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Emotional Intelligence and Investor Behavior



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Peter Salovey, provost of Yale University, is the Chris Argyris Professor of Psychology at Yale. Professor Salovey is the founding editor of the *Review of General Psychology* and an associate editor of the *Emotion and Psychological Bulletin*. He has authored or edited 13 books (translated into 11 languages) and published more than 300 journal articles and essays focused primarily on human emotion and health behavior. Professor Salovey has served on the National Science Foundation's Social Psychology Advisory Panel, the National Institute of Mental Health Behavioral Science Working Group, and the National Advisory Mental Health Council of the National Institute of Mental Health. He received a National Science Foundation Presidential Young Investigator Award, a National Cancer Institute CIS (Cancer Information Service) Partner in Research Award, and a Substance Abuse and Mental Health Services Administration Excellence Award. Professor Salovey has won both the William Clyde DeVane Medal for Distinguished Scholarship and Teaching at Yale College and the Lex Hixon '63 Prize for Teaching Excellence in the Social Sciences. He received an AB and MA from Stanford University and a PhD from Yale.

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Foreword

Does it really help investment performance to be able to keep your head when all about you are losing theirs?¹ Logic suggests that the answer is “yes” because booms are followed by busts, which are followed, in turn, by new booms. (This cycle seems to exist at the industry and security level as well as at the market index level.) Investors who can trade against this cycle of emotion—buying when others are panicking and selling when others are basking in their newfound fortune—should be able to beat the market index.

This question seems particularly timely as I write this foreword in December 2008. The S&P 500 Index has fallen 52 percent from peak to trough and as much as 8.8 percent in one day. Outside the United States, many markets have fallen even farther. Is it time to buy? Before responding, “Of course, it is,” the reader should consider the following questions:

- Buy how much? Just enough to rebalance to a preset asset mix? Or more?
- How quickly? Should one “average in” to the new target? Or reallocate all at once?
- If you are wrong and the market falls another 20 percent, should you then sell? Or should you buy even more?

Investors who take what my friend and frequent co-author Barton Waring calls a “clear-eyed, hard-headed” view of markets may not have much trouble with these questions, but such investors are few. Most investors have difficulty overcoming fear when prices are falling, so they buy too little; then, they become subject to greed when prices are rising and sell too little or hold too long.

The advantage of being able to manage one’s emotions productively is not confined to such market timing. Emotionally laden decisions include how much active management to use, how frequently to trade, how concentrated one’s portfolio should be, how extensively to use risky or novel strategies, and—perhaps most importantly—how much to save and invest (as opposed to consuming).

Anyway, we should not be satisfied with our (admittedly sensible-sounding) guess that investors who can manage their emotions might perform all of these tasks better than those who are overpowered by their emotional reactions. We want data!

In *Emotional Intelligence and Investor Behavior*, John Ameriks, Tanja Wrانik, and Peter Salovey provide exactly that. Having conducted a survey of Vanguard IRA and 401(k) investors, the authors show that investors who score highly on tests of “emotional intelligence” (EI) tend to exhibit behaviors (e.g., the use of low-cost fund options, a decision not to trade too frequently) that correlate strongly with good investment performance.

¹Apologies to Rudyard Kipling.

EI is something quite different from being emotional or being in touch with one's emotions. It is defined by the authors as the ability "to recognize and use emotions productively." Thus, in some situations, being emotional may pay off; in others, being coolly dispassionate will garner rewards. Either type of response could be defined as emotionally intelligent because the criterion is whether the response is *productive* (that is, has a positive payoff).²

The idea that there is more than one kind of intelligence (not just IQ or some other general measure) dates back at least to the work of Howard Gardner, who, in a celebrated 1983 book, identified a constellation of "intelligences"—including logical, linguistic, bodily, musical, interpersonal, and so forth.³ The psychologist Peter Salovey, one of the co-authors of this work, is noted for developing the idea of, and devising tests of, EI, which is a concept closely related to Gardner's interpersonal intelligence.⁴ Salovey and his colleagues have conducted their research on EI in multiple settings and demonstrated that it plays a significant role in positive social relationships, health, and well-being. In a chapter entitled "Applied Emotional Intelligence: Regulating Emotions to Become Healthy, Wealthy, and Wise" in Salovey (2001), the author suggested that EI should also play an important role in financial decision making. Similarly, Charles Ellis, a financial expert and author of several books, is convinced that because emotions are rampant in the domain of financial decision making, those who are emotionally intelligent should be better investors. Inspired by these ideas, financial economist John Ameriks and psychologist Tanja Wranič set out to test them empirically. We are very pleased to present the fruits of this interdisciplinary effort.

Laurence B. Siegel
Research Director
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²On the basis of this book's findings, emotionally intelligent investors who are familiar with the zero-sum nature of active management can rest easy. Such investors need someone to trade with—someone to buy what they are selling and vice versa. These trading partners must be, almost by definition, not all that emotionally bright. The authors of this book find that the supply of this group of people is not in danger.

³*Frames of Mind: The Theory of Multiple Intelligences* (New York: Basic Books)

⁴Salovey and Mayer (1990); Salovey (2001).

Preface

In this study, we evaluate associations between an investor’s “emotional intelligence” and the investor’s investment decisions. Emotional intelligence is a psychological characteristic that describes how effectively an individual identifies, understands, and regulates emotions and then uses them in problem solving and decision making. Based on data from an online survey of Vanguard Group investors, together with transactional and account balance records from Vanguard, we show that emotional intelligence and other psychological characteristics have noteworthy relationships with various aspects of financial decision making, including the frequency of transactional activity, the decision to invest in stocks, and the use of actively managed mutual funds and index funds.

