on investments (Sapienza & Gupta, 1994).

To cope with such agency risks, venture capitalists may resort to two approaches. The first approach is primarily concerned with implementing an effective contract between the venture capitalist and the entrepreneur (Jensen & Meckling, 1976). Although the contract can either be behaviour or outcome based, the entrepreneur's behaviour is not always observable or verifiable and measuring outcomes could be very costly. For technology ventures that thrive on experimentation and require trial and errors to facilitate innovation, formal contracts are usually not suitable or may be counterproductive (Faems, Van Looy, & Debackere, 2005). The second approach advocates ex post allocation of control over the invested venture through active involvement (Hart, 1995). While these approaches can help venture capitalists reduce information asymmetry risk to some extent, uncertainty is still present and cannot be fully eliminated. For early-stage venture investment, information asymmetry may aggravate the complexity and uncertainty faced by venture capitalists in their decision making.

2.2.5 Bounded Rationality, Heuristics, and Biases

Decision makers' rationality is limited by the information they have, the cognitive limitations of their minds, and the time constraint on making decisions. Herbert

Simon (1955) coined the term “bounded rationality” in response to the cognitive, social, and contextual constraints on human decision making. Bounded rationality sets constraint on decision makers in their information processing (receiving, storing, retrieving, transmitting).

Following expected utility theory, people need perfect information in order to achieve maximized utilities. In reality imperfect information is the norm. Departures from the normative theory of utility maximization in human decision making have been frequently identified by researchers (Simon, 1955; Wickens & Hollands, 2000). In the context of financial decisions, the limitations of decision makers’ information processing is demonstrated by prediction accuracy declining when the amount of information increases (Kanaan, 1993). In the venture capitalist decision-making context, Zacharakis and Meyer (1998) report similar findings.

Venture capitalists screen hundreds if not thousands of deals annually (Metrick, 2007). The sheer volume of information combined with the noise associated with the information easily exceeds venture capitalists’ cognitive capacity, particularly under time pressure. Given bounded rationality, however, people are comfortable with using less than perfect information and can adapt to “satisfice” rather than optimise (Simon, 1956). Zacharakis and Meyer (2000) argue that venture capitalists tend to use satisficing heuristics because most of them are swamped by entrepreneurs seeking funding. Therefore, they have to look for fatal flaws in the investment options to quickly eliminate the poor ones so as to allocate more time for the promising ones.

A heuristic may be defined as a rule of thumb, strategy, trick, simplification, or any other kind of device which drastically limits the search for solutions in large problem spaces (Barr & Feigenbaum, 1981). In corporate financial management practices, heuristics are frequently used due to the complexity of the decision environment (Kanaan, 1993).

Due to bounded rationality, venture capitalists seek to simplify the information process and thus also use heuristics. As shown in the literature, venture capitalists tend to use a variety of heuristics, including the noncompensatory heuristic (Khan, 1987), representative heuristic (Zacharakis & Shepherd, 2007) and satisficing heuristic

(Zacharakis & Meyer, 2000). The noncompensatory heuristic views each venture attribute as being independent and unique. Therefore, any weakness could potentially lead to a fatal flaw. The representative heuristic requires venture capitalists to compare the current investment opportunity to the deals transacted in the past. The satisficing heuristic directs venture capitalists' attention to possible negative indicators to abandon the deal quickly.

While heuristics enable efficient decision making, they may lead to suboptimal solutions and even systematic biases (Hitt & Tyler, 1991; Slovic, Fischhoff, & Lichtenstein, 1977). Table 1 presents a list of possible biases that may affect venture capitalists' investment decision making. One of the most prominent biases discussed in the literature is overconfidence. Zacharakis and Shepherd (2001) find that venture capitalists are over confident. In their conjoint experiment, 96 percent of the venture capitalist participants exhibit significant overconfidence. Moreover, overconfidence may increase due to several factors, such as an increase in the amount of information as well as more familiar information (Zacharakis & Shepherd, 2007). The negative impact of overconfidence bias on venture capital investment performance is that the venture capitalists may end up with more failures in the fund portfolio, thus impairing the fund's returns.

Similarity is another bias reported in venture capital literature. Franke et al. (2006) conducted a conjoint experiment with 51 respondents and found that venture capitalists tend to favour venture teams whose members are similar to the venture capitalists in terms of training and professional experience. As such, the team quality tends to be overrated in deal assessment due to the positive impact of similarity.

Table 1: Biases that May Affect Decision Making

<p>NOTE: This table is included on pages 33-34 of the print copy of the thesis held in the University of Adelaide Library.</p>
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Adapted from Hogarth and Makridakis (1981)

The biases listed above are cognitive in nature and generally originate from human thinking processes. A normal perception of biases is that they impede the process of reaching optimal decisions and therefore they are bad. Some researchers have even suggested ways to de-bias in decision making (Bazerman, 2002; Plous, 1993; Russo

& Schoemaker, 1989).

Many experts use heuristics, notwithstanding the biases they may engender. A number of studies have demonstrated the unsatisfactory performance of expert decision making and ascribe the cause to the use of heuristics., which paints a dismal picture of the use of heuristics as well as experts' abilities (Shanteau, 1992). However, there is an emerging view that experts do make competent decisions. Studies on livestock judges (Phelps & Shanteau, 1978) and auditors (Smith & Kida, 1991) have provided supportive evidence. Shanteau (1992) notes that past research on expert decision making has been largely assessed using inexperienced students to respond to artificial tasks. To obtain more valid and reliable research results, it makes a difference if the real experts are employed and asked to perform familiar job-related tasks in the study. Some researchers (Gigerenzer, 1991; Gigerenzer & Hoffrage, 1995) have done just that. As a result, Gigerenzer publishes a list of heuristics, termed the "adaptive toolbox," which is claimed to be very helpful in decision making (Gigerenzer & Todd, 1999). According to Gigerenzer (1991), heuristics can enable decision makers to adapt to the environment to achieve value maximisation, and therefore they are inherently good.

In most cases, when an environment is filled with complexity and incomplete information, heuristics are effective and may yield nearly optimal solutions using much less time and resources than the alternative, normative decision processes. The critical issue is not avoiding heuristics simply because they may lead to biases. Instead, it is more important for the decision makers to understand the nature, scope, and limits of what they do and do not know. Russo and Schoemaker (1992) refers to this awareness or knowledge as "meta-knowledge." The level of meta-knowledge may help explain the variance in decision quality (rationality and biases) when heuristics are used in decision making.

Interestingly, while many existing studies on expert decision making have focused on the aspect of deficiencies, research in cognitive psychology tends to pay more attention on how experts think and solve problems. As such, the latter field has had a significant impact on expert system development (Shanteau, 1992). There may be a similar implication for venture capital research: with due consideration given to the

advantages and limitations of heuristics, a focus on how expert early-stage venture capitalists perform with the use of heuristics may advance the theory related to venture capital investment and contribute to the design of learning systems.

Shepherd, Zacharakis and Baron (2003) posit that the expert decision-making model (Lord & Maher, 1990) best fits the venture capital setting, because the model fits between the normative model and a limited cognitive capacity model. Experienced venture capitalists possess a variety of mental models that can be called into action depending on the familiarity of the decision problem and context (Moesel et al., 2001; Zacharakis & Shepherd, 2001). What mental models venture capitalists have and how the models are used influence what and how the information surrounding the venture investment opportunity is perceived and processed. As such, it is perhaps the mental models rather than the decision criteria that plays a significant role in venture capitalists' investment decision making.

In a relatively stable although perhaps complex environment, the mental model concept implies that experienced venture capitalists can perform the decision tasks better than the inexperienced venture capitalists due to the multitude of the mental models stored in their memories. However, in an uncertain environment, unexpected events and surprises are the norm. Familiarity is at most a subjective judgment and the validity of existing mental models is much discounted due to the constantly changing environment and problem nature. How venture capitalists cope with such uncertainties is at the heart of the present research.

2.2.6 Risk versus Uncertainty

In the Hunt column of The New York Times on 14 May, 1999, appeared an interesting article entitled "Investors Pay Business Plans Little Heed, Study Finds" (Bowers, 2009). The author reports that:

[v]enture capitalists, who screen hundreds or thousands of solicitations each year, pay little or no heed to the content of business plans...because they make decisions 'under conditions of high uncertainty,' venture capitalists rely on instinct and their

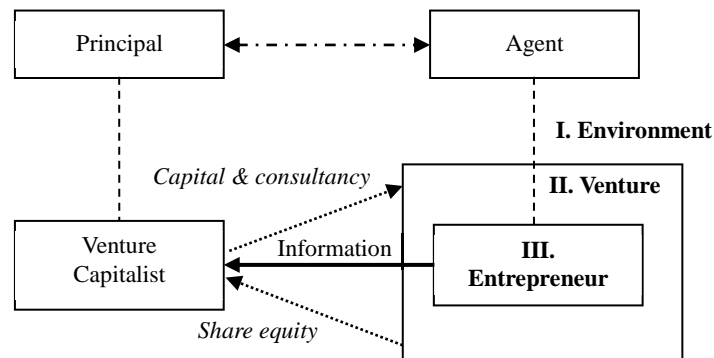
expertise in ferreting out information by other means to evaluate the prospects of a business.

The above statement is extracted from the conclusion of a study on venture capital investment by Kirsch, Goldfarb, and Gera (2009) from the University of Maryland. With respect to venture evaluation, Zacharakis and Shepherd (2007) point out that:

[v]enture capitalists must interpret information at the environmental level (industry trends, economic conditions, and so forth), the business model level (can the venture capital financing enable the company to grow to a point where the venture capital can extract a return on investment), and the team level (can the entrepreneur team execute) (p.184).

In other words, venture capitalists need to address uncertainty at three levels: (1) the environment, (2) the venture, and (3) the entrepreneur, as shown in Figure 9.

Figure 9: Three Levels of Uncertainty Faced by Venture Capitalists



Milliken (1987) suggests that there are three types of uncertainty with regard to the nature of the sources: uncertainty over how the environment is changing (state uncertainty), uncertainty over the impact of environmental changes (effect uncertainty), and uncertainty over the response options (response uncertainty). These types of uncertainty are all applicable to the early-stage venture investment, which make the present and the future a loosely coupled system.

Due to various types of uncertainty, on average, the chance of venture success is only 1 in 10. The probability figures shown in Table 2 provide a clear illustration. Consider the venture success results from many critical factors and each factor has an 80 percent probability of success. Even with such odds, the probability of ultimate success is only 17 percent. In the event the probability of a key variable drops to 50 percent, the chances for venture success drops to less than 10 percent.

Table 2: The Probability of Venture Success

<p style="text-align: center;">NOTE: This table is included on page 38 of the print copy of the thesis held in the University of Adelaide Library.</p>
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Adapted from Zider (1998)

In venture capital investment, it has long been recognised that from early-stage to expansion and pre-IPO, the early-stage venture financing is most risky. An early-stage venture typically has little historical data about its performance. Instead, it needs to deal with a long horizon of product and market development which embody many uncertainties (Tyebjee & Bruno, 1984). Sapienza and Gupta (1994) summarise these uncertainties as follows:

...greater unresolved demand uncertainties, greater unresolved technological uncertainties in both product and process design, greater unresolved resource uncertainties in areas such as availability of skilled employees, raw materials, and channels of distribution, and greater unresolved management uncertainties in areas such as the leadership capabilities of the founder and compatibility and balance within the top management team. (p.314)

For early-stage technology-based ventures, Storey (1995) concurs that these

companies represent a uniquely problematic case due to the lack of reliable assessments of product demand in highly immature markets, the need for investment to cover both development and marketing, the threat of accelerated redundancy in rapidly changing technology-based sectors, and most often the lack of managerial skills in entrepreneurs. These uncertainties, when interacting with each other and integrated further, may offer no “valid basis of any kind for classifying instances” (Knight, 1921: 225).

A venture capital investment can be perceived as an opportunity characterised by potential gain as well as potential loss. Risk is a function of the probability of losing and the amount of loss, the combination of which constitutes the prospect of having a loss. The prospect of having a gain is a function of the probability of winning and the amount of gain. Ruhnka and Young (1991) propose that the preferred level of risk of a venture capitalist is determined by three factors: (1) the minimum target rate of return required by the investment fund, (2) the level of risk of the existing investments in the fund, and (3) the venture capitalist's general tolerance for risk. They further argue that when screening prospects, venture capitalists may first identify those prospects with an acceptable prospect of loss, then attempt to maximize expected returns.

If venture capitalists know all of the possible outcomes of the decision as well as the probability of occurrence attached to each outcome, they then know the multitude of the risk or potential loss involved in the decision making. However, if they know the possible outcomes of a decision, but have no way to know the probability distributions of the outcomes, or if the outcomes are unknowable (in a worse case), this situation is called true uncertainty or Knightian uncertainty (Knight, 1921). Entrepreneurs frequently operate in this type of uncertainty. When a business concept concerns a new product and a new market, both the entrepreneur and the venture capitalist would have extreme difficulty estimating the potential outcomes as well as the probabilities of the outcomes. If the venture capitalist attempts to attribute subjective probabilities to the potential investment outcomes through scenario analysis, the distinction between risk and uncertainty blurs and that allows some form of mathematical computation or analysis to become operatable (Ruhnka & Young, 1991). However, situations of Knightian uncertainty are characterised by the fact that they are intractable under the logic of any form of predictability.

To calculate the expected utility when the outcomes have never occurred before, subjective probabilities are recommended as a solution. However, in the context of early-stage venture investment, substituting a subjective probability to fill the void of Knightian uncertainty is apparently a wishful act, ignoring the very heart of the issue. Novelty and innovation are the norm of early-stage venture development and they cannot be underestimated. Shackle (1979) emphasises that there is no justification for imposing subjective probabilities on the likelihood of innovativeness and there is no reason for adjusting subjective probabilities assigned for foreseeable events. That is because the possibility of a new novel scenario is simply infinite.

2.3 Decision Making under Uncertainty

2.3.1 Decision Techniques to Address Uncertainty

Within the realm of decision making under uncertainty, many people still believe that accurate predictions of the future are achievable so long as hard efforts and/or advanced technical tools are used. Over the years, substantial investment has been made in both academic and application fields to develop a variety of quantitative models and statistical techniques in hopes of facilitating the decision-making process.

Specifically, during the past few decades the field of finance witnessed a growth in the development of mathematical tools to guide decision tasks, such as asset pricing, portfolio selection, and investment choice. Given a set of assumptions, these normative models may be theoretically logical and consistent. However, their ability to predict and explain the actual outcomes has not been meticulously and systematically tested (Kanaan, 1993). Some empirical surveys show that the actual usage of normative financial models is infrequent in corporate financial management practices. This reluctance is directly related to the complexity of the decision environment, the lack of attention directed at the availability of necessary information required by the models, and the difficulty of model usage (Srinivasan & Ruparel, 1990).

However, researchers' enthusiasm for developing more powerful tools and systems to increase predictive accuracy for decision making never wanes. There are numerous

publications in the decision science literature showing how algorithms and expert systems outperform human decision-makers in various domains, including medical, nursing, financing, engineering, head-hunting, education and airplane piloting. An interesting story is shared by Sarasvathy (2008) in her book, *Effectuation: Elements of Entrepreneurial Expertise*: Carnegie Mellon University offers a variety of information system courses. After discussing several papers on automated decision making in a class, the lecturing professor mentioned that, even though intelligent systems appear to be superior to human beings, people are still reluctant to trust the machines. When asked why, the professor added, “I like the fact that the plane has an auto pilot. But I like even more the fact that there is a pilot-just in case-don't you?” (Sarasvathy, 2008; p.92). Obviously the point underlying the professor’s explanation is that: no matter how advanced the artificial intelligence is, it is unlikely able to handle unexpected emergencies coming out of uncertainty. This is why many decision aids or systems need human judgement to input critical parameters, and thus the estimation of subjective probability cannot be avoided.

In the absence of alternative decision models, people are used to applying normative approaches for problem solving even under Knightian uncertainty. In the setting of early-stage venture capital investment, venture capitalists attempt to utilise several techniques to alleviate the problem. For example, they typically adopt stagewise funding practices to disburse capital according to benchmarks set in the sequential development of the investee company (Ruhnka & Young, 1987). This approach is more about the reduction of risk rather than uncertainty. The second common approach is the use of a portfolio concept in hopes of dealing with the issue of nonexistent probability distributions. However, as highlighted by Ruhnka and Young (1991), “the probability of a final positive or negative outcome for a portfolio of 10 or more investments cannot be projected with any degree of certainty due to the wide dispersion in new venture outcomes and timing differences” (p.118). Smircich and Stubbart (1985) assert that, under Knightian uncertainty, this type of approach is symbolic at best rather than a real solution.

2.3.2 Search for a New Paradigm

The discussion presented so far reveals that: while the issue of uncertainty has been frequently mentioned in the venture capital literature, how venture capitalists deal with uncertainty in relation to early-stage venture investment is either underestimated or at least under-researched.

Normative theories seem to have inherent limitations in explaining and addressing decision making under uncertainty. As suggested by Zacharakis and Shepherd (2007), there may be a need to move beyond theories of strategy to explore theories of psychology in order to further our understanding of venture capital decision making.

Indeed, over the last several decades, a great deal of work has been carried out within the cognitive psychology discipline. The results from many exquisite empirical studies show that in Knightian uncertainty situations, people do not think and make decisions in a way that is described by the traditional literature. For example, while the literature frequently mentions that entrepreneurs prefer risk (Khilstrom & Laffont, 1979), recent empirical evidence shows this is not necessarily the case (Brockhaus Sr., 1980 ; Palich & Bagby, 1995). Conventional wisdom holds that entrepreneurs start their ventures because they predict a significant market potential for their new products. However, evidence from recent studies shows that expert entrepreneurs think prediction is neither easy nor sensible and therefore they would rather eschew predictive information (Dew et al., 2009; Sarasvathy, 2001b).

It is also worth noting Capen's (1976) study, which examined a group of petroleum engineers' response to uncertainty. Capen made the following remarks, which are particularly relevant to the present study:

1. *A large number of technical people have little idea of what to do when uncertainty crosses their path. They are attempting to solve 1976 problems with 1956 methods.*
2. *Having no good quantitative idea of uncertainty, there is an almost universal tendency for people to underestimate it. Thus, they overestimate the precision of the own knowledge and*

contribute to decisions that later became subject to unwelcome surprises.

3. *A solution to this problem involves some better understanding of how to treat uncertainties and a realization that our desire for preciseness in such an unpredictable world may be leading us astray.” (Capen, 1976, p. 843)*

More recently, some researchers have drawn attention to the difficulty of prediction under uncertainty. For example, Christensen (who developed the theory of disruptive innovation) goes so far as to say, “[M]anagers can always count on one anchor: *Experts’ forecasts will always be wrong* (Christensen, 2000a; p.154, italics in original) .” The same researcher also ascribes the reliance on prediction by corporate executives to company failure in sustaining market leadership. Alan Murray (2010) argues:

Market-leading companies have missed game-changing transformations in industry after industry, not because of "bad" management, but because they followed the dictates of "good" management. They listened closely to their customers. They carefully studied market trends. They allocated capital to the innovations that promised the largest returns.

Apparently, a strong predictive mentality reflected in the actions such as market forecasting, which was considered important for good management, may lead to the disastrous results of even market-leading firms.

It typically takes many years for venture capitalists to assess the investee venture’s performance after the initial investment is made. The existing venture capital literature has largely followed the dominant predictive logic to examine venture capitalists’ decision making, although even the venture capital community frequently argues that it is by and large a “gut feeling” that determines which ventures to back (Macmillan et al., 1987).

The business environment is increasingly uncertain, complex, and uncontrollable due

to many factors, such as globalization, networking, outsourcing, climate change, and competing for resources across borders. Moreover, emerging technologies in the modern economy are fundamentally changing how people interact with each other in every aspect of human action.

In the context of new venture creation, usually what the entrepreneurs know when starting out is something very general, such as the desire to create wealth or to simply pursue an interesting idea (Sarasvathy, 2001a). Most often the entrepreneurs do not know which particular market to capture simply because the market does not exist yet. In other words, they have no clear idea about what type of company they really wish to create in the beginning. March (1982) highlights that in a normative theory of choice the idea of changing goals is so intractable that nothing can be said about it. Against this backdrop, Sarasvathy and Simon (2000) come out with a theory of effectuation.

2.4 Effectuation

Effectuation is a specific logic rooted in the literature on cognitive expertise and decision-making under uncertainty (Sarasvathy, 2001a). While the conception of bounded rationality (Simon, 1991) has inspired research on heuristics and biases as a set of deviations from rationality, effectuation goes beyond simple deviation to invert several fundamental principles and overall logic that are central to the rational choice paradigm. Effectuation suggests minimizing the use of prediction and instead experimenting and acting quickly to capture new business opportunities. The fundamental reason is that under Knightian uncertainty, there is no basis to substantiate prediction with rationality.

2.4.1 Effectuation versus Prediction

A rational causal model takes a particular goal or effect as given and focuses on selecting between means to achieve the goal or create the effect. However, effectuation processes start with a set of means as given and focus on selecting between possible effects which could be created through the means (Sarasvathy,

2001a). To put it simply, causation models consist of many-to-one mappings; effectuation models involve one-to-many mappings, as depicted in Figure 10.

Figure 10: Effectual versus Causal Reasoning

NOTE:
This figure is included on page 45
of the print copy of the thesis held in
the University of Adelaide Library.

Adapted from Dew et al. (2002)

In terms of the problem space to which that effectuation and causal reasoning may be applicable, Sarasvathy (2008, p. 73) highlights that:

Causal strategies are useful when the future is predictable, goals are clear, and the environment is independent of our actions; effectual strategies are useful when the future is unpredictable, goals are unclear and the environment is driven by human action.

Compared to causal reasoning, effectuation has a different philosophy of how to cope with uncertainty. The fundamental assumptions about prediction and control underlying the two strategic approaches are different (Wiltbank, Dew, Read, & Sarasvathy, 2006). Drawing upon numerous constructs in various studies, Goodie

(2003; p. 598) defines control as follows:

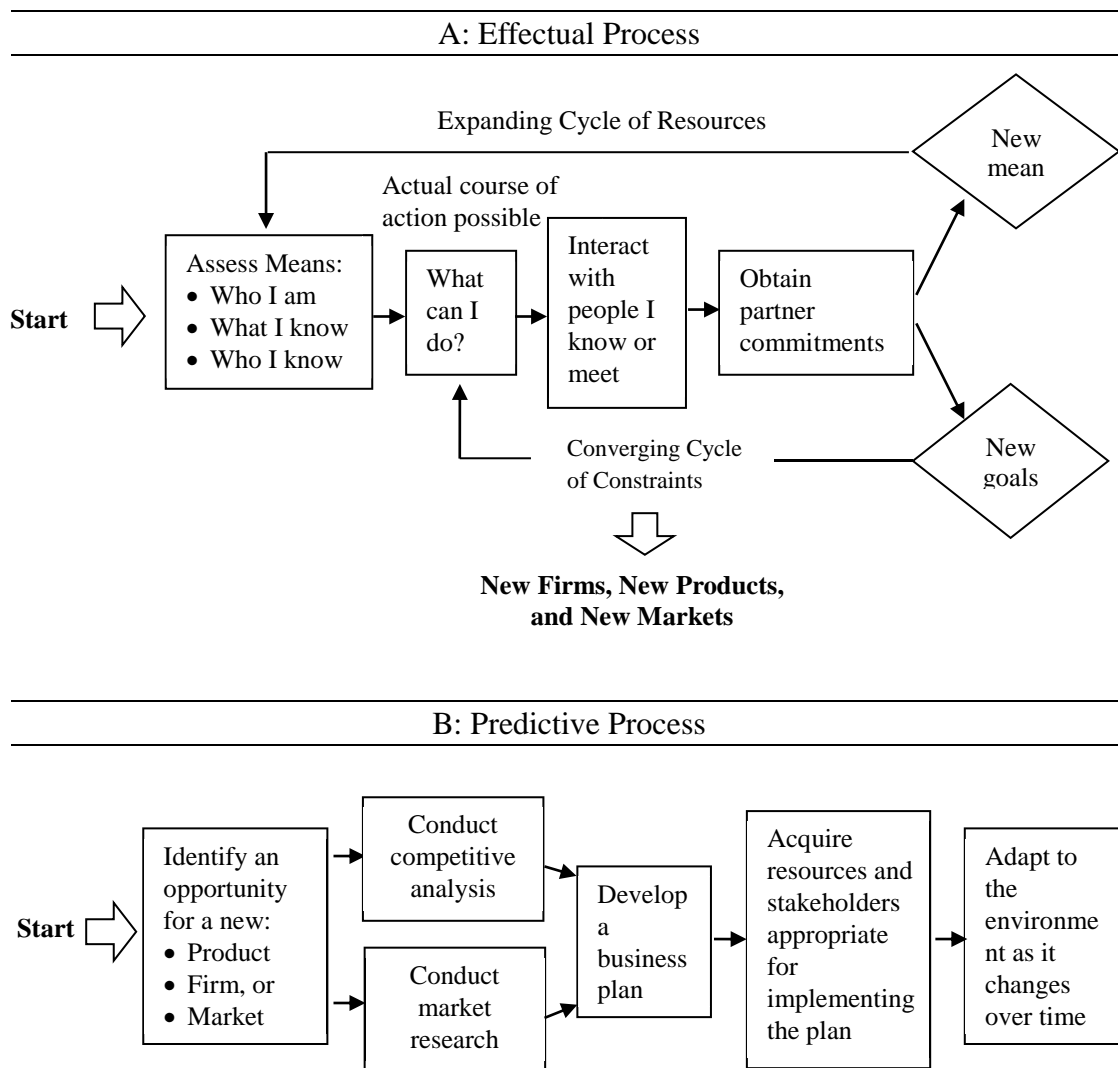
...the characteristic of probability alterability. That is, if a participant could take steps to favorably alter the success rate in subsequent administrations of the task (not in the current administration), then the task is said to be characterized by control.

In other words, rather than predicting a success or the chance of success, decision makers can seek favourable outcomes by taking actions to alter the probabilities in the event spaces and possibly create entirely new spaces (Wiltbank et al., 2009). The emergence of new event spaces is conceptualised by Knight (1921) as a fundamental ingredient in decision-making under uncertainty. However, how could a nascent entrepreneur, characterised by resource paucity, exercise power of control in effectuation? Bhowmick (2011) explores this contradiction through the examination of entrepreneurs' start-up decisions and actions. He suggests a relational view of control, which can be explained as a dialectical process, similar to the "dialectic of control" concept in the theory of structuration (Giddens, 1979, 1982, 1984). The theory of structuration is considered a logic conceptual and heuristic model of human behaviour/action (Jacobs, 1993). Its main argument is that social structure is both the medium and the result of human activities, not only restricting but also creating new space for human behaviour.

Causal logic is based on the premise that, to the extent you can predict the future, you can control it. In contrast, effectual logic is based on the premise that, to the extent we can control the future, we do not need to predict it (Sarasvathy, 2001a). That is why effectuation deliberately minimizes prediction. It views the environment as being endogenous to human actions.

Entrepreneurship provides a unique environment that necessitates, reinforces and rewards the use of effectuation (Sarasvathy, 2008). The entrepreneur attempts to cocreate the environment through commitments with a network of stakeholders including partners, investors, suppliers and customers. Figure 11 graphically presents a dynamic effectuation process in contrast to the predictive process.

Figure 11: Effectual Process in Contrast with Predictive Process



Source: Sarasvathy and Dew (2005b)

As mentioned at the beginning of this section, effectuation inverts several fundamental principles of predictive rationality. As Table 3 shows, both predictive and causal logics comprise heuristic principles that are applicable to new venture or market creation. The focus on these specific aspects has particular importance in theorizing about entrepreneurial behaviour and for situations where the future is truly unknowable or human agency is of primary importance (Sarasvathy, 2008).

Table 3: Differences between Predictive and Effectual Thought

NOTE:
This table is included on page 48
of the print copy of the thesis held in
the University of Adelaide Library.

Adapted from Sarasvathy (2001b)

2.4.2 Effectuation and Over-trust

Trust is commonly defined as a psychological state consisting of the intention to accept vulnerability or the risk of loss, based upon positive expectations of the intentions and behaviour of another (Rousseau, Sitkin, Burt, & Camerer, 1998). In an exchange relationship, trust can substitute for formal institutions and reduce transaction costs. In an entrepreneurial setting, trust plays an important role as the entrepreneur needs to acquire, exchange and integrate various types of resources to develop the venture (Coleman, 1990). For entrepreneurs who are developing early-stage ventures, trust could be even more important as they need to place their confidence rather quickly in people whom they may not know for long in order to exploit the contingencies arising in the early stages of venture creation.

Trust also plays an important role in venture capitalist decision making. Without trust in the entrepreneur, venture capitalists are unlikely to invest in the venture. In initial interactions between venture capitalists and entrepreneur, quickly developing trust

(Meyerson, Weick, & Kramer, 1996) facilitates the process fraught with time constraints and task complexity. This concept has previously been applied to the venture capital investment situation by Harrison et al. (1997).

It should be noted that trust is useful to the trustor to the extent that the trustee is trustworthy (Hardin, 1996). Otherwise, the trustor may be taken advantage of by the trustee and suffer from loss or harm. However, most often the trustee's trustworthiness is revealed only after the outcome of the trust decision is realised. There is always uncertainty inherent in the determination of trustworthiness.

Where "one chooses, either consciously or habitually, to trust another more than is warranted by an objective assessment of the situation," the trustor overtrusts the trustee (Goel, Bell, & Pierce, 2005). Goel and Karri (2006) argue that entrepreneurs who apply effectual logic tend to overtrust for several important reasons. First, effectuation assumes ambiguity and uncertainty are present in the environment. The entrepreneur may neither expect nor be able to get perfect information to make an objective evaluation of the trustee's trustworthiness or the probability of the potential loss. Therefore, they choose not to spend too much effort on information search and causal analysis. Second, affordable loss is a key principle of effectual logic. Certain decision criteria used by entrepreneurs are primarily derived from this principle. If the potential loss of any single overtrust case is unlikely to cause significant negative impact, the entrepreneur is willing to trust (and overtrust)- even more so if the entrepreneur take trusting as an inevitable approach to move things forward. Third, the action-oriented entrepreneurs may focus on the pursuit of multiple opportunities either consciously or habitually, knowing that there could be overtrust in some cases but none of them would lead to catastrophe.

