The influence of dispositional affect and cognition on venture investment portfolio concentration

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We explore how an investor’s dispositional affect and cognitive style influence venture investment portfolio concentration. Based on a field study using a sample of 128 judges from a business plan competition, we find that high positive affectivity investors construct more concentrated investment portfolios than their low positive affectivity counterparts, whereas high negative affectivity investors construct more diversified investment portfolios than their low negative affectivity counterparts. Further, investors who rely on analytical decision making display a weaker relationship between negative affectivity and investment diversification whereas investors who rely on emotion-based decision making display a stronger relationship between positive affectivity and investment concentration.

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1. Executive summary

Venture investment decision making is an important topic in entrepreneurship because it constitutes a process whereby resources and opportunities are matched. It has implications for both entrepreneurs and investors who seek to improve their resource acquisition and allocation activities, respectively. Although prior studies have shown how an investor’s usage of heuristics influences independent opportunity evaluations or how an investment firm’s characteristics influence its portfolio construction, they have overlooked how individual investors construct their venture investment portfolios.

We explore how dispositional affect and cognitive style influence a venture investor’s portfolio composition. Because affective experience influences behavior immediately (e.g., Keltner and Lerner, 2010), we first consider dispositional affect influencing the extent to which venture investors concentrate their portfolios. We argue that because high positive affectivity venture investors, i.e., those who frequently experience positive mood and emotion, are more likely to rely on heuristic-based decision making and positively approach and evaluate information (e.g., Ambady and Gray, 2002), they are less likely to carefully evaluate all investment opportunities, and overestimate the expected value of a few selected opportunities. Thus, they tend to concentrate their investment portfolio compared with their low positive affectivity counterparts. Likewise, because high negative affectivity venture investors, i.e., those who frequently experience negative mood and emotion, tend to rely on analytics-based decision making, and negatively approach and evaluate information (e.g., Forgas, 1994), they are more likely to use multiple criteria to evaluate venture investment opportunities, recall, and evaluate information related to those opportunities in a negative way. As a result, they tend to underestimate
the expected value of opportunities that they evaluate and diversify their investment portfolio to mitigate their risk as compared with low negative affectivity counterparts.

Moreover, human judgment and decision making are influenced by two distinct yet coexisting processes. System 1 processing is a rapid mechanism in human decision making, leading to heuristic-based decision making, whereas System 2 processing is a slower mechanism in human decision making, leading to analytical decision making (Evans, 2008; Kahneman and Klein, 2009). Individuals vary considerably in their propensities to rely on either process (e.g., Allinson and Hayes, 1996; Epstein et al., 1996). Some individuals with a high need for cognition enjoy thinking and rely on analytical decision making (Cacioppo and Petty, 1982; Pacini and Epstein, 1999). This tendency will result in a more diversified investment portfolio and weaken the relationship between dispositional affect and investment concentration. In contrast, emotion-based decision making represents an individual propensity to rely on affective experience when making decisions (Barchard, 2001). Thus, the relationship between dispositional affect and investment concentration is stronger for those investors who rely on affective experience to make decisions.

Using data from a major business plan competition, we generally find support for our predictions.

This study provides insights on venture investment decision by investigating personality traits influencing an investor’s portfolio composition. Further, our findings provide practical implications for both venture investors and entrepreneurs seeking to improve their investment allocation and funding strategies, respectively.

2. Introduction

Prior studies on venture investment decisions have typically taken two approaches. A first set of studies takes venture opportunities as a unit of analysis and finds that an investor’s use of heuristics, elicited by such factors as confidence level, personal background, and personal relationships, influences venture evaluations (e.g., De Clercq and Sapienza, 2006; Zacharakis and Shepherd, 2001). Despite their valuable insights, these studies overlook the inter-dependencies among evaluations of concurrent opportunities. In real life, venture investors typically evaluate multiple opportunities over a short period of time and allocate limited resources to a few selected ventures (Zacharakis and Meyer, 2000; Zacharakis and Shepherd, 2001).

Another set of studies takes an investment firm’s portfolio as a unit of analysis and finds that investment firm characteristics such as experience, expertise, and stage-focus influence the composition of investment portfolios (Dimov et al., 2007; Gupta and Sapienza, 1992; Han, 2009). A firm’s investment portfolio, however, is the result of complex social interactions whereby multiple actors make collective decisions over a long period of time (e.g., Patzelt et al., 2009). As a result, the findings from these studies cannot be easily applied to the formation of an individual investor’s portfolio. In many contexts, it is the individuals (e.g., angel investors or managers of venture investment firms) who make venture investment decisions.

In this study, we link individual investors to their investment behavior by exploring the influence of an investor’s dispositional affect, an individual propensity to experience specific types of mood or emotions (Watson and Tellegen, 1999), and cognitive underpinnings on venture investment concentration. Based on the influence of dispositional affect on cognitive process and information evaluation, we first illustrate that high positive affectivity investors tend to concentrate their portfolio compared with low positive affectivity investors. We then show that high negative affectivity investors tend to diversify their portfolio compared with low negative affectivity investors.

Moreover, individuals differ in cognitive style, i.e., the way they process and utilize information (e.g., Allinson and Hayes, 1996). Such a difference may influence investment behavior and moderate the relationship between dispositional affect and investment concentration. A well-documented cognitive style is the need for cognition, reflecting an individual’s propensity to enjoy and engage in thinking and analytical decision making (Cacioppo and Petty, 1982). Investors with a high need for cognition are more likely to evaluate the full set of investment opportunities. Thus, we argue that such investors are more likely to diversify their investment portfolio compared with investors with a low need for cognition. Further, we argue that varying propensities for employing cognition or emotion in decision making (Barchard, 2001; Cacioppo and Petty, 1982) will moderate the relationship between dispositional affect and investment concentration, such that the relationship becomes weaker for those with a high need for cognition and stronger for those who rely on their emotions when making decisions. Using data from a business plan competition at a major university in the U.S., our results generally support our predictions.

This study provides several insights. First, it contributes to venture investment decision research by exploring factors influencing an investor’s portfolio composition. Prior studies have focused on factors that influence either independent evaluations of venture investment opportunities (e.g., De Clercq and Sapienza, 2006; Shepherd, 1999) or a firm’s investment portfolio composition (e.g., Dimov et al., 2007; Patzelt et al., 2009). However, because real life venture investors often concurrently evaluate multiple investment opportunities (Zacharakis and Shepherd, 2001), our study provides insights on factors influencing how individual investors construct their investment portfolio.

Further, responding to the recent call for incorporating affect research in entrepreneurship (Baron, 2008; Foo, 2011), our study illustrates how dispositional affect can influence investment concentration and explain its boundary conditions. Our work also contributes to understanding how investment decisions can be predicted using theoretically relevant personality traits such as dispositional affect, need for cognition, and emotion-based decision making. Moreover, this study sheds light on dispositional affect research by showing how dispositional affect can influence investment behavior in a complex manner and that its impact is bounded by individual propensity for using cognition or emotion when making decisions.

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1 We define heuristics as simple mental shortcuts for making judgment and decisions that may lead to accurate or inaccurate outcomes (Kahneman and Klein, 2009; Tversky and Kahneman, 1974).
We first review prior studies on venture investment decisions and establish the role of affect. Next, we present hypotheses on the influence of dispositional affect on venture investment portfolio concentration. We describe the dual process perspective and propose a relationship between need for cognition and portfolio concentration. We then illuminate how an investor’s propensities for relying on either cognition or emotion moderates the relationship between dispositional affect and portfolio concentration, and follow this with a description of our methods and presentation of our results. We conclude by discussing the implications, limitations, and future extensions of our work.