After we review the important psychological concepts used in the study, we describe our sampling methodology, our data, and the empirical methodology we used. We then present our analysis of the results. In the concluding section, we also discuss possible avenues for further research. In Appendices A and B, we include some additional details on the raw test scores and the complete results from our statistical analysis of equity shares. Additional regression results, as well as an image of the invitation letter sent to survey participants, are available in our online supplemental materials at www.cfapubs.org. These details were omitted from the body of the paper to maintain our focus on the key issues at hand.

Our findings suggest that these psychological variables have a significant impact on investment outcomes. They also suggest that an important role for advisers and other financial intermediaries may be to ensure that their clients are aware of the roles (constructive and destructive) that personality and emotional intelligence can play in financial decision making.

We would like to thank the following people and institutions for help in this research project: Significant research assistance was provided by Karin Peterson Labarge and Liqian Ren of Vanguard. The Research Foundation of CFA Institute graciously provided financial support for the research. And Multi-Health Systems assisted in the design and administration of the survey instrument used to collect data and for making the MSCEIT (*Mayer-Salovey-Caruso Emotional Intelligence Test*) instrument available for this research. We would also like to thank Charles Ellis for initially suggesting a research collaboration between the authors and institutions involved in this project.

Emotional Intelligence and Investor Behavior

Although gains and losses are a normal part of the economic cycle, most investors do not respond equally to gains and losses (Kahneman and Tversky 1973, 1979). Investors feel positive emotions from a realized gain but relatively stronger negative emotions from a realized loss of the same size. As a result, some investors sell their winners prematurely while hanging on to their losers (Shefrin and Statman 1985; Barber and Odean 1999). Some trade too much, others, too little (Barber and Odean 2000). In the past, behavioral finance research attributed these kinds of mistakes primarily to cognitive heuristics and biases (Gilovich, Griffin, and Kahneman 2002). Recently, psychologists and economists have shown increased interest in the role of emotions in economic behavior and decision making (e.g., Hopfensitz and Wranik 2008; Loewenstein 2000; Thaler 2000). Indeed, ample evidence now exists that feelings significantly influence decision making, especially when the decision involves risk and uncertainty (Schwarz 1990; Forgas 1995; Isen 2000; Loewenstein, Weber, Hsee, and Welch 2001). Researchers still have much to learn, however, about the influence of individual differences in these processes and the role these differences and processes play in real financial investment decisions and behavior.

In the research reported here, we explored the relationship between investment decisions and three psychological variables: emotional intelligence (a measure of a person's ability to perceive, understand, use, and manage emotional signals), personality, and impulsiveness (the inclination to act on impulse instead of careful reflection). We found important relationships among aspects of these three psychological constructs and various investment behaviors.

Psychological Concepts

Experts have identified a number of personality and other individual differences factors that may systematically influence investment decisions (see, for example, Salovey 2001); however, there is still very little empirical evidence to determine the impact and importance of these variables (Hopfensitz and Wranik 2008). Based on past research and experience, we thus chose to focus on three psychological variables expected to play a major role to our study: emotional intelligence, personality, and impulsiveness.

What Is Emotional Intelligence? For our purposes, we use the term “emotional intelligence” (EI) in a more scientific and specialized sense than the concept popularized by such best-selling books as *Emotional Intelligence* (Goleman 1995). In the popular conception, EI comprises a broad range of personality traits, social skills, and qualities, such as “character.” In our research, EI is a precisely defined and measured capacity similar to traditional aspects of intelligence. Traditional intelligence is a person’s ability to use observed information or data (language, patterns, and spatial relationships) to think productively. Emotional intelligence is a person’s ability to recognize and interpret emotions and to use and integrate them productively for optimal reasoning and problem solving (Salovey and Mayer 1990; Mayer and Salovey 1997). In this way, EI is similar to traditional intelligence, but EI uses *moods* or *emotions* as data or information.

Emotional intelligence should be distinguished from simply “emotional.” An emotional person may feel and/or act more intensely than others; an emotionally intelligent person is one who is able to recognize and use emotions productively.

Research in the past decade has shown that moods and emotions play important roles in reasoning, decision making, and social relationships. Moreover, and contrary to popular beliefs, moods and emotions play not only the role of “culprit” in these processes (and hence need to be eliminated or minimized) but often play the role of “adviser” by containing valuable signals and clues that facilitate optimal personal choices and decisions. The trick is to know how to use moods and emotions in an advantageous manner. Those who are high in EI are able to use and integrate their moods and emotions effectively. Those who are low in EI may ignore, misinterpret, or be overwhelmed by their moods and emotions and thus may not reap the potential benefits of these cues. Given the pervasiveness of moods and emotions in all spheres of life (including financial decision making), the EI form of intelligence is gaining in acceptance and the definitions, research, and measures of EI are becoming more sophisticated over time (for a thorough review, see Mayer, Roberts, and Barsade 2008).