Given the above reasoning, Goel and Karri (2006) also note that overtrust is not necessarily an undesirable risk for entrepreneurs. They even claim that overtrust can be viewed as instrumental in making deals under the assumption that the other parties will keep their end of the bargain.

Sarasvathy and Dew (2008) respond to Goel and Karri's (2006) propositions by arguing that effectuation neither predicts nor assumes trust. They point out that the

conception of overtrust per se implies the existence of an optimal level of trust based on an objective assessment of the situation. However, in the face of Knightian uncertainty, there would be no reliable basis to make such an objective assessment and therefore there may not be such a thing as optimal trust (Sarasvathy & Dew, 2008).

While these scholars may disagree about whether effectuation leads to overtrust, there is consensus among them in that they acknowledge that decision makers are aware of the inability to assess the intention of the other party and the potential risk inherent in the relationship. The slight difference is in the response taken by the decision makers. Goel and Karri hold the view that entrepreneurs who know the thinking process may allow overtrust to enter the space and that any damage is within their control and affordable. However, Sarasvathy and Dew think the entrepreneurs do not bother at all in uncertain situations. Therefore, regardless of whether effectuation assumes trust and leads to overtrust or not, it drives people to make small (affordable loss-based) but credible commitments in taking action to create the future without overconcern about the other party's trustworthiness. Simply put, it is a deliberate and constructive way of doing things. To effectuators, the worthiness of action per se is more relevant and important than the concern of trustworthiness of the trustee in the face of uncertainty.

2.4.3 Effectuation and Performance

In a meta-analysis of studies focusing on effectuation and venture performance, Read, Song, and Smit (2009b) seek to measure the relationship between effectual principles and new venture performance. Their efforts have produced means for measuring effectuation and quantitatively analysing the relationship. Their findings indicate that most heuristics associated with effectuation are positively and significantly related to new venture performance.

In a study of 121 angel investors who had made 1,038 new venture investments, Wiltbank et al. (2009) empirically investigated angel investors' differential use of predictive versus effectual approaches. Their results indicate that the use of different strategies affects the outcomes of angel investing. In particular, they found that angels who emphasise effectuation experience a reduction in investment failures without a

reduction in the number of successful exits.

In the context of corporate research and development (R&D), many companies have difficulties finding efficient and successful approaches to different types of R&D projects, particularly those that involve a high level of innovativeness. Moving effectuation theory from its original field of entrepreneurship to the corporate R&D context, Brettel, Mauer, Engelen and Kupper (2011) find that different degrees of innovativeness require different R&D approaches. In particular, their findings indicate that the application of effectual dimensions in the corporate R&D context tends to positively impact R&D performance when innovativeness is high. As a result, that study informs R&D managers that effectuation offers ways to deal with innovative projects and to rethink internal processes. To a certain extent, their study increases the generalisability of effectuation.

Effectuation is a viable and descriptively valid alternative decision-making process. The eventual outcomes of decisions based on effectuation could be financial performance; new products, firms, or markets created; increase in social welfare; or change in the process by which things are done. These outcomes are subject to many factors and conditions. As highlighted by Sarasvathy (2008), effectuation should not be considered normatively superior in any context. In response to the general model proposed for future investigation of effectual approaches, many interesting results about the performance relationship and moderating factors may be expected from many ongoing research works (Sarasvathy, 2008).

2.5 Applicability of Effectuation in Early-Stage Venture Investment

2.5.1 Revisiting the Problem Space

Effectuation is a method for solving problems in spaces characterised by (1) Knightian uncertainty (Knight, 1921), (2) goal ambiguity (March, 1982), and (3) environment isotropy (Sarasvathy, Dew, Read, & Wiltbank, 2008; Weick, 1979).

These three characteristics typify the problems faced not only by entrepreneurs, but also by early-stage venture capitalists. Section 2.4.1 has already illustrated the

Knightian uncertainty which is pertinent to early-stage venture investment. This section will focus on the other two characteristics of the problem space.

Goals exist in hierarchies (Simon, 1964). Goal ambiguity refers to the lack of preferences or a clear order of preferences in objectives. Undoubtedly the top objective of venture capitalists in pursuing venture investment is to achieve high capital gain for the fund. Bygrave and Timmons (1992b) specify that, for venture capitalists pursuing a super deal, “the mission is to build a highly profitable, industry-dominant company that can go public or be sold within 4 to 7 years at a very substantial gain” (p.7). While this could be the profile of the super deal that classic venture capitalists dream about, the operationalisations at lower levels may be highly ambiguous.

Take, for example, the goal of a venture capitalist who wants to earn \$100 million in 10 years for the fund. This goal appears to be specific and clear, but it may not be easily translatable into immediate sub-goals to act upon. At a portfolio level, that objective may be achieved through a variety of approaches without any degree of certainty about any particular approach due to the wide range of potential outcomes of each investment and timing difference. Therefore, the goal does not necessarily provide a compelling reason for the venture capitalist to commit to any particular venture, new product, or matter.

Even if it is accepted as a fact that a venture capitalist who has made an investment decision sees the opportunity and clearly wants to co-build an online business of some sort with the entrepreneur, the venture capitalist, as well as the entrepreneur, might not be sure whether the business would eventually be able to command revenue from membership, advertisement, broking services, or something in between for which there are no clear business models. Therefore, a high level of goal ambiguity remains.

Environment isotropy refers to ambiguity in determining what elements of the environment are most salient for the investment decision (Dew & Sarasvathy, 2002). Venture capitalists hope to rely on standard venture performance factors or indicators to predict a venture's success. However, most of these factors are intangible and difficult to measure. What makes the task even more challenging is that the

functioning mechanism and interactions among the factors are too complex for human cognitive capacity. As emphasised by Kunze (1990), if venture capitalists fully analyse every potential deal, they would never select any ventures to invest in. In essence, the more analysis there is, the more reasons will be found for the venture potentially failing, resulting in paralysis by analysis (Zacharakis & Shepherd, 2001). When bounded rationality meets Knightian uncertainty in early-stage venture investment, the venture capitalists may not know exactly what elements of the environment to pay attention to and what to ignore.

As illustrated above, early-stage venture capital investment encompasses all three elements of the effectuation problem space. Some researchers (Coombs, 1975; Coombs & Huang, 1970) suggest that portfolio diversification strategy is appropriate for dealing with problems of non-existent distribution. And indeed, this strategy has been widely applied by most venture capitalists. However, this approach has received much criticism as a real solution to the problems of Knightian uncertainty (Dew & Sarasvathy, 2002; Smircich & Stubbart, 1985).

2.5.2 Venture Capitalists' Non-predictive Control

Effectuation presents a new and viable theoretical lens through which to examine early-stage venture capitalist decision making. This logic eschews prediction and emphasises a more direct effort to control uncertainty (Sarasvathy, 2001b).

In the context of early-stage venture capital investment, venture capitalists have own control in the following two areas:

First, legally, venture capitalists are entitled to exercise control over the companies in their portfolio, because they are part of the venture shareholders (Fredriksen, Olofsson, & Wahlbin, 1997; Gifford, 1997). Venture capitalists obtain control through structuring financial contracts to allocate cash flow and control rights and engaging information collection and monitoring in the project execution process (Kaplan & Stromberg, 2001). These contracts share certain characteristics, notably (1) staging the infusion of capital and preserving the option to abandon, (2) devising compensation schemes directly linked to value creation, (3) preserving ways to force management to

distribute investment proceeds (Sahlman, 1990).

Second, on the strength of rich market knowledge, expertise, and valuable network connections, venture capitalists can be actively involved in managing the companies they fund, functioning as consultants. They provide management support on business strategy, organizational professionalization and project execution (cf. Hellmann & Puri, 2002; Sapienza, Manigart, & Vermeir, 1996). Specifically, they help recruit and compensate key staff, build strategic alliances with suppliers and customers, help structure transactions, and often assume more direct control by changing management and sometimes being willing to take over day-to-day operations themselves (Sahlman, 1990). By being actively involved in the venture, venture capitalists enhance their influence and control with the intention to increase the likelihood of venture success and improve their return on investment. Empirical evidence demonstrates that such activities can result in the funded ventures enjoying sustainable competitive advantages (Eldridge, 2007). Brander et al (2002) find that in relation to venture success, venture capitalists' management support contributes more than deal selection.

2.5.3 Expertise and Early-Stage Venture Investment

The *Oxford English Dictionary* defines expertise as the quality or state of being expert; skill or expertness in a particular branch of study or sport." In the same dictionary, an expert is defined as someone who "has gained skill from experience" and a novice is "an inexperienced person; one who is new to the circumstances in which he is placed."

Experts exist in a variety of fields. Research in cognitive science has shown that experts process information differently than novices (Chi, 1988). To arrive at a judgment, the individual decision makers select, combine, and evaluate information cues (Spence & Brucks, 1997). This process is influenced by the decision makers' schemata, which play a fundamental role in all cognitive activities (Larkin, McDermott, Simon, & Simon, 1980; Matlin, 2005) As a cognitive structure, a schema is an organised network of knowledge that includes concepts, facts, skills, and action sequences (Gagné & Glaser, 1987). The concept of expertise is directly associated with schemata.

Schemata can be refined in various ways when individuals accumulate experience in a particular domain. In general, more experienced individuals possess more complete and detailed schemata and organise domain-specific knowledge in more meaningful ways (Lurigio & Carroll, 1985). Owing to that, they can draw on clearer concepts, create richer connections between concepts, and apply domain specific problem-solving procedures (Adelson, 1981; Gobbo & Chi, 1986).

The classic studies of expertise in chess playing by Simon and Chase (1973) demonstrate that experts are much better and quicker than novices in pattern recognition. Furthermore, Glaser and Chi (1988) identify several other characteristics of expertise. For example, experts tend to use problem-solving strategies emphasizing comprehension rather than rote performance. Experts frame decision problems in more abstract and meaningful ways instead of categorizing them according to superficial properties (Eells, Lombart, Kendjelic, Turner, & Lucas, 2005).

According to Bransford et al. (2000), experts differ from novices in several aspects: (1) Experts recognise patterns that are not noticed by novices. (2) Experts organise content knowledge around central ideas, which guide their thinking about applying general principles to particular problems. (3) Experts do not search every detail of the problem to find a solution. (4) Experts are able to retrieve knowledge effectively and efficiently.

With regard to the development of expertise, cognition research also provides valuable insights. Experts learn by doing (Greeno & Simon, 1988). Systematic differences between experts and novices within a domain nearly always reflect attributes acquired by experts during their lengthy period of practice to master the performance of critical tasks in specific domains (Ericsson, 2006). Nevertheless, experience alone is not sufficient to construct expertise (Camerer & Johnson, 1991). The key to the acquisition of expert performance lies in “deliberate practice” (Ericsson & Simon, 1993). Deakin et al (2006) suggest that deliberate practice occurs when an individual exerts high effort to conduct activities that are highly relevant to performance within a specific domain.

Ericsson et al. (1993) conducted a lengthy review of studies of expertise in a wide

range of domains, including science (Lehman, 1953), chess (Krogius, 1976; Simon & Chase, 1973), evaluation of livestock (Phelps & Shanteau, 1978), musical composition (Hayes, 1981), diagnosis of X-rays (Lesgold, 1984), music (Sosniak, 1985), mathematics (Gustin, 1985), tennis (Monsaas, 1985), swimming (Kalinowski, 1985), and medical diagnosis (Patel & Groen, 1991). These researchers confirm that the highest level of expertise and the resulting performance in a given domain are not attained automatically as a function of extended experience, but are a result of deliberate practice, for which motivation and perseverance (10 years and above as a rule of thumb) are necessary.

Different from simple repetitive practice, deliberate practice requires the subjects to deliberately repeat the activities with a motivation to improve the performance, engaging cognitive processes such as monitoring, reasoning, and anticipating (Ericsson & Lehmann, 1996). Moreover, the subjects should receive informative feedback and knowledge of results of their performance. Merely mechanical practicing (without deliberate effort to seek improvement and receiving feedback on the performance) may not necessarily lead to the attainment of high performance. Ericsson et al. (1993) point out that the weak relation between performance and experience found in many experimental studies may be due to the vague definition of practice, in other words, the lack of clarification between practice and deliberate practice. With reference to the number of years of experience to infer a person's expertise, Dew et al. (2009) note that no rule of thumb can apply because the years of experience may include not only periods when individuals work to improve their performance, but also long periods when they are essentially at leisure while their skill levels stay stable or deteriorate.

2.5.4 Early-Stage Venture Investment Expertise and Value-Added Activities

As described earlier, the tasks of venture capitalists can be classified in terms of pre- and post-investment activities, through which venture capitalists can influence the investment outcome. Literature is extensive on value-added activities in respect to venture capital investment and the important role played by venture capitalists in new product or market creation through their joint effort with entrepreneurs. Therefore, the uncertainty pertaining to early-stage venture investment places a high requirement on

venture capitalists to possess a specific form of expertise, which is both similar to and different from expertise in other domains.

Though consensus has yet to be reached on the definition or exact scope of the mechanisms that constitute early-stage venture investment expertise, it can be argued that this expertise derives primarily from deliberate practice and the acid test is reliably superior performance. Among the few works on venture capital investment expertise, Dimov and Shepherd's (2005) study shows the nature of venture capital partners' expertise affects both the successes and failures of the investee firms.

Deal selection and value-added services are two key functions of venture capitalists that are closely related to early-stage venture investment expertise. With respect to deal selection, Dimov et al (2007) propose that venture capitalists' decision to invest in early-stage ventures is influenced by the financial expertise of the venture capital firm's management team (the general partners). In their study, financial expertise is defined as expertise in evaluating the return potential as well as in managing the financial resources of a prospective venture. However, they find that venture capitalists of higher financial expertise are less willing to invest in early-stage ventures. This is not surprising. Due to the high uncertainty in estimating the return potential of early-stage deals, financial expertise is less applicable to early-stage venture investment. They also find that negative relationship between financial expertise and a preference for investing in early-stage ventures is alleviated by the reputation of the venture capital firm. Specifically, reputable venture capital firms with high finance capacity make more early-stage investments than their less reputable counterparts, which may be due to the notion of slack resources. Slack resources are generally defined as the pool of resources in excess of the minimum needed to produce a given level of organizational output (Nohria & Gulati, 1996). Reputable venture capital firms tend to have higher accumulations of slack resources. Therefore, venture capitalists who have high financial expertise but work in such firms, may be better positioned than their peers of similar level of financial expertise but not work in such firms, to engage in experimental investments and new strategy implementations.

In addition to financial capital, venture capitalists often provide substantial managerial

contributions to the ventures (de Bettignies & Brander, 2007). It has been widely accepted that venture capitalists are active, value-added investors. They bring to the table not only capital, but also knowledge, skills, and a network of legal, accounting, investment banking, marketing, and other contacts that are useful to a fledgling enterprise (Cumming & MacIntosh, 2003). In the context of early-stage venture financing, Hellmann and Puri (2002) find that closely involved investors can have a broader impact on the development of the companies they support. Acknowledging the value of experienced equity investors in guiding young firms' growth in the early stages, Warne (1988) describes venture capitalists' role succinctly as "capital and consulting."

Timmons and Bygrave (1986) observe that venture capitalists make significant contributions beyond the money provided to highly innovative technical ventures. Sapienza and Timmons (1989) match responses of chief executive officers (CEOs) of venture capital-backed firms and lead investors to examine their assessment of the importance of individual roles assumed by venture capitalists. Three role-types emerged: strategic, supportive, and networking. Several other studies (MacMillan, Kulow, & Khoylian, 1989; Rosenstein, 1988; Rosenstein, Bruno, Bygrave, & Taylor, 1989; Rosenstein, Bruno, Bygrave, & Taylor, 1993; Sapienza, Amason, & Manigart, 1994; Sapienza et al., 1996) report consistent findings with regard to important key roles, such as sounding board, financier, contact, management recruiter, and mentor.

In a similar vein, Gorman and Sahlman (1989) suggest a ranked order of the forms of assistance: (1) help with obtaining additional financing, (2) strategic planning, (3) management recruitment, (4) operational planning, (5) introductions to potential customers and suppliers, and (6) resolving compensation issues.

In essence, these value-added activities contribute to the professionalization of the investee firms (Bygrave & Timmons, 1992b; Gorman & Sahlman, 1989). In a related study, Hellman and Puri (2002) provide empirical evidence that venture capitalists foster the development of human resources in start-ups. They also find that venture capital-backed companies are faster in effectuating leadership changes; while venture capitalists can play both supportive and controlling roles, founders may remain with the company or leave after the arrival of the outside CEO.

The importance of venture capitalists' managerial contributions to the investee firms has been emphasised by the extensive descriptive and empirical work of Gorman and Sahlman (1989), Gompers and Lerner (1999), Hellmann and Puri (2000), Hellmann and Puri (2002) and Brander et al. (2002), among others.

Apparently, these extra services constitute a critical difference between venture capitalists and bankers. Smith (2001) argues that, from the entrepreneurial firm's perspective, venture capitalists' ability to provide value-adding services may constitute an even more important selection criterion than the funding. Indeed, venture capitalists may differentiate themselves by the quality of business services and reputational capital they bring to their portfolio companies. The reputation of venture capitalists' depends on their experience, information network, and direct assistance to the portfolio firms. Studies have found that entrepreneurs are willing to accept a discount on the valuation of their startups in order to access the capital of venture capitalists with a better reputation (Hsu, 2004). Entrepreneurs seem to accept the reasoning that there is value in being associated with more experienced and connected venture capitalists:

Venture funding is available from many sources. Entrepreneurs choose a lead venture partner to tap into practical experience contacts, and reputations. "The money is all the same," says Louis Volpe, president of Arrowpoint Communications. "But what type of additional value do you get? With Maxtrix Ventures, you get experienced people and a good network in telecom." Those intangibles can make the difference in landing a key early customer, attracting top calibre employees, and lining up the best IPO underwriters. The experience can make a real difference driving a brand new company in the right direction fast (Boston Globe 2000, p. D1).

Past evidence suggests that venture capitalist involvement is more critical to early- than to late-stage ventures. These value-added services may be particularly important for early-stage startups (Roberts, 1991). Timmons and Bygrave (1986) argue that venture capitalists make the greatest contributions in the earliest stages of high-tech ventures. Sapienza and Timmons (1989) provide empirical evidence showing that

venture capitalists' roles are assessed as being more important in ventures at earlier stages and for entrepreneurs who had less startup experience. In the context of early-stage venture capital investment, venture capitalists' distinct expertise in a relevant industry (operation, marketing, general management) and prior entrepreneurial experience play significant roles in reducing risk or uncertainty (March & Shapira, 1987). For example, Kleiner Perkins Caufield & Byers, a prominent venture capital firm, claims to facilitate inter-organizational cooperation by brokering strategically important information among its network of portfolio companies. This can be particularly important to start-up development because early-stage ventures face imperfect markets for information (Aoki, 2000).

With respect to the venture capital industry in China, foreign venture capital firms were a major source of new venture financing after they entered China. Before 2009, the venture capitalists from foreign firms targeted early-stage projects much more aggressively than their counterparts from domestic venture capital firms. One of the main reasons was that foreign venture capitalists had much better experience and expertise to manage the risk inherent in the early-stage investments (White et al., 2004). Venture capitalists from foreign firms were also found to provide much more valued-added services to the investees than those from domestic venture capital firms, because the latter are much less experienced in venture capital investment and have more restrained involvement in the investee ventures. White et al (2004) point out that although the venture fund can be raised quickly in China, the expertise to invest, monitor and support investee firms takes much longer to develop.

Legend Capital, founded in March 2001, is expected to be one of the China's largest domestic venture capital funds in terms of size. The fund positions itself as a proactive venture fund adopting a value-added service approach. Mr Liu Chuanzhi, Chairman of Legend Capital, points out:

...a favourable environment has given birth to many High-Tech companies and more are emerging now in China, but on the flip side, they are facing challenges and constraints such as lack of capital and management expertise, which hinders their growth. Venture capital can help these startups out of such difficulties, which is what Legend has

*been doing with 17 years of experience and know-how (Chen, 2003, p.47).*³

Following the above literature review, it can be argued that venture capitalists' value-added skills are a critical element of the early-stage venture investment expertise. Expert early-stage venture capitalists are expected to have higher value-added skills than novices and therefore contribute more to the success of their investee firms. Not surprisingly, Dimov et al. (2007) posit that venture capitalists' confidence in their ability to influence the success of the prospective venture may explain their decision to invest in early-stage ventures. This confidence may largely derive from the investors' possession of the expertise required for the particular type of project. If such expertise is lacking, venture capitalists' perceived control over the deal's outcome is lower.

2.5.5 Early-Stage Venture Investment Expertise and Transformation

Early-stage investment proposals involve companies that are in the process of exploring ideas for which there are no fully developed commercial products or tested markets yet (Dimov et al., 2007). Venture capitalists who choose to invest in early-stage ventures typically face uncertainty as entrepreneurs do. They also face the problems arising from new product or market creation in the process of providing value-added services to early-stage ventures.

Venture capitalists need to explore new possibilities. March (1991) points out that the essence of exploration is experimentation with new alternatives when the returns are uncertain, distant, and often negative. Indeed, a large number of empirical studies of the creation of new markets reveal the unpredictability, long time horizons, and failures involved in the exploration of opportunities for new market creation (Sarasvathy & Dew, 2005). Extending the theory on entrepreneurial orientation (EO) and the EO-Performance relationship of entrepreneurial firms to individual business angels, Lindsay (2004) argues that angel investors, because of their investment focus

³ Liu Chuanzhi's comments on the fund's mission at the press conference for launching Legend Capital.

on early-stage, new entrant, high risk, unlisted entrepreneurial firms, they need to be structured organically to respond to uncertainty and change. In other words, angel investors need to be consummate entrepreneurs to be successful in undertaking their investment activities. His study finds that angel investors do demonstrate an entrepreneurial orientation and all three of the underlying dimensions of entrepreneurship orientation (proactiveness, innovativeness and risk taking) were correlated to investment performance.

Early-stage venture capitalists operate in a similar environment as that of angel investors. To some extent, early-stage venture investment has an inherent entrepreneurial element. This notion is consistent with Coleman's (1990) description of an entrepreneurial function:

one in which the intermediary induces the trust of several trustors and combines these resources, ordinarily placing them in the hands of one or more other actors who are expected to realize gains for the original investors (p. 181).

According to this description, the early-stage venture investment well matches an entrepreneurial function. In essence, venture capitalists play an intermediary role to secure the trust and the capital from the limited partners to form the fund. In addition venture capitalists provide capital and strategic resources in a combined form to entrepreneurs who act on the business opportunities to realise gains for the investors.

Entrepreneurial actions transform extant reality into new products or markets through a chain of stakeholder commitments over time. Sarasvathy and Dew (2005) call the resultant network of stakeholders an effectual network, as depicted in Figure 11(A). Early-stage venture capitalists may play a significant role in this dynamic network for transformation.

Past evidence has shown that early-stage venture investment expertise positively influences venture capitalists' value-added contributions to the early-stage ventures. Moreover, the greater the perceived environmental uncertainty, the greater will be the value added. Sapienza's (1992) study shows that the level of innovation pursued by

the venture also has a significant impact on the value of venture capitalist involvement. It is also found that the greater the frequency of interaction between venture capitalists and entrepreneurs and the more open or informal the relations in the dyad, the greater the value of venture capitalist involvement.

The creation of new markets, new products, or new ventures is an isotropic process where decisions and actions involve uncertain future consequences. A phenomenon that appears ex post either like an exploration of all possibilities or the exploitation of technology or opportunity for commercialization may be the result of a series of transformations on the original reality in a local and contingent fashion (Sarasvathy & Dew, 2005). In the context of early-stage venture investment, this notion is well represented in the following statement by Russell Siegelman, Partner, Kleiner Perkins Caufield & Byers (Roberts & Barley, 2004, p.5):

I would say close to 100% of the time the original plan does not come to reality, sometimes in a good way and sometimes in a bad way. The founders didn't realize they had something completely wrong and had to overcome it. Or the opposite, we overlooked some great attribute in the original plan. So the point is, we have to view an opportunity as a multichapter novel. The business plan is the prologue or the book jacket summary because there is no real business yet. We write the contents of the book together, and that is how it works.

The real world is highly uncertain, and human agents have to produce valuable novelty from this uncertain world through their bounded cognition (Sarasvathy & Dew, 2005). With intensive practice and familiarization in the problem domain, experts develop refined situational awareness and perceptual abilities (Hutton & Klein, 1999). They learn to define the relevant features of decision problems and know how to adjust their decision-making style accordingly (Baron & Henry, 2006). Therefore, they are less likely to be reliant on predictive information.

The focus of the present study is not on why venture capitalists choose to invest in early-stage ventures or how they discover the business potential in early-stage

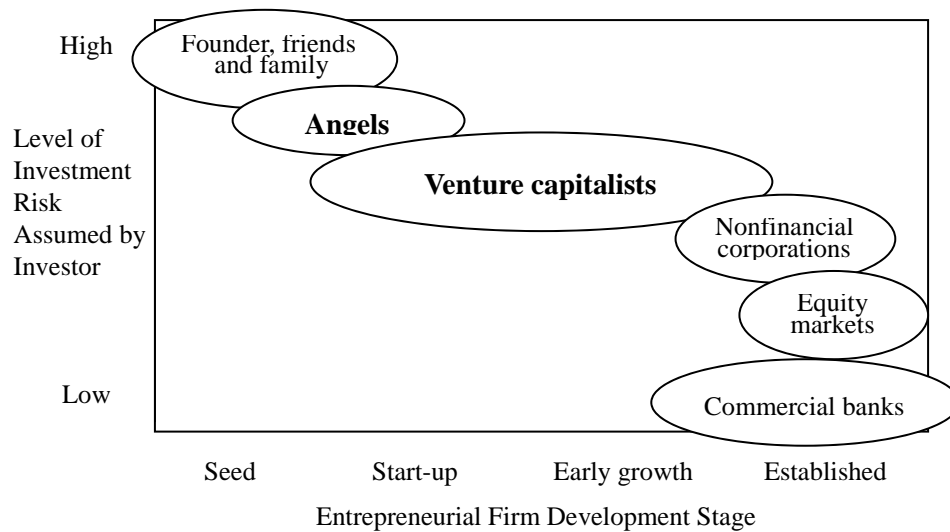
ventures. Instead, it is about how they evaluate an early-stage investment opportunity when facing uncertainty and considering the possibility of value-added contribution under uncertainty. Maula et al. (2005) refer to venture capitalists' value-added services collectively as "enterprise nurturing." Many early-stage venture capitalists have advised literally dozens of entrepreneurs on the challenges of enterprise formation and early-stage growth. Their early-stage venture investment expertise represents a potentially enormously valuable resource.

This study posits that expert early-stage venture capitalists are wilful agents, working with other intentional beings, particularly entrepreneurs, to select and construct new possibilities. Drawing on the notion of entrepreneurial function, this study argues that entrepreneurial expertise is an integral part of early-stage venture capital investment expertise. In this aspect, early-stage venture capitalists are like angel investors. Angel investors are a type of informal investors putting their financial wealth and entrepreneurial experience into new startups, often by working side by side with the entrepreneurs (Van Osnabrugge & Robinson, 2000).

Figure 12 presents the types of external fund providers that finance entrepreneurial firms through the various stages of their growth. As shown in the graph, there is a significant overlap in terms of the stages of the entrepreneurial firms that angel investors and early-stage venture capitalists invest in. These two groups of investors participate in a similar environment and they face similar level of uncertainty in investment decision making. Wiltbank et al.'s (2009) study shows that some angel investors employ effectual logic in their investment decisions, which suggests that early-stage venture capitalists may also use effectuation.

However, some may counter argue that there is a fundamental difference between angel investors and venture capitalists because angel investors manage their own money whereas venture capitalists manage primarily other people's money. Owing to this difference, it is assumed that venture capitalists have to use predictive information to justify their investment decisions; otherwise the agency problem will automatically become real. While such concerns are valid to some extent for venture capitalists in general, it may be less applicable to early-stage venture capitalists and the experts in particular, which is the focus of this study.

Figure 12: Main Providers of External Finance throughout the Evolution of the Entrepreneurial Firm



Source: Van Osnabrugge et al. (2000)

The earlier part of this section has elaborated that early-stage venture capitalists may participate in and contribute to a transformation process to a significant extent rather than taking merely a passive approach to venture selection. Moreover, as described in Introduction, venture capitalists typically receive an annual fixed management fee (around 2.5% of fund capital) plus a variable portion that is typically 20 percent of the fund profit (carried interest). In other words, a critical part of venture capitalists' compensation is directly linked to the fund's overall rate of return. This compensation structure ensures a significant economic incentive to align venture capitalists and the fund investors' interests toward achieving high investment returns. Thus, it could be argued that early-stage venture capitalists are generally motivated to treat the fund money as their own and this substantially eases the potential agency problem.

The venture capitalist–limited partner agency perspective argues that responsible behaviour on the part of the venture capitalists may be the best way to signal to their fund providers that they are of high quality. However, what leads limited partners to invest in a fund in the first place is not a specific investment but the venture capitalists' overall track record (the fund's story) and competence. Venture capitalists usually do this by signalling *ex ante* to the fund investors that the investments are made based upon quality information. The limited partners' fundamental objective is high fund

return and this is also their ultimate measure of venture capitalists' performance. Expert venture capitalists with superior past performance are more likely to develop a reputation for decision quality, which contributes to the limited partners' trust and confidence on them. Therefore, the expert venture capitalists have less pressure to signal their competence and reliability. Instead, expert venture capitalists may be more concerned with the means available to improve the prospective venture's performance rather than to justify the investment decision.