3. Theory and hypothesis

3.1. Venture investment decisions

Earlier studies on venture investment decisions found that those decisions often result from multiple, lengthy evaluations based on several criteria (e.g., Hall and Hofer, 1993; Shepherd, 1999). More recent studies have applied cognitive psychology (e.g., Tversky and Kahneman, 1973) to explore how heuristics influence venture investment evaluations. Researchers have found that investor attributes such as overconfidence (Zacharakis and Shepherd, 2001), similar training and work experience with venture team members (Franke et al., 2006), and personal relationships with venture teams (De Clercq and Sapienza, 2006) influence investment evaluations and decisions.

Despite their valuable insights, these studies have limited application for understanding venture investment decision making, because they typically rely on independent investment evaluations as a unit of analysis. The process of evaluating venture investment opportunities is complex and iterative (e.g., Hall and Hofer, 1993; Petty and Gruber, 2011). Investors typically evaluate multiple opportunities over a short period of time, allocating limited investment resources to a few selected ventures (Zacharakis and Meyer, 2000; Zacharakis and Shepherd, 2001). However, these studies provide limited insights on how investments are allocated across multiple opportunities.

Others explored how venture capital firms construct investment portfolios (e.g., Gupta and Sapienza, 1992). These studies typically focus on the influence of the firm and fund characteristics on firm-level portfolio composition. For example, venture capital firms with expertise in finance or entrepreneurial experience generally prefer early stage investments (Dimov et al., 2007; Patzelt et al., 2009), whereas firms that do not focus on early stage ventures or manage larger funds tend toward diversification (Gupta and Sapienza, 1992; Han, 2009). However, firm-level portfolio composition may be the result of complex social interactions, where multiple actors make collective decisions over a long period of time (e.g., Dimov et al., 2007). Thus, findings of these studies have limited usefulness to understand the formation of an individual investor’s portfolio. Because many venture investment decisions are made by individual investors (e.g., angel investors or managers of venture capital funds), understanding what influences individual investment portfolio construction can provide insights into overall venture investment decision making.

A traditional view in finance assumes investor rationality and suggests a two-stage prescription for optimal investment allocation (e.g., Brealey et al., 2007). Investors are first advised to evaluate each venture independently, using valuation methods such as discounted cash flow methods to calculate the net present value for a particular venture (Crane and Reinbergs, 2001; Lerner and Willinge, 1996). They are then prescribed to allocate their investments according to expected net present value of each investment and to diversify their portfolio to mitigate risk (Brealey et al., 2007).

Although these prescriptions may appear rational, they are unrealistic given the limited cognitive capacity for processing information and solving problems of human beings. Instead of finding the best solution, people often settle for a “satisfying” solution, i.e., one that meets a particular criterion adequately (Simon, 1957). In addition, they often rely on heuristics decision making (e.g., Tversky and Kahneman, 1973), a tendency that has been documented in venture investment decisions (De Clercq and Sapienza, 2006; Franke et al., 2006; Zacharakis and Shepherd, 2001). Indeed, individuals substantially differ in the extent to which they rely on heuristics decision making based on their traits such as dispositional affect and cognitive style (e.g., Ambady and Gray, 2002; Epstein et al., 1996). We explore how such traits influence investment decision making. Dispositional affect reflects an individual’s general propensity for certain affective experiences that persist across time and context (Larsen and Ketelaar, 1989; Watson et al., 1988). Because these affective experiences guide current and subsequent behavior in a rapid and effective manner (Cohen, 2005; LeDoux, 1996; Lerner and Keltner, 2001; Slovic et al., 2002), we first delineate how dispositional affect influences investment portfolio construction.

3.2. Hypotheses development

3.2.1. Dispositional affect

Following prior studies (e.g., Barsade et al., 2003), we categorize dispositional affect by using positive/negative activation approach suggesting that dispositional affect is often characterized by a two-dimensional structural model (Watson and Tellegen, 1999). The first dimension is pleasantness, ranging from high to low, whereas the second dimension is activation energy, also ranging from high to low. Based on this model, dispositional affect can be conceptualized as two dispositional affect: positive affectivity (or positively activated) and negative affectivity (or negatively activated) (Watson and Tellegen, 1999; Watson et al., 1988).

Positive affectivity refers to an individual’s propensity to experience positive emotion or mood (e.g., happiness) across situations and time (Watson et al., 1988). High positive affectivity individuals tend to feel cheerful, experience positive self-concept, be more sensitive, and overestimate the occurrence of positive stimuli (Hullett, 2005; Larsen, 1992). In the absence of triggering events or stimuli, positive affectivity will predispose people toward a positive mood or emotion (Watson, 2000). Negative affectivity refers to an
individual's propensity to experience a negative emotion or mood (e.g., sadness) across situations and time (Watson, 2000; Watson et al., 1988, 1999). High negative affectivity individuals tend to ruminate over their failures and weaknesses, experience emotional distress, and harbor negative self-concepts (Watson and Slack, 1993). They are likely to be sensitive, overestimate the occurrence of negative stimuli, and experience negative emotion or mood in the absence of any triggering event (Larsen, 1992; Watson, 2000). These two traits are unique constructs and conceptually independent. For instance, low positive affectivity does not suggest high negative affectivity or vice versa. They are also factorially independent in that they range along the bipolar dimensions of pleasantness and activation (e.g., Watson et al., 1999). Empirically, they are weakly correlated (Connolly and Vives, 2000; Watson and Tellegen, 1999) and independently influence behavior (Ng and Sorensen, 2009; Thoresen et al., 2003). Thus, we factor into our study the influence of these traits on investment portfolio concentration.

3.2.2. The influence of positive affectivity

High positive affectivity investors are likely to experience positive mood and emotion throughout the portfolio construction process compared with low positive affectivity investors. Initially, high positive affectivity investors are more likely to experience a positive mood even in the absence of stimuli (Watson, 2000). This affective experience influences subsequent judgment and decision making (Lerner and Keltner, 2000, 2001; Tiedens and Linton, 2001), prompting such investors to notice positive stimuli associated with their tasks (Larsen, 1992), resulting in a more frequent experience of positive mood and emotion. As a result, individuals sharing a particular dispositional affect display expressive and physiological profiles similar to those having a momentary affective experience (e.g., Lazarus, 1991), often resulting in similar effects of dispositional and state affect, e.g., emotion and mood in attitudes and behaviors across situations (e.g., Baron, 2008; Foo, 2011; Lerner and Keltner, 2001; Thoresen et al., 2003). Thus, high positive affectivity individuals are more likely to be influenced by positive mood and emotion (e.g., Ambady and Gray, 2002; Forgas, 1994) when they make investment decisions.

Positive mood and emotion influence two specific behaviors, i.e., cognitive process and information evaluation (e.g., Ambady and Gray, 2002; Forgas, 1994). First, individuals experiencing positive mood and emotion mainly rely on heuristic processing because positive mood and emotion often signal that their environment is safe. Hence those individuals do not need to utilize cognitive processes (Schwarz, 1990; Schwarz and Bless, 1991). Empirically, positive mood and emotion often reduce search effort on task-relevant information (Bless and Schwarz, 1999; Martin et al., 1993) and the use of structural protocol in complex decisions (e.g., Elsbach and Barr, 1999). Further, positive mood and emotion trigger stereotypic thinking (e.g., Bodenhausen et al., 1994) and heuristic-based decision making (e.g., Gasper, 2003; Hullett, 2005; Kaufmann and Vosburg, 1997). Second, because mood and emotion are often used consciously and unconsciously to evaluate encountered objects, positive mood and emotion can influence the valence of information that individuals approach, evaluate, and react to information in the environment (e.g., Bower, 1981; Isen, 1984; Larsen, 1992; Watson et al., 1988). Individuals with positive mood and emotion tend to approach and evaluate information positively (e.g., Hullett, 2005; Nygren et al., 1996; Wright and Bower, 1992), and make optimistic judgments across various situations (Johnson and Tversky, 1983; Nygren et al., 1996; Wright and Bower, 1992). Further, similar effects have been demonstrated for dispositional affect. Meta-analyses show that high positive affectivity individuals report greater levels of satisfaction regarding different aspects of life and work compared with low positive affectivity individuals (Ng, and Sorensen, 2009; Thoresen et al., 2003; Watson et al., 1988).