Our EI research is based on Mayer and Salovey’s ability-based model of EI (1997) and on an ability-based emotional intelligence test developed by Mayer, Salovey, and Caruso (2002)—namely, the MSCEIT (Mayer–Salovey–Caruso Emotional Intelligence Test). The model by Mayer and Salovey (1997) comprises four distinct competencies:

- *perceiving emotions*—recognizing emotional signals in people’s faces and via other communication channels,
- *using emotions*—using emotions to enhance thinking and problem solving (this ability may involve such actions as harnessing disruptive feelings to assist reasoning, problem solving, and decision making),

- *understanding emotions*—analyzing emotions, predicting how emotional states will change over time, and evaluating the influence of emotions on an outcome (this ability also includes using language to describe feelings and emotions), and
- *managing emotions*—understanding and regulating responses to emotional stimuli in the context of a particular goal or social situation.

Momentary moods, especially stemming from negative feelings, such as sadness or anger, influence real economic decisions; investors with the ability to use emotions intelligently make investment decisions when they are in a positive frame of mind (Lerner, Small, and Loewenstein 2004). Investors with the capacity to understand and manage their emotions intelligently should be less influenced than other investors by the tone of external information sources in making investment decisions.

Some of the most compelling—although indirect—evidence of the effect of emotions on decisions comes from research in neuropsychology. In particular, Bechara, Damasio, and Damasio (2000) and Bechara (2004) suggested that people who have suffered damage to the ventromedial prefrontal cortex of the brain tend to have cognitive capacities (as measured by the intelligence quotient, or IQ) that fall into the normal or even above-average range but have problems experiencing, understanding, expressing, and effectively using emotions.⁵ In other words, these individuals have normal IQs but low EI, which tends to influence their decision-making skills negatively (Bar-On, Tranel, Denburg, and Bechara 2003). In the studies, low-EI individuals consistently made poor decisions and, contrary to normal participants, showed an inability to learn from their previous mistakes. Most importantly, these behaviors were especially strong when exact calculations of a future outcome were not possible and choices had to be based on approximations, which is usually the case with financial decision making.

Using the MSCEIT, one can measure EI within each of these four competency categories and as a composite measure of a person's ability in all areas. The research we report here focused on investors' abilities within each of the separate areas and on the variety of influences that those abilities may have on actual investment behavior. Although we were interested in all four areas of EI, we predicted that skills in using and managing emotions would play a particularly large role in "effective" investment decision making.

⁵This research has an offshoot in the field of neuroeconomics, a field that combines neuroscience, economics, and psychology. This discipline argues that the brain has two basic regions: a "reflexive" or intuitive/emotional region, which all primates have, and a "reflective" or thinking/empirical region that is present only in the higher primates. The ventromedial prefrontal cortex—located in the reflective region—appears to be one of the main regions in the brain where we evaluate our investment decisions (Zweig 2007, p. 205).

Personality Characteristics That Might Be Important. In addition to emotional intelligence, we investigated how *personality* influences investment decision making. Although many theories describe personality, one of the most influential is the “Big Five” model. Evidence supporting the power of this theory to characterize personality differences began with the research of Allport and Allport (1921) and has been growing over the past 90 years. The work has been expanded by, among others, Norman (1963), Eysenck (1970), Goldberg (1981), and McCrae and Costa (1987, 1997). The Big Five are broad categories of personality traits thought to be the most parsimonious set for describing interindividual variation in behavioral propensities. Although a significant body of literature supports this five-factor model of personality, researchers do not always agree on the exact labels for each dimension. The following five categories, however, are typical:

- *extraversion*—the tendency to be talkative, energetic, and assertive;
- *agreeableness*—the tendency to be kind, warm, and sympathetic;
- *conscientiousness*—the tendency to be efficient, organized, “planful,” and thorough;
- *neuroticism/negative affectivity*—the tendency to be moody, tense, and anxious; and
- *intellect/openness to experience*—the dimension of having wide interests and being imaginative, complex, and insightful.

We chose to measure personality by using the Big Five Inventory (BFI) developed by John and Srivastava (1999) because it is the most reliable of the shorter personality tests.⁶

Although personality and investment decisions probably have no direct or simple relationship, just as corporate earnings and stock prices have no perfect relationship, the data may contain trends or patterns. For example, past research has found that introversion, lack of neuroticism, and lack of agreeableness determine higher levels of household savings in the real population (Nyhus and Webley 2001) and that conscientiousness and lack of neuroticism predict preretirement planning (Hershey and Mowen 2000). Other research has shown that extraversion and lack of conscientiousness are related to impulse buying (Verplanken and Herabadi 2001).

Impulsiveness. Impulsiveness is the immediate response to thoughts or deeds without any consideration of the appropriateness or consequences. Studies have linked impulsiveness to higher risks of smoking, drinking, and drug abuse and to aggression, compulsive gambling, severe personality disorders, and attention deficit problems. For our purpose, we were interested in the tendency of individuals who are impulsive to make decisions faster than nonimpulsive individuals and often to take higher risks (Zuckerman and Kuhlman 2000).

⁶One of the most comprehensive and reliable tests has 240 items and breaks the Big Five dimensions into six subscales. This instrument is generally too long, however, for applied research.

To understand impulsiveness in the financial domain, we find that differentiating between “stimulating” and “instrumental” risk taking (Zaleskiewicz 2001) is useful. On the one hand, the *stimulating* form of risk taking is motivated by hedonic pleasure and high arousal. It tends to be rapid, effortless, and perhaps even automatic. This form is important in such domains as impulse buying, gambling, and extreme sports and is typically linked to the impulse trait known as “sensation seeking.” The person who engages in *instrumental* risk taking, on the other hand, is striving for a long-term future profit or benefit. This form of risk taking is achievement and goal oriented and is related to the more complex functions in information processing. For this research, we were interested primarily in instrumental risk taking.

