The influence of mood on the willingness to take financial risks

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The purpose of this study was to determine whether support could be found for either the Affect Infusion Model or the Mood Maintenance Hypothesis regarding how mood influences financial risk tolerance. An ordinary least-squares regression model was used to determine if people who exhibited a happy mood at the time they completed a survey scored differently than those who were not happy. In a sample ($n=460$) of employed mid-western respondents between the ages of 18 and 75 years, being in a happy mood was positively associated with having a higher level of financial risk tolerance, holding biopsychosocial and environmental factors constant. Support for the Affect Infusion Model was obtained.

Keywords: risk tolerance; mood; emotions; risk-as-feelings; risky decisions

Introduction

Mood is a transient generalized affective state (Watson and Vaidya 2003) that can exert a dramatic influence on almost all aspects of a person's daily life. According to Sizer (2000, 762), 'Moods affect a wide range of our thoughts, feelings and attitudes in ways that are not constrained by subject matter or inferential rules'. Although the psychological literature recognizes that a person's emotional state impacts decision making in general as well as on a variety of consumer behaviors (Bagozzi, Gopinath, and Nyer 1999; Lerner, Han, and Keltner 2007; Lerner and Keltner 2000; Lerner, Small, and Loewenstein 2004; Luomala and Laaksonen 2000; Mellers, Schwartz, and Ritov 1999; Schwarz and Clore 1996; Slovic et al. 2004), there still exists considerable debate among economists regarding the role that mood plays in the way in which consumers make financial decisions and how this affects financial markets (Ackert, Church, and Deaves 2003; Clarke and Statman 1998; Olson 2006).

Until recently, the cognitively based utility theory of risk tolerance dominated financial services research. A shortcoming associated with the traditional economic utility approach is that the theory fails to adequately explain many financial attitudes and behaviors, such as shifting of risk-aversion preferences when questions with similar payoffs are framed differently (Slovic et al. 2004). The role of affective states as a factor influencing behavior is seldom examined within economic utility frameworks.

Over the past several decades, researchers have begun to examine the impact moods have on the way people perceive risk (Johnson and Tversky 1983) and how individuals make risky decisions when in different states of mind (Hirshleifer and Shumway 2003; Hockey et al. 2000). These researchers acknowledge that responses to risky situations and circumstances are a result of both analytical (i.e. cognitive)

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and affective (e.g. emotional) influences (Schunk and Betsch 2006; Townsend 2006; Wang 2006), but they differ in their conceptualizations of the role of specific emotional states, and unfortunately the predictions based on different models are contradictory and the results are inconsistent. Two competing possibilities have been proposed to explain how, theoretically, mood can alter one's willingness to accept risk. The one theory is termed the Affect Infusion Model (AIM), while the other is called the Mood Maintenance Hypothesis (MMH). Perplexingly, these two approaches lead to opposing predictions about the influence that positive and negative moods will have on risk tolerance.

According to AIM, a positive mood is expected to increase risk tolerance, whereas a negative mood should lower it (Forgas 1995), because selective attention and priming (Rusting and Larsen 1995, for example) causes the subjective probabilities to be construed differently. When in a good mood, the individual tends to focus on positive cues in the environment. Conversely, a bad mood shifts one's attention to the negative features of the situation.

On the other hand, MMH, advanced by Isen and her colleagues (Isen and Labroo 2003; Isen and Patrick 1983), suggests that a good mood will lead to greater caution, whereas a bad mood will encourage greater recklessness. According to this theory, people in a good mood want to remain in that state, so they are unwilling to take risks that could potentially result in losses that would shift them into a bad mood. However, when in a bad mood, they will behave less cautiously in the hopes of taking a chance and obtaining a reward, which would put them back into a good mood.

The purpose of the present study was to determine whether support could be found for either the AIM or MMH approach using data from surveys of adults completing a risk-tolerance questionnaire of the type used by financial advisors to gauge client risk tolerance to determine suitable investments. Little empirical research has been published on the topic with this type of participant. Understanding the role of moods on a person's risk attitude is not insignificant. Obviously, such information can be used to inform consumer decisions related to the investment and allocation of assets. It can also be used to help consumers adopt realistic purchasing behaviors.

Emotions and moods

Definition of mood and emotion

The terms 'mood' and 'emotion' are often used interchangeably, when in fact they are closely related but distinct phenomena (Beedie, Terry, and Lane 2005). Although the differences are subtle, the implications resulting from the distinction can be dramatic. Both emotions and moods fall within the theoretical realm of 'affect', which can be defined as '…the specific quality of goodness or badness (1) experienced as a feeling state (with or without consciousness) and (2) demarcating a positive or negative quality of a stimulus' (Slovic et al. 2004). Thus, at the most general level, affective states of both sorts can be categorized into positive (pleasant) and negative (unpleasant) feelings.