Both effects of positive mood and emotion experienced may jointly influence investment concentration. Because high positive affectivity investors are more likely to experience positive mood and emotion, triggering higher reliance on heuristic-based processing (e.g., Hullett, 2005; Schwarz and Bless, 1991) and reduction of information search efforts (Martin et al., 1993), these investors prefer to construct their portfolios in a less analytical manner compared with low positive affectivity investors. Instead of the two-stage strategy prescribed by finance scholars, high positive affectivity investors are more likely to simultaneously evaluate and allocate their investments in terms of a particular opportunity. Because high positive affectivity investors are more likely to experience positive mood and emotion, triggering higher tendency to respond to positive information and evaluate any encountered opportunity more positively (e.g., Hullett, 2005; Nygren et al., 1996), they are likely to overestimate the profitability of that particular opportunity. Their reduced information search efforts are likely to stop them from searching additional opportunities once they are satisfied with their selected investments, whereas their heuristic-based processing may make them to overlook the prescribed risk mitigation strategy, i.e., portfolio diversification. As a result, high positive affectivity investors, compared with low positive affectivity counterparts, evaluate fewer opportunities and allocate greater investments to selected opportunities, resulting in a more concentrated portfolio.

Indeed, even if high positive affectivity investors followed the prescribed two-stage strategy for constructing an investment portfolio, the joint influence of mood and emotion effects is likely to result in more concentrated investment portfolios. In the first stage, high positive affectivity investors are more likely to use heuristics, such as eliminating opportunities that is diagnosed with a fatal flaw (Maxwell et al., 2011) or selecting opportunities with a higher value in terms of a single criterion (Gigerenzer and Goldstein, 1996; Graefe and Armstrong, 2012), to arrive at a manageable set of opportunities. These approaches are likely to result in a smaller set of opportunities included for the later stage of analysis.

In the second stage, high positive affectivity investors will pay greater attention to positive cues, i.e., the strength of new ventures rather than negative ones, and make optimistic judgments (e.g., Johnson and Tversky, 1983; Larsen, 1992). These investors are likely to overestimate the profitability of their selected ventures among the smaller set opportunities resulting from the first stage. Further, their optimistic tendency elicited by positive affectivity prompts them to allocate larger amount to a few ventures and their heuristic-based processing prompts them to ignore the prescribed risk mitigating strategy, i.e., diversification. Given the combined effects of a smaller set of opportunities and a greater allocation to selected investments, high positive affectivity investors will devote a larger
amount of their investments to a smaller set of opportunities compared with low positive affectivity counterparts, resulting in a greater concentration in their portfolios. Thus,

**Hypothesis 1.** High positive affectivity investors are more likely to concentrate their investments in a smaller number of ventures compared with low positive affectivity investors.

3.2.3. The influence of negative affectivity

High negative affectivity investors are likely to experience negative mood or emotion even in the absence of stimuli compared with low negative affectivity investors (Watson, 2000). Negative affectivity prompts these individuals to approach and attend to negative stimuli in the environment (Larsen, 1992), resulting in more frequent experience of negative mood and emotion. This experience of negative mood and emotion is also likely to influence cognitive process and information evaluation. First, individuals with negative mood and emotion may feel that the environment is dangerous and action or analysis is needed (Schwarz, 1990; Schwarz and Bless, 1991). Empirically, individuals with negative mood and emotion tend to be more analytical in processing information (e.g., Frijda, 1988; Gasper, 2003; Kaufmann and Vosburg, 1997), spend more time searching for task-relevant information (Martin et al., 1993), be less likely to rely on stereotypes (Bodenhausen et al., 1994), focus on specific details of a persuasive message and be influenced by strong arguments (Hullett, 2005), and follow a structured protocol when making complex decisions (Elsbach and Barr, 1999). Second, negative mood and emotion make individuals approach, evaluate, and react to information in the environment negatively (e.g., Larsen, 1992; Schwarz and Bless, 1991; Watson et al., 1988). Studies have found that individuals with high negative mood and emotion, compared with those having low negative mood and emotion, are pessimistic across various scenarios (e.g., Johnson and Tversky, 1983; Wright and Bower, 1992). Meta analyses suggest that similar effect has been extended to understand the influence of negative affectivity, i.e., high negative affectivity individuals report lower levels of satisfaction regarding different aspects of life and work compared with their low negative affectivity counterparts (Ng and Sorensen, 2009; Thoresen et al., 2003).

Both effects of negative mood and emotion jointly influence how high negative affectivity investors construct their portfolios. Because frequent experience of negative mood and emotion triggers the use of analytical processes and structure protocols when making decisions (e.g., Elsbach and Barr, 1999; Frijda, 1988), high negative affectivity investors are more likely to follow the two-stage strategy prescribed by experts compared with low negative affectivity investors. In the first stage, high negative affectivity investors are more likely to systematically evaluate all investment opportunities using multiple criteria and evaluation methods (e.g., discounted cash flow evaluation) compared with their low negative affectivity counterparts. Because negative mood and emotion, experienced frequently by high negative affectivity investors, increase search effort on task-relevant information (e.g., Martin et al., 1993), these investors are likely to spend greater effort in searching for more investment opportunities, repeat the evaluation process for these opportunities, and carefully record all expected net present values and associated analyses. As a result, they are more likely to comprehensively evaluate all investment opportunities compared with their low negative affectivity counterparts.

In the second stage, the use of analytical processes by high negative affectivity investors motivate them to compare expected net present values for all opportunities to determine how to allocate their investments compared with low negative affectivity investors. Because high negative affectivity individuals have pessimistic outlooks and attitudes (e.g., Johnson and Tversky, 1983; Thoresen et al., 2003), those investors are more likely to underestimate the probability of favorable outcomes and overestimate unfavorable outcomes for potential investment opportunities. Further, their use of analytical processes motivates them to note and implement the prescribed risk mitigating strategy, i.e., diversification. As a result, high negative affectivity investors may hesitate to invest large amounts of money in a few new ventures but rather spread their funds over a larger set of opportunities. Thus, high negative affectivity investors will be more likely to diversify their investment portfolio compared with low negative affectivity investors.

**Hypothesis 2.** High negative affectivity investors are more likely to diversify their investments across a larger number of ventures compared with low negative affectivity investors.

3.2.4. Influence of the need for cognition

Although dispositional affect can influence behavior, it is not the only factor shaping behavior. Indeed, human behavior is co-determined by two types of cognitive process (Evans, 2008; Kahneman, 2003; Kahneman and Klein, 2009). System 1 processing operates in a rapid, implicit, automatic, and nearly effortless manner, whereas System 2 processing operates in a slow, explicit, controlled, and effortful manner (Evans, 2008; Kahneman, 2003; Kahneman and Klein, 2009). Because individuals have different cognitive styles (Allinson and Hayes, 1996; Epstein et al., 1996), some enjoy thinking (Cacioppo and Petty, 1982; Chatterjee et al., 2000; Smith and Levin, 1996), whereas others may be cognitive “misers” preferring to use shortcuts in order to make decisions (Taylor, 1981).