We measured impulsiveness by using the UPPS Impulsive Behavior Scale (Whiteside and Lynam 2001). This instrument measures four distinct traits related to impulsiveness: (1) Urgency, (2) (lack of) Premeditation, (3) (lack of) Perseverance, and (4) Sensation seeking. In this study, we used only the “lack of premeditation” and “urgency” subscales because the third trait is similar to the conscientiousness trait already measured by the BFI and the fourth trait is related to the stimulating form of risk taking. The two traits we used are defined as follows:

- *Urgency*—difficulty in controlling or coping with urges to act in response to unpleasant emotions. This trait is the component of impulsiveness most strongly associated with problem gambling (Whiteside, Lynam, Miller, and Reynolds 2005).
- *Lack of premeditation*—the tendency not to delay action until careful thinking and planning can occur. Those who exhibit impulsiveness act on the spur of the moment without regard to the consequences. Lack of premeditation, as measured by the UPPS Scale, has been linked to disadvantageous decisions in the Iowa Gambling Task (Zermatten, Van der Linden, d’Acremont, Jermann, and Bechara 2005).⁷

Impulsiveness can have both positive and negative effects for investment decisions. Impulsive investors may engage in more frequent trading than less impulsive investors. Impulsive investors may not fully analyze the situations they are in and, as a result, may make decisions too quickly. Being *not impulsive* can also create problems for an investor, however, because hesitation or inaction can be a liability over the long term.

⁷The Iowa Gambling Task simulates real-life decision making but with play money. Given the objective of maximizing profits, participants make a series of selections from two sets of cards. Selections from one set result in large gains with high costs—disadvantageous in the long run. Selections from the other set have smaller gains with lower costs.

Terminology. In the remainder of the book, when we discuss the psychological test results, we use the following notational conventions. The four measures of emotional intelligence are denoted EI-Perceiving, EI-Using, EI-Understanding, and EI-Managing; the overall score is designated EI-Total. The five attributes of personality as measured by the BFI are denoted BF-Agreeableness, BF-Conscientiousness, BF-Extraversion, BF-Neuroticism, and BF-Openness. And the two measures of impulsiveness from the UPPS IMP (Impulsive Behavior) Scale are denoted IMP-Urgency and IMP-Premeditation.

The Survey Sample

We summarize the results of a recent survey of 2,595 investors at Vanguard. From these investors, we collected demographic information, and we administered to them the three psychological tests measuring (1) emotional intelligence, (2) personality, and (3) impulsiveness. All sample members voluntarily responded to an e-mail invitation from Vanguard to participate in this research by taking an online survey. Invitations were sent to a selected sample of Vanguard clients who met a number of conditions: All were born between 1946 and 1964 (i.e., were Baby Boomers); all invitees had traditional IRA (individual retirement account), Roth IRA, or 401(k) plan assets of at least \$5,000, with at least \$1,000 in two different mutual funds on 31 December 2005. All participants, obviously, had to have valid e-mail addresses. Our final sampling universe was then randomly selected from the set of Vanguard clients meeting all these restrictions who were still clients on 31 December 2006.

In addition, because one of the goals of the study was to examine transactional activity in investors' accounts and how it relates to emotional intelligence, we oversampled investors with at least one transaction moving money from one fund to another (we call this type of transaction an "exchange transaction") in 2005. We reweighted the overall sampling universe so that 75 percent of the invitations would go to investors with at least one such transaction in 2005 and 25 percent would go to those who had made no exchange transactions.⁸ Finally, we elected to sample 401(k) plan participants and retail IRA account holders who met the criteria already mentioned on an equal-weighted basis; that is, half of the invitations went to IRA investors and the other half, to 401(k) investors. For most of the analyses that follow, we focus on the behavior of respondents in these two groups of investors *separately*. We refer to the IRA account owners as "IRA investors" and the 401(k) participants as "401(k) investors."

Invitations were sent from Vanguard by e-mail in rolling weekly waves from 30 January through 5 March 2007.⁹ The invitation included an appeal to shareholders to help further research in the field. As an incentive to participate, a copy of the

⁸In 2005, 28 percent of the Vanguard retail population made one transaction or more.

⁹A copy of the invitation is available in the online supplemental materials at www.cfapubs.org.

summary research findings was promised to shareholders who completed the survey. Each invitation provided the client with a link to a secure website where clients could complete the three psychological tests and supply demographic information, such as household income, age, and gender. The information we used was gathered from individuals in five sections: an initial set of demographic questions, a section of questions on impulsiveness, a section for the personality inventory, a section on the EI-Using and EI-Managing aspects of emotional intelligence, and an optional section on EI-Perceiving and EI-Understanding. Overall, filling out the entire test took participants 30–40 minutes. Perhaps largely as a result of the length of the survey, many individuals did not fill out the optional section; also, some attrition appears to have occurred at each section break in the survey questionnaire.

The sampling strategy was to roll out new waves of invitations until we had collected roughly 1,250 responses from IRA investors and 1,250 responses from 401(k) investors. Meeting this criterion required sending 15,213 invitations to IRA investors and 14,061 invitations to 401(k) investors over a period of six weeks.¹⁰ The data shown in **Table 1** indicate that the overall response rate was 9 percent in the IRA sample and 12 percent in the 401(k) sample.