However, emotions are feelings about a particular circumstance or event (someone or something) that arise from cognitive appraisals of circumstances, whereas moods are more generalized non-specific states that are not directed at any

particular target (Bagozzi, Gopinath, and Nyer 1999; Siemer 2005; Sizer 2000; Watson and Clark 1997). In other words, emotions are in reaction to specific stimuli, whereas moods are free-floating feelings that need not be linked to anything specific. Emotional states include specific feelings like anger, jealousy, fear and envy, while moods are general states of mind such as happy and sad.

The dispositional theory of moods suggests that a person's mood is temporary (Siemer 2005), but the duration of moods is longer than that of emotions. Moreover, moods tend to be unaffected by personal beliefs, and unlike emotions, moods are 'not intentional mental states' (Sizer 2000, 754). Sizer describes moods as follows:

> Moods are disengaged or disconnected from our beliefs and knowledge, demonstrating that they are not penetrable or influenced by the semantic contents of our representations. If one is depressed about everything, or things in general, then no particular piece of new information or change in belief is going to affect this underlying pervasive mood. Even if one is depressed and anxious about many different things – the noise outside the window, the pain in one's temple, or the upcoming meeting – the underlying state of anxiety remains regardless of the content of the subject's worrying. New information (that the noise outside was caused by the cat) does nothing to relieve the anxiety; it simply shifts it to a different focus. (760)

Role of mood in financial decisions

Traditional (utility theory) models

The specific role of mood in influencing attitudes and behaviors has received scant attention within the personal and consumer finance literature. This is primarily the result of the theoretical models used by those who study consumer attitudes and behaviors. Until recently, expected utility theory (or a conceptual offshoot) was the primary theoretical underpinning of nearly all personal and household finance research. Advocates of economic utility as a model of decision making assume that decisions are made logically using a reasoned processing method (i.e. rational/analytic system). The influence of emotions and moods in such decisions, by definition, is excluded.

Consider expected utility theory as a framework for rational/analytic systems, e.g. Modern Portfolio Theory (MPT). According to Loewenstein and his associates (2001, 267), 'economic utility theories posit that risky choice can be predicated by assuming that people assess the severity and likelihood of the possible outcomes of choice alternatives, albeit subjectively and possibly with bias or error, and integrate this information through some type of expectation-based calculus to arrive at a decision. Feeling triggered by the decision situation and imminent risky choice are seen as epiphenomenal – that is, not integral to the decision-making process'.

MPT is based on the assumption that individual investors develop tradeoffs between risks and returns when creating portfolios of risky assets (Mayo 2000). MPT, according to Mayo, 'indicates that investors require ever-increasing amounts of additional return for equal increments of risk to maintain the same level of satisfaction' (184). The Capital Asset Pricing Model (CAPM) extends MPT by defining the relationship between risk and return as purely positive. In a CAPM framework, investors rationally obtain higher rates of return by taking greater risks. At the root of both MPT and CAPM is the assumption that portfolio asset allocation depends on an 'individual's willingness to bear risk' (Mayo 2000, 189). Implicit in this assumption is that investors are economically rational when making tradeoffs between risk and return.[1] In other words, within an MPT framework,

tradeoffs between risk and return are purely analytical with emotions playing almost no role in influencing behavior.

More recent models

Researchers have started to take steps to move beyond traditional economic utility theory modeling of risk tolerance. The blending of behavioral, psychological and economic theories has opened up new lines of research within the personal and household finance fields. These include the burgeoning fields of behavioral finance and household economics. It is now generally recognized in these disciplines that individuals can use two modes of thinking when assessing circumstances and evaluating risks: rational/analytic (cognitive) and experiential (affective) systems (Epstein 1994; Slovic et al. 2004; Wang 2006). Schunk and Betsch (2006) reported evidence suggesting that a preference for either a cognitive (rational/analytic) or an affective (experiential) mode for processing risk information may be an individual difference. Some people, whom they call 'intuitive' decision makers, are more likely to process risk information on the basis of affective states, whereas others, whom they call 'deliberative' decision makers, are more apt to process the information on a cognitive basis. They concluded the following:

> Our findings suggest that intuitive people use the affective risk information contained in the lotteries when making their decisions, which might lead to the risk attitude (i.e., a feeling of risk) becoming integrated in the judgment, resulting in risk-averse or risk-seeking behavior. Deliberative people, on the contrary, seem to base their decisions on the stated values rather than on affect. It seems unlikely that deliberative people do not have any affective reactions to the lotteries, but they might therefore abstract from this affective information and might discount or neglect it when making their judgments (a process that requires time). (11)

Approaches to modeling risky decision making now exist that not only acknowledge that affect plays a role in the process, but in fact have the experiential system as the core process. Moods, in particular, are believed to influence the type and amount of risks people are willing to take. Slovic et al. (2004, 315) found that 'people base their judgments on an activity or a technology not only on what they think about it but also on how they feel about it. If their feelings toward an activity are favorable, they are moved toward judging the risks as low and the benefits as high; if their feeling toward it are unfavorable, they tend to judge the opposite – high risk and low benefit. Under this model, affect comes prior to, and directs, judgments of risk and benefit' (315).