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2 We derive Hypothesis 1 and Hypothesis 2 differently and independently. We use two scenarios, i.e., simultaneous evaluation of and resource allocation on a particular venture and the finance prescribed two-stage strategy, to derive Hypothesis 1 whereas we only use the two-stage strategy to delineate Hypothesis 2. Nevertheless, affect research has often found that positive affect and negative affect influence behavior in the opposite manners. As a result of using these findings, we may have appeared to derive our arguments for positive affectivity and negative affectivity oppositely.

3 Different terms, such as automatic evaluation versus conscious judgments (Bargh and Chartrand, 1999), heuristic versus analytic (Evans, 2008), and experiential versus rational (Pacini and Epstein, 1999), have been proposed to describe these two processes; however, we have adopted the popular terminology of System 1 and System 2 used in recent studies (Evans, 2008; Kahneman, 2003; Kahneman and Klein, 2009).
The need for cognition is a well-documented cognitive style construct that reflects an individual's propensity to engage in and enjoy thinking, which is a System 2 process (Cacioppo and Petty, 1982; Epstein et al., 1996). This construct has been shown to be reliable and stable across time and contexts (e.g., Cacioppo and Petty, 1982). For example, individuals with a high need for cognition are better at retaining information (Boehm, 1994) and more likely to search out new information (Cacioppo et al., 1996). In an argument, they are more likely to be influenced by a relevant message (Cacioppo et al., 1983) and less likely to be influenced by irrelevant information such as endorser appearance (Haugtvedt et al., 1992) or use of humor (Zhang, 1996).

Because the need for cognition triggers the use of analytical process, it can directly shape investment portfolio composition. Investors with a high need for cognition tend to engage in thinking and attend to relevant facts for their decision tasks (e.g., Zhang, 1996). They will thus more likely use the systematic approach prescribed by finance scholars when evaluating investment opportunities and will keep a comprehensive record of expected net present values of all investment opportunities. Thus, investors with a high need for cognition will generally assess a larger set of opportunities to determine investment allocations, and are more likely to diversify their investments compared with those with a low need for cognition.

**Hypothesis 3.** Investors with a high need for cognition are more likely to diversify their investments across a larger number of ventures compared with investors with a low need for cognition.

Further, the need for cognition may weaken the influence of affective experience on behavior. There is some indirect evidence showing how the influence of mood and emotion on behavior can be temporarily attenuated by increasing an individual's motivation to deliberately process information or by increasing their processing capability (e.g., Ambady and Gray, 2002; Bless et al., 1996). The need for cognition can also reduce affect-induced changes in behavior, such as the tendency to recall mood-congruent information (e.g., positive mood matched with positive framing) (Kuvaas and Kaufmann, 2004).

We argue that the need for cognition attenuates the influence of dispositional affect on investment portfolio composition. Because individuals with a high need for cognition tend to be motivated to consider task-relevant informational cues and ignore task-irrelevant information (Cacioppo et al., 1983; Haugtvedt et al., 1992; Zhang, 1996), they are less motivated to respond emotionally to stimuli in the environment, resulting in diminishing the influence of dispositional affect on frequent experience of certain type of mood and emotion. As a result, investors with a high need for cognition are less likely influenced by the effects of their affective experience. Such mechanisms attenuate the influence of dispositional affect on investment concentration. Thus, we expect that the need for cognition will weaken the relationship between dispositional affect and investment concentration.

**Hypothesis 4.** A need for cognition moderates the relationship between dispositional affect and investment decisions such that the greater the need for cognition, the weaker will be the relationship between dispositional affect and investment concentration.

3.2.5. The influence of emotion-based decision making

When individuals are motivated toward affective events, they are more likely to be influenced by their affective experience when making decisions (e.g., Maio and Esses, 2001). Emotion-based decision making is a cognitive style variable that captures the degree to which an individual relies on mood and emotion to process information and make decisions (Barchard, 2001; Evans and Barchard, 2005).

We argue that emotion-based decision making strengthens the relationship between dispositional affect and investment portfolio concentration. Because high emotion-based decision making investors tend to rely on mood and emotion in making decisions, they are motivated to attend and approach emotional stimuli in the environment compared with investors without such a preference. As a result, high emotion-based decision making investors will frequently experience the same types of mood and emotion, elicited by their dispositional affect. Further, investors who make decisions based on their emotions will pay more attention to their affective experiences and be influenced by associated effects. Taken together, we argue that high emotion-based decision making investors will be more influenced by dispositional affect when constructing investment portfolios compared with low emotion-based decision making investors.

**Hypothesis 5.** Emotion-based decision making moderates the relationship between dispositional affect and investment decisions such that the greater the emotion-based decision making, the stronger will be the relationship between dispositional affect and investment concentration.

4. Methods

4.1. Setting and procedures

Each year the entrepreneurship center at a major university in the western United States hosts a business plan competition. Venture teams composed of student organized teams to actual startup firms are evaluated through several rounds. Our study used
the “road show” round; this is held in a large room where venture teams are assigned to stations where they can display and pitch their products or ideas to judges. Judging the competition are prominent members of the local entrepreneurial community (e.g., entrepreneurs, venture capitalists, lawyers) recruited months before the competition who have received the business plans of participating ventures a few days before the event.

During the road show round, each judge is given an imaginary fund of $1000 to invest in ventures they consider the most viable. Judges have 4 h to decide how to allocate their funds. They typically walk from station to station and interact with team members before deciding how to make their investments. Most judges complete their allocations within two and half hours, spending 3 to 7 min on each business opportunity.

In the round we observed, there were variations in how judges interacted with the venture teams. Some took careful written notes, whereas others simply kept mental track. Some allocated a specific value to each new venture after their visit, whereas others made all their allocation decisions at the end. Once allocations were tallied at the end of the round, 16 teams that received the most investment funds advanced to the next round.

To test our hypotheses, we designed a two-stage study. In Stage 1, two weeks prior to the road show round, we asked the judges to complete an online survey about positive and negative affectivities, emotion-based decision making, need for cognition, and other possible confounding factors. This was done to control for effects of other variables. In Stage 2, following the road show round, we collected each judge’s investment allocations.

This design combined features of a laboratory experiment and a field study, giving it several advantages. First, compared with a laboratory experiment, this design produced more generalizable results because the judges made investment decisions in a realistic and meaningful context. Not only were they motivated to do their best but also they were less aware of being studied (Sackett and Larson, 1990). Second, compared with a field survey, this design allowed us to systematically control variables that may influence investment concentration. Specifically, all participants encountered the same set of venture investment opportunities with the same number of imaginary dollars, effectively controlling for opportunity and resource sets that may influence judging behavior (Han, 2009) and allowing us to attenuate threats to internal validity that most field surveys would have encountered. Most importantly, the design provides means to reduce common method bias by temporally and methodologically separating collection of measurements (Podsakoff et al., 2003). Specifically, data for our explanatory variables were collected two weeks prior to those for our dependent variable. Surveys were used to capture our explanatory variable data, whereas actual investment decisions were collected for our dependent variable. Such temporal and methodological separation of measuring explanatory and dependent variables can reduce common method bias caused by contextual effects, consistency motifs, and demand characteristics (Podsakoff et al., 2003, p. 888).

4.2. Sample

Over a two-year period (2008–2009), survey invitations were e-mailed to the 331 judges who participated in the business plan competition. In 2008, 33 ventures participated in this round and another 34 ventures participated in 2009. In total, 148 judges (45%) completed the online survey. We examined non-response bias by analyzing the mean and variance differences of the dependent variable, Investment Concentration, between responding and non-responding groups. We found that the variance of Investment Concentration between the responding group and the non-responding group was similar ($F = 1.506; p > 0.05$). Thus, we assumed equal variances and made independently sampled t-tests and found that the two groups did not have different means for Investment Concentration ($t = -1.272; p > 0.05$). We also tested whether judges with different types of work experience allocated investments differently, but found no significant differences in Investment Concentration for the most common occupations, i.e., venture capitalist ($t = 0.030; p > 0.05$) and attorney ($t = 0.455; p > 0.05$).