Table 1. Survey Responses

Vanguard Client Segment	E-Mails Received	Nonrespondents	Excluded Responses ^a	Client Sample
IRA investors	15,213	13,856	60	1,297
401(k) investors	<u>14,061</u>	<u>12,425</u>	<u>338</u>	<u>1,298</u>
Total	29,274	26,281	398	2,595

^aExcluded were duplicates (more than one response per client), respondents outside the desired age range, and clients with unavailable account information.

Response to the Survey. The availability of some demographic and account information for the entire universe of invited participants enabled us to analyze the relationship between various characteristics and the likelihood of responding to the survey. Results of a basic probit regression of response (1 = response,

¹⁰The e-mail invitations were rolled out at a rate of approximately 2,500 a week over this time period, in order of increasingly high ZIP Codes. We did not use our full sample of all qualifying Vanguard clients before obtaining a full quota of survey responses, so our respondents are generally individuals living in the northeastern United States.

0 = no response) on the characteristics available from accounting databases for all sampled individuals are presented in **Table 2**.¹¹

These results show that the impact of the three demographic variables on the likelihood of responding was modest, with varying degrees of statistical significance, for both the IRA and 401(k) samples. In general, age is negatively correlated with responding, in the sense that the younger the client, the less likely a response. This effect is slightly stronger in the IRA sample than in the 401(k) sample. The larger the retirement account balance, the more likely a response, although the effect is small, implying (roughly) that a 1 percent change in balance corresponds to a 0.01 percentage point difference in the response rate. The largest selection effect in both samples is in the transaction variable: For investors who made at least one transaction during 2005—arguably, a subset of investors who are more engaged in the

Table 2. Relationship of Demographic and Account Data to Response Probability

Parameter	IRA Investors			401(k) Investors		
	Regression Coefficient	<i>p</i> -Value ^a	Marginal Probability ^b	Regression Coefficient	<i>p</i> -Value ^a	Marginal Probability ^b
Intercept	-1.9803	<0.0001	na	-1.4350	<0.0001	na
ln(AcctBal) ^c	0.0721	<0.0001	1.58%	0.0083	0.5604	0.15%
Had transaction	0.2148	<0.0001	4.71	0.1971	<0.0001	3.66
<i>Age</i>						
42–44 years	-0.2558	<0.0001	-5.60%	-0.1361	0.0083	-2.53%
45–49 years	-0.1088	0.0116	-2.38	-0.0641	0.1168	-1.19
50–54 years	-1.1005	0.0152	-2.20	-0.0327	0.4283	-0.61
55–59 years ^d	—	—	—	—	—	—
60+ years	0.0395	0.6573	0.87	0.0969	0.3488	1.80

^aThe *p*-value is the estimated probability that the coefficient in question is equal to zero.

^bMarginal probability shows the estimated impact of a 1 unit change in the independent variable on the probability that an individual would respond to the survey.

^cAccount balances comprised rollover or Roth IRAs for IRA investors.

^dThe age variables are dummy variables indicating membership in each age category. To identify the relative effect of age on a response, the impact of age must be estimated as a deviation from the case in which an investor is a member of an (arbitrarily chosen) reference group; we chose the 55–59-year-old age group as the reference group. For example, a member of the 42–44 group was 5.6 percent less likely to respond than a member of the 55–59 group.

¹¹The probit model is a commonly used statistical technique used to model binary-outcomes data (yes/no or one/zero). The basic idea is to estimate the relative effect of each of a set of observed characteristics on an index value that, in turn, given the assumption that the error in the index's ability to correctly predict outcomes is normally distributed, predicts the likelihood of a yes or a no response.

management of their investment portfolios—the marginal probability of a response was 3.66 percent or 4.71 percent higher than for, respectively, 401(k) investors or retail investors not making transactions.¹²

Because the 401(k) sample was drawn from the database of plans for which Vanguard not only managed at least some assets but also did the record keeping, we had a much richer set of demographic data for members of the 401(k) client sample than for members of the IRA population. Therefore, we were able to carry out a probit analysis of response rates for the 401(k) sample in relation to an expanded set of independent variables. The results are shown in **Table 3**.

- Investors who made at least one transaction in 2005 were 3.58 percent more likely than others to have responded to our survey.
- Age and retirement portfolio balance had modest effects on the likelihood of response, which is consistent with the results in Table 2.
- The effects of household income were mixed, with the highest marginal probability of response being in the \$75,000–\$124,999 income range.
- The wealthiest clients in ZIP Codes where average household wealth exceeded \$1 million were most likely to have responded.
- Gender had no statistical significance.

The “engagement” of the investor as identified by “Status” also played an important role in determining whether a client responded to the survey invitation. For the “term-deferred” investors, the marginal probability of a response was nearly 7 percent lower. (Term-deferred investors would be plan participants who are no longer employed by the plan sponsor but who have chosen, either by a conscious decision or by inaction, to leave their 401(k) balances in the former employer’s plan.)

The issue of sample selection is important in the research design of any study. The results in Tables 2 and 3 show systematic relationships between individual demographic or financial variables and the likelihood of responding to our survey. These effects suggest that our sample is not representative of the universe of Vanguard clients invited to respond. Nevertheless, in general, the response effects documented here are modest and intuitive. Therefore, we conclude that we have successfully collected information from a large and diverse set of respondents without skewing heavily toward or away from a particular subgroup (or subgroups) other than intentionally oversampling individuals who made one trade or more in their retirement account(s).

In addition to any selection effects that may have arisen as a result of voluntary response to the survey, several other levels of selection effect may have influenced the characteristics of the sample of investors. Our sampling strategy explicitly

¹²Note again that we oversampled the group of those who made transactions in the population. The oversampling plus the higher average response rates led to a survey sample dominated by those with some account activity.