Due to the difference in agency pressure, experts and novices will probably utilise different approaches to deal with potential information asymmetry problems in their decision-making. Because novice venture capitalists are under pressure to behave competently for their fund providers, they may expend more effort controlling agency pressures prior to investment (i.e. through screening, due diligence, and the use of comprehensive contracts) based on the predictive approach. In contrast, expert venture capitalists have less such pressures and prefer more active involvement. As a result, expert early-stage venture capitalists have more flexibility in applying heuristics that are often difficult to explain to others.

Early-stage venture capitalists typically face a similar level of uncertainty in decision-making as angel investors do. The evidence from Wiltbank et al.'s (2009) empirical study shows that angel investors' use of effectuation led to a reduction in investment failures without a reduction in the number of successful exits. There is ground to posit that expert early-stage venture capitalists and angel investors may behave similarly. Moreover, expert early-stage venture capitalists may use effectuation to a larger extent than novices. Indeed, an empirical study by Sarasvathy (2007) sheds some light that the more experienced venture capitalists are, the more likely they may use effectual logic and the more likely to behave as experienced entrepreneurs. In that study, an instrument was presented to 65 entrepreneurs and 56 venture capitalists, asking participants to respond to a list of strategy choices regarding how they would manage two business scenarios, one highly controllable but not predictable, and the other highly predictable but not controllable. Although it was found in general that entrepreneurs were more likely than venture capitalists to employ effectuation, the more interesting results were in the comparison between novice entrepreneurs against novice venture capitalists and the comparison between

expert entrepreneurs against expert venture capitalists. One of the major findings is that there was no significant difference between the expert venture capitalists and expert entrepreneurs on any of the dimensions measured by the instrument. An implication drawn from that study is that despite different strategic starting points, entrepreneurs and venture capitalists may develop similar approaches to dealing with the uncertainty inherent in a new venture (Sarasvathy, 2007).

In seeking to clarify what effectuation is (and what it is not), Dew and Sarasvathy (2002, p.3) state that,

[a]lthough the effectuation lens gives researchers a distinctive point of view on entrepreneurial action, it builds on the work of many leading management theorists such as March and Weick by providing an integrating logic at the level of individual decision-making. The logic of effectuation also promises to be useful in other research domains including economics and strategic management.

The view of action was first advocated by the American Pragmatist philosophers such as William James (1907) and John Dewey (1917). Building on that, the work of Hans Joas (1995) and Karl Weick (1979) illustrates the characteristics of rational actions in depth. Specifically, Joas' work provides the philosophical foundation for effectuation and Weick's work offers an organisational level manifestation of effectual action (Dew & Sarasvathy, 2002). Effectuation also exhibits these characteristics. The logic goes further from an action-theoretic view and posits imagination not only as an important impetus to action, but also acknowledges the creativity inherent in action.

Wiltbank et al. (2009) acknowledge that understanding the differential use of predictive and effectual logics may be relevant not only to entrepreneurs, but also to angel investors, venture capitalists, and managers making decisions under uncertainty.

2.6 Summary

If decision makers believe they are dealing with a measurable or relatively predictable

future, they are motivated to gather information systematically and make an effort to conduct reasonable analysis of the information within certain bounds. However, if they believe they are dealing with relatively unpredictable phenomena, they will try collecting information through experimental and iterative learning techniques aimed at first discovering the underlying distribution of the future (Sarasvathy, 2008).

Effectual logic is particularly applicable in situations where the future is highly uncertain, the precise nature or characteristics of the objectives are unknown with any amount of certitude, and human action (locally or in the aggregate) is the predominant factor shaping the future (Sarasvathy, 2008). Effectuation appears to be a good approach that enables early-stage venture capital decision makers to cope with uncertainty by possibly converting it into opportunity. The theory seems to have the potential to serve as an apt theoretical framework for empirical studies of early-stage venture capital decision making under uncertainty.

Chapter 3 Theoretical Framework and Hypotheses

I would say close to 100% of the time the original plan does not come to reality, sometimes in a good way and sometimes in a bad way. The founders didn't realize they had something completely wrong and had to overcome it. Or the opposite, we overlooked some great attribute in the original plan. So the point is, we have to view an opportunity as a multichapter novel. The business plan is the prologue or the book jacket summary because there is no real business yet. We write the contents of the book together, and that is how it works."

- Russell Siegelman, Partner, Kleiner Perkins
Caufield & Byers (Roberts & Barley, 2004, p.5)

3.1 Introduction

This study explores why expert and novice venture capitalists may have differential use of effectuation in early-stage venture capital investment decision making. The key constructs of the theoretical framework for this study are early-stage venture capital investment expertise and the use of effectuation in various dimensions.

While research on venture capital investment decision making has commonly focused on selection and prediction, there is extensive literature on value-added activities with respect to venture capital investment. Venture capitalists can play a significant role by direct involvement in new product or market creation together with entrepreneurs and other related stakeholders. Therefore, it is argued that early-stage venture capital investment involves and contributes to a transformation process rather than taking merely a passive approach to venture selection. The transformation perspective provides a theoretical explanation for why the difference in the amount of early-stage venture capital investment expertise influences the differential use of effectuation between expert and novice venture capitalists.

The proposed central hypothesis is: *Expert early-stage venture capitalists will use more effectual approaches than novice venture capitalists in early-stage venture*

investment decision making. This study proposes a theoretical framework of effectuation for early-stage venture investment decision making based on the specific dimensions contrasting effectuation and prediction. A series of hypotheses are proposed for testing the differential use of effectuation by expert and novice early-stage venture capitalists.

3.2 Expected Differences between Experts and Novices in Early-Stage Venture Investment Decision Making

At least part of the reason for the way models and theories on venture capital have developed over the last several decades is rooted in the investor's motivation for financial profit maximization. An investor will look at both return and risk aspects of an investment opportunity. Following a predictive logic, market research and competitive analysis are necessary for the development and execution of investment strategies to achieve the highest possible returns for new ventures. Given the reasoning put forward in the previous sections, however, expert early-stage venture capitalists may discount predictive information and emphasise approaches that enable them to directly control, co-create, and transform situations toward positive outcomes, together with entrepreneurs under uncertainty. These venture capitalists tend to be more committed to value-added contributions in their post-investment interaction with entrepreneurs.

In contrast, novice venture capitalists tend to either underestimate the uncertainty inherent in early-stage venture investment or be less mentally prepared or possess fewer value-added skills. Therefore, venture capitalists with little early-stage venture investment expertise may primarily rely on predictive information to make investment decisions.

Accordingly, the central hypothesis of this research is:

Expert early-stage venture capitalists will use more effectuation than novice venture capitalists in early-stage venture investment decision making.

While a vast variety of models of human behaviour and action based on predictive rationality have been developed by scholars over the past two centuries, there could also be a comparable variety of effectual models to be discovered to explain endeavours in areas other than entrepreneurship. Several empirical studies testing effectuation have deliberately juxtaposed the fundamental principles of effectuation and prediction as a dichotomy to enable comparison and clearer theoretical exposition. Table 4 presents a dichotomous model developed by Sarasvathy (2001a), contrasting effectuation and prediction.

Table 4: Differences in Fundamental Principles between Predictive and Effectual Thought in Early-Stage Venture Investment Decision Making

<p>NOTE: This table is included on page 71 of the print copy of the thesis held in the University of Adelaide Library.</p>
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Source: Sarasvathy (2001a)

The five dimensions depicted above have appeared repeatedly in several publications about the theoretical development and empirical testing of effectuation. Each dimension represents two extremes within a much broader spectrum of decision-making behaviour under uncertainty. This model provides a strong theoretical framework to identify heuristics and examine the differential use of effectuation in a systematic manner with respect to early-stage venture capitalist decision making.

For entrepreneurs, the use of and preference for a particular mode of effectuation or prediction is related to their level of expertise and where the firm is in its life cycle (Sarasvathy, 2001a). It should be noted that the current study does not make the assumption that the difference between the concepts of effectuation and prediction or causation is irreconcilable. In other words, these two ways of thinking are not necessarily mutually exclusive. Sarasvathy (2001a) acknowledges that

[b]oth causation and effectuation are integral parts of human reasoning that can occur simultaneously, overlapping and intertwining over different contexts of decisions and actions (p.245).

Wiltbank et al. (2009) further assert that entrepreneurs and their investors are capable of both effectual and predictive logics and often use both in practice. Hindle and Senderovitz (2010) attempt to resolve the controversy concerning the nature of the logical systems of decision making and the entrepreneurs' patterned modes of behaviour in designing and managing the early stages of the entrepreneurial process. Their study finds that various mixes of causal and effectual logic are used in the evaluation and management of early-stage ventures by an expert entrepreneur. They also find that, for some ventures, effectuation and causation are not mutually exclusive or at "opposite ends" of a bipolar discontinuity. Instead, high levels of effectuation and causation can be used simultaneously by a venture (Hindle & Senderovitz, 2010). Although Hindle and Senderovitz's (2010) study has some limitation as the analysis was based on one source (Terry Allen, the expert entrepreneur) and the subject's narrative is a retrospective study, the perspective put forward in that study does shed some light in this field.

Likewise, in the context of early-stage venture investment decision making, effectuation and prediction are not regarded as contending explanations all the time but rather as contextually contingent and perhaps compatible explanations of some behaviour, at least some of the time. For simplification, effectuation and causation may be placed as two extremes. However, this study does not rule out the possibility that a venture capitalist may use both effectuation and prediction in early-stage venture investment decision making. In other words, neither of the two logics are exclusively connected to early-stage venture capitalist behaviour.

This research draws on the dimensions of effectuation exhibited by expert entrepreneurs to examine the differential use of effectuation by expert and novice venture capitalists in the particular domain of early-stage venture investment. These dimensions can be examined independently and focusing on each dimension may generate fruitful research insights. For instance, a means-driven entrepreneurial process does not automatically go together with a focus on creation or controllability; it can go together with an emphasis on predictability as well. A combination of means-driven behaviour and a focus on creation is only one of many possible combinations. Another example is that a person perceiving the environment as predictable can still pursue a strategy focusing on loss minimization, whereas another person focusing on creation can set return maximization as a priority. Therefore, the dimensions may not necessarily relate to each other in the unequivocal way suggested by the theory of effectuation.

Drawing on the above discussion, the following sections formulate specific hypotheses based on the fundamental principles which are expected to contrast the differential use of effectuation by expert and novice venture capitalists in early-stage venture investment decision making.

3.2.1 Creation versus Prediction

Common belief holds that venture capitalists attempt to assess the attractiveness of investments by paying much attention to market data, such as market size and market growth of a potential venture. If the environment is stable enough, future actions may be reliably based on data from the past. In fast-moving, uncertain environments,

predictive information is perishable and does not account for the impact of actions the entrepreneurs will take (Van Heerde, Dekimpe, & Putsis Jr., 2005). In a new market that is still being created, consumer tastes are ambiguous, ill defined, and continuously evolving (Sarasvathy, 2008).

The business environment of early-stage ventures is uncertain and the future of an early-stage venture is driven primarily by human action that is intrinsically unpredictable. The continuously changing technologies and innovation further transform the way customers consume products. When all these dynamics interact with each other, market demand quickly becomes intractable. The value of prediction in early-stage venture investment becomes particularly low.

Having spent a significant amount of time and intensive efforts to understand decision problems, experts become familiarised with the domain and acquire refined perceptual abilities (Hutton & Klein, 1999). Expert venture capitalists may recognise that often the target market is not immediately available for access by early-stage ventures.

Russell Siegelman, Partner, Kleiner Perkins Caufield & Byers, once said, “Most of the plan doesn't materialise the way the entrepreneur expects. The financials are usually not even close...” He highlights that,

[w]ith most of the opportunities we seriously pursue, the market data is unclear because the company has no customers and revenue. Frequently, we brief potential customers about the product concept, but often they haven't met the company. Sometimes, they've met the company, but not under nondisclosure agreement, so they don't have the full story. We have to filter all that. We have to ferret out what the customers' real needs are and their willingness to pay. But it's all sketchy and really hard to do (Roberts & Barley, 2004: p.3).

In new technology commercialization, pioneering entrepreneurs frequently find that formal market research and expert forecasts, no matter how sophisticated in their approaches and analyses, fail to predict how the markets will be formed and where they could be (Sarasvathy, 2008). In the R&D process, the high level of

innovativeness generates significant uncertainty; market analysis becomes outdated very quickly. Fred Wang, General Partner of Trinity Ventures, acknowledges,

We're often funding companies in unproven markets, and we just don't know how large the market will be. Frankly, we don't put a lot of weight in market size projections. (Roberts & Barley, 2004, p.10)

It could be argued that if the expert venture capitalists believe the future of the venture is created rather than predicted, they may choose to concentrate on actions that will shape the future rather than building elaborate forecasts. However, venture capitalists without strong domain expertise are likely to attempt to predict using textbook tools of market research. Although they may have strong factual knowledge about the venture industry, they may lack practical experience in dealing with uncertainty. Thus this study expects:

H1a: When making early-stage venture investment decisions, expert venture capitalists tend to emphasise execution more than novices do.

It can also be hypothesised that:

H1b: When making early-stage venture investment decisions, expert venture capitalists are more likely to be sceptical about market data, while novices are more likely to take market data as given and credible.

As discussed earlier, entrepreneurial expertise may be an integral part of early-stage venture capital investment expertise. Venture capitalists who invest in early-stage ventures may be perceived as wilful agents, working with other intentional beings, particularly entrepreneurs, to jointly transform the extant reality into new products or markets. The experts may be more mentally prepared to provide value-added services to the investee ventures. Indeed, the nature of early-stage investor–investee relationships is typified by a high degree of direct involvement. Expert early-stage ventures tend to focus on what actions could be taken to co-create an environment to nurture and develop the venture to enhance its advantage. Fred Wang states,

We're trying to find more deals like this where we create the situation ourselves. We know the CEO; we don't have to reference that person. We have also spent time with the technology and the product, and so we put them all together...

In situations where we're betting on momentum, we'll spend a lot of time with the sales team. We'll do account reviews. We'll ask them about the status of their top 20 accounts: where are you, what have you talked about, who are the other guys? We go through the pipeline like we are the VP of sales (Roberts & Barley, 2004, p.13).

Venture capitalists' value-added skills could form a critical component of the early-stage venture investment expertise. Expert early-stage venture capitalists are expected to be more hands-on and are more prepared than novices to get involved in the process of new product development and market creation. Therefore, the following is expected:

H1c: When making early-stage venture investment decisions, expert venture capitalists place a greater emphasis on acquiring their own experience with the product than novices do.

3.2.2 Means Driven versus Goal Driven

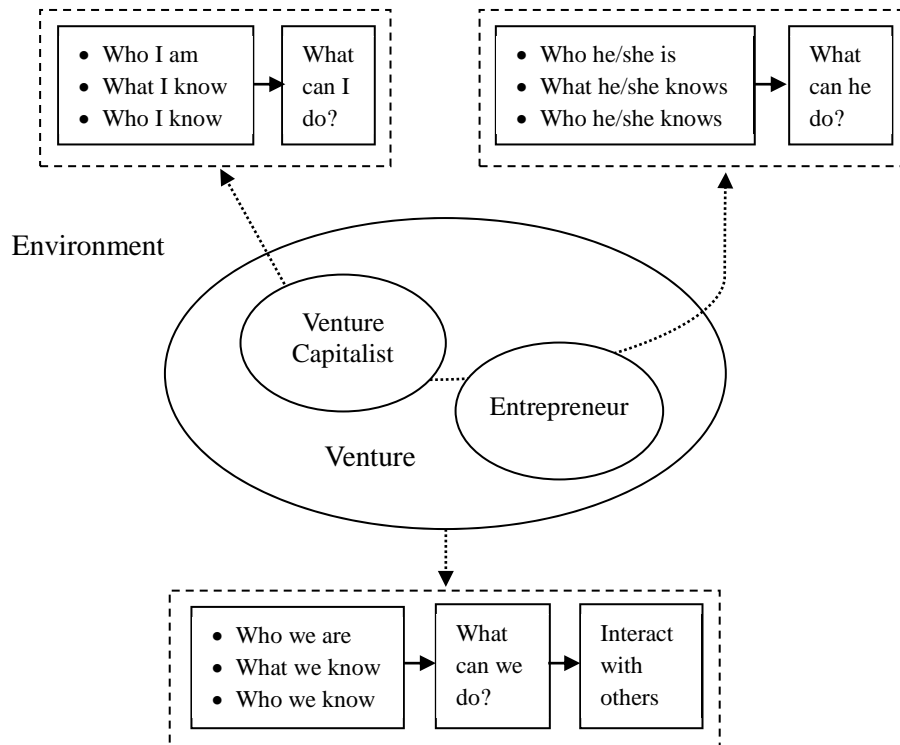
Traditional decision-making techniques make it a prerequisite that goals be set as the focus to guide the identification or creation of the means to achieve those goals. But effectuation does not begin with a prescribed goal. Instead, the emphasis of effectuation is on creating something new with existing means (Sarasvathy, 2008; p. 21). Effectuators start with a given set of means and work hard to let goals emerge automatically over time.

The beliefs that venture capitalists subscribe to about the future also shape the venture capitalists' conception of what reasonably can be done with the resources available. When prompted with an early-stage investment opportunity, instead of starting with the assumption of a huge existing market, a venture capitalist may begin by examining

the particular set of means available. There are two types of means to assess. The first is about the venture capitalist self, from where the investor can extend the source of available means further to the entrepreneur. In examining the available means, the venture capitalist may ask these questions: who I am, what I know, and whom I know. Indeed, evidence has shown that whom venture capitalists know (social capital) and what they know (knowledge) influence the application of value-added services (Maula et al., 2005). Dimov's (2002) study shows that venture capitalists' education, functional expertise, and prior experience in particular industries strongly determine whether they are prepared to invest in a venture at certain developmental stages and in particular industries.

The second type of means is related to the entrepreneur. Referring to Coleman's (1990) description of an entrepreneurial function, entrepreneurs are deemed as "actors who are expected to realise gains for the original investors" (p. 181). From an investment economics perspective, the entrepreneur is valuable human capital, playing a critical role in venture formation and development. Naturally venture capitalists would assess who the entrepreneur is, what the entrepreneur knows, and whom the entrepreneur knows. Following that, the venture capitalist assesses what the entrepreneur intends to do and what can be done based on the combined means available and possible value-added services. Coming to this point, the venture capitalists need to imagine themselves being vested in the venture and the resources are bounded as a whole to address the business challenges faced by the venture, as shown in Figure 13. Acting as the entrepreneur's partner, the venture capitalist may switch the thinking from the role of "I" to "we."

Figure 13: Venture Capitalist Vested in the Venture



Among various means, the entrepreneur as human capital may be the most important and central to the development of new firms. Arthur Rock, the lead investor for Apple Computer, summarises the importance he places on the lead entrepreneur and management team (Bygrave & Timmons, 1992b, p.6):

If you can find good people, they can always change the product. Nearly every mistake I've made has been in picking the wrong people, not the wrong idea... Most entrepreneurs have no problem coming up with a good strategy, but they usually need all the help they can get in developing and implementing the tactics that will make them successful in the long run.

Extensive literature has shown that the background, experience, skills, and networks of entrepreneurial team members influence the performance of new ventures (eg. Anderson & Jack, 2002; Birley, 1985; Hite & Hesterly, 2001). A key aspect of due diligence in initial investment evaluation is learning the background of the entrepreneurial founder and the managers (Ahlstrom et al., 2007). While this applies

to the venture capital practice in the U.S., it is even truer in China because venture capitalists may not be able to gain much from a firm's financial statements which may contain limited valuable information and other means of due diligence are often problematic.

Human capital may be the most valuable resource a new startup possesses. However, this attribute is difficult to assess in venture proposals (Kozmetsky, Gill, & Smilor, 1985). It has to do with making projections of future behaviours that human capital is likely to perform (Smart, 1999). Experienced and novice venture capitalists may differ in their evaluation of entrepreneur human capital.

Lichtenthaler (2009) argues that, because of the difficulty inherent in predicting developments in uncertain environments, prior resources are particularly important because the concentration on existing resources helps firms to access additional knowledge and to successfully proceed with their development paths (p. 828). In the R&D literature, it is found that new competencies, which are necessary when innovativeness drives uncertainty into the R&D process, must be grounded in existing expertise (Atuahene-Gima, 2005).

In environments characterised by high complexity and uncertainty, prediction becomes difficult and the goals need to be revised to cope with the changing environment. Project targets could be initially fuzzy and may even remain highly abstract. Therefore, means may be the starting point for expert venture capitalists to evaluate the possibility of actions to take and the effects to create by both entrepreneurs and the venture capitalists for early-stage venture investment. In this process, valuable inputs from various stakeholders count. With regard to venture capitalists, apart from the capital, they may possess extensive industry networks and expertise in managing similar types of businesses. They can directly integrate or support the entrepreneurs to put these resources to work.

Some researchers (e.g., Freid & Hisrich, 1994; MacMillan, Zemann, & Subbanarasimha, 1987; Tyebjee & Bruno, 1984) have found empirical support for the positive relationship between the quality of venture human resources and the ability to acquire funding. Therefore it can be expected that:

H2a: *When making early-stage venture investment decisions, expert venture capitalists place a higher weight on the background and resources that entrepreneurs have (what they have, what they know, and who they know) than novices do.*

In the context of China, the need for early-stage ventures to get value-added services from venture capitalists may be greater than in comparable situations in the West, particularly for high tech firms (Ahlstrom et al., 2007). They point out that in China, hiring people with right skills and resources is extremely important to the entrepreneurial firm. Venture capitalists can make significant contribution by aiding the search for professional managers, including finding suitable candidates from multinational firms throughout Asia and attracting them by offering a small stake in the venture (Pohndorf, 1997).

H2b: *When making early-stage venture investment decisions, expert venture capitalists are more likely than novices to consider how their own means could add value to the venture.*

Consistent with the above hypotheses but in a different aspect, the following can be expected:

H2c: *When making early-stage venture investment decisions, expert venture capitalists place less emphasis on entrepreneurs' goal setting than novices do.*

3.2.3 Downside Protection versus Upside Attractiveness

Return and loss have long been seen as the twins in venture capital investment decisions. Tyebjee and Bruno (1984) propose a model to view venture capital decision making as a task evaluating both return and risk. An investment can also be viewed as an opportunity characterised by potential gain and loss. Investors typically look at both upside and downside. The key issue here is which side goes first or which one gains primary attention.

Ruhnka and Young (1991) suggest that venture capitalists' screening of potential deals consists of two steps. In the first step, venture capitalists identify those ventures with an acceptable prospect of loss. Second, they try to identify the ones that carry the highest possible gain. This is supported by Robert Simon, Director, Alta Partners, who shares his personal experience:

The business presentations usually have both the revenue model and expense model. We first look at the expense model. How much money does the opportunity take to get to cash flow breakeven? We construct our own model on revenues because usually they're widely optimistic: first year \$1 million, second year \$20 million, third year \$100 million- it's a little unrealistic. (Roberts & Barley, 2004, p.18).

...

Everyone wants the \$1 billion market. If we're honest, we don't know what and where the \$1 billion markets are until we get there (Roberts & Barley, 2004, p. 15).

To make reliable return forecasts for a deal, venture capitalists need information on market acceptance, sales volume, growth rate, and even risks that constitute their cost of capital. Early-stage ventures operate typically in Knightian uncertainty. Reliable information on the upside potential is rare. The paradigm based on causal reasoning suggests that investors are more concerned with whether the target markets can generate high returns. The choices between options tend to be made with the objective to maximize expected returns. However, the upside data for business under uncertainty is usually not discriminating and reliable enough to be the key decision criteria (Dew et al., 2009). Ruhnka and Young (1991) assert that, even at the portfolio level, which may consist of a dozen investments, the probability of a final positive or negative outcome for that portfolio cannot be projected with any degree of certainty—nor can estimation of the return of a single deal.

Some venture capitalists may refuse to invest in a venture until they predict it to be able to pay a substantial return. In contrast, others may focus more on the affordable loss, limiting the exposure to downside potential and then seeking to enhance profitability by pulling in stakeholders' joint commitments and exerting control later

on. In an earlier study comparing how entrepreneurs and bankers perceive and manage risk, Sarasvathy et al (1998) find that entrepreneurs seek out options with lower predicted variance and lower predicted returns than bankers who pick projects with high predicted returns in the belief that they can control the downside through a variety of analytical and predictive strategies. Thereafter entrepreneurs come up with more ways of increasing returns at any given level of risk than bankers who merely accept predictions of potential returns.

Some venture capitalists ask about how much the potential gain is first and then think about the risk. Some are initially concerned with the worst-case scenario and then the upside.

Downside for a new venture includes financial losses for an extended period of time, failure to reach breakeven, and, ultimately, the cessation of operations. Expert early-stage venture capitalists are aware that even failure is common for early-stage ventures due to the business uncertainty. Moreover, venture capital investments are at least partially irreversible because they cannot be fully recovered and costlessly redeployed in the event of a negative shock. Therefore, downside loss protection could be a major concern for venture capitalists.

Success cannot be predicted when facing uncertainty but risks are comparatively easy to assess and the occurrence of failure can be significantly controlled (Sarasvathy, 2001a). Expert venture capitalists learn to examine the worst-case scenario and prefer to make small bets. By taking action based on affordable loss rather than on predicted values, the risk involved in any one action cannot put an entire fund in jeopardy.

It can be argued that expert venture capitalists are more pragmatic and they tend to focus on the practicality, which may be reflected in their concern about the cost of doing business. Fred Wang, General Partner of Trinity Ventures, highlights:

We don't spend too much time initially on the marketing.... If it's a hardware business, we need a clear understanding of what working capital looks like. Working capital, especially if the company's doing well, can really be a cash drain...

We typically like the other model of going after a slightly smaller opportunity, a more bite-sized and tactical one. But we'll know early on after \$5 million to \$7 million of investment if we're on the right track. Then, we hope to get into adjacent markets and grow the company from there (Roberts & Barley, 2004, p.11-12).

From a real option perspective, in contrast to discrete large investments, small investments provide greater flexibility to the venture capitalists to adapt to changes in market conditions (Bowman & Hurry, 1993). By adopting the staging approach to investment, venture capitalists have the flexibility to terminate failing investments timely. This approach of affordable loss can contribute to the total fund return in the long run because it avoids overexpenditure on the wrong projects.

Upside potential is definitely an important consideration for venture capitalists in making investment decisions. However, according to Dew et al. (2009), when upside information is fuzzy, expected returns may not lead to the right choice. It can be argued that expert venture capitalists are more concerned about the affordable cost (the worst-case scenario) compared to the upside potential in evaluating early-stage ventures. They are first concerned about the viability of the business, then the upside. When a fatal flaw in the new venture is identified, they likely give it a pass no matter how attractive the investment could be. On the contrary, novices first ask about how much there is to gain and then think about the possibility of loss. Therefore, the following is expected:

H3a: When making early-stage venture investment decisions, expert venture capitalists are more likely than novices to consider the cost of developing the business.

Driven by practicality, effectual investors are more concerned about the intrinsic value of the new product or technology, which should be demonstrated in the interests of the potential customers.

Venture capitalists applying effectual logic in early-stage venture investment decision

making may prefer an approach which concentrates the resources to win a battle first rather than begins with the ambition to win the war for the sake of expected returns. To them, return is the result of the effort. Instead of expecting the business to target a wide range of customers, an expert early-stage venture capitalist may prefer seeing a product develop distinctive value proposition to certain potential customers, letting the initial small successful bet evolve and generalise into a large market. Following this reasoning, it can be argued that:

H3b: When making early-stage venture investment decisions, expert venture capitalists are less concerned about the expected return than novices do.

3.2.4 Partnership versus Competition

The partnership dimension of effectuation refers to the involvement of partners in the decision-making and innovation processes. The partnership bounding process is necessary and an inevitable component of any entrepreneurial projects (Sarasvathy & Dew, 2005).

Focusing on partnership enables expanding means and reducing uncertainty. Institutions are a response to uncertainty (Loasby, 1999). Fundamentally, institutional tissues that connect the demand and supply sides of markets into co-evolving dynamics reduce the cognitive costs otherwise incurred in developing new markets (Dopfer, Foster, & Potts, 2004). Stakeholders such as suppliers or customers may provide necessary information and resources to reduce uncertainty and ambiguity, thereby positively impacting the venture development. For example, pre-commitments from potential customers may facilitate startups to test their products without the need of investing heavy resources to fund market tests (Chandler, DeTienne, McKelvie, & Mumford, 2011). The meta-analysis on new ventures by Read et al. (2009b) suggests a positive relationship between self-selected partnerships and new venture performance.

Investors emphasizing the causal approaches tend to conduct systematic and detailed competitive analyses by assuming the existence of a predetermined market. In line with this, the specification of market segments and the identification of target market

are necessary. However, expert early-stage venture capitalists may de-emphasise it because they do not hold such assumptions of pre-existent market. Instead, they weigh more heavily the commitments shown by entrepreneurs and other key stakeholders that the entrepreneurs brought on board or are connected with, even before clarifying what exactly the product or market they are dealing with.

Investors emphasizing competition may be more concerned with dilution of ownership. Their priority is protecting future profit. In order to achieve that, they tend to focus on how to prevent direct competition or imitation. For example, they may seek solutions by relying on unique technologies or business models.

Under uncertainty, however, relationships may be driven by creating new markets, which need the inputs from various stakeholders. For effectuators, the emphasis is on who can offer commitments and who come on board determine the project objectives and upside (at least partially). Expert entrepreneurs know that successful ventures involve complete and complex webs of stakeholder relationships, with stakeholders bringing resources as well as obligations to a new venture (Sarasvathy, 2001a).

Venture capitalists emphasizing partnership are more inclined to co-invest. They are more concerned with making the deal successful with partners who have complementary expertise and efforts instead of being afraid of sharing profits with others. Bygrave (1987) shows that venture capital firms tend to co-invest more extensively when funding early-stage ventures. Lerner (1994) finds syndication is common in the first round of investing. Deal syndication allows multiple venture capitalists to take an equity stake in an investment for a joint payoff while sharing and reducing risks. For venture capitalists, the joint due diligence and investment capital put in the same deal is one form of stakeholder-partner's pre-commitment.