Of those who responded to our survey, 117 judges were male and 31 judges were female. Ages ranged from 23 to 73 years, with a mean of 42.63 (SD = 10.68) years. The racial breakdown for respondents was 4.7% Asian, 84.1% European American, 3.4% Hispanic American, and 7.5% other ethnicities. Most planned to start a new business (79.1%), whereas about half had founded a business that was still in operation (50.0%). This is consistent with prior findings that many new venture investors, (e.g., angel investors) tend to have entrepreneurial experience (e.g., Mason, 2006). There were 8 lawyers (5.4%) and 21 new venture investors (14.2%). Out of 148 respondents, 128 completed all survey items of our study and were included in the final analysis. Over the two-year period, 23 judges participated in the business plan competition both years consecutively, whereas 82 judges participated in only one annual competition.

4.3. Dependent variable: Investment Concentration

We used the Herfindahl–Hirschman index to measure degree of concentration of an investment portfolio. This index was originally designed as a proxy to measure industry concentration, but is often used to determine the concentration of investment portfolios (e.g., Seo et al., 2010). It is considered a better way to measure investment portfolios than calculating the number of investments, because the index takes into account both “unequal distribution and fewness” (Hirschman, 1964, p. 761). We took several steps to arrive at the investment concentration index. For every investor, we calculated the percentage of imaginary dollars invested in each new venture ($s_i$) from the total investment. We then obtained the sum of squares of the percentage values for all investment $\sum_{i=1}^{N} s_i^2$ as the investment concentration index. The index ranged from 0 to 1. When the index was close to 1,
an investor was considered to have a concentrated investment portfolio, and when it was close to zero, the investor was considered to have a diversified investment portfolio.

\[
\text{Investment concentration index} = \frac{1}{N} \sum_{i=1}^{N} s_i^2.
\]

Further, we obtained two simpler measures of investment concentration for robustness tests. We measured the number of invested firms by counting the number of firms an investor has distributed his or her imaginary dollars. A higher value reflects a more diversified portfolio. We also measured the standard deviation of an investor’s invested amounts. A higher value reflects a more concentrated portfolio.

4.4. Explanatory variables

4.4.1. Positive affectivity and negative affectivity

We used the Positive Affect Negative Affect Schedule (PANAS) developed by Watson et al. (1988) to measure investors’ positive and negative affectivities. A 20-item version was used, with ten descriptors employed to measure positive affectivity and ten descriptors used to measure negative affectivity. Some sample descriptors for positive affectivity were as follows: excited, enthusiastic, and inspired; some descriptors for negative affectivity included afraid, hostile, and nervous. Survey respondents were asked to use such descriptors to rate themselves on how they generally felt, using a 5-point Likert scale with 1 being “very slightly or not at all” and 5 being “extremely.” This scale has demonstrated reliability and validity. Similar to other studies (e.g., Watson et al., 1988), we obtained an alpha reliability coefficient of 0.85 for positive affectivity and 0.80 for negative affectivity.

4.4.2. Need for cognition

We used a 10-item Need for Cognition scale from the International Personality Item Pool (IPIP). This tool was developed as part of an extensive effort to develop and refine personality inventories (Goldberg et al., 2006). All items in the IPIP have been rigorously and systematically validated, and appear in over 80 publications (Goldberg et al., 2006). The Need for Cognition scale was originally developed to capture an individual’s propensity to engage in and enjoy effortful cognitive activities (Cacioppo and Petty, 1982). Some sample items are “need things explained only once” and “like to solve complex problems.” We used a 5-point Likert scale to rate responses, with 1 being “very slightly or not at all” and 5 being “extremely.” Individuals with a high need for cognition are considered highly and intrinsically motivated toward thinking, and exhibit a strong propensity for enjoying complex cognitive tasks. The alpha reliability coefficient for need for cognition was 0.70, consistent with that in other studies (e.g., Cacioppo and Petty, 1982).

4.4.3. Emotion-based decision making

We used a 9-item Emotion-Based Decision Making scale originally developed to capture an individual’s propensity to rely on emotion and “gut feelings” when making decisions (Barchard, 2001; Evans and Barchard, 2005). Some sample items include “believe emotions give direction to life” and “listen to my feelings when making important decisions.” We used a 5-point Likert response scale (1 being “very slightly or not at all” and 5 being “extremely”). This measure has good content validity because the items measure what they were intended to measure. In the validation study (Evans and Barchard, 2005), this measure showed good internal consistency (alpha reliability coefficient was 0.77) and test–retest reliability (0.70). Further, this measure is highly correlated to the Intuition vs. Reason Scale (r = 0.59, p < 0.001), a similar measure designed to capture the degree to which “gut reactions” dictate decision making (Tett et al., 1997), and not correlated with an unrelated measure (r = −0.15, p = 0.076), IPIP Activity Level Scale that captures activity level (Goldberg et al., 2006). Further, our study indicates that this measure is not correlated with unrelated measures such as need for cognition scales (r = −0.10, p = 0.229), positive affectivity (r = −0.05, p = 0.326), and negative affectivity (r = 0.01, p = 0.463). We obtained an alpha reliability coefficient of 0.86.

4.5. Control variables

Because each judge had the same amount of imaginary fund and opportunity sets, we were able to control the effect of fund size and opportunity sets on investment behavior (e.g., Han, 2009). We controlled for age, gender, and ethnicity because they may be related to one’s risk taking propensities and investment decisions (Erb et al., 1997; Powell and Ansic, 1997; Suden and Surette, 1998; Weber et al., 1998), which may in turn influence how an investor constructs portfolio. We also controlled for finance knowledge, using the number of finance-related courses participants had taken and business founding experience by taking into account whether they planned to start a business and whether they had a business still in operation, because financial knowledge and prior entrepreneurial experience may bias investment decision making (e.g., Graham et al., 2009). Further, we controlled for participants’ risk-taking propensities measured by a 10-item Risk Taking scale from the IPIP because low risk propensity can lead to a more concentrated investment portfolio. Sample items include “enjoy being reckless” and “take risks.” Its alpha reliability coefficient was 0.76. Finally, we controlled for whether participants had judged both years of the business plan competition. We coded 1 for those who participated in both competitions and zero if they had not.
5. Results

Table 1 reports the means, standard deviations, reliabilities and correlations of the variables. A number of explanatory variables are significantly correlated with one another. In order to detect possible multicollinearity issues, we examined the variance inflation factor (VIF) using the full model. Specifically, our VIF ranges from 1.108 to 2.599; these results do not violate the typical rule of thumb; i.e., a VIF of 5 or 10 and above indicates a multicollinearity problem (Kennedy, 2003). Nevertheless, in order to reduce any multicollinearity associated with interaction terms and easily compare our effect sizes, we centered our explanatory variables (positive affectivity, negative affectivity, need for cognition, emotion-based decision making, and risk-seeking propensity), and used the centered variables to calculate the associated interaction terms (Aiken and West, 1991; Edwards, 2008).

To test our hypotheses, we used standard hierarchical regression. We present the ordinary least square results with investment concentration as the dependent variable in Table 2. We included all control variables in Model 1, which was statistical significant ($R^2 = 0.119$, $p < 0.05$). Investors with greater finance knowledge ($\beta = 0.009$; $p < 0.05$) and those whose business was still operating ($\beta = 0.19$, $p < 0.05$) had a significant positive impact on investment concentration.