Table 3. Relationship of Demographic and Account Data to Response Probability: 401(k) Investors Only

Parameter	Regression Coefficient	<i>p</i> -Value	Marginal Probability
Intercept	-1.6003	<0.0001	na
ln[401(k) balance]	0.0227	0.1573	0.42%
Had transaction	0.1928	<0.0001	3.58
<i>Age</i>			
42–44 years	-0.1334	0.0159	-2.48%
45–49 years	-0.0477	0.2725	-0.89
50–54 years	-0.0220	0.6173	-0.41
55–59 years	—	—	—
60+ years	0.1006	0.3587	1.87
<i>Household income</i>			
<\$20,000	0.0851	0.3733	1.58%
\$20,000–\$49,999	-0.0156	0.8395	-0.29
\$50,000–\$74,999	0.1399	0.0016	2.60
\$75,000–\$124,999	0.0381	0.3590	0.71
\$125,000+	—	—	—
<i>Wealth ranges^a</i>			
<\$100,000	—	—	—
\$100,000–\$249,999	-0.1386	0.0222	-2.57%
\$250,000–\$499,999	0.1084	0.3037	2.01
\$500,000–\$999,999	-0.1217	0.4123	-2.26
\$1 million+	0.4833	0.0436	8.97
<i>Gender</i>			
Male ^b	—	—	—
Female	0.0156	0.6529	0.29%
<i>Status</i>			
Active ^c	—	—	—
Retired	0.3467	0.3037	6.44%
Term deferred ^d	-0.3689	<0.0001	-6.85

Notes: See notes to Table 2.

na = not applicable.

^aWealth ranges were estimated by IXI Corporation, an independent data vendor that calculates wealth ranges based on the average wealth for households in each ZIP Code.

^bAll effects are relative to the male gender group.

^cAll effects are relative to the active status.

^dParticipants no longer employed by the plan sponsor but with 401(k) balances in the former employer's plan.

excluded investors with less than \$5,000 in assets at Vanguard and those holding only one mutual fund. In addition, we oversampled those with at least one transaction in 2005. Clearly, selection effects may also be relevant when investors choose Vanguard over other financial services providers; those who consciously choose Vanguard tend to be cost conscious and interested in index fund investing. This matter is not an issue for 401(k) participants, as it is for IRA investors, because in the case of 401(k) funds, an investment committee—not the individual participant—chose Vanguard. Nevertheless, we caution readers that we were unable to control for a wide variety of selection effects that may differentiate this sample of survey respondents from the overall broad population of investors.

Respondent Demographics. Definitions of demographic variables and a description of how they were measured are in Exhibit B1 of Appendix B. **Table 4** presents the averages of sample demographic data. Although the 401(k) and IRA samples are similar in many respects, they have some interesting differences. Just under 75 percent of retail IRA respondents were still working full-time, whereas 94 percent of 401(k) respondents were employed full-time. The groups were both highly educated and had correspondingly high incomes and wealth. More retail respondents, however, reported having a master's degree or higher, household income of higher than \$100,000, and household financial assets of \$500,000 or more.¹³ As **Table 5** shows, these differences translated into higher average account balances for the IRA respondents.

Table 4. Sample Demographic Averages

Demographic Category	IRA	401(k)
Age	52	51
Male	68%	71%
Married	76	80
Working full-time	73	94
Retired	12	3
No college degree	21	39
Postgraduate degree	38	25
Household income >\$100,000	58	56
Household financial assets >\$500,000	59	33

Note: Because not every respondent answered every question, each group contained missing observations.

¹³Income and financial assets were categorical variables. Respondents answered these questions by choosing the range that encompassed their income and assets.

Table 5. Investment Behavior of Sample

Asset Location/Activity	IRA Investors		401(k) Investors	
	Mean	Median	Mean	Median
<i>Account balance</i>				
As of 31 December 2005	\$181,797	\$110,113	\$164,026	\$109,164
As of 31 December 2006	214,789	131,945	200,091	136,356
<i>Asset allocation^a</i>				
Asset class				
Equities	76.1%	81.2%	78.7%	83.2%
Fixed income	16.4	12.1	18.2	14.2
Index funds	36.6	30.8	28.1	24.3
Equity allocation	41.2	35.2	29.1	24.5
Fixed-income allocation	21.9	0.0	25.6	0.0
<i>Transaction activity</i>				
Number of days in 2005	2.0	1.0	1.7	1.0
Number of days in 2006	1.7	1.0	1.3	1.0

Note: Because not every respondent answered every question, each group contained missing observations.

^aAsset allocation percentages calculated as of 31 December 2005. Percentages may not add to 100 because of rounding.

According to Table 5, survey respondents had an average of 76 percent of their IRA and 78 percent of their 401(k) allocated to stocks; the remainder was in fixed-income assets. Differences in the use of index funds may have resulted from individual choice/sample selection in the IRA group (retail investors may associate Vanguard with index fund investing) and variations in 401(k) plan designs. The menu of funds offered in 401(k) plans varies from one plan to another, and some plans may not include index funds in the lineup offered to participants.