The venture capitalists may also contact the entrepreneurs from previous investments of relevance to the current investment opportunity or technical experts who they know to seek strategic feedback. Working together, various stakeholders reconcile their interests and motivation towards something they commonly think possible and worth doing. Another advantage of this approach is that the experts can acquire rich, firsthand knowledge related to the task and will gain a quick sense of the potential of

the business (Read et al., 2009a).

Through such pre-commitments, the stakeholders can focus on creating new markets rather than attempting to guess at structures of exogenous markets through predictive competitive analyses. Therefore, the following could be expected:

H4a: When making early-stage venture investment decisions, expert venture capitalists place greater weight on developing partnerships than novices do.

H4b: When making early-stage venture investment decisions, expert venture capitalists are less concerned about competition than novices do.

3.2.5 Contingency Acknowledging versus Ignoring

Emphasis on prediction may lead to decision makers' commitment to planned strategy despite the need to make changes in their plans under uncertainty. The effects of these commitments are referred to as "imprinting" by Boeker (1989).

In an uncertain business situation, however, surprises are common. In the context of technology commercialization at early stage, market analysis becomes outdated very quickly. The possibility of breaking formal rules and reacting to the emergence of unanticipated ideas is high (Naveh, 2007). Close adherence to the existing analyses can lead to flawed decisions and hinder a company's ability to adapt to new situations (Grewal & Tansuhaj, 2001).

Surprises arising from action often constructs new situations which go beyond imagination and existing beliefs (Dew & Sarasvathy, 2002). Unexpected contingencies are part of the innovation process and shall not always be viewed as obstacles upsetting existing plans. Instead, they may be welcomed and creatively used as a resource in transforming the event space. "Acknowledging the unexpected" can have a positive impact on R&D performance because it fosters spontaneity and encourages the decision makers to improvise and explore market opportunities as they arise (Lewis, Welsh, Dehler, & Green, 2002).

Empirically, Frederickson & Mitchell (1984) and Frederickson & Iaquinto (1989) find that comprehensive planning efforts were negatively related to performance under uncertainty. Brettel et al. (2011) report that acknowledging surprises positively impacts the R&D output and efficiency when high innovativeness drives uncertainty.

In general, experts possess a highly adapted set of cognitive skills and a deep understanding of the nature of problem domain (Bettman & Sujan, 1987) They are more likely to consider the environmental changes and emphasise the ability to adapt to the changes. This flexibility further enables them to work with partners who are willing to pre-commit, and to embrace strategies that are affordable rather than optimal.

Expert venture capitalists know surprises are natural in early-stage venture development. They are inclined to expect entrepreneurs to make do with what comes their way, leveraging uncertainty by treating the arrival of contingencies as opportunity to exercise control of the emerging situation. Russell Siegelman, Partner, Kleiner Perkins Caufield & Byers, shares his views on entrepreneurs with regard to early-stage venture development:

[T]he best ones are willing to reexamine their assumptions and are willing to veer left or right or pivot all the way around when the data suggests they're headed in the wrong direction. They amble around until they find something good. The bad ones typically get overcommitted or wed to a particular idea. (Roberts & Barley, 2004, p.2).

With extensive exposure to the uncertainty pertaining to the problem domain of early-stage venture investment, experts develop refined situational awareness and perceptual abilities (Hutton & Klein, 1999). This makes expert early-stage venture capitalists to become used to be wary about unexpected events and they learn how to identify the contingencies. In contrast, novices have limited exposure to the uncertainty and insufficient experience dealing with real-world problems and a shortage of feedback for decision outcomes. Therefore, novices are less able to identify the true uncertainty even they actually face it. This leads to the following:

H5a: When making early-stage venture investment decisions, expert venture capitalists are more likely to acknowledge unexpected contingencies, while novices are more likely to ignore unexpected contingencies.

The key concern of the above hypothesis is about the difference in perceiving or identifying uncertainty between expert venture capitalists and novices. A further interesting question following this is: If the uncertainty is recognised, do these two groups of people behave same or differently to tackle the issue of uncertainty? It could be argued that while acknowledging or ignoring uncertainty can be considered an issue about mental awareness or recognition, how to treat or react to the contingencies is more of an attitude or deliberate behaviour. This becomes the subject of the next hypothesis.

H5b: When making early-stage venture investment decisions, expert venture capitalists are more likely than novices to emphasise exploiting opportunities arising from unexpected contingencies.

3.3 Summary

This chapter explains why expertise influences venture capitalists' use of effectuation from theoretical perspective. It defines expertise and early-stage venture investment expertise. Drawing upon psychology literature, it explains why expertise influences the use of effectuation.

In addition, hypotheses are proposed. The research methodology and empirical work will be illustrated in the following chapters.

Chapter 4 Research Methodology

4.1 Introduction

The previous chapters establish this study's purpose in examining the contrasting uses of effectuation versus prediction by expert and novice venture capitalists in early-stage investment decision making. A review of the issues related to venture capital, venture capitalist decision making, decision making under uncertainty, and effectuation was provided, followed by the development of the theoretical framework and specific research hypotheses. This chapter describes the research methodology employed and specifically the protocol analysis method adopted by the present study. Following the justification of the research methodology, the research design, participants and data collection, and data analysis are illustrated in Sections 4.3, 4.4, and 4.5 respectively.

4.2 Methodology Justification

4.2.1 Discussion of Research Methodologies

Research methodologies are concerned with ontology, the study of existence/how the world really is (Gerring, 2004; Morgan & Smircich, 1980), and epistemology, the study of knowledge (Dancy, 1986). For social science research, there are three main approaches: positivist, interpretive, and critical. Most ongoing social research is based on the first two approaches while critical social science is less common in journal publications (Neuman, 2006).

The positivist social science approach emphasises discovering causal laws, careful empirical observations, objective measure of phenomenon, and value-free research (Neuman, 2006). This approach is often linked with “scientific” and “logical” quantitative research methodologies in Western research tradition (Cavana, Delahaye, & Sekaran, 2001), which are based on deductive reasoning and aim to use precise statistics to analyse data (Cavana et al., 2001). Most people assume that the positivist approach *is* science (Neuman, 2006). However, critics contend that positivism reduces people to numbers and thus does not reflect the actual lives of real people. As such,

many researchers feel that “being a positivist is not a good thing” (Turner, 1992: 1511).

The vast complexity, richness, and hidden realities of our world may be lost during the operationalisation of variables in quantitative research (Miles & Huberman, 1994; Parkhe, 1993; Silverman, 2005; Yin, 1994). The interpretive approach thus emphasises the importance of understanding meaningful social action, socially constructed meaning, and value relativism. It is concerned with how people act, interact, and get along with each other in a social environment. Interpretive studies are often qualitative in nature. The aim of this approach is more about understanding the meaning of the phenomena, rather than the frequency (Cavana et al., 2001; McGaughey, 2004; Van Maanen, 1983) and providing insight rather than generalisations (Miles & Huberman, 1994). This approach is the foundation of social research techniques that are sensitive to the complexities of behaviour and meaning in the contexts where they typically or naturally occur (Harre & Secord, 1972). While a positivist researcher prefers precise measure of specific quantitative details about a large scale of population and use statistics for analysis, interpretive researchers use participant observation, field research, or transcripts of conversations (Neuman, 2006).

The positivist versus interpretive debate has existed for many years in discussions of social science methodology. Meanwhile, the third approach, critical social science, emphasises combating surface-level distortions, multiple-level reality, and value-based activism for human empowerment (Neuman, 2006). This approach agrees with many of the criticisms interpretivists direct at positivists but it also criticises the interpretive approach for being too subjective and relativist. The critical approach is often used by community action groups and political organizations rather than full-time researchers.

It is apparent that there are competing approaches to social research based on philosophical assumptions about the purpose of science and the nature of social reality. Couch (1987: 106) states,

The ontological and epistemological positions of these...research traditions

provide the foundation of one of the more bitter quarrels in contemporary sociology.... Each side claims that the frame of thought they promote provides a means for acquiring knowledge about social phenomena, and each regards the efforts of the other as at best misguided.... They differ on what phenomena should be attended to, how one is to approach phenomena, and how the phenomena are to be analysed.

In simple terms, research is a way of seeking answers to questions. Social research is a collection of methods and methodologies that people use systematically to produce scientifically based knowledge about the social world (Neuman, 2006). It is often argued that interpretative research methods are used in exploratory research in theory generation/building whereas positivist methods are better suited to theory testing (Cavana et al., 2001; Glaser & Strauss, 1967) and the critical approach is more appropriate for action-oriented research (Neuman, 2006). However, Neuman (2006) points out that there is no single, correct approach to social science research and there is no strict rule with regard to the fit between the various approaches and the types of research. Different methodological approaches, positivist versus interpretive, quantitative versus qualitative, have their own merit and can address the same research topic with different philosophies and techniques. One approach may complement another in the development of a comprehensive theory (Miles & Huberman, 1994; Parkhe, 1993).

4.2.2 Methodology Adopted in This Research

In the very early stages of designing this study, I considered the possibility of using positivist/quantitative methodologies, in the belief that they could provide more credibility to the claim of generalization. Recall that the research questions addressed in this study are:

- (1) *Do venture capitalists use effectuation in early-stage investment decision making?*
- (2) *In what ways do early-stage venture capitalists use effectuation?*
- (3) *How do expert and novice venture capitalists differ in their use of effectuation in early-stage investment decision making?*

After a review of the literature and discussions with several venture capitalists, the subjects of this research, it became apparent that a quantitative approach would have limited potential for theoretical discovery and development due to the inherent constraints of variable operationalisation and measurement, as well as the practical obstacles to achieving a statistically representative sample size of venture capitalists in China. On the other hand, I was confident that I could obtain interviews with a relatively large number of expert early-stage venture capitalists, which could generate a wealth of information to contribute to research in this area. In considering how to maximise the potential of this opportunity, I was keen to hear expert venture capitalists describe, in their own words, how they evaluate early-stage ventures and make investment decisions, rather than have them fill out a questionnaire that by its very nature could be laden with preconceptions.

When the aim of research is to understand complex social phenomena comprising different dimensions, specific contexts, and/or the role of the human factor, qualitative research methodologies are particularly suitable (Bonoma, 1985; Cavana et al., 2001; McGaughey, 2004; Miles & Huberman, 1984; Parkhe, 1993; Yin, 1994). Some researchers have even argued that qualitative studies may also be appropriate for theory testing, especially if an existing theory is to be tested from a new perspective (Miles & Huberman, 1994; Sekaran, 1992; Yin, 1994). Therefore, after lengthy consideration of the various methodological issues, I decided to adopt a qualitative methodology for this study.

Qualitative research is typically assumed to be inductive in nature for theory generation (Glaser & Strauss, 1967). However, very few qualitative studies proceed without due consideration being given to existing theories (Parkhe, 1993; Silverman, 2005). A qualitative study can also incorporate positivist/deductive approaches (See: Miles & Huberman, 1994; Yin, 2003) or combine both inductive/theory-generating and deductive/confirmatory approaches (Parkhe, 1993). The current study takes a middle position, leaning toward a positivist/deductive qualitative approach. This approach requires a priori specifications of some variables or theoretisation (Keating, 1995; Miles & Huberman, 1994), which can lead to some limitation of the findings in favour of improved planning and conceptual preparation.

In a domain of qualitative inquiry, there are different types of research methods. This study employs the protocol analysis method, which will be discussed in detail in the next section.

4.2.3 Protocol Analysis Method

Protocol analysis is considered to be a qualitative methodology (Green, 1998) and is a standard paradigm for studying expertise in a knowledge domain (Eells et al., 2005). It is based on the assumption that an individual's verbalisations are an accurate record of the information attended to, the problem solving structure, and the strategies employed when a particular task is carried out (Green, 1998; Nersessian, 2008).

In the context of research into human cognition, protocols are detailed records of human behaviour in carrying out a task (Gilhooly & Green, 2008), for example, doing a mental calculation, solving a problem, making a decision, or interacting with a computer. Verbal protocols are transcribed recordings of people's spoken accounts of their thought processes as they perform a cognitive task under think-aloud instructions.

The theoretical framework for protocol analysis originates from Ericsson and Simon (1984) and is introduced in detail in Van Someren, Barnard, and Sandberg (1994). Based on theoretical analysis, Ericsson and Simon (1993) argue that the connection between actual thoughts and verbal reports is closest when people verbalise spontaneous thoughts during task completion. Figure 14 illustrates how most thoughts are given verbal expression under this condition.

Figure 14: An Illustration of Overt Verbalizations

NOTE:
This figure is included on page 94
of the print copy of the thesis held in
the University of Adelaide Library.

Source: *Ericsson (2006)*

Spontaneously thinking aloud is a common practice of human beings. When solving difficult tasks or working in noisy surroundings, adults may automatically adopt a think-aloud approach, particularly if they are on their own. When tasks are performed while thinking aloud, the verbalizations reflect information generated from the person's cognitive processes. By analysing this information, the verbalised sequences of thoughts can be compared to the sequence of intermediate results required to compute the answer by different strategies that are specified in a task analysis (Ericsson & Simon, 1993). For children, spontaneously thinking aloud is a part of the natural learning process when difficult problems are encountered. Accordingly to Berk (1994), such verbalization in children may aid their long-term learning and knowledge acquisition.

To illustrate, one example of think-aloud protocol analysis is mental multiplication. Most adults know the multiplication tables and the standard procedure taught in school for solving multiplication problems. When solving a specific problem such as 68×52 , they will first calculate $2 \times 68 = 136$, then $50 \times 68 = 3,400$, and finally $136 + 3400 = 3536$. More sophisticated adults may recognise that 68×52 can be transformed into $(60 + 8)(60 - 8)$ and that the formula $(a + b)(a - b) = a^2 - b^2$ can be used to calculate 68×52 as $60^2 - 8^2 = 3,600 - 64 = 3,536$.

According to the behaviourist Watson (1920), thinking is accompanied by covert neural activity of the "inner speech." He advocated the use of the think-aloud method

to externalise thought for study purpose. If subjects are instructed to vocalise their inner speech, their thinking process and problem- solving strategies can be well captured and analysed.

Cognitive task analysis is one of the principal methods that could reproduce the observable aspects of human performance on well-defined tasks through the application of explicit procedures (Ericsson, 2006). Task analysis can be applied to the analysis of think-aloud protocols during a relatively skilled activity. To a certain extent, protocol analysis is similar to content analysis in that its primary objective is to ensure the validity of inferences drawn from unstructured qualitative data about the cognitive processes which underlie the performance of the task or some other aspect of reality that the data are deemed to refer to.

Verbal protocol analysis is distinct from other techniques such as discourse analysis or interviewing, “which focus primarily on linguistic content and structure, and the formation of what is said” (Green, 1998: p.p. 1). In a think-aloud protocol experiment, participants are presented with problems to solve and asked to verbalise their thoughts. The protocols can be collected concurrently or retrospectively depending on whether the verbalization occurs during or after the participant completes a task. However, concurrent protocols are far less susceptible to influences from unwanted variables (Green, 1998) than are retrospective protocols, which allow subjects to narrate how they believe they solve problems rather than how they actually solve them. Therefore, whenever possible, concurrent protocols should be used when conducting research.

Protocol analysis is useful in both pure and applied research (Gilhooly & Green, 2008) and has a long history of application in a wide range of domains, including cognitive psychology, educational psychology, social psychology, and cognitive science (Green, 1998). Nearly a hundred years ago, researchers such as John B. Watson (1920) and Karl Duncker (1945) began using the think-aloud method to elicit subjects’ verbalizations and collect immediate verbal reports about their thoughts while performing tasks. The protocol analysis method works effectively in the investigation of cognitive processes for problem solving in a wide range of areas, including computer language learning (Anderson, Farrell, & Sauer, 1984), text comprehension (László, Meutsch, & Viehoff, 1988), scientific discovery (Qin & Simon, 1990),

medical diagnosis (Johnson, 1988), mental representations in mathematical problem solving (Schoenfeld & Herrmann, 1982), and exploration of differences in solving political science problems (Voss, Greene, Post, & Penner, 1983). More recent published research using protocol analysis includes the study of the cognition of design creativity (Kim, Kim, Lee, & Park, 2007) and comparison of cognitive actions of design engineers and cost estimators (Houseman, Coley, & Roy, 2008). The method has also been used in business, management, and entrepreneurship research, such as accounting expertise (Riahi-Belkaoui, 1989), argumentation in management consulting (Young, 1988), decision making (Montgomery & Svenson, 1989), examination of risk management by entrepreneurs and bankers (Sarasvathy et al., 1998), and entrepreneurship expertise (Dew et al., 2009; Read et al., 2009a).

Sometimes verbal reports are the only information source when researching human cognition or expert performance and the insights gained may go beyond what is attainable with more traditional research methods. For data analysis, the collected verbal protocols need to be transcribed, coded, and analysed by researchers so that inferences can be drawn about the underlying cognitive processes in problem solving. The protocols can be gathered from different individuals to constitute a body of qualitative data that provides primary information or “a direct trace” (Ericsson & Simon, 1984: p.p. 220) for researchers to use in their analysis (Nersessian, 2008).

Protocol data can be quantified in various ways, such as looking at the frequency with which certain behaviours occur. The data are typically coded prior to analysis. Afterwards, both qualitative and quantitative analyses can be carried out (Green, 1998). For example, statistical analyses may be conducted to compare the protocols of different groups of subjects, including experts and novices, or to construct profiles of cognitive activities associated with different individuals.

4.2.4 Validity of Data Elicited Using the Thinking-Aloud Method

In protocol analysis, it is generally accepted that verbalizations are valid representations of thought processes (Simon & Kaplan, 1989). Ericsson and Simon (1984) show that verbal protocols can be reliably scored and that verbalization does not affect cognitive processes as long as the participants need only to verbalise their

thoughts as they occur and not explain or justify them. Theoretically, as long as it is carried out in this manner, verbalization can be deemed not to interfere with the nature of the ongoing reasoning(Nersessian, 2008).

In actual practice, participants are normally given minimal prompting in the protocol collection process. But they are not supposed to answer questions such as “why did you do that?” or “why do you think so?” In non-mediated verbalization, participants think aloud and are prompted only when they pause for a period of time(Green, 1998). If a prompt is necessary, it tends to be as unintrusive as possible, such as a request to “keep talking.” In this way, the participants do not have to do extra intellectual work such as constructing an argument or formulating themes for an explanation. The thoughts verbalised by the participants during the problem-solving process are deemed sufficient as responses. The inference of cognitive strategies is the task of researchers, not the participants(Payne, 1994).

The think-aloud method outlined here is distinct from classical introspection (Titchener, 1909), which requires a highly artificial form of verbal report in the language of elementary sensations. The many limitations of classical introspection do not apply to thinking aloud. Extensive research, reviewed by Ericsson and Simon (1993), indicates that, in general, direct concurrent thinking aloud has no significant effect on the quality of performance.

There is persuasive evidence for the validity of verbalised thoughts. Ericsson and Simon (1993) argue that verbalization can reveal sequences of thought that match those specified by task analysis. The validity of verbal reports was tested by using task analysis to predict a set of alternative sequences of concurrently verbalised thoughts in relation to the generation of the solution to a task(Ericsson, 2006); a close correspondence between participants’ verbalised thoughts and the information they sought was revealed in the analysis(Ericsson & Simon, 1993).

By examining experts’ verbal protocols when they think aloud in situations involving challenging tasks, the expert-performance approach to expertise (Ericsson & Lehmann, 1996; Ericsson & Smith, 1991) can capture the essence of expertise in respective domains. The naturally emerging situations can be simulated as well-defined tasks

seeking immediate action. The representative tasks can then be presented to individuals at different skill levels under standardised conditions, while their concurrent verbalizations of thinking are recorded and analysed (Ericsson, 2006).

As for early-stage venture capital investment decision making, there are no naturally occurring cases where many venture capitalists evaluate the problems for the identical complex venture situation such that the logic of their decisions can be directly compared. However, this research challenge can be overcome by following the pioneering research of de Groot (1978), who identified challenging situations (chess positions) in representative games that required immediate action—the selection of next move. This method has been used as the best available measure of chess skill to predict performance in chess tournaments (Ericsson, Patel, & Kintsch, 2000; van der Maas & Wagenmakers, 2005).

In a similar research effort, Dew et al. (2009) designed a representative imaginary product called *Venturing* that required generation of solutions for the problems typically encountered by entrepreneurs at a venture's early stage. They then presented the same problems to entrepreneurs of different skill levels and instructed them to think aloud while they solve the problems. Through protocol analysis, importance differences were found between the thought processes of experts and novices.

To obtain the most valid and complete trace of thought processes, researchers should strive to draw out conditions which allow subjects to perform tasks that are representative of the research matter and enable them to verbalise their spontaneous thoughts while completing the task (Ericsson, 2006). It is reported that most participants generally can understand the think-aloud instructions and comply well (Payne, 1994). In order to ensure the validity of the verbal protocols collected from the subjects, this study has observed the above guidelines closely in the research design and data collection procedures.

4.3 Research Design

Planning and designing a study is particularly important for research using protocol

analysis because the technique is resource intensive and time-consuming. Green and Gilhooly (1996) point out that the following nine issues need to be considered before beginning the protocol analysis:

- (1) The availability of resources for conducting the study
- (2) The aim of the study and what information to obtain from the protocols
- (3) The feasibility of protocol collection in the targeted research domain
- (4) The practicality of collecting protocols in terms of when, where, and how
- (5) The quantity of the protocols required and the duration of each experiment
- (6) The protocol transcription tool and method to employ
- (7) The verbal recording equipment and method to employ
- (8) How to achieve participant cooperation and motivation
- (9) The need for conducting a pilot study

In the present study, this checklist of issues was carefully considered in the development of the research design.

4.3.1 Protocol Instrument

The protocol instrument addresses the research questions considered in this study. Both theoretical and practical issues were reviewed carefully so that the research instrument would be designed for effective use. It was essential that the participants understand the problem domain and the assumptions employed in the practices. Ericsson and Smith (1991) propose that the study of expertise with laboratory rigor requires representative tasks that capture the essence of expert performance in a specific domain of expertise.

To develop the research instrument, I considered the options of designing a brand-new instrument versus adapting the protocol analysis instrument developed by Sarasvathy (2008, p. 309-313). The Sarasvathy instrument consists of a detailed description of a hypothetical new product, a game of entrepreneurship called *Venturing*. The decision problems presented in this instrument were intentionally designed to be not too technical so as to allow for meaningful responses by subjects with all levels of knowledge and experience. Sarasvathy and her colleagues used that instrument to

examine entrepreneurial effectuation by comparing different levels of effectuation applied by expert and novice entrepreneurs for new venture development. As a result of their research, important empirical findings were reported in several published papers on effectuation (See: Dew, Read, Sarasvathy, & Wiltbank, 2011; Dew et al., 2009; Read et al., 2009a).

As this study focuses on early-stage venture capitalists, who typically face similar types of decision problems and similar levels of uncertainty as entrepreneurs, the Sarasvathy research instrument would be highly applicable to the current research issues. Therefore, I chose to adapt that existing instrument for use in pursuing the current research objectives.

The Sarasvathy research instrument was revised for use this study in several ways. First, the participants were asked to assume the role of an early-stage venture capitalist instead of an entrepreneur. Administered individually in a standardised format, the participants were asked to picture themselves in a scenario of being approached by entrepreneurs for venture capital financing and then to think aloud as they analysed the situation and arrived at their decisions. Second, the decision context was specified as being in China and the description of the corresponding business and entrepreneurship environment was incorporated into the experiment to reflect the unique features of the Chinese context. Third, the market information and market survey data in the experiment were customised to match the real business situation in China. Finally, five new questions were added to redress gaps acknowledged by the original instrument researchers and to collect more information pertaining to the current research issues. These modifications resulted in an instrument with the following three sets of problems for venture capitalist respondents to address.

Problem Set 1: Market Identification

1. Who could be the potential customers for this product?
2. Who could be the potential competitors for this product?
3. What information would you seek about potential customers and competitors? List questions you would want answered.
4. How would you find out this information—what kind of market research would you do?
5. What do you think are the growth possibilities for this business?

Problem Set 2: Marketing & Risk

1. Which market segment(s) should the product be sold to?
2. How would you suggest pricing this product?
3. How would you suggest selling this product to your selected market segment(s)?
4. What are the major risks in investing in this business?
5. How would you deal with the risks?

Problem Set 3: Investment

1. In evaluating this business, what important information would you like to get further?
2. If you are to invest in this company, what is the most suitable exit strategy?
3. Based on the provided information, what result an investment is likely to achieve in the next 5 years? Use a seven-point scale to indicate.

Least (Total loss) 1 2 3 4 5 6 7 Most (10 times' return or above)

The instrument requires the subjects to solve problems related to market identification, marketing and risk assessment, and investment evaluation, which are typical issues involved in venture capital investment decision making. The questions in the problem sets are intended to elicit information about the underlying dimensions of the logic used by the venture capitalists. The relation between the questions and the dimensions are presented in Table 5.

Table 5: Protocol Instrument Framework Linking Questions and Factors

Problem Set	Questions	Relevant Hypotheses
1. Market Identification	Who could be the potential customers for this product?	H2c
	Who could be the potential competitors for this product?	H4b
	What information would you seek about potential customers and competitors? List questions you would want answered.	H1b, H1c H4b
	How would you find out this information - what kind of market research would you do?	H1b, H1c H2b
	What do you think are the growth possibilities for this business?	H1b, H2a, H2b H3b H5a
2. Marketing & Risk	Which market segment(s) should the product be sold to?	H1b H3a, H3b
	How would you suggest pricing this product?	H3b
	How would you suggest selling this product to your selected market segment(s)?	H3a H4a
	What are the major risks in investing in this business?	H1a H3a H3b H4b H5a H5b
	How would you deal with the risks?	H1a H2a H5b
3. Investment Evaluation	In evaluating this business, what's the important information that you want to get further?	H1a, H1b H2a, H2b

	If you are to invest in this company, what do you think is the most suitable exit strategy?	H5b
	Based on the information provided above, if to use a seven-point scale to indicate, what result do you think the investment is likely to achieve in the next 5 years?	H1b H3b

The adapted instrument in English was translated into Chinese by an independent translator. The Chinese version was translated back into English and the discrepancies verified and reconciled to ensure content consistency. Thereafter, the Chinese version of the research instrument was used. The text of the English and Chinese versions of the research instrument can be found in Appendix A and Appendix B, respectively.

4.3.2 Sampling Criteria

The focus of this study is on individual decision making. The unit of analysis for protocol analysis is the semantic chunk while each participant provides a large number of analysable data units. As individual expertise is contextual (Ericsson & Smith, 1991), the research setting needs to be established.

Expert: As discussed earlier, an expert can be defined as someone who has attained reliably superior performance in a particular domain. The “strong-form” expertise is associated with deep personal ability and knowledge derived from extensive practice and experience based on immersion in the relevant domain. Based on these rules, Dew et al. (2009) define expert entrepreneurs as persons who, either as individuals or as part of a team, have founded one or more companies, remained with at least one company that they founded for more than 10 years, and taken it public.

This study defines expert early-stage venture capitalists as persons who, either as individuals or as part of a team, have more than 6 years of early-stage venture investment experience, have invested in at least three early-stage companies and have achieved at least one of the invested companies going public or being bought out profitably. An expert typically holds the position of partner or the equivalent in venture capital firms. Applying these criteria ensures that the venture capitalist has spent a significant amount of time in domain-specific deliberate practice and achieved an extraordinary level of performance in an investment (Ericsson & Lehmann, 1996).

Novice: In contrast to the experts, the novice early-stage venture capitalists are those who have sufficient investment knowledge and business experience to address the questions in the research instrument but have little early-stage venture capital investment experience. Ideally, these would be interns or newly appointed venture capital associates working in venture capital firms but they could also be individuals who have developed some expertise by closely observing as well as being involved in venture capital deals.

In order to reduce unnecessary noise related to myriad candidate backgrounds, the novice venture capitalist participants in the current study were all entrepreneurship postgraduate students. This choice is appropriate for three reasons:

First, according to Chi (2006), expertise can be taken as a level of proficiency that novices can attain. Therefore, samples may be drawn using relative rather than absolute criteria. In other words, a more knowledgeable group can be considered the experts and a less knowledgeable group the novices.

Second, using students in expertise experiments has been an established practice. For example, Hillerbrand and Caiborn (1990) used 17 licensed, employed psychologists and 15 graduate counselling students in a think-aloud protocol study to examine reasoning skill differences between expert and novice counsellors. Another example is Martin, Slemon et al.'s (1989) study, which used 12 interns in the second year of a master's program in counselling as part of the sample using protocol analysis. In contrast, the experienced counsellors had at least 4 years of professional experience. Moreover, as highlighted by Dew et al. (2009), prior research on expertise in management and entrepreneurship has also effectively used student samples.

Third, one of the important objectives of this study is to isolate and understand key elements of early-stage venture capital investment expertise that could be learned by junior venture capitalists. Entrepreneurship postgraduates have a basic knowledge of business and the investment concepts used in the decision tasks. Thus, the use of this sample establishes a common baseline of knowledge in business fundamentals across the expert–novice groups, which ensures to a large extent that the differences in the

decision results will be mainly due to the amount of early-stage venture investment expertise possessed. This is consistent with the objective of this study which is not merely to investigate how to invest in a risky venture, but rather to explore the knowledge structures and conceptual cues that drive the steps and processes of investing in an early-stage business. Therefore, although there are limitations related to not using a sample of true novice early-stage venture capitalists in this study, these are offset by the benefits of using entrepreneurship postgraduate students.

4.3.3 Pilot Study

A pilot study was conducted to test the efficacy of the protocol instrument. Specifically, the pilot study sought to assess the perceived validity of the instrument, the clarity of the instructions, the efficacy of the variables and their definitions, and the time required to complete the instrument. Four expert venture capitalists and four entrepreneurship postgraduate students participated in the pilot study. The basic information of the four expert venture capitalists is shown in Table 6 and their bio information is attached in the Appendix C.