Table 2
Multiple regression analysis of the impact of dispositional affect and cognitive style on investment concentration.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duplication</td>
<td>0.032</td>
<td>0.006</td>
<td>0.036</td>
</tr>
<tr>
<td>Age</td>
<td>0.016</td>
<td>-0.067</td>
<td>-0.073</td>
</tr>
<tr>
<td>Gender</td>
<td>0.105</td>
<td>0.114</td>
<td>0.118 &amp;</td>
</tr>
<tr>
<td>Asian American</td>
<td>0.045</td>
<td>0.061</td>
<td>0.072</td>
</tr>
<tr>
<td>European American</td>
<td>0.017</td>
<td>0.100</td>
<td>0.084</td>
</tr>
<tr>
<td>Hispanic American</td>
<td>0.116</td>
<td>0.186 *</td>
<td>0.157 *</td>
</tr>
<tr>
<td>Finance knowledge</td>
<td>0.207 *</td>
<td>0.175 *</td>
<td>0.185 *</td>
</tr>
<tr>
<td>Risk taking preference</td>
<td>0.091</td>
<td>0.122</td>
<td>0.106</td>
</tr>
<tr>
<td>Plan to start</td>
<td>-0.118</td>
<td>-0.145</td>
<td>-0.175 *</td>
</tr>
<tr>
<td>Business still in operation</td>
<td>0.252 **</td>
<td>0.246 **</td>
<td>0.263 **</td>
</tr>
<tr>
<td>Emotion-based decision making</td>
<td>0.043</td>
<td>0.050</td>
<td>0.086</td>
</tr>
<tr>
<td>Positive affectivity (Hypothesis 1)</td>
<td>0.220 *</td>
<td>0.267 **</td>
<td></td>
</tr>
<tr>
<td>Negative affectivity (Hypothesis 2)</td>
<td>-0.203 *</td>
<td>-0.178 *</td>
<td></td>
</tr>
<tr>
<td>Need for Cognition (Hypothesis 3)</td>
<td>-0.118</td>
<td>-0.131</td>
<td></td>
</tr>
<tr>
<td>Need for cognition × positive affectivity (Hypothesis 4)</td>
<td></td>
<td></td>
<td>-0.065</td>
</tr>
<tr>
<td>Need for cognition × negative affectivity (Hypothesis 4)</td>
<td></td>
<td></td>
<td>0.157 *</td>
</tr>
<tr>
<td>Emotion-based decision making × positive affectivity (Hypothesis 5)</td>
<td></td>
<td></td>
<td>0.177 *</td>
</tr>
<tr>
<td>Emotion-based decision making × negative affectivity (Hypothesis 5)</td>
<td></td>
<td></td>
<td>0.007</td>
</tr>
<tr>
<td>F-statistic</td>
<td>1.423 &amp;</td>
<td>1.751 *</td>
<td>1.829 *</td>
</tr>
<tr>
<td>R square</td>
<td>0.119</td>
<td>0.178</td>
<td>0.232</td>
</tr>
<tr>
<td>Adjusted R square</td>
<td>0.035</td>
<td>0.076</td>
<td>0.105</td>
</tr>
<tr>
<td>Change in R square</td>
<td>0.050 *</td>
<td>0.054 **</td>
<td></td>
</tr>
</tbody>
</table>

N = 128. One tailed tests were performed when our hypotheses contained directionality. Two tailed tests were performed otherwise. Standardized regression coefficients are reported in the table.

** $p < 0.01$.

* $p < 0.05$.

& $p < 0.10$. 

Internal reliabilities are in parentheses. Correlations greater than 0.16 or less than $-0.16$ are significant at $p < 0.05$. 

Table 1  
Means, standard deviations, reliabilities and correlations.
(β = 0.053; p < 0.01) were more likely to construct more concentrated investment portfolios. However, we did not find a relationship between risk taking preference and investment concentration, perhaps because our risk taking preference measure only captures risk attitudes in a general manner. Risk taking preference can be further categorized, based on the task types (e.g., financial risk taking, safety risk taking, recreational risk taking). Although each risk preference type is uniquely correlated to behavioral frequencies in different task types (Weber et al., 2002), our generic measure may not have captured such subtleties.

We introduced main effects of positive affectivity, negative affectivity, and need for cognition influencing investment concentration in order to test Hypotheses 1, 2, and 3, controlling for the main effect of emotion-based decision making in Model 2. The addition of the predictor variables made significant contributions over and above Model 1 (ΔR² = 0.059; p < 0.05). Hypothesis 1 predicted that positive affectivity would lead to a more concentrated investment portfolio, whereas Hypothesis 2 predicted that negative affectivity would lead to a less concentrated investment portfolio. We obtained a positive coefficient for positive affectivity (β = 0.046; p < 0.05) and a negative coefficient for negative affectivity (β = −0.054; p < 0.05). Thus, both Hypothesis 1 and Hypothesis 2 were supported. However, the negative coefficient for need for cognition was not significant (β = −0.029; p > 0.05). Thus, Hypothesis 3 was not supported.

Finally, we introduced the interaction effects of an investor’s need for cognition and emotion-based decision making on investment concentration in Model 3. The addition of the predictor variables made marginally significant contributions over and above Model 2 (ΔR² = 0.054; p < 0.10). Hypothesis 4 predicted that investors with a higher need for cognition would be less likely to be influenced by dispositional affect than would investors with a lower need for cognition. We obtained partial support for Hypothesis 4. Although the coefficient for the interaction between need for cognition and positive affectivity was not significant (β = −0.034; p > 0.05), the coefficient for the interaction of need for cognition and negative affectivity was positive and significant (β = 0.096; p < 0.05). The coefficients for our main variables remained the same as in Model 2. Fig. 1 graphically illustrates this relationship. Investors with a low need for cognition had a strong negative relationship between negative affectivity and investment concentration, whereas investors with a high need for cognition were not influenced by their dispositional affect in constructing their investment portfolios.

Hypothesis 5 predicted that investors who relied on emotion would be more likely to be influenced by dispositional affect than would their counterparts who did not rely on emotion in making decisions. We obtained partial support for Hypothesis 5. In Model 3, the coefficient for the interaction term of emotion-based decision making and positive affectivity was positive and significant (β = 0.061; p < 0.05), but the coefficient for the interaction term of emotion-based decision making and negative affectivity was not significant (β = 0.003; p > 0.05). Fig. 2 graphically illustrates how individuals with a higher propensity to rely on emotion when making decisions were more likely to have a stronger relationship between positive affectivity and investment concentration compared with investors who had a lower propensity to rely on emotion to make decisions.

Our empirical analysis revealed that need for cognition is a suppressor (Mackinnon et al., 2000; Pandey and Elliott, 2010) because it is related to our explanatory variable, positive affectivity, but unrelated to our dependent variable and its inclusion boosted the coefficient of positive affectivity. However, we did not eliminate this suppressor variable because doing so would produce a wrong estimation of key parameters, weaken the predictive power of the model, lead to sample specific biases, and ignore its theoretical relevance (Pandey and Elliott, 2010).