There is some evidence to suggest that collective mood or market sentiment impacts stock and bond market returns at the macro-level (Olson 2006). For instance, Clarke and Statman (1998) found that high returns in the stock market, over short periods of time, are associated with increased bullishness among investment newsletter writers. Clarke and Statman hypothesized that volatility in the markets increases bullishness. While not explicitly stated, their findings suggest that newsletter writers' moods appear to impact risk-taking attitudes, and that the moods of investors change over short periods of time.

The risk-as-feelings hypothesis

A framework that combines the rational/analytic and experiential systems is the 'risk-as-feelings' hypothesis proposed by Loewenstein and his associates (2001). This

model postulates that individuals evaluate risky situations using both cognitive and affective processes. In this framework, cognitive evaluations are based on subjective probability estimates and anticipated outcomes, whereas feelings about risk are influenced by factors such as vividness and mood. A unique feature of the model is the proposition '…that responses to risky situations (including decision making) result in part from direct (i.e. not cortically mediated) emotional influences…' (270). In other words, according to Slovic et al. (2004), 'affect influences judgment directly and is not simply a response to a prior analytic evaluation' (315). Schwarz (2000) pointed out that even though emotion (i.e. mood) appears to affect a person's judgment about future events directly, the relationship between affect and decision making is bidirectional. In other words, it is possible that outcomes associated with given behaviors can induce changes in emotions resulting from the gains and losses experienced with the risky behavior.

Decisions that are influenced by emotions and moods tend to be easier, faster, and often more efficient than decisions made using a rational/analytic system. This is not to say that experiential decision systems that have an affect basis always lead to optimal financial risk choices. It is possible that a person's mood can cause short-term myopic decisions that do not account for later changes in emotions and circumstances. Loewenstein and his associates (2001) noted that affect can even play an important role in traditional risk-averse forward-looking decision making. If this is true, the role of moods and emotions in influencing rational/analytic decision systems becomes a topic of interest not only to behavioralists but economic rationalists as well.

Determinants of risk tolerance

Biopsychosocial and environmental factors

Irwin (1993) presented a risk-taking behavioral model that can be used as a framework for understanding the determinants of risk tolerance and risk taking. Irwin suggested that both environmental and biopsychosocial factors can exert an influence on risk tolerance. Environmental factors, as defined by Irwin, include individual and family financial attributes. Examples of environmental factors are income, net worth and home ownership status. Biopsychosocial factors are those aspects of an individual's life that reflect stable (perhaps immutable) individual differences. These factors include one's demographic characteristics (e.g. racial background, age and gender) and deeply ingrained or inherent personality dimensions over which a person has little or no control. Examples of the latter are traits that result from a person's social environment, attitudes, beliefs and psychosocial factors.

In general, the literature to date confirms that both environmental and biopsychosocial factors play a role in the way a person evaluates financially risky situations (Callan and Johnson 2002; Coleman 2003; Goodall and Corney 1990; Grable and Joo 2004; Grable and Lytton 1998; Hawley and Fujii 1993–1994; Horvath and Zuckerman 1993; Huston, Chang, and Metzen 1997; Kennickell, Starr-McCluer, and Sunden 1997; Roszkowski 1999; Sung and Hanna 1996; Wang and Hanna 1997; Wong and Carducci 1991). Eleven environmental and biopsychosocial variables commonly emerge in research findings as being associated with financial risk-taking attitudes (see Bajtelsmit 2006 for a discussion of some of these factors).

Table 1. Factors affecting financial risk-tolerance attitudes.

Variable	Type	Characteristic	Relationship
Age*	Biopsychosocial	Younger	Positive
Gender	Biopsychosocial	Male	Positive
Race/ethnic background	Biopsychosocial	Non-Hispanic White	Positive
Financial satisfaction	Biopsychosocial	Higher	Positive
Household income	Environmental	Higher	Positive
Net Worth	Environmental	Higher	Positive
Education	Environmental	Higher educational level	Positive
Homeownership	Environmental	Own home	Positive
Marital status*	Environmental	Single	Positive
Employment status	Environmental	Employed full-time	Positive
Financial knowledge	Environmental	Higher	Positive

*Research findings are not consistent in the relationship to risk tolerance; curvilinear effects have sometimes been noted with age.

The relationships between these variables and financial risk tolerance are summarized in Table 1.

Mood

In a recent discussion of risk tolerance at Morningstar Forums (2007), a participant named Megan made the following astute observation: 'My risk tolerance sometimes is high, sometimes is low (depends on my mood, hah)'. This is anecdotal evidence that an important factor missing in Table 1 is mood. A person's mood is known to impact all types of daily decisions, including the type of clothes worn, food eaten, and participation in risky and non-risky activities (Ackert, Church, and Deaves 2003; Hirshleifer and Shumway 2003; Schwarz 2000). Therefore, it would be quite strange if mood did not exert some influence on risk tolerance, as Megan suggested. Megan failed to indicate, however, whether a good mood raised or lowered her risk tolerance. In general, there exists controversy about the way mood affects a person's financial risk-tolerance (Hockey et al. 2000).