Table 6: Basic Information of Expert Venture Capitalists Participating in Pilot Study

Name	Name in Chinese	Designation	Company
Jixun Foo	符绩勋	Managing Partner	GGV Capital
York Chen	陈友忠	President and Managing Partner	iD TechVentures Inc.
James Mi	宓群	Managing Director	Lightspeed Venture Partners
Jason Li	李泉生	Managing Partner	Delta Capital

All subjects were asked to set aside at least 40 minutes to complete the problem sets and all were able to complete the task without time pressure, boredom or fatigue. The terms and variables were identified as being efficacious in describing the relevant concepts.

During the pilot study, all participants inquired as to whether the game described in the experiment was a real product or purely hypothetical. They also wanted verification of whether the target market was in fact in China or international as most of them mentioned that different strategies and practices would be needed for different

markets. In response to such queries, the participants were told to treat the product of *Venturing* as being real and the target market as being in China and focus on the problem solving. One participant in the pilot study commented that there was not sufficient information to make the final investment decision. After being told that the research was interested primarily in how venture capitalists arrive at their decisions rather than what decisions they make, the participant suggested that it would be helpful to highlight in advance that participants should try their best to be indifferent in terms of whether they think the business is per se worth investing in or not when attempting to solve the problems.

These observations from the pilot study provided important information for taking the next step of formal data collection. In order to ensure that participants concentrated on the problem solving, I informed them of the following before beginning the experiment: “First, I would like you to make an assumption that the *venturing* product is real and entrepreneurs are very serious about this business. Second, the business is still at the early stage. So please treat the lack of information as normal. I am interested in knowing how you look at the problems and think about the solutions.”

Based on pilot study feedback, some revisions were made in the wording of the instrument instructions to exclude anything that was liable to be misunderstood or open to misinterpretation. Some of the definitions were also modified to be more clearly stated.

Several checks with the pilot study participants confirmed that it is feasible to collect concurrent recording of thinking-aloud reports. All of them mentioned that they found the problems interesting, realistic and absorbing. The expert venture capitalists commented that the problems reminded them of actual decisions they had to make in their real-life venture investment experience. This lent credibility to the representative task used in this study.

4.4 Participants and Data Collection

4.4.1 Description of Participants

This research collected protocols from 62 participants: 32 expert early-stage venture capitalists and 30 novices. All protocol reports were collected during face-to-face meetings from May 2010 to July 2011.

At the outset of this study, I used two sources to help identify expert early-stage venture capitalists who might be willing to participate in this study:

- (1) a list of 570 venture capital and private equity firms compiled in the *China Venture Capital & Private Equity Directory 600*, including 181 domestic and 389 foreign firms
- (2) a list of 888 private equity and venture capital firms based in China including Hong Kong, compiled by the *Asian Venture Capital Journal*, with the data generated from the journal database in 2010

In the first source, the investment stages of the firms were categorised into “early,” “expansion,” and “mature.” While a firm may choose to invest in multiple stages, the early-stage category consisted of 451 firms (79%).

Together, these two sources covered virtually all institutional venture capital firms operating in China up to 2010. But because the protocols need to be drawn from venture capitalist individuals rather than firms, the above directories were of reference value only. Additional steps needed to be taken to identify individual research subjects.

In identifying expert early-stage venture capitalists, a public report *Who Still Invest in Early-stage* (May 2010) issued by CYZONE.CN (2010), the exclusive partner of the U.S.-based *Entrepreneur* magazine in China, was highly relevant to the current study. This special report covered 21 venture capitalists who were well-known for their investment in early-stage ventures in China (see Appendix D). In a cross-check of the 16 venture capital firms represented by these 21 venture capitalists, it was found that

15 out of the 16 (with Green Pine Capital Partners Co., Ltd (松禾资本) being the exception), were listed in the *China Venture Capital & Private Equity Directory 600*. A further check with a few leading early-stage venture capitalists in China confirmed the credibility of these venture capitalists as being experts in early-stage venture capital investment.

I contacted all 21 expert venture capitalists by phone to explore the possibility of inviting them to participate in this research. The potential participants were informed that the study was an attempt to establish a better understanding of how venture capitalists of different levels of expertise make decisions related to early-stage venture investments. Eleven of the venture capitalists agreed to participate in the experiment. Five of the remaining 10 did not participate themselves, but recommended colleagues with equivalent credentials and experience in early-stage venture investment who agreed to participate in the study.

The other 16 expert venture capitalists who participated in the study included five expert early-stage venture capitalists who were consulted for confirmation of the credibility of the 21 venture capitalists as mentioned earlier. Other participants were recruited through referrals from the expert venture capitalists who had participated in the early stages of data collection. Given the fact that an adequate list of expert early-stage venture capitalists in China is hardly accessible using purposive or quota sampling strategy, plus the resource and time constraint, the snowball sampling was almost the only feasible tool available to overcome the problem of data sampling in this study. Though snowball is a useful tool in this research context, the success of this technique depends on greatly on the initial contacts and the follow-up connections. Hendricks and Blanken (1992) argue that rigour in constructing the sample is essential in this form of research. I considered and addressed the following methodological problem areas, which were identified by Biernacki and Waldorf (1981) in relation to the use of snowball sampling:

- finding respondents and starting referral chains;
- verifying the eligibility of potential respondents;
- engaging respondents as informal research assistants;
- controlling the types of chains and the number of cases in any chain;

- pacing and monitoring referral chains and data quality.

In a study on China’s venture capital industry from an institutional perspective, Bruton and Ahlstrom (2003) also adopted the snowball sampling approach after conducting the interview with 22 randomly selected venture capitalist participants. The researchers took suggestions from these interviewees about other key informants and increased the sample size to 36 venture capitalists.

Although proper procedure has been adopted in order for securing about half of the expert group participants with snowball sampling, the limitations of this sampling technique are still applicable on a theoretical and practical level. Cautions need to be observed in interpreting the research findings. The limitations will be discussed in the conclusion of this study.

Based on precedents in the “deliberate practice” literature on expertise, this study sought a control group of novices based on the sampling criteria described in section 4.3.2. Two classes of entrepreneurship postgraduates formed the source of 30 novices for protocol collection. Prior to and at the beginning of the protocol collection session, several documents were presented to the participants. Those included an information sheet entitled “Understanding Early-stage Venture Capitalists’ Use of Effectual and Predictive Logics” (attached in Appendix E/F). The participants’ demographic data, such as age and educational background, were captured at the end of each protocol session by having them fill out a standard form (attached in Appendix G/H). The participants were also asked to provide information on their venture capital investment experience, preferences, and the results pertaining to early-stage venture investment. Table 7 shows the descriptive data for the sample.

Table 7: Characteristics of Expert and Novice Venture Capitalists

Venture Capitalist characteristic	Expert (N=32)				Novice (N=30)			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Gender (male/female)	29/3				25/5			
Age (years)	42.6	5.1	36	55	28.8	5.7	23	44
Education level (Years of education with Diploma = 14, 3/4-year college degree = 15/16, Master :+1/2, Doctorate: +4)	17.7	0.9	16	20	17.0	0.8	16	20

Years of working (including years as venture capitalist)	18.9	5.3	11	33	4.9	5.9	0	21
Years of experience as venture capitalist	9.1	2.5	6	16	0.2	0.5	0	2
No. of early-stage ventures invested	8.4	2.8	3	14	0.1	0.4	0	2
No. of profitable investment deals	3.1	1.6	1	8	0	0.2	0	1

The expert early-stage venture capitalist sample consisted of 3 women and 29 men. Fourteen were from Beijing, 14 from Shanghai and 4 from Shenzhen, which represent three centres for venture capital in China (Batjargal & Liu, 2004). All venture capitalists spoke Mandarin frequently. Six were Singaporean and 14 were overseas returnees who were mostly born in Mainland China, Hong Kong, or Taiwan but were either brought up or studied overseas, typically in the United States. This profile of composition is comparable to that of Bruton and Ahlstrom's (2003) study on China's venture capital industry based on interviews with 36 venture capitalists from 24 venture capital firms investing in China. Among the 36 participants, sixteen (44%) were foreigners or overseas Chinese.

On average, the subjects in the current study had 9 or more years of experience with venture capital investment and had invested in five early-stage ventures, with the minimum number being two. Each expert venture capitalist had at least one of their portfolio companies (early-stage) having achieved initial public offering or profitable trade sale. The final sample of expert venture capitalists used in this study was fairly representative of the population of expert venture capitalists.

In Bruton and Ahlstrom's (2003) research, the venture capitalists had an average of 8 years of experience working in the venture capital and private equity industry and were responsible for investment decisions, being either partners or senior managers of the venture capital firms. Another study by Zacharakis et al. (2007) employed a sample of 39 Chinese venture capitalists, with the typical participant being male (97%), 36 years old ($SD = 5.6$) and involved in venture capital investment for 1 year. Half of the sample had a college degree and the other half had a master's degree. Zacharakis et al. added that the limited years of experience of the venture capitalists in the sample could be due to institutional influence of the venture capital industry in China. The characteristics of the sample in these two studies lend support for the representativeness of the current sample for expert early-stage venture capitalists in China.

The novice early-stage venture capitalist sample consisted of 25 men and 5 women. On average, the subjects had less than 1 year of investment (including venture capital) experience. They were 100% Chinese, between 23 and 41 years of age, with primary knowledge and training in venture capital financing and deal assessment. A comparison of the expert and novice groups on key indicators of early-stage venture capital investment expertise showed that the two groups were indeed dichotomous. Of the novice group, 90% had never invested in a firm.

4.4.2 The Protocol Experiment

Before proceeding with the fieldwork, ethics approval (H-082-2008) for this study was obtained from the University of Adelaide Human Research Ethics Committee. The main ethics concern pertained to the privacy of the participants and confidentiality of the information provided during the course of the research.

I met with each participant and verbally briefed them on the aim of the study, the specific procedures involved, and the time commitment required for participation. Participants' informed consent was obtained for the interview and for the resulting data to be digitally recorded, analysed, and later depersonalised in the final report. In almost all cases the experiment lasted from 35 to 55 minutes. As participants talked through solving the problems, the verbalised protocol data were collected.

Several protocol analysis experts (see: Ericsson & Simon, 1993; Green & Gilhooly, 2008; Payne, 1994) suggest that employing a simple practice procedure helps participants become familiar with giving verbal reports. A good warm-up task involves asking the participants to think aloud while doing simple mental arithmetic (Green & Gilhooly, 2008, p. 58). I used a simple warm-up task in this study because it allowed me to ensure that participants understood the instructions and would in fact think aloud and also relaxed the participant. Table 8 shows the warm-up practice used in this study.

Table 8: Warm-up Practice Problem

Please mentally multiple 36 by 24. When you work out the answer, please stay focused on generating the solution to the problem. Please verbalise the steps or your thoughts that spontaneously emerge in attention when you work out the solution.

The research instrument was administered to each participant individually in a standardised format. Before beginning each session, I explained to the participants that they would be presented with three decision problems related to market identification, marketing, and investment, highlighting that the problems arose in the context of screening an early-stage venture for a hypothetical product.

A detailed description of the hypothetical product *Venturing* was provided to each participant. They were asked to picture themselves in the role of a venture capitalist investing in early-stage ventures. They were asked to read aloud the introduction and the product description. After doing so, they were presented with the five written questions about market identification pertaining to Problem Set 1 and asked to read the questions aloud. This ensured that they all experienced the questions in the same order and format.

After responding to the first five questions, participants were presented with two pages of market research information related to opportunity for the *Venturing* product. After reviewing the information, participants received five additional written questions about marketing and risk pertaining to Problem Set 2, again in a standardised format and order.

Finally, participants were asked to answer the remaining four questions related to investment evaluation. Throughout the experiment the participants were asked to keep talking during the task and maintain their speech loud enough and clear so that the recorded sessions could be accurately transcribed. Participants were not asked to describe or explain how they solved the problems. Therefore, they needed only to remain focused on solving the problems and merely give verbal expression to their thoughts.

To ensure that the respondents put forth the effort to go through the problem solving

process as realistically as possible, they were advised that even if they did not find the product to be consistent with their current investment policy or strategy, they were still expected to seriously consider the situation and solve the problems.

The average duration of the research sessions with the participants was 45 minutes. All the participants completed the interaction without time pressure, and members of both groups remarked that they found both the scenario and the questions to be engaging and representative of the kinds of issues they faced or might expect to face in the context of evaluating a new venture. A digital recorder (SONY IC Recorder ICD-UX71F) was used for protocol collection.

4.5 Data Analysis

4.5.1 Data Transcription

In general, 10 hours of work is required to analyse 1 hour of protocol data. First, the original recorded data needed to be transcribed for coding and analysis. The transcription was done in a two-step process:

In the first step, I converted each participant's verbalizations in full from the digital recording into written texts. Table 9 shows an excerpt from a protocol generated by one of the expert venture capitalists.

Table 9: Example Section of An Expert Venture Capitalist's Protocol

Okay, the key to early-stage investment is people. (pause) This is an early-stage company. I don't expect to see all the details such as market size or profitability for this type of companies. According to the description in the paper, it seems the team has found a good business opportunity and they have put much effort to make it happen...For example, the product seems to have attractive features and the team has tried different ways to understand the customer and the market etc... But I haven't got a chance to see the real product and try it out. So frankly, I have some reservation on the product features and those figures...But I can see the passion and execution ability in the team...That's the key. I need to feel it...On top of that, I want to know who they are, what jobs they have done, where, and even which companies they have been with... (pause) For the background of the entrepreneurs, what described in the case is too basic...

In the second step, the transcribed protocols were segmented, following the procedure described by Stinson, Milbrath, and Reidbord (1994). This method builds on the basic theory that human judges have implicit knowledge as to what an idea is and are able to reliably identify it even though they may not be able to articulate the rules used to make the judgments (Stinson et al., 1994). Applying this method, I segmented the texts into “idea units,” which were typically a sentence, clause, or phrase, according to the judgment of what constituted a complete idea. Table 10 shows an example of the protocol being segmented into simple statements.

As all participants’ verbalizations were in Chinese, the transcription and segmentation of the protocols were also conducted in Chinese. “Segmentation is not usually difficult, and can be carried out with high reliability” (Ericsson & Simon, 1993; p.p. 266). Thereafter, I proceeded to code the protocols. Given the complicity and unique language structure and meaning of the Chinese language, it is advisable to conduct the protocol coding in Chinese as well, to ensure the consistency of the original meaning of the protocols and the corresponding thinking process at a fine level. For illustration purpose, the examples shown above were translated from Chinese into English. In order to report the results of this study, key excerpt and statements were also translated into English.

Table 10: Segmented Protocol from An Expert Venture Capitalist

Okay, the key to early-stage investment is people./ (pause) This is an early-stage company. I don’t expect to see all the details such as market size or profitability for this type of companies./ According to the description in the paper, it seems the team has found a good business opportunity and they have put much effort to make it happen.../For example, the product seems to have attractive features and the team has tried different ways to understand the customer and the market etc... /But I haven’t got a chance to see the real product and try it out. /Frankly, I have some reservation on the product features and those figures.../But I can see the passion and execution ability in the team...That’s the key. /I need to feel it.../On top of that, I want to know who they are, /what jobs they have done,/ where,/ and even which companies they have been with.../ For the background of the entrepreneurs, what described in the case is too basic.../

4.5.2 Coding Process

Coding is an integral part of the process of drawing out the usable content from the protocols collected. It involves identifying themes, dividing the research content into chunks or units and allocating the units to the themes.

Protocol coding could be an iterative process, partly driven by the nature of the research hypotheses (Green & Gilhooly, 2008). In this study, I adopted the helix process described by Ericsson and Simon (1993) in the coding of the protocols. Green and Gilhooly (2008) suggest a random sample of approximately 10% could be taken to develop the coding categories. I began the iterations by randomly selecting two expert and two novice venture capitalists' protocols to create an initial list of scheme items. Thereafter, the list was expanded by adding new items from other protocols. In other words, the list remained open to modification and change. The expansion continues in an iterative manner with the scheme items being tested, added, deleted, and refined. As the indexing progresses, understanding improves and eventually the coding scheme converges into a complete and coherent instrument such that new protocol transcripts yielded no further modifications.

The final coding scheme was developed along the axis of the expertise dimension in early-stage venture capital investment decisions. It generated an inventory of variable descriptions and operationalisation, in light of the theoretical framework, the pilot study and the examination of the segmented protocols, as presented in Table 11.

Table 11: The Coding Scheme

Variable	Hypothesis	Coding Question	Protocol Question (Most related)
Execution	H1a	Did this person emphasise the importance of entrepreneur's execution capability in talking about venture growth, risk, decision to invest or even go beyond making decisions specified in the case scenario to talk about the importance of execution? Enter "Yes" or "No." If yes, count how many times.	P2Q4 P2Q5 P3Q1
Market research	H1b	Did this person believe the market data shown in the business proposal? Enter "Yes" or "No." (Even if you are not 100% sure as to yes or no, please choose based on your overall judgment- whether	P1Q3, P1Q4 P1Q5 P2Q1 P3Q1, P3Q3

		largely yes or largely no.)	
Personal experience	H1c	Did this person highlight the need to try out the product or interact with the potential customers in person? Enter “Yes” or “No.”	P1Q3, P1Q4
Entrepreneur means	H2a	Was this person concerned about the entrepreneurs’ background and resources (what they have, what they know, and who they know)? Enter “Yes” or “No.”	P1Q5 P2Q5 P3Q1
Investor means	H2b	Was this person concerned about whether the means available to him or her can add value to the business besides providing financial capital? Enter “Yes” or “No.” (Even if you are not 100% sure as to yes or no, please choose based on your overall judgment – whether largely yes or largely no.)	P1Q4, P1Q5 P3Q1
Goal setting	H2c	Was this person concerned about the business goals set by the entrepreneurs? Enter “Yes” or “No.”	P1Q1
Operating cost	H3a	Did this person worry about the potential challenges and the cost of developing the business, such as product development, product promotion and distribution? Enter “Yes” or “No.” If yes, count how many times the concern was mentioned.	P2Q1, P2Q3 P2Q4
Upside attraction: expected return	H3b	Did this person talk about the factors (eg. market size, market growth) related to return potential of the investment? Enter “Yes” or “No.”	P1Q5 P2Q1, P2Q4 P3Q3
Upside attraction: pricing	H3b	Did this person go beyond selecting prices to talk about developing a fee charging strategy on recurring instead of one-off basis? Enter “Yes” or “No.”	P2Q2
Partnership: partnership consideration	H4a	Did this person propose partnership with someone else to leverage the external resources? Enter “Yes” or “No.” If yes, count the number of partnerships.	P2Q3
Partnership: strategic client	H4a	Did this person visualise building a strategic relationship to enhance the credibility of the product? Enter “Yes” or “No.”	P2Q3
Competition	H4b	Did this person worry about the potential competition or what the potential competitors would do? Did this person worry about market entry barrier, competitor replication or unique competence? Enter “Yes” or “No.” If yes, count number of the concerns.	P1Q2, P1Q3 P2Q4
Contingency acknowledging	H5a	Did this person stress the challenges brought by changes and uncertainty when talking about the investment risks and even go beyond making decisions specified in the case scenario to mention uncertainty? Enter “Yes” or “No.”	P1Q5 P2Q4
Contingency leveraging	H5b	Did this person stress entrepreneurs’ ability to take advantage of the environmental changes? Enter “Yes” or “No.”	P2Q4, P2Q5 P3Q2

To check effectiveness of the coding scheme as well as to experience the whole

working procedure of the coding as part of this research and knowledge acquisition process, I coded the protocol transcripts according to the coding scheme that concerned the subject matters of the research. Being aware of the limitations of this approach, I later employed two independent coders to check the interrater reliability of the coding. Table 12 provides a working example of how the protocols were coded. This procedure essentially linked the units or chunks of the content to the codes.

Table 12: Coded Protocol from An Expert Venture Capitalist

Segment	Variable / Coding
Okay, the key to early-stage investment is people.	Execution
(pause) This is an early-stage company. I don't expect to see all the details such as market size or profitability for this type of companies.	Market data/research
According to the description in the paper, it seems the team has found a good business opportunity and they have put much effort to make it happen...	Execution
For example, the product seems to have attractive features and the team has tried different ways to understand the customer and the market etc...	Execution
But I haven't got a chance to see the real product and try it out.	Personal experience
Frankly, I have some reservation on the product features and those figures...	Market data/research
But I can see the passion and execution ability in the team...That's the key.	Execution
I need to feel it...	Execution/Personal experience
On top of that, I want to know who they are,	Entrepreneur means
what jobs they have done,	Entrepreneur means
where,	Entrepreneur means
and even which companies they have been with...	Entrepreneur means
For the background of the entrepreneurs, what described in the case is too basic...	Entrepreneur means

Use of Independent Coders: In order to check interrater reliability (James, Demaree, & Wolf, 1993), two independent coders who had not been involved in the study in any other way (i.e. blind to the hypotheses), were employed to recode both the expert and

novice protocols independently using the scheme in Table 11. One independent coder was a PhD graduate in finance and the other was a master’s entrepreneurship graduate. Both independent coders were trained in venture capital investment theory and practice. Both were familiar with the terminology in the domain and expressed that the scheme is simple and easy to understand.

To a large extent, the coding scheme served as an important explicit guideline in ensuring subjective interpretation by the coders to be kept to a minimum. The independent coders randomly selected six transcripts, three by expert venture capitalists and three by novices. Thereafter, they conducted the coding independently.

The three sets of coding were then compared based upon each variable. Table 13 illustrates an example of 24 pairwise agreements out of a total of 30 possible, for which the proportion of interrater agreement is 0.8.

Table 13: Example Data of Qualitative Judgments

	Coders			Consensus	A&B	A&C	B&C	Agreements	Total
	A	B	C		Agree?	Agree?	Agree?		
1	Y*	Y	N	Y	Yes	No	No	1	3
2	Y	Y	Y	Y	Yes	Yes	Yes	3	3
3	N	N	N	N	Yes	Yes	Yes	3	3
4	Y	Y	Y	Y	Yes	Yes	Yes	3	3
5	N	Y	Y	Y	No	No	Yes	1	3
6	Y	Y	Y	Y	Yes	Yes	Yes	3	3
7	Y	Y	N	Y	Yes	No	No	1	3
8	Y	Y	Y	Y	Yes	Yes	Yes	3	3
9	Y	Y	Y	Y	Yes	Yes	Yes	3	3
10	N	N	N	N	Yes	Yes	Yes	3	3
TOTAL								24	30

Proportion of interrater agreement (A) = 24/30 = 0.8

*Y = “Yes” N = “No”

A: the researcher (the author of this thesis)

B: independent coder

C: independent coder

The results of comparison on the three sets of coding pertaining to this study revealed a strong mean interrater agreement of .84 across all variables with no agreement less than .70. calculated using the proportional reduction in loss (PRL) approach (see Rust & Cooil, 1994). Given the parameters of two categories (“Y” and “N”) and three judges in this study, Rust and Cooil’s (1994) table (attached in Appendix I) for checking PRL reliability (X 100) for two categories given number of judges and

proportion of interjudge (interrater) agreement was referred. The standard is quite comparable to the work by Dew et al. (2009) which has the mean agreement of .82 and the minimum agreement of .67. In another study by Ahlstrom et al. (2007), the researchers conducted interviews with 65 venture capitalists, transcribed and coded the data. The reported reliability among the three coders (two authors and one graduate student) was nearly 90%. The PRL interrater agreement scores in this study are satisfactory.

Content analysis is an efficient method for analysing a large number of critical incidents and highlighting the differences between the subject issues that the research concerns. It added a quantitative element to the analysis of qualitative material. Therefore, I started the content analysis after the coding process was completed. With respect to dichotomous variables such as “market research” in relation to hypothesis H1b, the numbers of respondents belonging to “Yes” and “No” categories pertaining to the expert and novices groups were used in chi-square tests. As for scale variables which can be measured by the frequency with specific issues or themes appearing in the transcribed protocols by each individual, such as the variable “execution” in relation to H1a, the independent two-sample *t*-test was performed, with the mean value of each group being computed and analysed. For the *t*-test, the statistics were treated with unequal variance and two-tailed. The F value ($=t^2$) was subsequently used to represent the result. Both sets of statistics were tested at the 95% significance level. The details of the variable descriptive statistics and the findings are presented in the next chapter “Research Findings and Discussions”.

4.6 Summary

This chapter discusses the research methodology and justifies protocol analysis as a suitable research method for this study. The research design, including the protocol instrument, sampling criteria, and the pilot study were described. I then presented the profile of the participants and the approach of the protocol experiment being conducted. Finally, the data transcription and coding process were outlined. With these in place, the next chapter will report and discuss the findings of the research.

Chapter 5 Research Findings and Discussions

5.1 Introduction

Following the description of the research methodology, this chapter presents the results of the hypothesis testing and discusses the findings. Specifically, H1a, H1b, H1c, H2a, H2b, H3a, H4a, H5a and H5b are supported, whereas H2c, H3b, and H4b are rejected.

5.2 Hypothesis Testing

For ease of reference and to provide an overview, all hypotheses developed for this study are displayed in Table 14.

Table 14: Overview of Research Hypotheses

Dimension/Principle	Experts	Novices
<p>View of the Future: creation vs. prediction</p>	<p>H1a: <i>When making early-stage venture investment decisions, expert venture capitalists tend to emphasise execution more than novices do.</i></p> <p>H1b: <i>When making early-stage venture investment decisions, expert venture capitalists are more likely to be sceptical about market data, while novices are more likely to take market data as given and credible.</i></p> <p>H1c: <i>When making early-stage venture investment decisions, expert venture capitalists place a greater emphasis on acquiring their own experience with the product than novices do.</i></p>	
<p>Basis for taking Action: means vs. goals</p>	<p>H2a: <i>When making early-stage venture investment decisions, expert venture capitalists place a higher weight on the background and resources that entrepreneurs have (what they have, what they know, and who they know) than novices do.</i></p> <p>H2b: <i>When making early-stage venture investment decisions, expert venture capitalists are more likely than novices to consider how their own means could add value to the venture.</i></p> <p>H2c: <i>When making early-stage venture investment decisions, expert venture capitalists place less emphasis on entrepreneurs' goal setting than novices do.</i></p>	

<p>Predisposition toward risk and resources: downside protection vs. upside attraction</p>	<p>H3a: <i>When making early-stage venture investment decisions, expert venture capitalists are more likely than novices to consider the cost of developing the business.</i></p> <p>H3b: <i>When making early-stage venture investment decisions, expert venture capitalists are less concerned about the expected return than novices do.</i></p>
<p>Attitude toward outsiders: partnership vs. competition</p>	<p>H4a: <i>When making early-stage venture investment decisions, expert venture capitalists place greater weight on developing partnerships than novices do.</i></p> <p>H4b: <i>When making early-stage venture investment decisions, expert venture capitalists are less concerned about competition than novices do.</i></p>
<p>Attitude toward unexpected contingencies: acknowledging vs. avoiding</p>	<p>H5a: <i>When making early-stage venture investment decisions, expert venture capitalists are more likely to acknowledge unexpected contingencies, while novices are more likely to ignore unexpected contingencies.</i></p> <p>H5b: <i>When making early-stage venture investment decisions, expert venture capitalists are more likely than novices to emphasise exploiting opportunities arising from unexpected contingencies.</i></p>

Table 15 provides a summary of the descriptive statistics of the variables, the findings on the differences in the use of effectuation and prediction in early-stage venture investment decision making between expert venture capitalists and novices, and the significance of the differences.