The effect sizes of our study may appear to be small at a first glance, but they are qualitatively meaningful. Based on Model 3, one standard deviation increase in positive (negative) affectivity leads an increase of 0.01 (decrease of 0.02) in investment concentration. However, small differences in the investment concentration index may lead to large qualitative differences in investment behavior. For instance, an average investor in our setting invested in 7.8 new ventures with an investment concentration index of 0.17 in eight ventures. Although our example is only for illustrative purpose, small differences in this index may result in relatively different portfolios.
We performed a number of robustness tests to rule out alternative explanations based on missing occupation variables, sample selection choice, other non-tested, nonlinear relationships, or the operationalization of our dependent variables (Table 3). Model 4 includes occupational variables, i.e., legal profession and venture investment experience, which were added to our analysis because it is possible that work experience might alter an investor’s cognitive process. In Model 5, we excluded participants who had repetitive involvement in the business plan competition, including only first-time participants. Model 6 excluded second evaluations by participants who had repetitive involvement in the business plan competition and included the occupation variable. In Model 7, we included square terms of key variables involved in the interaction terms to control for plausible confounding effects of other nonlinear terms (Edwards, 2008). To test whether our findings are consistent with alternative operationalizations of our dependent variable, we included simpler measures of investment concentration, i.e., the number of invested firms and the standard deviation of invested amounts, as our dependent variables in Model 8 and Model 9 respectively. Overall, we found relatively consistent results throughout our robustness tests.

Fig. 2. Moderating impact of emotion-based decision making, on the relationship between positive affectivity and investment concentration.

Table 3
Robustness tests.

<table>
<thead>
<tr>
<th></th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
<th>Model 7</th>
<th>Model 8</th>
<th>Model 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duplication</td>
<td>0.043</td>
<td>0.054</td>
<td>−0.049</td>
<td>0.034</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>−0.066</td>
<td>−0.074</td>
<td>−0.065</td>
<td>−0.066</td>
<td>0.129</td>
<td>−0.034</td>
</tr>
<tr>
<td>Gender</td>
<td>0.124b</td>
<td>0.146b</td>
<td>0.153b</td>
<td>0.130b</td>
<td>−0.114</td>
<td>0.100</td>
</tr>
<tr>
<td>Asian American</td>
<td>0.074</td>
<td>0.063</td>
<td>0.064</td>
<td>0.069</td>
<td>0.244</td>
<td>0.202</td>
</tr>
<tr>
<td>European American</td>
<td>0.084</td>
<td>0.134</td>
<td>0.132</td>
<td>0.083</td>
<td>0.072</td>
<td>0.214</td>
</tr>
<tr>
<td>Hispanic American</td>
<td>0.157b</td>
<td>0.111</td>
<td>0.111</td>
<td>0.148b</td>
<td>−0.066</td>
<td>0.284</td>
</tr>
<tr>
<td>Finance knowledge</td>
<td>0.185b</td>
<td>0.193b</td>
<td>0.192b</td>
<td>0.182b</td>
<td>−0.005</td>
<td>0.165b</td>
</tr>
<tr>
<td>Risk taking preference</td>
<td>0.111</td>
<td>0.152</td>
<td>0.159b</td>
<td>0.104</td>
<td>−0.073</td>
<td>0.127</td>
</tr>
<tr>
<td>Plan to start</td>
<td>−0.172b</td>
<td>−0.224b</td>
<td>−0.221b</td>
<td>−0.184b</td>
<td>0.163b</td>
<td>−0.209b</td>
</tr>
<tr>
<td>Business still in operation</td>
<td>0.274b</td>
<td>0.296b</td>
<td>0.307b</td>
<td>0.270b</td>
<td>−0.136b</td>
<td>0.260b</td>
</tr>
<tr>
<td>Emotion-based decision making</td>
<td>0.084</td>
<td>0.027</td>
<td>0.026</td>
<td>0.091</td>
<td>0.041</td>
<td>0.091</td>
</tr>
<tr>
<td>Law profession</td>
<td>0.037</td>
<td></td>
<td>0.033</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment experience</td>
<td>0.023</td>
<td></td>
<td>0.026</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Emotion-based decision making) ^ 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>−0.038</td>
<td></td>
</tr>
<tr>
<td>(Positive affectivity) ^ 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.081</td>
<td></td>
</tr>
<tr>
<td>(Negative affectivity) ^ 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.083</td>
<td></td>
</tr>
<tr>
<td>(Need for cognition) ^ 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>Positive affectivity (Hypothesis 1)</td>
<td>0.265**</td>
<td>0.248*</td>
<td>0.247*</td>
<td>0.295**</td>
<td>−0.152b</td>
<td>0.362**</td>
</tr>
<tr>
<td>Negative affectivity (Hypothesis 2)</td>
<td>−0.180*</td>
<td>−0.177*</td>
<td>−0.178*</td>
<td>−0.197*</td>
<td>0.222*</td>
<td>−0.136b</td>
</tr>
<tr>
<td>Need for cognition (Hypothesis 3)</td>
<td>−0.133</td>
<td>−0.160b</td>
<td>−0.162b</td>
<td>−0.135</td>
<td>−0.020</td>
<td>−0.244*</td>
</tr>
<tr>
<td>Need for cognition × positive affectivity (Hypothesis 4)</td>
<td>−0.066</td>
<td>−0.036</td>
<td>−0.035</td>
<td>−0.128</td>
<td>0.046</td>
<td>−0.057</td>
</tr>
<tr>
<td>Need for cognition × negative affectivity (Hypothesis 4)</td>
<td>0.158b</td>
<td>0.150b</td>
<td>0.150b</td>
<td>0.141b</td>
<td>−0.150b</td>
<td>0.141b</td>
</tr>
<tr>
<td>Emotion-based decision making × positive affectivity (Hypothesis 5)</td>
<td>0.181b</td>
<td>0.179b</td>
<td>0.182b</td>
<td>0.183b</td>
<td>−0.160b</td>
<td>0.166b</td>
</tr>
<tr>
<td>Emotion-based decision making × negative affectivity (Hypothesis 5)</td>
<td>0.003</td>
<td>−0.014</td>
<td>−0.018</td>
<td>−0.004</td>
<td>−0.111</td>
<td>−0.081</td>
</tr>
<tr>
<td>F-statistic</td>
<td>1.629b</td>
<td>1.589b</td>
<td>1.408b</td>
<td>1.525b</td>
<td>1.545b</td>
<td>2.262**</td>
</tr>
<tr>
<td>R square</td>
<td>0.233</td>
<td>0.250</td>
<td>0.251</td>
<td>0.242</td>
<td>0.203</td>
<td>0.272</td>
</tr>
<tr>
<td>Adjusted R square</td>
<td>0.090</td>
<td>0.093</td>
<td>0.073</td>
<td>0.083</td>
<td>0.072</td>
<td>0.152</td>
</tr>
</tbody>
</table>

N = 105 for Model 5 and Model 6, N = 128 for other models. One tailed tests were performed when our hypotheses contained directionality. Two tailed tests were performed otherwise. Standardized regression coefficients are reported in the table.

** p < 0.01.
* p < 0.05.
& p < 0.10.
6. Discussion and conclusions

This study explored how dispositional affect and cognitive style of new venture investors influence their portfolio concentration. We found that high positive affectivity investors constructed more concentrated investment portfolios compared with their low positive affectivity counterparts. In addition, high negative affectivity investors constructed more diversified investment portfolios compared with their low negative affectivity counterparts. We also found that the impact of dispositional affect on investment portfolio concentration was moderated by an investor’s cognitive style. Specifically, investors with a high need for cognition to make decisions demonstrated a weaker relationship between negative affectivity and investment diversification compared with their counterparts with a low need for cognition. Likewise, high emotion-based decision making investors relying on affective experience to make decisions showed a stronger relationship between positive affectivity and investment concentration compared with their counterparts with a low emotion-based decision making (see Fig. 3).