Evidence in support of the Affect Infusion Model (AIM)

Based on AIM, individuals who exhibit a positive mood when making a risky choice tend to be willing to take more risks than those with a negative or neutral mood. A number of studies have reported results supporting AIM (Chou, Lee, and Ho 2007; Deldin and Levin 1986; Fehr et al. 2007; Johnson and Kahneman 1983; Leith and Baumeister 1996; Mayer et al. 1992; Mittal and Ross 1998; Nygren et al. 1996; Pietromonaco and Rook 1987; Wegener, Petty, and Klein 1994; Williams 2004; Wright and Bower 1992; Yuen and Lee 2003). For instance, Wright and Bower found that cheerful people (i.e. those in a 'happy' mood) tend to be more optimistic in general, and that optimistic people are more likely to report higher probabilities for positive risk events and lower probabilities for negative risk events. They observed that mood states have a greater influence on judging events that were less

frequent. Sizer (2000) added that people may be less cautious when in a happy mood because positive moods are associated with wide informational focusing and lessened concentration on details. According to Schwarz (2000, 433), 'Individuals are likely to evaluate about any target more positively when they are in a happy rather than sad mood'.

Schwarz (2000) recommended that researchers studying the role of moods on decision making do so by accounting for mediating factors, such as gender. In fact, Fehr et al. (2007) did find a substantial gender difference in the impact that a good mood exerts on subjective probability weighting. Females in a good mood assigned higher subjective probability weights under both gain and loss scenarios, consistent with AIM. As a group, men, on the other hand, were not influenced by good mood.

One possible reason is that the men were more analytical in their approach to the task, with 40% reporting that they made their decisions on the basis of the lotteries' expected payoffs. Among the women, only about 8% used expected value calculations to benchmark their decisions. This finding suggests that, in the terminology used by Schunk and Betsch (2006), women are more 'intuitive' while men are more 'deliberative'.

The males who used the expected value approach were especially resistant to the influence of moods, but even men who do not use this rule showed only a weak mood effect, so adherence to mechanical rules does not explain the sex difference entirely. While this finding may suggest that women were less rational in their approach to the task, their probability weighting function under a good mood was less S-shaped, indicating that when in a positive frame of mind, they made more rational decisions. Good mood had an especially strong influence on women when the stated probabilities were high for gains and low for losses.

Another mediating factor may be age. According to Chou et al. (2007), most studies of mood and risk taking compare a good mood to a neutral mood, with relatively few comparing a neutral to a bad mood. Yuen and Lee (2003) found that people under an induced sad mood were less risk tolerant than people in a neutral mood, consistent with the predictions based on AIM. However, people in an induced happy mood were not more risk tolerant than people in a neutral mood. In other words, Yuen and Lee discovered that mood has an asymmetrical impact on risk tolerance. That is, the difference in risk taking between an induced negative mood and a neutral state was larger than the difference between an induced positive mood and the neutral state.

Chou et al. (2007) suggested that the findings from the Yuen and Lee (2003) study may be due to the fact that the participants were young people, who have a tendency to focus more on the negative rather than the positive aspects of a situation. In Chou et al.'s study, young and old people were therefore compared to see if positive and negative moods have an asymmetrical impact on risk taking among older individuals as well. As in the earlier study (i.e. Yuen and Lee 2003), Chou et al. found that among the young, there was no difference in risk taking between positive versus neutral moods, but there was a difference between the negative and neutral states. In contrast, the opposite occurred among the older subjects. Namely, the difference in risk taking was greater between the positive and the neutral mood states than between the neutral and the negative state. If the neutral point is disregarded, then for both the young and old participants, greater risk taking was evident among those in a happy mood than those in a sad mood.

Mehra and Sah (2002) examined the theory of projection bias and moods. Projection bias suggests that individuals take actions today as if the circumstances used to make the decision will persist into the future. This is a bias because people's preferences change over time; however, when making risky decisions, people tend to not account for these shifting preferences. Mehra and Sah hypothesized that individuals project their current mood into their visualization of the future. They found that 'small fluctuations in investors' discount factors induce large fluctuations in equity prices' (883), and that, in general, positive moods (i.e. projections) lead to increases in equity prices. Again, these results are consistent with AIM.