Table 15: Summary of Variable Descriptive Statistics and Findings

Variable	Descriptive Statistics	Significance of Expert-Novice Differences	Summary of Findings on the Differences Between Experts and Novices	Results of Hypothesis Testing
H1a (Execution)	Maximum: 4 Minimum: 0 \bar{x}_e : 2.03 \bar{x} n: 1.50	F = 4.10 p = .047	As opposed to novices, expert venture capitalists are more likely to emphasise execution.	Supported
H1b (Market research)	Expert: 14 yes, 18 no Novice: 25 yes, 5 no	$\chi^2 = 12.90$ p < .001	Expert venture capitalists are less likely than novices to believe and accept market research.	Supported
H1c (Personal experience)	Expert: 23 yes, 9 no Novice: 11 yes, 19 no	$\chi^2 = 11.94$ p < .001	Expert venture capitalists are more likely to emphasise acquiring own experience with the	Supported

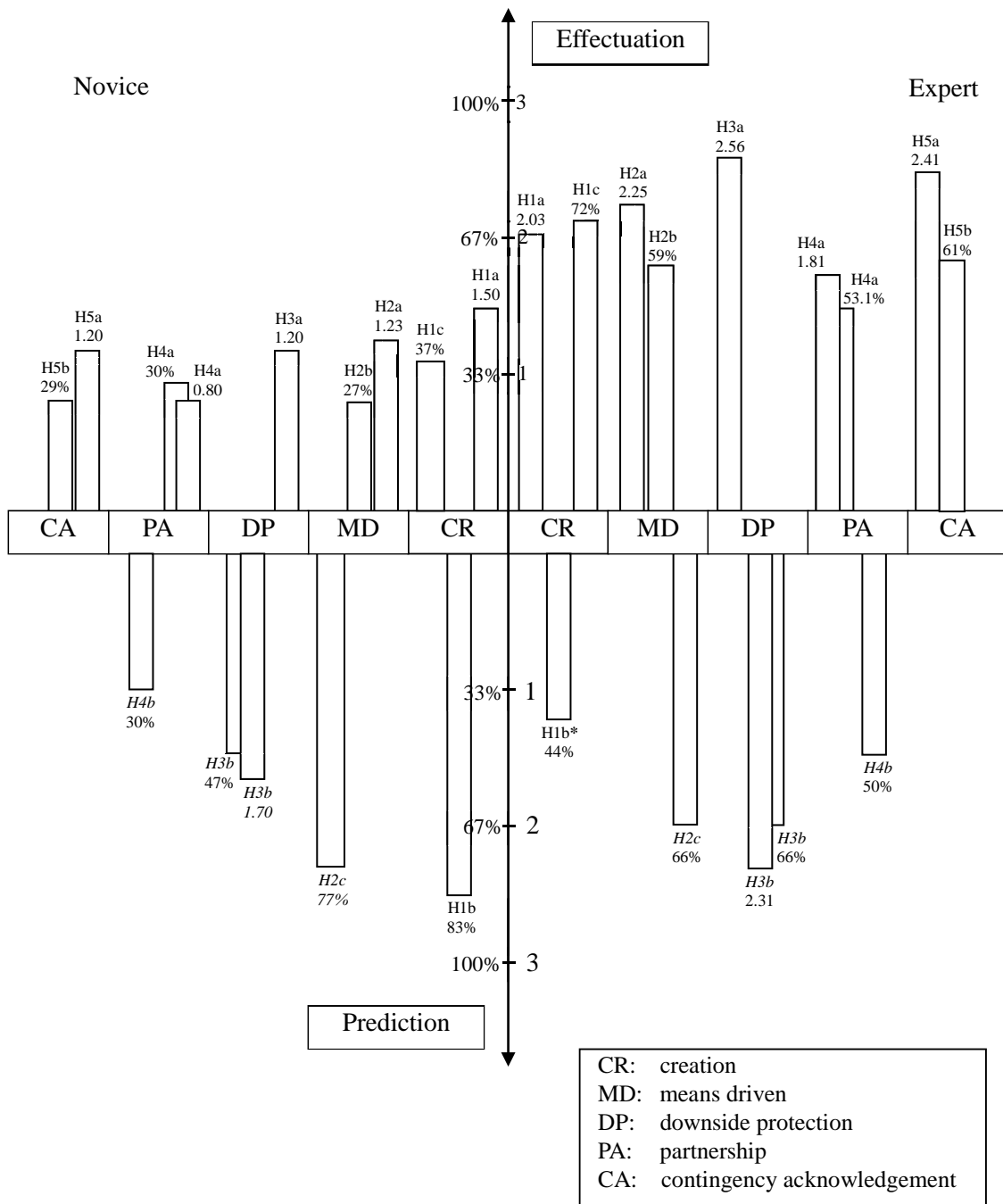
			product.	
H2a (Entrepreneur means)	Maximum: 4 Minimum: 0 \bar{x}_e : 2.25 \bar{x} n: 1.23	F = 16.22 p < .001	Expert venture capitalists tend to place higher importance on entrepreneurs' means than novices do.	Supported
H2b (Investor means)	Expert: 19 yes, 13 no Novice: 8 yes, 22 no	$\chi^2 = 9.16$ p = .002	Expert venture capitalists tend to place higher importance on their own means than novices do.	Supported
H2c (Goal setting)	Expert: 21 yes, 11 no Novice: 23 yes, 7 no	$\chi^2 = 3.2$ p = .074	No difference in emphasis on entrepreneurs' goal setting, between expert venture capitalists and novices	Not supported
H3a (Operating cost)	Maximum: 6 Minimum: 0 \bar{x}_e : 2.56 \bar{x} n: 1.20	F = 13.76 p < .001	Expert venture capitalists are more concerned with the operating cost of a venture than novices do.	Supported
H3b (Upside attraction)				Not supported (Opposite)
Expected return	Maximum: 4 Minimum: 0 \bar{x}_e : 2.31 \bar{x} n: 1.70	F = 4.86 p = .031	Expert venture capitalists are <u>more</u> concerned about the expected return than novices do.	-
Pricing	Expert: 21 recurring, 11 one-off Novice: 14 recurring, 16 one-off	$\chi^2 = 4.58$ p = .032	Expert venture capitalists are <u>more</u> likely to base pricing decisions on a recurring charge strategy instead of one-off charge strategy than novices.	-
H4a (Partnership)				Supported
Partnership	Maximum: 3 Minimum: 0 \bar{x}_e : 1.81 \bar{x} n: 0.80	F = 17.79 p < .001	Expert venture capitalists are more likely than novices to emphasise partnership.	-
Strategic client	Expert: 17 yes, 15 no Novice: 9 yes, 21 no	$\chi^2 = 5.74$ p = .016	Expert venture capitalists are more likely than novices to emphasise developing strategic clients.	-
H4b (Competition)				Not supported
	Expert: 16 yes, 16 no Novice: 19 yes, 11 no	$\chi^2 = 3.40$ p = .065	No difference in the concern about competition between expert venture capitalists and novices.	

H5a (Contingency Acknowledging)	Maximum: 5 Minimum: 0 \bar{x}_e : 2.41 \bar{x} n: 1.20	F = 14.00 p < .001	Expert venture capitalists are more likely than novices to acknowledge contingency.	Supported
H5b (Contingency Leveraging)	Expert: 17 yes, 11 no Novice: 6 yes, 15 no	$\chi^2 = 9.49$ p = .002	Among those who acknowledge contingency, expert venture capitalists are more likely than novices to leverage the contingency.	Supported

Notes: Chi-square tests are two-tailed.

Each group's relative positions in the five dimensions, namely, creation, means driven, downside protection, partnership, and contingency acknowledgement, are depicted in the following chart (see Figure 15).

Figure 15: Differences between Experts and Novices in Five Dimensions



Notes: *For Chi-square tests, the proportion of the respondents (experts vs. novices) who made effectual or predictive expressions was converted to percentage value. Italics refer to non-supported hypotheses.

Each of the following sub-sections delineates its associated findings.

5.2.1 Creation versus Prediction

In comparison with prediction, creation is more about doing and execution. Creation discounts the importance of planning because, under uncertainty, planning does not work effectively. Given the uncertainty in early-stage venture development as well as the importance of human action under uncertainty, it is expected that expert venture capitalists are more likely than novices to emphasise entrepreneurs' execution. Expert venture capitalists are also expected to be more likely to underweight market data, whereas novices are more likely to take market data as given and credible.

In analysing the experimental data to test H1a, this study counted the instances in which a participant referred to concepts representing execution. Expert early-stage venture capitalists were found to be significantly more likely than novices to emphasise the importance of execution ($p = .047$), thus providing support for H1a. Details of the variable descriptions can be found in Table 15. Two examples of expert venture capitalists' transcript excerpts are presented here:

Expert Venture Capitalist 7
Startups face lots of challenges. Entrepreneurs must be very hands-on and get things done fast. For early-stage investment, my concern is not about the several pieces of paper..., so-called business plan... but people. I'd like to talk to the entrepreneurs face to face, to know what they can do and how they will do it. For those who have strong execution ability, even though sometimes they can't figure out all solutions by themselves, they know how to communicate with us and can make creative use of our resources.

Expert Venture Capitalist 15
The game software requires the entrepreneurs to continuously put in effort to modify and make improvement. Lots of details need to be taken care and acted upon fast. I would say, besides passion, the entrepreneurs must be able to make the product not only interesting to users, but convincing enough for them to pay. However, you know- all these are easier said than done...

In contrast to the expert venture capitalists' concern mentioned above, the novices appeared to be less worried about the entrepreneurs' execution. They tended to think that advanced technology can address many human problems. Some seemed to take it for granted that the product would be of the same standard as what was presented in

the scenario. Some considered the 8 years of technical or management experience of the entrepreneurs (described in the beginning of the protocol scenario) to be equivalent to execution capability when in fact, execution competence derives from intensive deliberate practice and is highly contextual to particular domains. The novices also tended to overlook or bypass the execution issues and rush to make financial predictions. An example of a novice venture capitalist's transcript excerpt is presented here:

Novice Venture Capitalist 2
This gaming product is interesting. Nowadays technology is very advanced. Artificial intelligence has also started entering our daily life. So I don't think there are technical barriers to develop such a product. Moreover, those features related to entrepreneurship training are very useful and attractive. I believe this product can catch many young entrepreneurs' interest. By the way, China has so many young graduates coming out of colleges every year. Even only a small percentage of them are going to buy this product, I can see the revenue is huge.

To test H1b, this study searched the experimental data for comments reflecting doubts about market data. It was found that expert venture capitalists tended to underweight predictive information and were more likely than novices to question the credibility of the market data provided in the scenario ($p < .001$). Two examples of expert venture capitalists' transcript excerpts are presented here:

Expert Venture Capitalist 12
Since the market is premature, I would rather not to spend too much time to do formal market research. The effort I make to analyse the figures won't pay off. It makes more sense for me to just go out to talk to some real people, such as the entrepreneurs or people who have worked in the industries...

Expert Venture Capitalist 16
Let's take a look at the market, yah...here are some figures... Erm, would you believe the market is really so big? Honestly, I have doubt. Entrepreneurs are a special group of people. Those who want to learn or experience entrepreneurship could also be somewhat special. Surely there will be people interested in playing this type of software. But, I think the data are too optimistic....

In contrast, novice venture capitalists typically did not question the credibility of the

data, as illustrated in the excerpt below:

Novice Venture Capitalist 19
They have done the market research, right? As you can see, one of the major market segments comprises young adults between the age of 15 and 25. The population is 40 million. This plus the 60 million people from the adult segment of over 25 years is 100 million. The young adult segment includes college graduates entering the society every year. So a RMB50 billion education software market makes sense to me. By the way, the annual market growth rate of 30% for the next five years is definitely attractive. The market potential is huge.

To test H1c, the study examined whether the expert venture capitalists, compared to the novices, preferred to personally acquire product knowledge and experience, rather than simply accepting what is presented in a business plan. Analysis of the results reveals significant difference between the two groups ($p < .001$), thus supporting H1c. It was found that novices preferred delegating the tasks to others or tended to pay more attention to government policy as a predictive factor for the business prospect. Following are two representative transcript excerpts from one novice venture capitalist and one expert, respectively:

Novice Venture Capitalist 6
As elaborated in the background, the whole nation and government are promoting entrepreneurship. I believe this type of software can get government support and will have good demand...For market research, we can find lots of information on Internet. We can also search, or read... consultancy reports. If such information is not available, I will ask an associate to collect data or if needed, get an agent to find information for me...

Expert Venture Capitalist 23
Seeing is believing. I don't get a feel just from reading these (data in the paper)... I always like viewing the real product and try it out by myself. Then I can get the real experience of 'playing.' Moreover, there is a gap between the product description here and what I think the product should be. I'm open to the new concepts or things....But I really hope you could give me a chance to try.

5.2.2 Means Driven versus Goal Driven

In contrast to causal logic where goal setting is followed by means selection/acquisition, effectual logic starts with a given set of means and focuses on generating new ends. The experimental data was analysed to count the number of comments made by participants regarding the means available to the entrepreneurs. As predicted in H2a, expert venture capitalists were significantly more likely than novices to consider the means available to the entrepreneurs ($p < .001$) and to themselves ($p < .001$) in their decision making. Expert venture capitalists even highlighted that if the entrepreneurs do not have a significant amount of industry expertise, the venture would most likely fail due to market uncertainty, as illustrated in the following excerpt:

Expert Venture Capitalist 3
People are the most important factor for the success of early-stage ventures, particularly for software businesses. The prospect of new technology commercialization is often unclear and there is few data to analyse. So my focus is always on people... The founder of Facebook is attracted to Internet technology like crazy. He did an online community at Harvard as a communication tool for the students. It became more and more popular and evolved from a concept to a fashion...and now an integral part of many people's life. Definitely I want to know the entrepreneurs' background, what experience they have and how that has influenced their thinking....

Empirical evidence has shown that venture capitalists can contribute to the success of a venture by being personally involved in providing value-added services (Bygrave & Timmons, 1992a; Fried & Hisrich, 1995; Rosenstein, 1988). Consistent with this, the results in this study show that expert venture capitalists are more concerned than novices about whether the means available to themselves can add value to the venture, as illustrated in the following excerpt:

Expert Venture Capitalist 16
Most of the times, the early-stage entrepreneurial teams are incomplete. What they need is not just your money, but also your resources.... I find many VCs, especially those who investing in late stage, are not prepared or even willing to provide such resources. Some venture capitalists may have that ability, but they still need to consider whether the resources can be transplanted to the venture smoothly or effectively....Among many things, industry knowledge and expertise are particularly important. They help

entrepreneurs avoid potential pitfalls and build business networks. The companies distinguishing themselves from other VCs are likely to be those of deep knowledge of the industries. They are able to integrate resources to match the need of the investee firm, bringing in tremendous value...

This study also examined the difference between expert venture capitalists and novices with regard to their concern about whether the business or the entrepreneurs have set clear goals to achieve. It was expected that, when making early-stage venture investment decisions, expert venture capitalists would be more likely to discount the importance of goal setting in relation to product development and market creation, due to the uncertainty embedded in the business environment and process. On the other hand, novices may take entrepreneurs' goal setting more seriously, assuming that the goals will determine means acquisition or actions to take. However, this study found no significant difference ($p = .074$) between the expert and novice groups in weighting the importance of goal setting by the entrepreneurs: 65.6% of experts and 76.7% novices paid attention to this issue. This study further investigated the transcripts of the experts and novices who acknowledged the importance of goal setting and, interestingly, noted that 14 of the 21 experts mentioned the need for clarifying the logic or assumptions of the entrepreneurs' goals, whereas only 7 of the 23 counterpart novices expressed such a concern, as reflected in the following excerpts:

Expert Venture Capitalist 9

Things will be always evolving for early-stage companies. It's impossible for entrepreneurs to have a full picture at this stage. If they have a goal, it's hard to be very specific. However, I still like to see whether the business founders have a direction. And more importantly, on what basis they set the direction. I hope they keep an open mind and let the details be shaped along the way...

Novice Venture Capitalist 5

The most important thing is what the entrepreneurs want to achieve on earth. Does he want to help potential entrepreneurs know the entrepreneurship process, learn how to start a business, and gain entrepreneurial experience, or he just wants to attract people to this product and make money? Is his primary objective set on education or entertainment? To me, different goals mean different actions to take and different resources to acquire then...

5.2.3 Downside Protection versus Upside Attractiveness

The protocol experiment did not specifically ask the participants to estimate costs or expenses in relation to the business. In fact, the participants were not given any information about how much investment capital they could assume to have in the scenario. As venture capitalists, they may expect to have sufficient capital to meet the financing requirements of a single early-stage investment project. The focus was instead on examining whether the venture capitalists were concerned with the downside of a potential investment. In this regard, the number of spontaneous mentions of the operating cost, specifically the product development cost and sales and distribution expense, was used as a measure to determine the degree to which participants were concerned about the investment downside.

A comparison of the expert and novice groups offers support for H3a: expert venture capitalists were more likely than novices to consider the operating costs of the venture ($p < .001$) when evaluating the potential of a business, with 84% of experts mentioning a total of 76 cost concerns, while 67% of novices mentioned a total of only 36 cost concerns. Transcript excerpts from two experts and a novice are presented here:

Expert Venture Capitalist 12
Whether the business is capital intensive or not has an impact on the operating risk. I want to know how much capital the venture still requires in order to succeed. By the way, people have been trying to integrate education and entertainment. It's tough. There is fundamental difference between the two things. For entertainment, people want to have fun. For education, being authentic and realistic is the key. The entrepreneurship process consists of various changes and high complexity. Especially in China, government policy, industrial regulations, social custom, and "guanxi"...., how to quantify these into a gaming algorithm is definitely a question to me. It's hard...., so my gut feeling is... this product needs significant amount of capital and effort for continuous development.

Expert Venture Capitalist 25
You'd better start from the low-cost sales approaches. In the past, the typical approach of software sales is building direct distribution channels all over the places. That is very costly and inefficient. Now almost everything is put online. The anti-virus software, for instance...probably less than one per cent of it is sold by retail shops. Online purchase has become a customer habit. If you don't take advantage of it, you will easily end up with

high marketing cost but lousy results. Moreover, if you use Internet, the best approach is not spending money heavily on buying “key words” at those search websites. The best way is still online referral, the word-of-mouth.

In the above transcript excerpts, expert venture capitalist 25 considered cost four times as he made a channel decision. Novices seemed to be confident (perhaps overconfident) and tended to assume the future market share as given. They were more likely to pay attention to the approaches associated with generating high financial returns, with significantly fewer references to cost, as illustrated in the following excerpt:

Novice Venture Capitalist 14

To succeed, a gaming software must have big installation base. If you have a significant installation base, the stickiness of the product will then make sense and you will have much room to play with.... For example, you can add many things on to the base line and further upscale, with different versions, different features, at different prices. So you should try hard to cover multiple segments...you can establish some shops in big cities such as Beijing and Shanghai, and perhaps do some marketing campaigns at universities.

Expert venture capitalists also know the importance of installation base and economies of scale. However, due to their concern about the downside, including product feasibility, some of them would like the entrepreneurs to concentrate on one or two market segments in the beginning.

To examine whether there is a significant difference in emphasising investment upside, this study looked for explicit remarks about return estimation, such as statements reflecting concerns about market size or growth. Expert venture capitalists were found to be significantly more concerned than novices about the expected return ($p = 0.031$). This result is the opposite of what was predicted in H3b. Most of the venture capitalists who participated in this study indicated that if they do not see the return potential for a venture, they are not willing to commit resources for investment or even proceed further in deal evaluation. From the venture capitalist professional institution’s perspective, a shared culture of venture capital investment practices may dictate venture capitalists' decision policies (Zacharakis et al., 2007). An alternative explanation to this observation is that perhaps the roles acted by venture capitalists as the agent of limited partners and therefore managing primarily other people’s money

still have significant influence on early-stage venture capitalists' decision logics. It appears that achieving high returns remains a primary justification for the existence of institutional venture capitalists. Therefore, the emphasis on return potential even under high uncertainty for early-stage investment is not very surprising. That implies that professional institutions still exert significant influence on early-stage venture capitalists' decision making.

Taking this analysis further, statements that reflected fee-charging strategies on a recurring or one-off basis were identified. Expert venture capitalists were found to be significantly more likely to adopt a usage-based recurring strategy whereas the novices were more likely to charge on a one-off basis ($p = .032$), as illustrated in the two excerpts below:

Novice Venture Capitalist 27

Coming to pricing, I think it's important to look at your target customers. There are mainly two categories: the retail customers and the institutional clients. The retail customers can include two types of adults shown in the description. For this category of people, I think the price shall be around RMB1,000. The institutional clients are mainly educators. A price range between RMB1,000 and RMB1,500 is reasonable. If they want some specific after-sales services or free software upgrade, you can charge a premium. If you are going to offer several versions of products combined with different levels of services, you may consider a few pricing options. But in general it's not advisable to set the price too high, as shown in the survey results. Otherwise, potential customers may think twice whether to buy or simply turn to pirated software.

Expert Venture Capitalist 18

I would rather think this as a service instead of a product. As a start, you'd better make people try first. So you have to keep the price low or even offer free versions online. As a gaming software, it can refer to the business model of Civilization, which is essentially for entertainment purpose. In order to win, the players are willing to purchase various tools and weapons in the game, including accumulating credits to make friends or build partnerships....The value of the business is captured not from the sale of the software itself, but from selling tools and equipments from time to time within the game. The software can even provide a platform for players to exchange gaming experience and trade their tools and equipments...which in turn enhances the product stickiness. I believe, whether it's for entertainment or education, charging based on subscription and usage is more efficient and sustainable.

5.2.4 Partnership versus Competition

Expert early-stage venture capitalists were expected to emphasise the importance of partnership more than novices. In order not to prime the subjects, this study did not specifically ask about partnership issues. The number of spontaneous mentions of partnership thus reflects the degree to which this issue is important to participants. As expected, expert venture capitalists were significantly more likely than novices ($p < .001$) to be concerned about partnership when considering product distribution, as illustrated in the following excerpt:

Expert Venture Capitalist 11
You need to somehow collaborate with existing educational organizations or connect to relevant platforms... Yes, you would have to...If you want to sell to retail customers such as students, you can partner with schools. You can also make use of media resources or social community on the Internet, such as renren.com, to find your users and reach them. There are many Chinese websites focusing on education. You can leverage these platforms or channels to sell your products because of the traffic volume which is extremely important for sales....

H4a is further supported by the analysis of the differences in how expert venture capitalists and novices use partnership to develop strategic clients. Business success depends on the mutual understanding and commitment of multiple parties in many relationships. A strategic client can be a useful reference and bring prestige to enhance the credibility of the company or its product. Securing a strategic client can be a game changer for the vendor and is therefore of special importance to a startup which typically has limited reputation and resources. The study examined the differences between the two groups on their predisposition toward building such strategic relationships ($p = .016$). The following excerpt provides an example of a statement about strategic clients by an expert venture capitalist:

Expert Venture Capitalist 7
For education, authority is important. To be received by the mass market, I think an effective strategy is to get some well-known people, preferably successful entrepreneurs, to endorse this product. If you can't get these people, at least you should find some educational institutes who are willing to accept your product. It is a long way to go from a good idea to company IPO. If the entrepreneurs can find strategic clients to buy or

co-develop the product...the path to success might be significantly shortened ...

The study then examined expert venture capitalists' and novices' concern about competition by counting the number of remarks participant made about this issue. It was found that both experts and novices pay attention to competition, as illustrated in the following excerpt, with no significant difference between the two groups ($p = .065$).

Expert Venture Capitalist 28

The competitive landscape for early start-ups is hard to predict. However, that doesn't mean we should totally leave it out. In China, if your business doesn't do well, people won't bother. However, once you make some profit or show a sign of it, competition immediately becomes a real issue. It's too late to take actions after you see the competitors and what they do. As investors, if we see a startup of success potential, automatically we will think how the success can be sustained from competition. We won't look at things such as whether the entrepreneurs have a killer technology, a patent, or a unique business model alone. We will evaluate them as a whole and assess what advantages the entrepreneurs could have that the followers cannot easily copy or catch up. Although most often the start-up doesn't have much to deter the potential competitors, it is still good to know whether the founders are aware of the situation so that they become even more committed in their execution...

However, a point worth noting in terms of the slight difference between the two groups in evaluating competition is the perspective from which they look at the issue. The novices seems to be more concerned about external factors typified by what the competitors could do, as illustrated in the following excerpt, whereas the experts are more concerned about internal factors, such as what competencies or unique strengths the entrepreneurs may have, to resist or cope with the potential competition.

Novice Venture Capitalist 22

I don't think the barrier is high in terms of product concept and technical design. Once the business receives venture capital, it simultaneously releases a signal to the market that there are investment interests following this line of industry. The competitors can come from various fields, regardless of whether they have experience in software business or education. Particularly, we need to think about how the gaming entertainment giants like Tencent or Shanda or big educational companies like New Oriental may respond to such signals.

The expert venture capitalists' focus is consistent with the assertions of Tyebjee and Bruno (1984) that one of the top two factors significantly impacting a deal's investment risk is the venture's resistance to environmental threats.

5.2.5 Contingency Acknowledging versus Ignoring

Although the study instrument did not incorporate any specific unexpected events, expert venture capitalists appeared to be more cautious and highlighted significantly more concerns about contingencies than novices. The results show that expert venture capitalists were more likely to consider environmental changes, as illustrated in the following excerpt:

Expert Venture Capitalist 15
As a brand-new product, especially at its early development stage, it's impossible to be flawless. Collecting users' feedback and making continuous changes and improvement are routine. A particular challenge is that there are few examples to refer to. It's not like opening shops as McDonald or KFC, you know what the business is and where to put your effort in, how to improve, etc. For things like this, the key to success is unclear, due to so many unknown factors... One day when this gaming software reaches a mature stage and you look back, you may not help but laugh at the original concept or design...as it seems so rough, naive and even a bit silly.

Expert venture capitalists were also found to be more likely to emphasise the importance of entrepreneurs' dynamic capabilities for leveraging surprises arising from uncertain situations. Among the 28 experts who acknowledged contingencies, 17 of them mentioned that they expect the entrepreneurs to be flexible and take advantage of the unexpected circumstances if possible. In contrast, only 6 out of the 21 novices who acknowledged contingencies explicitly made a point that they would not be tethered to existing goals. This seems to be consistent with the finding from a recent study on industrial application developers' quality of exception handling (Shah, Gorg, & Harrold, 2010), which reports that novices tend to ignore unexpected events due to the complexities of handling them, whereas experts view handling of contingencies as a crucial part of the development process.

The following excerpt illustrates the mentality of an expert venture capitalist in visualising exit options in response to uncertainty.

Expert Venture Capitalist 18

In general, we consider exit prospect from macro point of view. It should be somehow visible or at least we have a feel. That's all. There are many things down the load beyond control. We cannot predict now what the market will be at the time of exit. Both entrepreneurs and investors have to make do according to the situation. My belief is: if the company does well, there will be a way out. If IPO is not favourable, we can try trade sale because M&A will become more and more popular. So even in adverse conditions, we hope the entrepreneurs can keep up with the positive attitude and leverage opportunities arising from adversity.

It has been reported in the literature that venture capitalists are overconfident about their prediction abilities (Zacharakis & Shepherd, 2001). The results from this study's examination of venture capitalists' views of the future and their predisposition toward risk and resources revealed that novice venture capitalists have higher overconfidence than experts in not only their own prediction abilities but also entrepreneurs' execution capability. Such overconfidence is likely to be associated with novices' insufficient understanding of the nature of uncertainty and the impact of uncertainty on early-stage investment. This is consistent with conclusions drawn from Cao and Hsu's study (2011), which examines the informational role of startups' patenting activities in venture capital financing, suggesting that more experienced venture capitalists are more sophisticated and do not easily become overconfident about investees' innovations.

5.3 Summary

This study's findings support the central hypothesis that expert venture capitalists use effectuation to a significantly higher extent than novices in all five dimensions that distinguish effectuation and prediction.

The rejection of H2c, H3b, and H4b indicates that expert venture capitalists also use causal logic and they also could be as predictive as novices in some of the dimensions in certain contexts. That means expert venture capitalists do not completely abandon prediction in early-stage venture investment decision making. However, overall, expert early-stage venture capitalists use effectuation and prediction in an organised and compatible way. For goal setting, while acknowledging its importance, expert

venture capitalists were found to be less likely to take the goal set by the entrepreneurs as granted or warranted. They are more likely to challenge the underlying logic and rationale, attempting to verify whether the goal can be sustained by the means. Regarding concern about competition, experts tend to examine what competencies or unique strengths the entrepreneurs may have to resist the competition, whereas novices tend to worry more about the actions the competitors might undertake.

Through deliberate practice, expert venture capitalists are able to develop a database of patterns they can draw on to compare and match with new situations to solve problems (Gobet & Simon, 1996). Although expert venture capitalists underweight certain predictive information, they may take advantage of the acquired skills of pattern recognition and matching, or simply analogical reasoning, to make up for predictive information to tackle problems under uncertainty.

Chapter 6 Summary and Concluding Comments

6.1 Introduction

This chapter discusses the theoretical and practical implications of the research findings. Limitations of the study are also acknowledged and recommendations for further research are offered.

6.2 Theoretical Implications

Conventional wisdom assumes that venture capitalists think and take actions based on predictive rationality. However, early-stage venture development is fraught with uncertainty and ambiguity (Afuah, 1998; Garud & Van De Ven, 1992), resulting in a high rate of investment failure. Predictive rationality does not work effectively under uncertainty. That partially explains why persistent research endeavours in developing predictive venture capitalist decision models are largely unfruitful.

Effectuation is based on a distinctive logic inverting several key principles that are central to the rational choice paradigm. The theory offers an important alternate frame for examining early-stage venture capital investment decision behaviour under uncertainty.

This study makes a significant contribution to the literature by challenging the conventional wisdom about how venture capitalists think and what actions they intend to take in relation to early-stage investment decision making. It is the first time the effectuation perspective has been extended from the entrepreneurship domain to venture capital by examining its use in early-stage venture capitalist investment decision making.

The proposed theoretical framework helps to understand the approaches that early-stage venture capitalists undertake to tackle uncertainty in their investment decision making. Within such a context, this study examined why and how venture capitalists use effectuation in contrast to prediction in the context of early-stage

investment decision making and how expert and novice venture capitalists differ in the use of effectuation.

Based on extant literature, this study shows that, from a theoretical perspective, effectuation is applicable to the early-stage venture investment decision-making setting. The empirical findings then demonstrate that venture capitalists, particularly expert early-stage venture capitalists, do use effectuation in all five dimensions, namely, creation, means driven, downside protection, partnership, and contingency acknowledgement.

The study results supported the central hypothesis that expert venture capitalists use effectuation to a significantly higher extent than novices. Specifically, expert venture capitalists are more likely than novices to emphasise execution, be sceptical about market data, and prefer their own personal knowledge of the product. Experts place significantly more emphasis on the entrepreneurs' resources (what they have, what they know, and who they know) and on how venture capitalists' own means could add value to the venture. In addition, experts are more likely to consider the business development cost and partnership. Expert venture capitalists are more aware of unexpected contingencies and are more likely to emphasise the importance of exploiting opportunities arising from the contingencies.

Zacharakis and Shepherd (2007) argue that the use of heuristics enables venture capitalists to cope with uncertainty. The findings of this study support this claim and show that expert early-stage venture capitalists are more likely than novices to use heuristics based on effectual logic.

While this study fosters an appreciation of effectuation theory, it also provides a critical reflection on effectuation versus causation in the present research context. Although some results are consistent with the theoretical predictions, some of the hypotheses are rejected. The unsupported hypotheses (H2c, H3b, and H4b) introduce several questions: in this research context, why do expert early-stage venture capitalists and novices not differ in certain dimension, specifically in weighting the importance of entrepreneurs' goal setting? Why do expert early-stage venture capitalists emphasise competition as much as novices do? Why do expert early-stage

venture capitalists place more, but not less, emphasis on expected return than novices do?