Our study showed that positive affectivity leads to a more concentrated investment portfolio (Hypothesis 1), whereas negative affectivity leads to a more diversified investment portfolio (Hypothesis 2). However, we failed to find a direct influence of need for cognition on investment concentration (Hypothesis 3). This suggests that an investor’s propensity to rely on analytical process might not be sufficient in shaping that investor’s portfolio concentration. We suspect that because constructing an investment portfolio is such a complex process, mere tendency to engage in analytical decision making does not influence how an investor diversify investment portfolio. Further, we only obtained partial support for the moderating hypotheses (Hypothesis 4 and Hypothesis 5). Perhaps our small sample size did not provide enough statistical power to detect moderating hypotheses (Aguinis and Stone-Romero, 1997). Further, because the moderating effects of cognitive style were significant only when dispositional affect and cognitive style have similar effects on cognitive process, i.e., both cognitive style and dispositional affect leading to either heuristic/emotion-based processing or analytical processing, it is plausible that when independent effects of dispositional affect and cognitive style on cognitive process are in the opposite direction, cognitive style is not strong enough to influence the effect of dispositional affect on cognitive process. Future experimental research could provide further explanations on these underlying mechanisms.

6.1. Theoretical contribution

This study contributes to literature related to venture investment decision. Prior studies have either studied investors’ independent decision of evaluating single ventures or firms’ portfolio construction. Yet, a firm’s investment portfolio is constructed by individuals who often concurrently evaluate multiple opportunities. This study fulfills the intermediary gap by delineating and testing
factors influencing the composition of an individual’s investment portfolio. Further, our work responds to the recent call to introduce affect-related research into the study of entrepreneurship (e.g., Baron, 2008; Foo, 2011) by delineating how dispositional affect influence investment concentration and how these relationships are moderated by an investor’s cognitive style.

Our work also contributes to the study of personality traits related to investment decisions. It suggests that investment concentration can be captured by personality variables, i.e., dispositional affect, need for cognition and emotion-based decision making. Investment portfolio construction is the result of a complex set of judgments and decision making tasks. Investors often took hours to evaluate multiple ventures and determine how to allocate their investments among multiple opportunities. Their investment portfolios reflected important behavioral regularities that can be predicted using personality traits (Epstein and Barchard, 2005). Our study shows that the direct and interaction effects of our personality variables are theoretically relevant, empirically meaningful, and captured important regularities of portfolio construction.

Further, our study contributes to dispositional affect research in two ways. First, it provides further evidence on criterion validation for the Emotion-Based Decision Making scale. This scale has only been demonstrated to be reliable, highly correlated with similar constructs and uncorrelated to unrelated constructs (Evans and Barchard, 2005). To our knowledge, this study is the first one to demonstrate how this scale could be used to predict behavior. Second, it shows how the influence of dispositional affect on simple cognitive tasks and job attitudes (e.g. Lerner and Keltner, 2001; Thoresen et al., 2003) can be extended to understand complex behavior, such as the portfolio composition of a new venture investor. Further, this study illustrates that the influence of dispositional affect on behavior is moderated not only by an individual’s reliance to engage in analytical process, but also by that individual’s reliance on affective experience to make decisions.

6.2. Practical implications

Because the competition judges independently determined how to allocate their investments, we refrain from applying our findings to group level decisions. Instead, we discuss how our findings have practical implications for individual decision making. Although our task may not perfectly capture investment portfolio composition, our findings may shed light on such daily resource allocation decisions as screening business plans for first meetings or selecting new ventures for due diligence. As components of a lengthy evaluation process (Hall and Hofer, 1993; Zacharakis and Meyer, 2000; Zacharakis and Shepherd, 2001), such decisions are hardly inconsequential. In fact, both new venture investors and entrepreneurs may benefit from the findings of this study.

Entrepreneurs can use our findings to improve their resource acquisition strategies. First, entrepreneurs could estimate a potential investor’s dispositional affect by talking with others who know their investors. Based on this information, entrepreneurs could better determine how to best present information to potential investors. For example, entrepreneurs could provide a comprehensive analysis of a firm’s net present values to ease the use of analytical process to investors with high negative affectivity, whereas they could highlight key points for investors with high positive affectivity to ease their use of heuristic processing. Moreover, entrepreneurs could also selectively approach a particular type of investors depending on their funding needs. For example, if entrepreneurs seek large amount of funding quickly, they might consider looking for high positive affectivity investors because these investors are more likely to make large amount of investment compared with high negative affectivity investors.

Venture investment firms could use our findings to strategize how to construct investment portfolios that reflect an investor’s risk profile and distribution of expected returns (e.g., Dimov and De Clercq, 2006; Han, 2009). They could select investment managers by matching their dispositional affect, need for cognition, and emotion-based decision making with a firm’s investment strategy. The literature of person–organization fit suggests that a better match between organization and individual can lead to greater job satisfaction, retention, and even performance (e.g., Kristof-Brown et al., 2005). Investment firms could use our findings to design training and development programs to teach employees methods that could attenuate personality bias by changing motivation or cognitive capability (e.g., Bless et al., 1990; Bodenhausen et al., 1994; Worth and Mackie, 1987). Likewise, entrepreneurs could use our findings to understand how their investors allocate investment resources among multiple ventures.

6.3. Limitations and future direction

The limitations of this study indicate areas for possible research directions. First, the business plan competition setting may lack realism in understanding the actual composition of a venture investment portfolio. Our study limits the extent we can generalize findings to realistic investment settings. Our sample represents a relatively small group of investors who took part in a business plan competition, which may have limited resemblance to actual investment practices. Moreover, although many judges were active members of the local community of entrepreneurship-related professionals (venture capitalists, lawyers, entrepreneurs, etc.), relatively small proportion of them have actual investment experience. Thus, it is important to test our framework with actual venture investors making real decisions.

Second, our study design did not allow us to track how the effects of dispositional affect on cognitive process and information evaluation could influence investment concentration on an ongoing basis, because we could only use it as a proxy for the combined effects of dispositional affect. Future researchers could unpack these effects by using a real-time research design, i.e., a verbal protocol such as thinking aloud to capture investor thought processes when evaluating multiple ventures (Hall and Hofer, 1993), radio frequency identification techniques and experience sampling methodology to track and capture judges’ feelings, movements and search activities at an investment road show (Uy et al., 2010; Welbourne et al., 2009).

Third, although this study investigated how two main types of dispositional affect can influence investment behavior, scholars advocate that dispositional affect be refined into more discrete categories such as trait fear and trait anger, along with positive and
negative affectivities (Foo, 2011; Lerner and Keltner, 2001). They have found that discrete forms of dispositional affect can influence behavior using different mechanisms. Thus, ongoing research could explore how other types of dispositional affect may influence portfolio composition.

Fourth, this study does not distinguish the impact of dispositional affect and emotional states such as mood or emotion. An investor’s affective experience can easily change during the portfolio construction period. Therefore, it is possible that the relationship between dispositional affect and venture investment allocation may be mediated by a given state affect (Foo et al., 2009). The interplay between dispositional and other types of affect is an important possible direction for future research. Because the activation role of an individual’s dispositional affect partly influences the impact on venture efforts (Foo et al., 2009), future research should investigate these relationships within a similar context. Although ample evidence shows that the influences of dispositional affect and state affect are quite similar, the underlying mechanisms could be quite different. It is plausible that state affect serves as a mediator for the influence of dispositional affect on attitudes and behaviors (e.g., Foo et al., 2009; Lyubomirsky et al., 2005). Future research could further distinguish these two constructs and the underlying mechanism.

Investment portfolio construction is the result of a complex set of judgments and decision making tasks involving lengthy processes. Their investment portfolios represent important behavioral regularities that can be predicted using theoretically relevant personality traits. Our theoretical framework and empirical results provided insights on how dispositional affect, need for cognition, and emotion-based decision making influenced venture investment behavior using a real-life business plan competition. We hope that our theoretical framework could open up exciting future research opportunities.

References