Note also that the distribution of equity exposure in our 401(k) survey sample differed significantly from that in Vanguard's overall defined-contribution plans. Only two of our sample respondents had no equity exposure in their 401(k)s; 85 percent of respondents had more than 60 percent of their account assets in equities. In Vanguard's overall 401(k) client database, 13 percent of participants had no equity and 61 percent had more than 60 percent in equity (Vanguard 2006).¹⁴ This clear difference between our sample and the broad population of 401(k) investors is probably a result, in part, of the voluntary nature of our survey and our oversampling

¹⁴Our low number of respondents with zero equity allocation may be largely a result of the two-fund minimum we imposed on our survey sample. For the 401(k) sample, this criterion would eliminate those participants who chose to participate in the plan but made no fund decision and thus were invested entirely in the plan's (historically cash) default option.

of participants with transaction activity. In particular, our sample undoubtedly excluded many individuals who tend to “ignore” their 401(k) plans. Such individuals are likely to account for a large portion of the individuals in the participant population that have little or no exposure to equity.

The last two rows of Table 5 present data on transaction activity by participants. Because fund investors may move assets from one fund to another, from one fund to several, or from several funds to one, resulting in multiple transactions arising from a single investment decision on any one day, we aggregated all transactions on a given trading day into a “transaction day” variable.¹⁵ Even though our sample was constructed to oversample individuals with at least one transaction in 2005, the degree of transaction activity we observed in our sample is modest. Consistent with earlier research, retail respondents traded more often, on average, than their 401(k) counterparts.¹⁶

Relationship of Psychological Tests Scores to Demographic and Financial Variables. Although the subcomponents of each psychological test measure a relatively different aspect of emotional intelligence, personality, or impulsiveness, these subcomponents are not completely independent.¹⁷ The reason is that psychological functioning, unlike chemical functioning, is not made up of basic independent parts. Indeed, early personality research sought to describe and compile such elements of personality in order to create a psychological “periodic table of the elements.” Most statistical tools still treat personality and other individual differences in this fashion, but decades of research have shown that complete independence of psychological characteristics is neither possible nor desirable. The value of modern research into individual differences (personality, emotional intelligence, skills, intelligence, gender, etc.) is that researchers no longer try to demonstrate independence of variables but, rather, try to determine how individual variation along any one dimension helps predict behavior (Pervin and John 2001).

From Appendix A, the correlation coefficients between most of the demographic and financial-activity variables tend to confirm the internal consistency of the survey responses.¹⁸ For example, having a postgraduate degree correlates with

¹⁵Only *ad hoc* transactions, not automatic transactions, were counted in computing the exchange-day variable. For IRA investors who had set up regular automatic interfund exchanges, the automatic changes were not counted. During the period analyzed in this study, Vanguard 401(k) investors did not have this automatic transaction option.

¹⁶Mitchell, Mottola, Utkus, and Yamaguchi (2006), Agnew, Balduzzi, and Sundén (2003), and Ameriks and Zeldes (2004) found low trading levels for 401(k) plan participants, whereas Barber and Odean (2000) reported extremely high levels of trading by discount brokerage clients.

¹⁷The correlations for 401(k) investors are provided in Appendix A in Table A1; the correlations for IRA investors exhibited similar relationships.

¹⁸Table A2 in Appendix A presents the simple correlation coefficients between most of the demographic and financial-activity variables.

higher incomes and higher portfolio balances. This outcome suggests that we obtained reasonable responses. The data also reveal some less obvious relationships. For example, being male is positively correlated with regular reading of financial literature, with not seeking and acting on financial advice, with larger 401(k) balances, with higher equity allocations, and with more trading. And investors with larger portfolio balances tend to make changes to their accounts more often than other investors in the sample and to seek and act on financial advice.

We emphasize that our research goal was *not* (and because of our survey's structure and small scale, *could not be*) to assess the EI of investors at large.¹⁹ Our goal was to collect a significant amount of detailed data that could be used to determine whether, within a group of Vanguard investors, variation in the components of emotional intelligence and other variables representing individual differences had a significant relationship with observed investor behavior.

Table 6 presents the mean and median scores and subscores for the two Vanguard samples. As shown, the EI-Understanding score and, to a smaller extent, EI-Using score are significantly higher among IRA clients than among the 401(k) sample. In addition, the IRA sample appears to have slightly higher scores on the IMP-Premeditation and IMP-Urgency scales. Given our coding convention in which *lower* scores suggest greater impulsiveness, these two data items suggest that 401(k) sample members were characterized by a greater degree of impulsiveness. Finally, Table 6 shows slight differences in BF-Agreeableness (IRA investors being slightly less agreeable) and BF-Extraversion (IRA investors being less extraverted).

If one accepts that investors who have established an individual IRA account are likely to have a higher “propensity to save” than an average 401(k) investor, these psychological characteristics may play an important role in explaining who saves and who does not. For example, the higher scores for understanding and using emotions among IRA investors compared to 401(k) investors could have at least two explanations. First, although managing emotions is considered the most important skill for effective decision making (Salovey 2001), there is evidence that *understanding* emotions may be the driving force behind effectively using and managing emotions (Wrانik, Barrett, and Salovey 2007). Therefore, the differences in scores could reflect the fact that those who are more skilled in understanding and using emotions are more likely to recognize the utility of saving for retirement. Second, understanding emotions is related to higher verbal skills and to attaining a higher education level (Lewis 2000). The differences may thus also reflect higher levels of education and wealth and, therefore, the financial opportunity to open IRA accounts. Finally,

¹⁹To the extent that Vanguard investors (and the group we sampled within that class) may differ from other investors, our data do not allow generalization of our conclusions to the overall universe of individual investors.