With regard to the perceived importance of entrepreneurs' goal setting from early-stage venture capitalists' perspective, experts and novices may have different motives in emphasising the goal setting. This was partly revealed by the comparison of the related transcripts of the experts and novices who acknowledged the importance of goal setting. As highlighted in section 5.2.2, a significant number of these expert early-stage venture capitalists are concerned with the underlying assumptions made by the entrepreneurs in relation to the goal setting. In other words, the experts are less likely to take the goal set by the entrepreneurs as granted or warranted. They are more likely to challenge the underlying logic and rationale, attempting to verify whether the goal can be sustained by the means. Further research focusing on this dimension to verify and explain this issue may generate new insights about the logics of venture capitalist early-stage investment decision making.

With respect to the lack of difference between expert early-stage venture capitalists and novices in their emphasis on competition, it may be partly due to the economic institution in which the decision makers operate. China, with its relatively new institutional frameworks, offers a fertile business ground with rich growth opportunities but also vast, intense, and relatively unregulated competition that can arise in many forms. Competition is thus naturally a major concern for both entrepreneurs and investors in such a context. The association of effectuation with cooperation may not necessarily exclude competition in terms of business relationships in a fast-growing economy like China. From another perspective, in the circumstance of intellectual property playing an important role for a startup, too much focus on cooperation with external parties can be detrimental when insufficient protections have been put in place. This is a particularly significant concern in a business context of weak legal enforcement.

Legal protection for investors and legal enforcement are two important aspects of regulatory institutions impacting the way venture capitalists behave (Bruton, Ahlstrom, & Wan, 2003). A stable institutional regime with predictable legal enforcement helps venture capitalists safeguard and achieve their investment returns.

The relatively weak legal enforcement and strong uncertainty typifying many emerging economies (Meyer, 2001; Peng, 2000) increase business risk and thereby enhance the importance of transaction costs in the evaluation of new venture investment opportunities. As a result, expert venture capitalists become concerned about not only partnerships, but also competition. Therefore, although the hypothesised difference between expert venture capitalists and novices with regard to their emphasis on market competitive analysis was not supported, it is not entirely unexpected.

Theoretically, effectuation and causation are virtually diametrically opposed and the two ways of thinking are mutually exclusive. Effectuation and prediction may be placed as two extremes within a broad spectrum for simplification. It is interesting that the findings from this study show that expert early-stage venture capitalists, while using effectuation, do not completely abandon prediction, which suggests that there may not necessarily be a simple bipolar division between effectuation and prediction in the context of venture capitalist early-stage investment decision making in China. Wiltbank et al. (2009) point out that entrepreneurs and their investors are able to use both effectuation and prediction and often use both in practice. To certain extent, this study's results provide some evidence showing that early-stage venture capitalists do not employ effectuation as a wholesale replacement for predictive rationality.

In terms of the consideration of upside potential, it is also particularly interesting that expert venture capitalists are even more concerned than novices with the expected return. In section 5.2.3, some explanations from the venture capitalist professional institution's perspective and the agent role played by venture capitalists for limited partners and managing other people's money were provided. However, further research can be carried out to test such propositions and examine how and to what extent professional institutions influence early-stage venture capitalists' decision making under uncertainty.

Meanwhile, the results from this study demonstrated that expert early-stage venture capitalists discount predictive information, which brings up another interesting question: How could expert early-stage venture capitalists assess investment returns with limited information? In other words, how do venture capitalists reconcile these

two approaches, at least in some dimensions, in early-stage venture investment decision making?

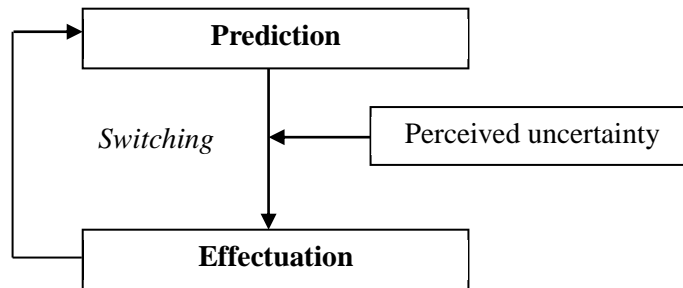
We can look at this issue from three aspects. First, experts amass and organise significant bodies of knowledge into a pattern database which enables them to make good decisions with less reliance on processing external information inputs (Rikers et al., 2002). Second, experts use pattern recognition and analogical reasoning extensively. They can retrieve information from their pattern database to compare and match with the new situations to solve problems (Gobet & Simon, 1996). For example, industrial designers make significant use of pattern recognition and analogical reasoning in new product development (Kalakoski & Saariluoma, 2001). Expert entrepreneurs apply this unique knowledge to the modelling of solutions for new product development and market creation (Dew et al., 2009). This study also revealed that in many instances expert early-stage venture capitalists refer to previous experience in their decision making. Third, there is a difference between desiring high returns and being attracted by high returns. As demonstrated by the results in testing H3a, expert early-stage venture capitalists are more likely to consider the cost of developing the business. If they learn to switch between the two modes of prediction and effectuation, they are also likely to consider a potential investment in the worst-case scenario. That means they will not be easily attracted or convinced by a projection of high returns shown in a scenario or claimed in a business plan. To summarise, although expert venture capitalists underweight certain predictive information, they are capable of taking advantage of analogical reasoning to make up for the limited information. Therefore, in essence the rejected hypotheses do not completely contradict the central hypothesis.

After investing a significant amount of time on intensive practice and familiarization with the decision domain, experts have developed refined situational awareness (Hutton & Klein, 1999). As a result, they are able to identify the relevant features of decision problems and adjust their decision-making styles accordingly (Baron & Henry, 2006).

As investors, venture capitalists may have preset views based on prediction. However, uncertainty or, more precisely perhaps, the perceived uncertainty, may act as a trigger

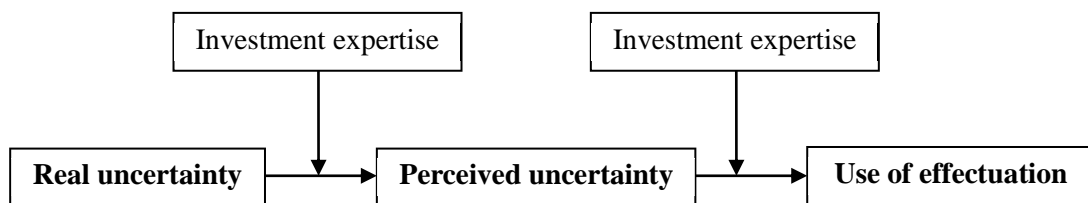
point for them to engage effectuation. If the level of uncertainty is high, expert venture capitalists may switch between prediction and effectuation readily and frequently, something novices may not be accustomed to doing. This concept is illustrated in Figure 16.

Figure 16: Switching between Prediction and Effectuation



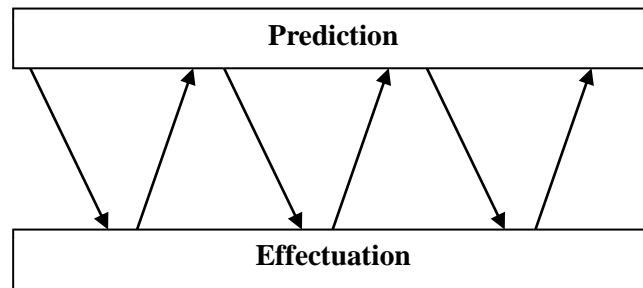
For novices, even when they sense uncertainty, they tend to continue to apply predictive logic. Therefore, novices may expend more time to predict even in an environment surrounded by uncertainty. Moreover, it is possible that, in the first place, expert early-stage venture capitalists are better at sensing and are more willing to acknowledge uncertainty in project evaluation, whereas novices are less sensitive to this subject matter. This study’s results support this notion, as depicted in Figure 17.

Figure 17: Information Processing from Real Uncertainty to the Use of Effectuation



Another possibility is that effectuation and prediction are two parallel thinking logics in the mind of venture capitalists. Sarasvathy (2008) argues that a person can use both causal and effectual logics at different times depending on what the circumstances call for. The parallel thinking is like a wave running within the range of two streams and the switching between the two modes is the important dynamism of an automatic process, as shown in Figure 18.

Figure 18: An Automatic Switching Process between Prediction and Effectuation



Overall, the results of this study suggest that the thinking process of expert venture capitalists is more comprehensive, elaborate, and complex than that of novices. In comparison with novices who tend to ignore conflicting information, expert venture capitalists are better at reconciling the different decision approaches with more holistic thinking.

Although effectuation may be thought of as being applied at the level of the entire entrepreneurial process, it might be better applied at the level of individual human actions. Dew and Sarasvathy (2002) acknowledge that “...entrepreneurial effectuation is but a special case of a more general theory of effectuation that might potentially be developed” (p. 22). The models proposed above may offer more research opportunities for further development of effectuation theory.

In addition, this study also has theoretical implications for further study of the venture capitalist–entrepreneur relationship. In negotiating a deal and investment terms, these two parties sit on the opposite sides of the table. Therefore, it is important to understand the similarities and differences of their decision logics.

Sarasvathy (2007) suggests that the more experienced the venture capitalists are, the more likely they are to use effectuation and the more likely they behave as experienced entrepreneurs. In the study by Read et al. (2009a), the researchers found that expert entrepreneurs were significantly more likely to base pricing decisions on a skim pricing strategy and that managers were significantly more likely to base pricing decisions on a penetration pricing strategy. Their proposed reasoning is that expert entrepreneurs are likely to price on the basis of the highest level of value they have

uncovered through interactions with individual customers (Berthorn & John, 2006). Interestingly, this study did not directly find any significant difference between expert venture capitalists and novices in terms of using skim or penetration pricing strategy. However, the difference exists in that expert venture capitalists favour a pricing strategy on a revenue-recurring basis whereas the novices were more likely to adopt a pricing strategy on a one-off revenue basis. A further look into the revenue-recurring pricing strategy by expert venture capitalists revealed that expert venture capitalists had an incentive to price low or even offer the product free in the beginning in hopes of capturing market share and capitalising through recurring charges on supplementary products or services later in the cycle.

According to Dew et al. (2009), expert entrepreneurs emphasise limiting downside potential rather than focusing on upside potential when viewing risk and resources. However, this study shows that expert venture capitalists treat both factors as important, instead of as an “either/or” issue.

This study also adds to the literature by having chosen China as the research setting. China has a unique institutional environment with great complexity and uncertainty, providing a classic research context for the current study. Moreover, existing literature on venture capitalists’ investment decision making has largely focused on the decision-making environments in Western economies. As the first examining the use of effectuation in venture capitalist early-stage investment decision making, this study responds to the appeal by Ahlstrom, Bruton, and Yeh (2007) that more exploration is needed to fill the gap in venture capitalist decision making in emerging economies. Although China is widely considered to be unique and research findings about China may not be directly applicable to other countries, the insights gained and the theoretical framework developed in this study do offer insights that can be applied to other developing economies.

6.3 Practical Implications

Early-stage venture capitalists need to be aware of the difference in the use of effectuation between experts and novices because this difference may have a

significant impact on fund performance. Wiltbank et al. (2009) find that angel investors who use effectuation more widely benefit from experiencing a reduction in the number of negative exits without reduction in their rate of positive exits. In other words, effectuation may help angel investors achieve a better overall return for the fund. Similarly, Shah et al. (2010) find that industrial designers who are better able to handle unexpected contingencies have a better chance of achieving superior performance.

Novice venture capitalists need to improve their understanding of the nature of uncertainty and its impact on early-stage venture development and the associated investment decisions. The results of this study revealed that novice venture capitalists are less sensitive even when they face true uncertainty. As a result, they may underestimate the negative impact, resulting in overcommitment of capital invested in unwarranted ventures. This is particularly important for early-stage venture capitalists because the proportion of capital allocated to early-stage ventures is much more limited and therefore more precious, than that to ventures of high-growth and pre-IPO stages.

The research findings also suggest that, even when both expert and novice venture capitalists perceive the existence of uncertainty, novices tend to stick to the predictive mode (the textbook approach) rather than switch to the effectual mode as readily as expert venture capitalists. This is consistent with another study on industry design expertise (Shah et al., 2010), which shows that novices are less prepared to react to uncertainty and are less effective in undertaking strategic approaches to cope with the environmental challenges and exploit business opportunities. That means novice venture capitalists should not only improve their understanding of uncertainty, but also learn how to take effective approaches to address uncertainty in early-stage investment decision making.

Effectuation may be an important topic to be covered in venture capitalist training in relation to early-stage investment decision making. The concept is textured and systematic, with eminently learnable and teachable principles and practical prescriptions of its own (Dew & Sarasvathy, 2002). The key principles and elements of effectuation, namely creation, means driven, downside protection, partnership and

contingency leveraging, set a useful ground for developing training materials including real-life cases to train junior venture capitalists. Thus, this study not only makes an original contribution to the literature on early-stage venture investment decision making, it also provides the basis for developing training programs for novice venture capitalists in decision making and problem solving that would otherwise take much longer via on-the-job experience. A targeted and specific approach will greatly shorten the learning curve.

The findings of this study also have significant implications for entrepreneurs seeking early-stage venture capital. Most entrepreneurs are concerned not only with securing the financial capital needed, but also the amount of assistance that the investor can provide. This was reflected in this statement by a technology entrepreneur during an interview:⁴

When receiving the first sum of venture capital from the investor, I was exhilarated. But soon after that, I felt a pressure, "Does he really know my business and is he really interested in what I am going to do?" Frankly I was not that sure because at that time even myself was still trying all ways to improve my technology and the product concept in order to develop a sizeable market in China. Anyway one thing I am sure is that I love child education and believe it is the area where my mixed reality technology should target at. I hoped my investor truly understand me and can help me craft effective strategies to grow business in China.

As categorised by MacMillan et al. (1989), venture capitalists may fall along a spectrum of styles from "laissez faire" to "close trackers." For early-stage investment, the venture capitalists who are more actively involved with venture development are credited as being more valuable. Expert early-stage venture capitalists tend to emphasise effectuation and do not rely on predictive information as much as novices do. They are more likely to question the validity or credibility of the predictive

⁴ The interviewee was Dr Steven Zhou, Director of the Interactive Multimedia Lab and Founder & Director, MXR Corporation Pte Ltd. The interview was conducted by me on 15 March 2011 in Singapore.

information presented to them. That means entrepreneurs' understanding of effectuation and being able to engage the logic to address venture capitalists' concerns may greatly increase the effectiveness of communication. As a result, they have a better chance of securing early-stage financing if the venture involves a high level of innovation and uncertainty. Furthermore, even after the money is invested in the venture, effectuation will likely be used in the venture co-development process by both the investor and investee. Again, entrepreneur's knowledge of effectuation will be a positive contribution to the effectiveness of this process.

In addition, the findings of this study have significant implications for limited partners because this group of people stand on the supply side of venture capital. The majority of these stakeholders are trained in or significantly influenced by causal thinking. Because the use of effectuation is likely to correlate with the early-stage venture investment expertise and performance, all these related parties may need to review and rethink their business strategies and operational approaches to increase their success under uncertainty.

Nascent or growing venture capital industries now exist in almost all developed economies in the world (Murray, 2007). With the combination of risk capital and high levels of managerial and entrepreneurial expertise, an established venture capital industry helps transform and reinvigorate mature and established economies. Policy makers in emerging economies such as China are exploring the development potential of venture capital. There may be a legitimate role for government policy in shaping local and regional economic development and promoting the appropriate elements of capital formation. However, designing a policy tailored to all objectives is nearly impossible. This study offers policy makers with additional information and perspectives that will assist them in promoting the economic power of early-stage venture capitalists. More empirical evidence is needed as forming and implementing policy often runs ahead of knowledge (Mason, 1996). New research is constantly needed on venture capital and a wider scope of entrepreneurship.

6.4 Limitations of the Study

This study has several limitations, which are centred on the nature and quality of the data set.

First, protocols may provide only a subset of the problem-solving processes (Ericsson & Simon, 1984) instead of representing complete registrations of cognition (Nersessian, 2008). People are not perfectly aware of what they are thinking and what can be heeded at any one time is also limited to a certain extent. These can cause gaps in a sequence or perhaps unmotivated changes in direction.

Second, due to the nature of the protocol analysis, the sample size used in this study is small by the standards of many studies on venture capitalist decision making. The difficulty in securing a sample of expert venture capitalists and the time-consuming nature of the data collection and coding process also set practical constraints. Nearly half of the expert sample was obtained using a snowball sampling approach. It is important to note that most snowball samples may be strongly biased toward inclusion of individuals who have many interrelationships and the absence of individual inclusion probabilities may lead to biased estimation (Berg, 1988). Although the protocol analysis method can be implemented with sound statistical power, it is likely that the findings would have been more insightful and externally more valid with a more random and larger subject pool.

A third possible criticism of this study concerns the selection of the novice venture capitalist sample. Following the principle that samples may be drawn using relative rather than absolute criteria, the novice sample consisted of 32 entrepreneurship postgraduate students who have sufficient investment knowledge and business experience to address protocol questions but have little early-stage venture capital investment experience. Although using students in expertise experiments has been an established practice, ideally interns or newly appointed venture capital associates working in venture capital firms could have been employed to best represent true novice venture capitalists. Meanwhile, a related concern is the age disparity between the expert and novice groups. The novice sample was significantly younger than the expert sample in this study. The fact is not surprising and it is difficult to avoid due to

the long period of deliberate practice required to attain expertise. Age difference should not be entirely ruled out as a potential factor causing the difference in the use of effectuation between the experts and novices in this study.

A further limitation of this study concerns the fact that, for the reasons described in the methodology chapter, I coded the transcripts. Ideally, an independent person not involved in the study in any other way would be employed to code all the protocols and another independent coder could recode using the coding scheme developed by the first person. Thereafter, the two sets of codings could be compared to test for reliability. With the analysis done in the current study, two types of bias are of particular concern. The first possible bias could result from my prior knowledge of the experimental design and hypotheses. The second bias may originate from the assumption that subjects will think in the same ways that the research does and therefore same inferences are made. It is problematic when the coder is faced with an ambiguous or schematic statement. In that case, the coder may attribute to the subject the action or thought he or she considers most reasonable in the particular context. But this bias is less of a concern when the protocol information is very explicit and clear (Ericsson & Simon, 1984), which is the case in the present study.

Fifth, It is important to draw attention to the research context of China and its unique institutional environment. The venture capitalist professional institution and the Chinese economic institution may jointly influence venture capitalists' decision preferences. This limitation presents an opportunity for further research to replicate the current study by controlling the factors of interest.

The strength of claims about any relationship between effectuation and early-stage venture capital investment expertise has to come from the fact that the experts are carefully selected and given decision tasks precisely within their domain of expertise. Given the above limitations, the generalisability of this study's results to early-stage venture capitalists outside of the sample frame needs to be done with due caution.

6.5 Recommendations for Further Research

Effectuation is not just a refreshingly new perspective to entrepreneurship, but a new way of looking at the world around us. There are several recommendations for further research.

First, a focus could be placed on cross-validating the results of this study in other developing economies to extend the generalisability of the results. Specifically, an interesting avenue would be to test whether the theoretical framework of effectuation developed in this study is applicable in early-stage venture capitalist investment decision making in other countries. Different business environments may have different impacts on the formation of early-stage venture investment expertise and the use of effectuation. The findings from this study imply that institutions have influence on venture capitalists' use of effectuation and prediction in the Chinese context. By conducting further research, the possible impact of institutions on early-stage venture capitalists' use of effectuation and prediction can be further examined. It is noteworthy that the hypothesised lower emphasis expert venture capitalists place on goal setting, expected returns, and competition, was not supported in the present study. Future research into this could generate further insights.

Second, future research can focus on the effect of the level of innovation involved in early-stage ventures, such as high-tech versus low-tech, on venture capitalists' use of effectuation in investment decision making. Alternatively, the differences in the use of effectuation in investment decision making between two groups of expert venture capitalists, one group focusing on early stage and the other on late stage, could be examined. Although expert venture capitalists may share certain common characteristics, their investment expertise associated with different stages of entrepreneurial firms may result in differential use of effectuation. Wiltbank et al. (2009) assert that many founding entrepreneurs may experience enormous pressures to move from effectual to causal reasoning in response to the development stages of their entrepreneurial firms. Similarly, further studies can focus on whether the use of effectuation by a venture capitalist varies when investing in different venture stages.

Third, further study could be conducted on the use of effectuation by early-stage

venture capitalists in postinvestment decision making, which is related to delivering value-added services. Based on Chandler's (2011) original research instrument, I have developed a survey form, which is attached in Appendix J with the Chinese version in Appendix K. This form serves as an instrument to facilitate a national extension from the current study. Such a study will further contribute to a better understanding of the process of venture co-creation or co-development by venture capitalists and entrepreneurs. Moreover, the survey can be customised into two versions to administer on venture capitalists and entrepreneurs, respectively. The differences between the two groups can be compared and analysed statistically. This could be one of the more reliable ways to operationalise the differences and such a study will make a significant contribution to the literature and have strong practical implications for both venture capitalists and entrepreneurs.

Fourth, similar to the examination of angel investors' performance, future research could benefit from the examination of the impact of effectuation on early-stage investment performance, addressing the question of "so-what?" If using effectuation does have a positive impact on investment performance, the emphasis placed on effectuation by expert early-stage venture capitalists will be better justified. It is also useful to know when (pre- or postinvestment) the use of effectuation has more significant impact on investment performance.

Fifth, perceived uncertainty, instead of actual uncertainty, could be a moderating or confounding explanatory factor on venture capitalists' use of effectuation. The perception of uncertainty could be related to the awareness and understanding of uncertainty. Meanwhile, individual investors' overconfidence may also play a role in the perception of uncertainty. Further studies focusing on these issues may shed further light on specific elements for venture capitalist training.

With regard to education and training, MBA and many entrepreneurship programmes frequently teach participants how to analyse and predict. The traditional management and strategy theories seem handy for them to address entrepreneurial financing or investment decision problems. However, it is fascinating to read the statements made by leading venture capital researchers, reputable expert early-stage venture capitalists, senior executives from renowned e-business, and up-and-coming technopreneurs, as

quoted in this study. A commonality among them is that all of them acknowledge uncertainty related to the early-stage venture development or investment. Moreover, veteran venture capitalists like Mr Foo Jixun openly admitted their “inability to predict the future of an early-stage venture” in making investment decisions. That seems interesting but contradictory to conventional wisdom. However, this echoes well the characteristics of effectuation.

I close this thesis by citing the remark by Dew and Sarasvathy (2002, p. 11-12):

The key to understanding and applying effectuation is to realize that it co-exists with rational choice and provides an additional set of tools to the decision maker. In fact, one of the most fruitful areas for future empirical work in this regard would consist in carving out the space and bounds for the use of these two very different modes of reasoning.

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Appendices

Appendix A: Research Instrument (English)

Introduction

In recent years, people see increasing demand for entrepreneurship education, which has been frequently reported in the TV and newspaper. One striking phenomenon is the rising number of entrepreneurial start-ups by university graduates. The Chinese Ministry of Education, Ministry of Personnel, and the Ministry of Labour and Social Security actively encourage and support such entrepreneurship. However, the outcome is unsatisfactory. Two main reasons seem to be: 1) the failure of integrating the entrepreneurial mindset education into the university curriculum; and 2) the failure of providing entrepreneurship skill training to undergraduates. Meanwhile, it is found that even for middle or high school students, a curriculum involving entrepreneurship not only induces them to learn business, but also help them improve math, science, and communication skills. Inspired by this, three entrepreneurs created an entrepreneurship educational computer game called *Venturing* to meet market demand and helps players study and experience entrepreneurship. On average, each entrepreneur has about 8 years of technical or management experience. One of them has achieved some entrepreneurial success before.

Product Description

Venturing provides a unique entrepreneurship education model, integrating teaching, simulation, and practice - three in one. It helps students comprehend situations that possibly occur in actual entrepreneurship process and master relevant decision skills. Although the company has just started, the entrepreneurs have conducted realistic market research, which shows this product is not only technically feasible but also financially viable. The game provides a simulated environment for starting and running business. It also incorporates various components such as markets, competitors, regulators, macroeconomics, marketing strategies, and even a random factor for "luck". The game has a sophisticated multi-media interface - for example, a 3D office where market information is delivered through phone calls, a TV providing macroeconomic data, and simulated managerial staff whom the player (CEO) can consult for decision-making. At game start, the player can choose the type of business he/she wants from a variety to start up and then make decisions such as which market segments to identify, how many people to hire, what type of financing to seek, etc. The decisions to make involve manufacturing (e.g. how much to produce and whether to build new warehouses), marketing (e.g. which distribution channels to use and which media to advertise in), and management (e.g. hiring and training employees). The game has a specialised accounting module to track and compute the implications of various decisions for the bottom line. The results from the player's decisions permit a range of possible final outcomes - from bankruptcy to a "hockey stick".

The entrepreneurs have taken all possible precautions regarding intellectual property.

Problem 1: Market Identification

This team of entrepreneurs approach you for venture capital financing. Please use your imagination to put yourself in the above scenario and answer the following questions – one at a time. This research requires you to think aloud as you arrive at your decisions.

1. Who could be the potential customers for this product?
2. Who could be the potential competitors for this product?
3. What information would you seek about potential customers and competitors? List questions you would want answered.
4. How would you find out this information - what kind of market research would you do?
5. What do you think are the growth possibilities for this business?

Market Segmentation

Based on published secondary market data, the entrepreneurs estimate there are three major market segments that would be interested in the product:

Segment	Estimated total size
Young adults between the ages of 15 and 25	40 million persons
Adults over 25 who are curious about entrepreneurship	60 million persons
Educators	400,000 institutions

In China, the estimated market value of the educational software is RMB50 billion and the estimated market value of the interactive simulation education software is RMB20 billion. Both markets are expected to grow at a minimum rate of 30% p.a. in the next 5 years.

First-hand Market Research

The following are the results of the primary (direct) market research completed by the entrepreneurs.

Survey #1: Internet users were allowed to download a scaled down version of the game prototype (with the game stopping after 15 min of playing) and were asked to fill out a questionnaire. The site received 800 hits per day. Eventually 400 individuals actually downloaded the product. They received 500 completed questionnaires. The following pricing information was received from Survey 1.

Unit Price-Willing to Pay	Young Adults	Adults	Educators
RMB500-999	45%	26%	52%
RMB1,000-1,499	32%	38%	30%
RMB1,500-1,999	15%	22%	16%
RMB2,000-2,499	8%	9%	2%
RMB2,500-2,999	0	5%	0
Total	100%	100%	100%

Survey #2: The prototype was demonstrated at 2 popular computer technology bookstores and 3 Xinhua Bookstores. The following pricing information was received from Survey 2.

Unit Price-Willing to Pay	Young Adults	Adults	Educators
RMB 500-999	51%	21%	65%
RMB1,000-1,499	42%	49%	18%
RMB1,500-1,999	7%	19%	10%
RMB2,000-2,499	0	8%	7%
RMB2,500-2,999	0	3%	0
Total	100%	100%	100%

Survey #3: Focus group of educators (high school and local university lecturers and administrators)

The educators who participated in the focus group found the product exciting and useful — but wanted several additions and modifications made before they would be willing to pay a price of over RMB1,500 for it. As it is, they would be willing to pay RMB500–999 and would demand a discount on that for site licenses or bulk orders.

Both at the bookstore demo and the focus group, participants were very positive and enthusiastic about the product. They provided the entrepreneurs with good feedback on specific features and suggestions for improvement. But the educators were particularly keen on going beyond the “game” aspect; they made it clear that much more development and support would be required in trying to market the product to them. They also indicated that there are non-profit foundations and other funding sources interested in entrepreneurship that might be willing to promote the product and fund its purchase by educational institutions.

Marketing & Competition

Based on the above market research, the entrepreneurs arrive at the following cost estimates in response to different approaches for marketing their *Venturing* product:

Internet	RMB200,000 upfront + RMB5,000 per month thereafter
Retailers	RMB5~10 million upfront and support services and follow-up thereafter
Mail order catalogs	Relatively cheap — but ads and demos could cost RMB500,000 upfront
Direct selling to schools	Involves recruiting and training sales representatives except locally

None of the following four possible competitors offers a simulation game with substantial education components — this company is unique in this respect.

Company	Product Description	Unit Price	Sales
A	Urban planning simulation	RMB300	RMB300 mil
B	Civilization building simulation	RMB500	RMB200 mil
C	City building simulation	RMB600	RMB180 mil
D (New Co. <1 yr. old)	CD-ROMs of Scholastic Books	n/a	RMB10 mil

These competitor game companies are making a net return of 35% on sales.

Problem 2: Marketing & Risk

Please make the following decisions: (please continue thinking aloud as you arrive at your decisions.)

1. Which market segment(s) should the product be sold to?
2. How would you suggest pricing this product?
3. How would you suggest selling this product to your selected market segment(s)?
4. What are the major risks in investing in this business?
5. How would you deal with the risks?

Problem 3: Investment

Please make the following decisions: (please continue thinking aloud as you arrive at your decisions.)

1. In evaluating this business, what important information would you like to get further?
2. If you are to invest in this company, what is the most suitable exit strategy?
3. Based on the provided information, what results an investment is likely to achieve in next 5 years? Use a seven-point scale to indicate.