Two studies on the role of weather fluctuations on moods and equity prices also support the AIM hypothesis. Kamstra, Kramer, and Levi (2003) found the effects of a seasonal affective disorder (SAD) in stock market returns. Basically, SAD is a psychological condition where a reduction in the number of daylight hours is correlated with the onset of depressive symptoms. In such cases, fewer daylight hours result in increased levels of depression. Kamstra and his associates found a clear link between SAD symptoms and lower risk-taking behaviors. Hirshleifer and Shumway (2003) also discovered that the amount of sunshine in a given market influences moods, and that these moods in turn impact stock market returns. In their study, Hirshleifer and Shumway collected weather data in the major stock trading centers in 26 countries from 1982 to 1997. They concluded that 'Sunshine is strongly significantly correlated with stock returns' (1009), and that 'People in good moods tend to generate more unusual associations, perform better in creative problem-solving tasks, and show greater mental flexibility' (1012).

Evidence in support of the Mood Maintenance Hypothesis (MMH)

A smaller number of studies have reported support for MMH. Isen and Geva (1987) and Isen and Patrick (1983) report that positive moods produce risk-averse financial behaviors. A study by Kliger and Levy (2003) also used weather conditions as a proxy for mood, but unlike the results of Kamstra, Kramer, and Levi (2003), their findings were more in line with MMH. In real capital market decisions, investors were less risk tolerant under pleasant weather conditions (i.e. proxy for good mood) and more risk tolerant during unpleasant weather conditions (i.e. proxy for bad mood). Hockey and his associates (2000) found that risk-taking propensities were affected by a person's level of fatigue, which induced a negative mood. When in a negative mood induced by fatigue, people exhibited increased levels of risk taking. According to Hockey et al., 'Risky decisions are thought to be rejected under positive moods because the likely loss will upset the good mood state, whereas the likely gain from a low risk decision would serve to enhance or maintain it' (824).

Gaps in literature

In summary, there is ample evidence to suggest that a person's mood is related to the amount of risk they are willing to tolerate at any given time, but it is not clear what direction it will take. Given that nearly all of the previous literature is based on either macro-economic data or experiments using participants with induced mood states rather than naturally occurring moods, an apparent need exists to further study the influence of mood on risk-tolerance using individuals in a natural state of mind

engaging in daily financial decision-making situations. Moreover, since nearly all studies to date have compared a positive to a neutral mood but relatively few studies have addressed the impact of negative mood on risk taking, there is value in further examining the effects of a negative mood on risk taking.

Methodology

An ordinary least-squares regression model was used to determine if people who exhibited a happy, neutral and gloomy mood at the time they completed a financial risk-tolerance quiz scored differently, holding other relevant factors constant.

Participants

Data for this study were obtained from a convenience sample of mid-western individuals who replied to a survey during spring 2005. The survey was sent to randomly selected, employed individuals from databases owned by the research team. Just over 1300 surveys were originally mailed (using the US postal service); 548 were returned. Thirty-six surveys were returned as undeliverable, while three were returned with missing data. Nine surveys were returned but not opened. The useable return response rate was calculated to be 38%. Given missing data, the sample size for this study was reduced to 460 respondents.

The mean age of respondents was 44 years (SD=12). Nine percent of respondents were never married, 4% were not married but living with a significant other, 4% were in a significant relationship, 63% were married, 8% were remarried, 1% were separated, 8% were divorced and 3% were widowed or other. Less than 1% of the sample was self-employed. Six percent were employed part-time, while 85% were employed on a full-time basis. One percent was either retired or a student; 7% were not employed. Over 92% of sample respondents were non-Hispanic Whites. Two percent were African-American/Black, 2% were Hispanic/Latino, and 4% indicated another ethnic/racial background including Native American, Asian/Pacific Islander or Other.

The sample was relatively homogenous and representative of the three communities from which data were collected. However, the sample was over-represented by women. Seventy-one percent of respondents were women, while 29% were men. Moreover, on average the respondents were better educated and wealthier than the state and nation. For approximately 10%, a high school diploma or less was the highest educational attainment. Twenty-eight percent had some college or vocational training, 6% held an associate's degree, 34% held a bachelor's degree, and 22% earned a graduate or professional degree. The median household income, computed on grouped data, was $55,702.

Outcome variable

A 13-item risk-tolerance scale (Grable and Lytton 1999) was used as the dependent variable. For illustration, several sample items from the scale are shown below:

- If you unexpectedly received $20,000 to *invest*, what would you do?

    a. Deposit it in a bank account, money market account, or an insured CD
    b. Invest it in safe high quality bonds or bond mutual funds
    c. Invest it in stocks or stock mutual funds

- When you think of the word 'risk' which of the following words comes to mind first?

    a. Loss
    b. Uncertainty
    c. Opportunity
    d. Thrill

- Some experts are predicting prices of assets such as gold, jewels, collectibles and real estate (hard assets) to increase in value; bond prices may fall; however, experts tend to agree that government bonds are relatively safe. Most of your investment assets are now in high interest government bonds. What would you do?

    a. Hold the bonds
    b. Sell the bonds, put half the proceeds into money market accounts, and the other half into hard assets
    c. Sell the bonds and put the total proceeds into hard assets
    d. Sell the bonds, put all the money into hard assets, and borrow additional money to buy more

- Given the best and worst case returns of the four investment choices below, which would you prefer?

    a. $200 gain best case; $0 gain/loss worst case
    b. $800 gain best case; $200 loss worst case
    c. $2600 gain best case; $800 loss worst case
    d. $4800 gain best case; $2,400 loss worst case

Possible scores on the scale can range from 13 (lowest risk tolerance) to 47 (highest risk tolerance). Scores in this study ranged from 14 to 34. The mean and standard deviation of the distribution were 23.16 and 4.10, respectively. The Cronbach's alpha coefficient in this sample was 0.70, suggesting an adequate level of reliability for research.

Grable and Lytton (1999, 2001) employed a principal components factor analysis in the development of the scale. The factor analysis resulted in three extracted factors: investment risk, risk comfort and experience, and speculative risk. The reliability of the overall instrument, using Cronbach's alpha, has ranged from 0.70 to 0.85 (Yang 2004). The validity of the instrument has also been assessed. For example, Grable and Lytton (2001) compared the scale to the Survey of Consumer Finances (SCF) risk-assessment item. They found a modest positive correlation between the two measures (i.e. $r = 0.54$). Grable and Lytton (2003) also conducted a follow-up study of the scale's criterion-related validity, finding that scores on the scale were positively related to the level of equity assets owned by individuals. Lower scale scores indicated an increased likelihood of holding cash or fixed-income assets.

Control variables

While the focus of the study was the relationship between mood and risk tolerance, 11 other independent variables (Table 2) were included in the model to serve as control variables for environmental and biopsychosocial influences on risk tolerance.

Table 2. Control, independent, and dependent variables used in the regression model.

Variable	Descriptive statistic
Control variables	
Age	$M=44.29$ (SD$=12.00$)
Gender (1=male)	29%
Race/Ethnic Background (1=non-Hispanic White)	94%
Household Income (1=less than $20,000, 5=$50,001–$60,000, 10=over $100,000)	$M=5.21$ (SD$=2.48$)
Self-reported net worth (1=in serious debt,10=money left over)	$M=7.61$ (SD$=2.64$)
Educational status	
Some college or less	37%
Associate's degree	6%
Bachelor's degree	35%
Graduate degree	22%
Own home	76%
Married	64%
Employed full-time	90%
Financial knowledge (1=the lowest level, 10=the highest level)	$M=6.42$ (SD$=1.73$)
Financial satisfaction (1=extremely unsatisfied,10=extremely satisfied)	$M=5.62$ (SD$=2.04$)
Independent variables	
Mood	
Happy	38%
Neutral	57%
Gloomy	5%
Dependent variable	
Grable and Lytton risk tolerance questionnaire	$M=23.16$ (SD$=4.10$)

Age was measured at the interval level, while gender was coded 1 if male, otherwise 0. Non-Hispanic Whites, those who owned their own home, those who were married and those employed full-time were coded 1, otherwise 0. Those with an Associate's, Bachelor's, or Graduate degree were compared to those with some college education or less (i.e. the reference category). Household income was used as an interval variable. Financial satisfaction and financial knowledge were measured using 10-point self-assessment scales that asked respondents to circle the number that represented how satisfied they were with their present financial situation and how knowledgeable they thought they were about personal finances compared to others, respectively. The scales were similar to ones used by Joo (1998) and Prawitz et al. (2006). Higher scores indicated increased satisfaction and knowledge. Self-reported net worth was measured using a 10-point scale originally designed by Porter (1990) and subsequently revised by Joo. Respondents were asked to indicate if they would be in serious debt (1), break even (5), or have money left over (10) if they sold all of their major possessions, investments, and other assets and paid off their debts.

Independent variable

A respondent's affective state was assessed at the time the survey was completed. The mood measure included in the analysis was the first question on the survey. This

placement is crucial because earlier questions can affect the answer to the mood question (Kahneman and Krueger 2006; Kahneman et al. 2006). It consisted of a self-rating into one of three categories: happy, neutral and gloomy. The percentage of the sample in each mood was: 38% happy, 57% neutral and 5% gloomy. The respondents did not receive any immediate gratuity for participating; however, respondents could request results from the study. This aspect of the study is being made explicit, since it is possible that receipt of compensation might significantly lift a participant's mood before completion.

The small percentage of respondents in a gloomy mood posed a dilemma. Several options were considered: eliminate them from the analysis, combine gloomy with neutral, and run the analysis with three levels of mood. Given the purpose of the study, eliminating gloomy respondents was deemed a poor choice. The findings reported by Chou et al. (2007) and Yuen and Lee (2003) argue against option *b*. Option *c* appeared most reasonable given that a search of the literature on the distribution of happy, neutral and sad moods suggests that the frequency of the gloomy mood in our sample probably represents the actual distribution of gloomy moods in the population (Almeida, Wethington, and McDonald 2001; Crawford and Henry 2004; Kahneman et al. 2006; Kennedy-Moore 1992; Ram et al. 2005). In essence, few people are unhappy at any one moment for long. To illustrate, consider a *Time* magazine telephone poll conducted 13–14 December 2004 and reported in the 17 January 2005 issue (Wallis 2005). Among the 1009 adults surveyed by SRBI Public Affairs about how frequently they are happy, 78% reported being happy 'most or all the time', 16% answered 'some of the time', and only 5% said 'not very often'.