Least	1	2	3	4	5	6	7	Most
(Total loss)								(10 times' return or above)

Appendix B: Research Instrument (Chinese)

背景介绍

近年来，人们对创业教育的需求与日俱增，电视和报纸对此常有报道。一个显著的现象是不断增长的大学毕业生创业人数。中国教育部、人事部以及劳动和社会保障部也都积极鼓励和支持大学毕业生创业。然而，此类创业结果并不令人满意。两大主要原因看来是：1) 创业意识教育未融入大学课程；2) 未给本科生提供创业技能训练。同时，人们发现：即使对初中或高中生，涉及创业的课程不仅能引导他们学习商科，还能帮助他们提高数学、理科和沟通技能。受此启发，三名创业者携手开发了一套适应市场需求并能帮助玩家学习与体验创业的教育游戏软件，此软件名为《探险》。这些创业者平均拥有 8 年技术或管理经验，其中一个拥有一些成功的创业经验。

产品描述

《探险》提供一个融教学、模拟、实践“三位一体”的独特的创业教育模型。它能帮助学生理解实际创业过程中可能发生的情况和掌握相关决策技巧。虽然公司刚刚起步，三位创业者已做了务实的市场研究。研究显示该软件在技术和财务上都可行。游戏提供创办和经营公司的仿真环境，并融入诸多组件，如市场、竞争对手、管制者、宏观经济、营销策略，甚至有体现“运气”的随机因素。《探险》提供精致的多媒体界面，例如有通过电话传达市场讯息的三维办公室、报道宏观经济信息的电视、给玩家（CEO）提供决策咨询的虚拟管理团队。游戏开始时，玩家可从一系列企业中选择想创建的公司类型，然后对确定细分市场、员工招聘、融资方式等作出决策。需要作出的决策涉及生产（如产量以及是否需要建造新仓库）、营销（如分销渠道及广告媒体）以及管理（如招聘和培训员工）。游戏设有一个专门用以跟踪并计算各项决策对经营绩效影响的财务模块。根据玩家所作的决策，模拟产生的结果从公司破产到赢取巨额利润皆有可能。

此外，创业团队对知识产权已采取了所有可能的防范措施。

问题一：市场判断

这个创业团队找到您要求融资。请运用想象把自己置身于上述情景并逐一回答以下问题。此研究需要您将思考过程大声“说”出来。

1. 谁可能是本《探险》产品潜在的顾客？
2. 谁可能是本产品潜在的竞争对手？
3. 针对潜在的顾客和竞争对手，您想获得哪些信息？列出您要问的问题。
4. 您会如何找到这些信息——将做怎样的市场研究？
5. 您认为该公司的增长可能性如何？

市场细分

基于公开的二手市场数据，创业团队估计对本产品有兴趣的三个主要细分市场如下：

细分市场	预计总规模
15-25岁的年轻人	4千万人
25岁以上并对创业感兴趣的成年人	6千万人
教育工作者	40万家机构

中国教育类软件市场估值约人民币 500 亿元。互动模拟教育软件市场估值约 200 亿元。估计这两个市场在将来 5 年内的年增长率均不低于 30%。

一手市场研究

以下是这几位创业者所做的一手（直接）市场研究结果。

调查 1：允许互联网用户下载游戏原型简化版（游戏启动 15 分钟后自动终止），并要求他们填写一份问卷。平均每天有 800 人点击。最后有 400 人下载了产品。他们共收到 500 份问卷反馈。调查 1 获得的定价信息如下。

单价支付意愿	年轻人	成年人	教育工作者
500-999元	45%	26%	52%
1,000-1,499元	32%	38%	30%
1,500-1,999元	15%	22%	16%
2,000-2,499元	8%	9%	2%
2,500-2,999元	0	5%	0
共计	100%	100%	100%

调查2：在2家热门的计算机书店和3家新华书店展示了产品原型。调查2获得的定价信息如下。

单价支付意愿	年轻人	成年人	教育工作者
500-999元	51%	21%	65%
1,000-1,499元	42%	49%	18%
1,500-1,999元	7%	19%	10%
2,000-2,499元	0	8%	7%
2,500-2,999元	0	3%	0
共计	100%	100%	100%

调查3：教育工作者焦点小组（高中和当地大学的讲师和管理人员）

参与焦点小组的教育工作者都觉得本产品让人兴奋且很有用处。但是，若要让他们愿意支付1500元以上购买本产品，则需要对产品的功能作相当多的赠加和改进。对于目前的产品，他们愿意支付500至999元并且要求如果网上特许或大量购买时获得折扣。

在书店演示和焦点小组调查中，参与者对产品的反应十分积极和热情。他们对产品的具体特点提供了良好的反馈并提出改进建议。但教育工作者们对游戏之外的东西尤感兴趣；他们明确指出若要把产品推销给他们，还需做更多的开发和支持工作。他们还表示：一些对创业感兴趣的非盈利基金会和资助单位可能愿意推广此产品并资助有关教育机构采购此产品。

营销及竞争

基于以上市场研究，创业团队对《探险》这一产品不同营销途径相应的成本估算如下：

互联网	一次性首付20万，以后每月支付5千元
零售	一次性首付5百万至1千万，以后提供支持服务及跟进
邮购订单目录	相对便宜，但广告和演示需一次性投入50万
向学校直销	除本地外，需要招聘和培训销售代表

以下四家潜在竞争对手的游戏产品都没有提供足够的教育成份—在此方面此公司独一无二。

公司	产品描述	单价	销售
A	城市规划模拟	300元	3亿元
B	文明创建模拟	500元	2亿元
C	城市建设模拟	600元	1.8亿元
D (不足1年的新公司)	教科书配套光盘	不适用	1千万元

这些竞争对手游戏公司销售净利率为35%。

问题二：营销及风险

请作出以下决策：（在决策过程中，需继续“大声”思考。）

1. 本产品应对哪个(些)细分市场进行销售？
2. 您建议如何给本产品定价？
3. 您建议如何把本产品销往您选定的细分市场？
4. 您认为投资该公司主要的风险在哪儿？
5. 您认为可以怎样来应对这些风险？

问题三：投资判断

请作出以下决策：（在决策过程中，需继续“大声”思考。）

1. 在对本案例是否投资作出决策的时候，您想进一步获得哪些重要信息？
2. 如果投这个公司，最合适的退出策略是什么？
3. 基于提供的信息，投资这家公司5年后的结果会是怎样？用7分度表示。

最低
(彻底亏损)

1 2 3 4 5 6 7

最高
(10倍或以上回报)

Appendix C: Background Information of the Four Expert Venture Capitalists Who Participated in the Pilot Study

Jixun Foo Jixun is a Managing Partner in GGV's Shanghai Office. He brings with him over 10 years of experience in venture capital investments, and he focuses on investments in Asia. Jixun's current investments include Qunar.com, Media V, UCweb, Meihua Group(600873.SS), CTG, Chaoli High-Tech etc.

Prior to GGV Capital, Jixun was a Director of Draper Fisher Jurvetson ePlanet Ventures where he led investments in Asia, such as Baidu (NASDAQ:BIDU) and Longcheer (SGX: L28).

Prior to joining DFJ ePlanet in 2000, Jixun headed up the Investment Group with the Finance & Investment Division, National Science & Technology Board of Singapore (NSTB). Prior to his involvement in venture capital, Jixun was an R&D engineer and project group leader at Hewlett Packard.

Jixun is a graduate of the National University of Singapore with First-Class Honors degree in Engineering; he subsequently received a M.Sc. in the Management of Technology from the university's Graduate School of Business.

York Chen York is the President and Managing Partner of iD TechVentures Ltd. (iDT VC). In Greater China, the funds have invested into some 70 early and expansion stage tech deals in areas of local value-added services, IC designs, components, BPO, alternative energy and projects addressing the needs for emerging consumers. York is the director to some 10 companies, including founding directors of Linktone (Nasdaq: LTON).

York has been one of the most active venture capitalists in China and termed by media as a "VC Evangelist" and "VC Scholar" unselfishly sharing his deep observation and advice on China VC market to the peer groups at home and abroad. iDT started its operation in early 2000 with offices in Shanghai, Taipei and Beijing, managing more than US\$400M LP funds. iDT VC is one of the few seasoned, localized and stable VC teams in China with 8 partners. With more than eight years solid presence, local operation and delivered track record (3 Nasdaq, 1 in Hong Kong and more than 17 other IPOs and M&A), iDT is recognized as one of the most reliable GP partners China.

Before 2000, York was a board member of Singapore listed Acer Computer International Ltd. He initiated, managed and oversaw more than 10 diversified national and JV operation spanning from Moscow to Auckland, from Seoul to Bangalore. Before '91, York was involved in Acer's successful presence in Mexico and ex-Soviet Union markets. He is the first Chinese to deliver a public speech in the Kremlin in May 1991 to some 2000 Russian political & industrial leaders.

York started his career in the public sector. He holds a B.S. from National Taiwan University, an MBA from Fordham University and EMBA from Peking University.

James Mi James is Managing Director of Lightspeed Venture Partners. He focuses on firm's investment in China across multiple sectors, including Internet, media, cleantech and consumer services.

Prior to Lightspeed, James was Director of Corporate Development in Greater China for Google, responsible for the company's strategic investment and M&A efforts in Greater China and pan-Asian region. He led investment in companies including Baidu, Dianping, Xunlei, Tianya and Ganji. He also served as Head of Asia Products at Google, and spearheaded Google's early China efforts while serving as Chief Representative of the Google China Representative Office.

Before joining Google, James co-founded a venture-backed startup, iTelco Communications, which provides VOIP-based global communication products and services. Prior to that, James was with Intel, where he held management positions in engineering, marketing, product management and business development. He also co-invented MLC NOR Flash technology, which developed into Intel's billion-dollar StrataFlash business.

James received an MS in Electrical Engineering from Princeton University, BS in Physics from Fudan University and received Executive Management Training at Stanford University. James holds 12 US patents in flash memory, communications, Internet security and commerce.

Jason Li Jason is Managing Partner at Delta Capital. He co-funded Delta Ventures Fund (JV RMB fund) in 2007 and Delta Growth Fund (RMB fund) in 2010. With over ten years' experience in investment into high tech companies, he has invested into high tech companies such as Spreadtrum Communications (Nasdaq: SPRD), Actions, GMedia Corporation, Chongqing Chuanyi and Centec.

He was formerly a Managing Partner of Shanghai Dingjia Ventures, and worked for Pacific Venture Group (PVG) as Vice President, where he was dedicated to China investments. He was the Chairman and CEO of Shanghai Longyuan Shuangdeng Corporation (China's Shenzhen Stock Market: 000835), and was the Director of Shanghai Pudong New Area's S&T Department.

Jason Li got his B.S. degree in Automotive Engineering from Tsinghua University and M.S. degree from Shanghai University of Technology. He is the Chairman of Tsinghua Entrepreneur and Executive Club (TEEC) Shanghai Branch.

Source:

Adapted from venture capitalist bios at

<http://en.ggvc.com/team/team-members/jixun-foo>

<http://character.zero2ipo.com.cn/en/character/2008425133843.shtml>

http://www.idtvc.com/team_moban.aspx?id=53

<http://character.zero2ipo.com.cn/en/character/2009326114843.shtml>

<http://www.lightspeedvp.com/TeamMember.aspx?m=43>

<http://character.zero2ipo.com.cn/en/character/2008422205341.shtml>

<http://www.delta-capital.cn/figure/liquansheng.jsp>

<http://character.zero2ipo.com.cn/en/character/2010322165612.shtml>

Appendix D: Some Well-known Early-stage Venture Capitalists in China

NOTE:

This appendix is included on pages 180-183 of the print copy of the thesis held in the University of Adelaide Library.

Source: CYZONE.cn (2010)

Appendix E: Information Sheet (English)



INFORMATION SHEET

Understanding Early-stage Venture Capitalists' Use of Effectual and Predictive Logics

Venture capital investment is important to entrepreneurship, particularly to the ventures at early stage. However, due to various uncertainties surrounding the early-stage development of technology ventures, the risk of investment is especially high. This research aims to develop a better understanding on venture capitalists' thinking process and the use of logics in decision making for early-stage technology venture investment.

The research outcome may have implication or generate insights into venture capital investment decision-making under uncertainty. It may be of reference use to venture capitalists, entrepreneurs and policy makers in their real practices.

It takes about 40 minutes to complete this experiment. The interview will be digital-recorded for the purpose of obtaining accuracy in the record of the data. There is no right or wrong answer. You just need to provide some of your personal information and opinions. Please rest assured that all information that you provide will be handled with **strict confidentiality**.

If you wish to receive a copy of the consolidated report of this experiment, please provide your contact information.

If you have any queries, please feel free to contact me at +65 9699 5300 or email: zhiqiang.xia@adelaide.edu.au. You can also discuss your participation in this research with the principal supervisor of this project: Professor Noel Lindsay, Entrepreneurship, Commercialisation and Innovation Centre, The University of Adelaide, Australia. He is contactable at: +61 8-8303 7422 or noel.lindsay@adelaide.edu.au.

Your kind support is greatly appreciated.

Sincerely,

Zhiqiang Xia
PhD candidate (Entrepreneurship)
Entrepreneurship, Commercialisation and
Innovation Centre
The University of Adelaide

Post address:
Level 1, Engineering South
The University of Adelaide
SA 5005 AUSTRALIA

调研参与者信息

早期风险投资人对手段导向与预测两种思维模式的运用

风险投资对创业——尤其在其早期阶段很重要。然而由于科技企业早期的发展过程有许多不确定性，风险尤其大。本研究旨在对风险投资人对早期科技企业投资决策中的思维过程和逻辑的运用获得更好的了解。

研究结果可能对在不确定情况下的风险投资决策提供启示和洞见；对风险投资人、创业人士和政策制定者的实践有一定的借鉴意义。

完成该调研需约 40 分钟。为了保证数据的准确性，访谈将被数码录音。答案本身并无对错，您仅需提供您个人的一些信息和想法。我们保证您提供的信息将受到严格保密，请尽管放心。

如果您希望收到一份此调研结果的汇总报告，请提供您的联系方式。

若您有任何问题，请致电 +65 9699 5300 或电邮 zhiqiang.xia@adelaide.edu.au 联系我本人。您也可以与本研究的导师：澳大利亚阿德雷德大学创业、产业化和创新中心的 Noel Lindsay 教授讨论有关您参与此研究的情况。他的联系电话是 +61 8-8303 7422 电邮：noel.lindsay@adelaide.edu.au。

对您的支持与帮助，我们不胜感谢！

此致

夏智强
博士研究生（创业学）
阿德雷德大学 创业、产业化和创新中心

通讯地址：
Level 1, Engineering South
The University of Adelaide
SA 5005 AUSTRALIA

Appendix G: Participants' Profile (English)

1. Age: _____ years

2. Highest education attained: Doctorate Master Bachelor Diploma
Other: _____

3. Specialization(s) of your higher education - you may choose more than one.

Economics/ management/ business Humanities/ arts/ law
Science/ engineering Other: _____

4. The total amount of funds currently managed by you

USD fund(s): USD _____ RMB fund(s): RMB _____

5. The average percentage of your ownership in the fund(s)

USD fund(s): Nil 0-5% 6-10% 11-15% 16-20% > 20%
RMB fund(s): Nil 0-5% 6-10% 11-15% 16-20% > 20%

6. Please indicate your relative preference of investing in the following industries

	Low preference			High preference	
General IT	1	2	3	4	5
Biotech/ medicine & healthcare	1	2	3	4	5
Cleantech	1	2	3	4	5
Services	1	2	3	4	5
Traditional business	1	2	3	4	5

7. Indicate your level of expertise in following areas according to your knowledge/experience

	Low			High	
Technology	1	2	3	4	5
Sales/Marketing	1	2	3	4	5
Financial management	1	2	3	4	5
Operation management	1	2	3	4	5

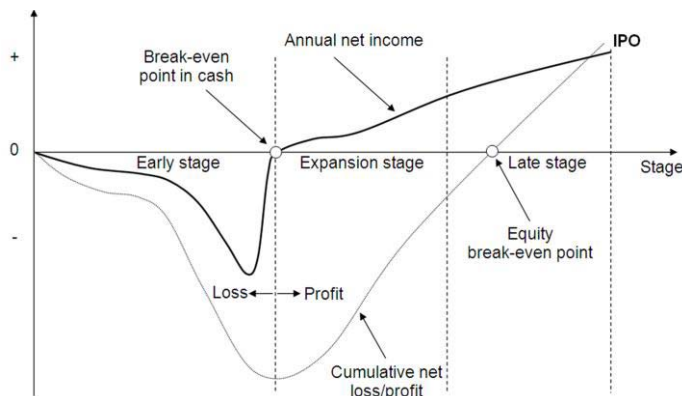
8. Your entrepreneurial experience

Have you ever started your own business? No Yes
If yes, how many years of entrepreneurial experience do you have? _____ years.
How many companies have you started? _____ companies.

9. Your venture capital investment experience

How many years have you been working as a VC? _____ years.
How many companies have you invested in? _____ companies.

10. Your early-stage venture investment experience



Note: Early stage here refers to the time before the venture achieves break-even in cash (getting out of the survival challenge), which includes start-up and early growth periods.

How many were early-stage ventures among those invested by you? _____ companies.

What's the average investment scale of those early-stage investments? _____.

11. Investment due diligence and portfolio management

For early-stage investment, normally you need _____ months for due diligence per deal. On average, the cumulative time for due diligence per deal is about _____ days. On average you spend about _____ hours per week on each invested early-stage deal for portfolio management. If you have not been involved in any of these activities, please indicate: Not Applicable - .

12. With reference to the industry normal practice about early-stage venture investment, please evaluate yourself on the following:

	Low				High
Level of involvement in investment due diligence	1	2	3	4	5
Willingness to syndicate with other venture capitalists for investment	1	2	3	4	5
Desire to be the lead-investor in syndication	1	2	3	4	5
Amount of time and effort put in the deal management after investment	1	2	3	4	5

13. Deal exit

Among your invested early-stage ventures, how many of them have been terminated or exited? _____. Among these, how many are profitable: _____.

14. Among your profitable early-stage investments, what's the investment return denoted by IRR? (IRR is the internal rate of return of the project investment)

IRR = 0~25% _____

IRR = 26~50% _____

IRR = 51~75% _____

IRR = 76~100% _____

IRR > 100% _____

Your patience and support is highly appreciated!

If you wish to receive a copy of the consolidated results of this survey, please provide the following information or your business card.

Name: _____ Company: _____

Telephone: _____ E-mail: _____

Your information will be kept strictly confidential.

Appendix H: Participants' Profile (Chinese)

1. 年龄: _____ 岁

2. 最高学历: 博士 硕士 本科 大专 其它: _____

3. 您所受高等教育的专业背景, 可选多项。

经济、管理或商科 人文、艺术或法律
理工科 其它: _____

4. 您可投的基金额度

美元基金额度: USD _____ 人民币基金额度: RMB _____

5. 您在基金中所持有的股份

美元基金 没有股份 0-5% 6-10% 11-15% 16-20% > 20%
人民币基 没有股份 0-5% 6-10% 11-15% 16-20% > 20%

6. 请标注您对以下行业投资的偏好程度

	偏好低					偏好高
广义 IT	1	2	3	4	5	
生物科技/医疗保健	1	2	3	4	5	
清洁技术	1	2	3	4	5	
服务	1	2	3	4	5	
传统产业	1	2	3	4	5	

7. 根据您的知识和经验, 请标注您在以下领域的专长水准

	低				高
技术	1	2	3	4	5
销售/营销	1	2	3	4	5
财务管理	1	2	3	4	5
运营管理	1	2	3	4	5

8. 您的创业经验

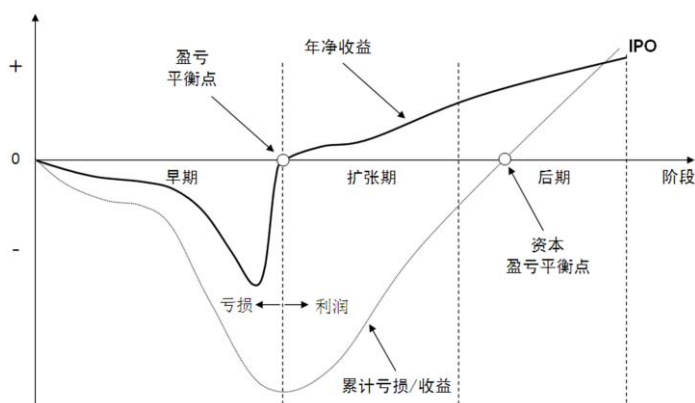
您本人是否创过业? 否 是

若是, 您有多少年的创业经验? _____ 年。 您创立了多少家公司? _____ 。

9. 您的风险投资经验

您至今有多少年的风险投资从业经验? _____ 年。 您至今投了多少家公司? _____ 家。

10. 您对早期企业的投资经验



注：企业的“早期”指一般情况下的科技类企业在实现经营盈亏平衡（越过生存危机）之前的阶段。

在您投的企业当中，有多少家属于早期企业？
_____ 家。

在这些早期企业当中，您投资的平均规模是？
_____。

11. 投资尽职调查和投资项目管

对早期企业投资的尽职调查，您通常在每个案例上花 _____ 个月的时间。

平均而言，每个案子尽职调查需要花费的累积时间大概是 _____ 天。

对早期企业投资后的项目管理上，您一般每周投入 _____ 个小时。如果您还没有参与任何被投后企业的管理，请标注： 不适用

12. 与行业中对早期企业投资的惯例相比，就以下各项您如何评价自己：

	低				高
投资尽职调查的参与程度	1	2	3	4	5
与其他风险投资人联手投资的意愿	1	2	3	4	5
希望在联手投资时领投的意愿	1	2	3	4	5
投资后对个案管理上时间与精力的投入程度	1	2	3	4	5

13. 投资退出

在您投资的早期项目中，有多少项目已终止或已退出？ _____ 个。其中，盈利的项目有 _____ 个。

14. 在您盈利的早期项目投资中，以下各项的结果如何？（IRR 为项目投资内部回报率）

IRR = 0~25%	_____ 个
IRR = 26~50%	_____ 个
IRR = 51~75%	_____ 个
IRR = 76~100%	_____ 个
IRR > 100%	_____ 个

衷心感谢您的耐心与支持！

如果您希望收到一份所有参与此调研的风险投资人答案的结果汇总，请提供以下信息或附上名片。

姓名： _____ 公司： _____

电话号码： _____ 电子信箱： _____

您的信息将受到严格保密。

Appendix I: PRL reliability (X 100) for Two Categories Given Number of Judges and Proportion of Interjudge Agreement

NOTE:

This appendix is included on page 190 of the print copy of the thesis held in the University of Adelaide Library.

Source: Rust and Cooil (1994; p.p. 7)

Appendix J: Co-Development of Early-Stage Ventures (English)

Please consider the **early stage of a venture invested by you**, for which you are expected to add value and co-develop the venture with the entrepreneurs. Please indicate the degree to which you agree or disagree with each of the following items. The two terms, “**our**” and “**we**”, both refer to you and the entrepreneurs as a whole. 1=strongly disagree; 2=disagree; 3= neither agree nor disagree; 4=agree; 5=strongly agree.

	Strongly Disagree			Strongly Agree	
1. Our initial knowledge and resources provide a starting point that requires some iterations to find a working business model.	1	2	3	4	5
2. We try to leave our options open by not investing too much in any single possible scenario.	1	2	3	4	5
3. We barter with others for necessary resources.	1	2	3	4	5
4. When selecting opportunities our decision-making is focused more strongly on what we know how to do well than on external factors.	1	2	3	4	5
5. We adapt what we are doing to the resources we have.	1	2	3	4	5
6. We speak with many different people outside the company before making business decisions.	1	2	3	4	5
7. We experiment with different products and/or business models.	1	2	3	4	5
8. We are careful not to risk more money than we are willing to lose with our initial idea.	1	2	3	4	5
9. Network contacts provide low cost resources.	1	2	3	4	5
10. In developing the early-stage business we carefully look at our knowledge and resources before thinking about different alternatives for products/services.	1	2	3	4	5
11. By working closely with people/organizations external to our organization we are able to greatly expand our capabilities.	1	2	3	4	5
12. We start by looking at what and who we know, and think of different things we can try.	1	2	3	4	5
13. We organise and implement control processes to make sure we meet objectives.	1	2	3	4	5
14. Network contacts provide services that we otherwise will have to pay up front for.	1	2	3	4	5
15. Our partnerships with outside organizations and people play a key role in our ability to provide our product/service.	1	2	3	4	5
16. We allow the business to evolve as opportunities emerge.	1	2	3	4	5
17. We use trial and error processes to find a product/service mix that works well with customers.	1	2	3	4	5
18. We focus on developing alliances with other people and organizations.	1	2	3	4	5
19. We try to be flexible so we can take advantage of future opportunities.	1	2	3	4	5
20. Before we commit a lot of resources we try things out to see if the business model would work.	1	2	3	4	5

21. We spread out the risk so no single stakeholder bears too much.	1	2	3	4	5
22. We try out a number of different approaches until we find a business concept that works.	1	2	3	4	5
23. We use deals with other organizations and people to create a “virtual” organization.	1	2	3	4	5
24. Our decision making is largely driven by potential financial returns.	1	2	3	4	5
25. We adapt accessible resources to our own specific needs.	1	2	3	4	5
26. Our early-stage business development process can best be described as a series of experiments.	1	2	3	4	5
27. We are careful not to risk so much money that our company will be in real trouble financially if things don’t work out.	1	2	3	4	5
28. We research and select target markets and do meaningful competitive analysis.	1	2	3	4	5
29. We are able to get our customers to pre-order our products/services.	1	2	3	4	5
30. We avoid courses of action that restrict our flexibility and adaptability.	1	2	3	4	5
31. The product/services that we will provide could be substantially different from what we originally conceptualise.	1	2	3	4	5
32. We are careful to not commit more resources than we can afford to lose.	1	2	3	4	5
33. We have a clear and precise vision of where we want to end up.	1	2	3	4	5
34. We use pre-commitments from customers or suppliers as often as possible.	1	2	3	4	5
35. Our first consideration when selecting among business options is our knowledge and resources.	1	2	3	4	5
36. We are flexible and take advantage of opportunities as they arise.	1	2	3	4	5
37. During our early-stage business development process we experiment with different products and/or business models.	1	2	3	4	5
38. Our decision making is largely driven by what we can afford to lose.	1	2	3	4	5
39. We use a substantial number of pre-commitments and agreements with customers, suppliers and other organizations and people.	1	2	3	4	5
40. We design and plan business strategies.	1	2	3	4	5

Appendix K: Co-Development of Early-Stage Ventures (Chinese)

作为风险投资人，您投了一家处于**早期阶段的科技创业型企业**。因为该公司尚处早期，您需要帮助创业者一起来发展该公司。在此情景下，请根据您本人的情况对以下各项描述表示同意或不同意的程度。描述中“我们的”和“我们”均指您和创业者一起。1=强烈反对；2=反对；3=中性；4=同意；5=强烈同意。

	强烈 反对				强烈 同意
1. 在发现可行的商业模式之前，我们以起初的知识和资源为起点，中间需要一些反复。	1	2	3	4	5
2. 我们尽量保留选择余地，在任何单个情景下不作过多投入。	1	2	3	4	5
3. 我们和别人交换以获取必须的资源。	1	2	3	4	5
4. 在做机会选择的时候，我们的决策更关注于那些我们擅长做的东西而非外界因素。	1	2	3	4	5
5. 我们根据拥有的资源决定要做的合适的事情。	1	2	3	4	5
6. 我们要与公司以外很多不同的人交谈之后才作出商业决策。	1	2	3	4	5
7. 我们拿不同的产品和 / 或商业模式作试验。	1	2	3	4	5
8. 我们在初始点子上很小心，不拿比我们愿意损失的更多的资本去冒险。	1	2	3	4	5
9. 人脉关系提供低成本资源。	1	2	3	4	5
10. 在公司发展的早期阶段，我们在考虑产品 / 服务的不同方案之前先谨慎审视自己的知识和资源。	1	2	3	4	5
11. 通过与公司外部的人和机构紧密工作，我们能够极大地拓展我们的能力。	1	2	3	4	5
12. 我们从检视自己的知识和人脉为起点，考虑我们能尝试的不同的事情。	1	2	3	4	5
13. 我们组织并实施控制流程以确保我们达成目标。	1	2	3	4	5
14. 人脉关系提供给我们本来必须预先支付的服务。	1	2	3	4	5
15. 我们与外界机构和个人的合作关系对我们提供产品 / 服务的能力而言至关重要。	1	2	3	4	5
16. 我们让企业随着机会的浮现而逐渐演变。	1	2	3	4	5
17. 我们通过反复试验来发现顾客所接受的产品 / 服务组合。	1	2	3	4	5
18. 我们专注与他人和机构建立联盟。	1	2	3	4	5
19. 我们尽量保持灵活性，由此能抓住将来的机会。	1	2	3	4	5
20. 在投入大量资源之前，我们要进行尝试以验证商业模式是否可行。	1	2	3	4	5
21. 我们把风险分散以避免任何单个参与者承担过多风险。	1	2	3	4	5

22. 在发现可行的商业模式之前，我们会尝试许多不同的途径。	1	2	3	4	5
23. 我们通过与其它机构和个人之间的业务往来，创造出一个“虚拟的”机构。	1	2	3	4	5
24. 我们的决策很大程度上受潜在的财务回报驱动。	1	2	3	4	5
25. 我们根据自己具体的需要调配所能获得的资源。	1	2	3	4	5
26. 用一系列的实验来描绘我们企业早期的发展过程最恰当不过。	1	2	3	4	5
27. 我们很谨慎，不会拿太多的资本冒险以避免如果事情不按预期发展的话公司陷入真正的财务困境。	1	2	3	4	5
28. 我们研究和选择目标市场并做有意义的竞争分析。	1	2	3	4	5
29. 我们能够让我们的客户预订我们的产品 / 服务。	1	2	3	4	5
30. 我们避免采用那些让我们的灵活性和适应力受限的行动方针。	1	2	3	4	5
31. 我们将提供的产品 / 服务可能与我们原先构思的大相径庭。	1	2	3	4	5
32. 我们很小心，不会投入比我们所能承受的损失更多的资源。	1	2	3	4	5
33. 对于最终要达到的目标，我们有清晰而精确的愿景。	1	2	3	4	5
34. 我们尽量让客户或供应商预先投入。	1	2	3	4	5
35. 在各商业机会之间作出选择时，我们的第一考量是我们的知识和资源。	1	2	3	4	5
36. 我们很灵活，机会出现时就把握住。	1	2	3	4	5
37. 在企业的早期发展阶段，我们在不同的产品和 / 或商业模式上进行试验。	1	2	3	4	5
38. 我们的决策很大程度上受我们所能承受的损失驱动。	1	2	3	4	5
39. 我们大量应用客户、供应商和其他机构及个人所作的预先投入和与他们建立的协议。	1	2	3	4	5
40. 我们设计并规划商业策略。	1	2	3	4	5