Respondents who were happy or gloomy were compared to those who were neutral in terms of mood (i.e. neutral was the reference category). It was hypothesized that respondents who were in a happy mood would exhibit a higher risk tolerance, holding all other factors constant, whereas those in a gloomy mood should score lower on the risk-tolerance scale.

Data analysis method

An ordinary least-squares regression was used to determine the relationship between mood and risk-tolerance, controlling for other variables related to risk tolerance. Multicollinearity was not an issue. All analyses were run using SPSS 15.0 for Windows.

Results

Descriptively, the mean risk-tolerance scores for the three mood states were as follows when uncontrolled for possible confounding variables: gloomy=22.77 (SD=4.34), neutral=23.84 (SD=0.18) and happy=24.54 (SD=4.68). To determine the independent contribution of mood on risk tolerance, an ordinary least-squares (OLS) multiple regression was employed. A number of regression analyses were conducted, but only the final regression model is shown in this paper. In addition to the regression model that is displayed, models were tested (not shown) that included curvilinear variables for age and income. The inclusion of these variables did not significantly improve the amount of explained variance in the model. Also, because others have found gender differences in the effect of mood on risk tolerance (i.e.

females more subject to it), and possible asymmetry issues (e.g. Chou et al. 2007), four terms were created to account for possible interactions between gender and mood and age and mood. The regression models that included these interaction terms were over-specified. As such, the final regression model excludes these interactions.

Results from the final multiple regression analysis, reported in Table 3, indicate that 10 of the control variables shown in Table 2 were significantly associated with financial risk tolerance. Age was negatively associated with risk tolerance, which means that younger respondents, on average, were willing to take more financial risk than older respondents. Males were found to be more risk tolerant than females. Household income and reported net worth were both positively related to risk tolerance. Respondents who held an Associate's, Bachelor's or Graduate degree were progressively more risk tolerant than the reference category (some college or less). Those who considered themselves to be more financially knowledgeable were more risk tolerant. Finally, financial satisfaction was associated with risk tolerance, but the relationship was negative (i.e. the less satisfied a respondent was with their current financial situation, the more likely they were to have a higher risk tolerance, on average).

After controlling for these variables, mood was found to still be predictive of risk tolerance. The Beta (standardized regression coefficient) indicates that being in a happy mood was positively associated with having a higher level of financial risk tolerance as compared to the reference category (i.e. neutral mood) when holding the control variables constant. Conversely, participants who were in a gloomy mood

Table 3. Results of regression analysis showing relationship between mood and risk tolerance, controlling for biopsychosocial and environmental variables.

Variable	b	SE	Beta	t
Age	−0.04	0.02	−0.11	−2.16*
Gender (1=male)	1.72	0.46	0.17	3.78***
Race/ethnic background (1=non-Hispanic White)	−0.75	0.97	−0.04	−0.76
Household income	0.31	0.11	0.17	2.85**
Self-reported net worth	0.21	0.10	0.13	2.01*
Educational status				
Associate's degree	1.73	0.75	0.18	2.30*
Bachelor's degree	2.25	0.77	0.24	2.92**
Graduate degree	3.02	0.82	0.29	3.68***
Homeownership (1=own home)	0.03	0.65	0.01	0.04
Marital status (1=married)	−0.55	0.48	−0.06	−1.15
Employment status (1=employed full-time)	0.99	0.70	0.07	1.43
Financial knowledge	0.49	0.13	0.20	3.80***
Financial satisfaction	−0.29	0.13	−0.13	−2.22*
Mood				
Happy	0.88	0.43	0.10	2.03*
Gloomy	−0.31	1.05	−0.01	−0.30

$F=5.91$***, $R^2=0.18$, adjusted $R^2=0.15$.
*$p<0.05$, **$p<0.01$, ***$p<0.001$.

exhibited lower risk-tolerance scores relative to those who were neutral, but this Beta was extremely small and failed to reach statistical significance. This suggests that a positive mood has greater bearing on risk tolerance than does a negative mood. The asymmetry observed in previous studies is suggested by the descriptive data but the small number of cases in a gloomy mood did not allow enough power to permit for an inferential analysis to establish that mood has an asymmetrical impact on risk taking (as suggested by Chou et al.).

Discussion

As shown in this and other studies, risk tolerance is related to relatively static biopsychosocial and environmental variables that served as the control variables in the present study. Younger respondents, males, and those with higher incomes and net worth were more risk tolerant than others. Financial knowledge and education were positively related to risk tolerance, whereas financial satisfaction was negatively associated with a person's willingness to take financial risks.

Most notably, results from this study show that transient states such as mood also have a bearing on risk tolerance that is as strong as some of the environmental and biopsychosocial variables. This too has been demonstrated in previous studies, but much of the previous literature devoted to assessing the relationship between mood and financial risk taking reported findings based on data collected at either the macro level (e.g. Hirshleifer and Shumway 2003) or via psychological experiments (e.g. Wright and Bower 1992) that looked at induced moods rather than naturally occurring ones. Little has been known about how mood affects the scores on a risk tolerance questionnaire of the type commonly used by financial advisors. Results from this study document that a client's mood has a bearing on the score he or she obtains on such a measure. Test-takers who classified themselves as happy scored significantly higher relative to persons in a neutral state, even when holding all other known relevant factors constant.

From an academic point of view, findings showing an association between mood and risk tolerance suggest that the newer models of risk taking, such as the risk-as-feelings framework, might offer insights into decision making involving risk that are not currently addressed using traditional economic utility theories. The results add further credence to the risk-as-feelings hypothesis since it appears that individual assessments of risk are influenced by the affect attribute of mood. More specifically, these findings are consistent with the preponderance of research published to date (Schwarz 2000) in offering support for the AIM of risk taking rather than the MMH.

Currently, economic utility theory and financial decision-making models based on the theory (e.g. MPT and CAPM) do not account for inputs that might be considered 'irrational'. Changing one's taste for risk on different occasions because of mood is quite 'irrational' in an economic sense. However, this does appear to be the case, and current economic utility theory does not account for this anomaly, whereas the AIM and the risk-as-feelings hypothesis do. The data support Jackson's (2006) contention that 'cognitive and affective appraisals may interact; feelings about a risk object may infuse more formal and numeric appraisals' (258). As Loewenstein et al. (2001) suggest, cognitive and experiential processes can operate side-by-side.

These findings also have practical policy implications. Economic utility theory posits that individuals act rationally when making risk and return tradeoffs, and as such their performance on a risk-tolerance questionnaire should not be subject to the vagaries of mood. Results of this study indicate that this assumption may only partially be true. The data indicate that risk tolerance is a function, in part, of a person's current affective state. Although longitudinal changes were not explicitly examined in this study, the data suggest that rather than assuming that risk tolerance is static and fixed, and then using this test score as a factor in the determination of the appropriate risk and return tradeoff, it may be more astute to assume that risk tolerance evaluations can change as a person's mood changes. Being in a euphoric mood when taking such a test could result in an overestimation of an investor's typical risk tolerance level. Someone who is happy when completing a risk tolerance questionnaire may be unknowingly projecting current mood into the future without realizing that because of this, the long-run level of risk tolerance is being compromised. In other words, clients in happy moods may be engaging in a projection bias, and it might be wise for such clients and their advisors to step back and reevaluate the level of risk offered by a service or product before purchase when in a more neutral state.

Although the findings from this study are noteworthy, it is important to consider several caveats. First, the number of participants in a gloomy state was small, which limits the power of any analyses involving that group. That is, the small number of participants in a gloomy mood did not permit for statistical inferences on the asymmetry issue. Second, the mood measure consisted of a single item self classification, which can be questioned because single item scales tend to be less reliable than a composite based on a number of different items. Third, it cannot be ruled out that there may have been a self-section bias in the sample. For example, potential respondents who were very gloomy might have lacked the motivation to even complete the survey. Fourth, it would be useful to determine if the effects of mood identified in this study are unique to the middle US or whether these differences are geographically broader. Likewise, no international comparisons were possible. Fifth, the sample was limited in its racial and ethnic diversity. Since almost all respondents to the survey were non-Hispanic White, possible interactions between ethnicity and mood on risk tolerance could not be studied. Finally, research is needed to examine the interplay among risk tolerance and mood with other variables, such as self-esteem, investment choice and asset accumulation over time. The limitations inherent in this study provide ample opportunities for future research.

Notes

1. In fact, much of the literature indicates that financial risk tolerance, which is defined as a person's willingness to engage in 'behaviors in which the outcomes remain uncertain with the possibility of an identifiable negative outcome' (Irwin 1993, 11), is closely associated with financial behaviors as described by MPT and CAPM (Hariharan, Chapman, and Domian 2000; Irwin 1993; Morse 1998; Trone, Allbright, and Taylor 1996). For example, Hariharan and his associates found that 'increased risk tolerance reduces an individual's propensity to purchase risk-free assets' (159). As predicted by MPT, high risk tolerance tends to be associated with the propensity to save (Cavanagh and Sharpe 2002; Chang

1994; Chen and Finke 1996; Huston and Chang 1997), the likelihood of owning investment assets (Xiao 1996), and participating in retirement plans (Yuh and DeVaney 1996).

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