Table 6. Psychological Test Scores of Sample

Test	IRA Investors		401(k) Investors	
	Mean	Median	Mean	Median
<i>EI</i>				
EI-Perceiving	91.9	90.4	92.9	92.2
EI-Using	98.0	98.9	97.4	98.1
EI-Understanding	96.8	97.4	94.9	93.8
EI-Managing	96.0	96.7	96.6	97.5
EI-Total	94.4	94.1	64.4	94.5
<i>UPPS IMP Scale</i>				
IMP-Premeditation	3.20	3.18	3.13	3.09
IMP-Urgency	3.11	3.17	3.03	3.00
<i>BFI</i>				
BF-Agreeableness	3.86	3.88	3.99	4.00
BF-Conscientiousness	4.17	4.22	4.16	4.22
BF-Extraversion	3.11	3.00	3.21	3.25
BF-Neuroticism	2.54	2.50	2.49	2.50
BF-Openness	3.65	3.70	3.63	3.60

Note: Because not every respondent answered every question, each group contained missing observations.

the personality results for agreeableness are similar to those by Nyhus and Webley (2001), who found that individuals scoring high on agreeableness had less in savings and were more likely to borrow money than other individuals.

A comparison of mean test scores with demographic variables shows only a few significant systematic relationships for gender, educational attainment, and total assets:²⁰

- Women had higher EI scores in both the IRA and 401(k) samples. This gender effect has been found in most research in the domain of emotional intelligence. It probably reflects socialization experiences and cultural values (Bernet 1996; Mayer, Salovey, and Caruso 2008).²¹ Therefore, to allow for an accurate estimation of the effect of EI for the dependent variable, the norms for male and female scores are frequently set by gender.

²⁰See Tables A4 and A5 in Appendix A.

²¹A major reason is that girls and women are allowed to explore various aspects of their emotional lives, which gives them greater breadth of knowledge, whereas boys and men tend to be restricted. Modern parenting and educational practices may minimize or eliminate these differences in future generations.

- Women had higher scores for all personality traits except Openness in the BFI. Gender differences in personality have not been systematically found by researchers (Hyde 2005). The differences in our sample may reflect that we had fewer women than men in our sample and that those women over 50 who were active in investing are probably a unique group. Readers will want to note the gender differences but should not place too much emphasis on them.
- Women had lower scores on the impulsiveness tests, which indicates that they have the characteristics of less premeditation and more urgency than their male counterparts. Gender differences in impulsiveness are not usually found (Lynam and Miller 2004), although teenage girls may show slightly higher urgency scores in some cultures (d’Acremont and Van der Linden 2005). Again, these gender differences could reflect the unique nature of the women in our sample. For example, impulsive women from the Baby Boom generation may have been more likely than less impulsive women to forsake traditional values, enter the workforce, and thus have accumulated investment accounts.
- The higher the educational attainment level, the higher the average EI-Total score, BF-Openness score, and IMP-Urgency score. The positive relationships between education and EI (Mayer et al. 2002) and between education and openness to experience (Flynn, Smith, and Freese 2006) are normal; the relationship with urgency is unclear.
- We found no systematic relationships between total assets and the EI or personality characteristics.

Methodology for Examining Financial Behavior

Our analysis focused on five distinct aspects of investment behavior (or results) of the group of individuals surveyed in the period 2004–2007:

1. asset allocation and overall exposure to stock market risk in retirement accounts,
2. frequency of trading or transaction activity in retirement accounts,
3. use of passive, index-based mutual funds as opposed to actively managed funds as part of investment portfolios,
4. adoption of international equity investing, and
5. internal rate of return on investments in retirement accounts.

We first describe each dependent variable that captured the behavior of interest, and we present summary statistics and a univariate analysis of the relationship between these variables and the psychological characteristics that we measured. For each dependent variable, we used a multivariate regression

framework to examine—while controlling for the influences of a large set of demographic and other individual characteristics—the extent of the relationship between the psychological characteristic and the outcome measure.

Our analysis of each of these areas of investment behavior is exploratory and mainly descriptive in nature. Although we approached the data with hypotheses and theories in mind that were connected to the psychological literature, we did not have well-formed structural models of how the various psychological characteristics might interact to affect observed behavior. For example, a piece of folk wisdom among investment professionals is that trading on impulse leads to poor investment results. What is not clear is whether those with a highly impulsive nature would necessarily be poorer investors than others in the long term. If those who show strong impulsiveness tend to possess any degree of “skill,” in the sense of identifying unusually attractive or unattractive investment opportunities, impulsiveness may be an element of their success.

Our empirical results allow several possible interpretations; a challenge for future work will be identifying additional tests or analyses that would help narrow the set of plausible interpretations and implications. In addition, the interaction of various dimensions of personality and emotional profiles make it hard to cleanly assess the independent impact of various characteristics for the entire population of respondents. In some cases, we looked within specific subgroups of the population to find a significant effect of a particular characteristic. For example, we examined only respondents with high levels of neuroticism to find the significance of aspects of emotional intelligence within this specific group.

The hypothesis we were most interested in testing is whether individuals who demonstrate a high degree of EI demonstrate patterns in investment behavior, or in investment results, that normatively appear to be better than other investors.

Asset Allocation. To model the asset allocation decision, we first formed three groups of investors with different percentages of their retirement accounts invested in stocks (0–49 percent, 50–90 percent, and 91–100 percent). These groups were intended to represent individuals likely to be, respectively, (1) underexposed to equity, (2) holding a portfolio that would be consistent with common practice for retirement investing (the medium-equity group), and (3) those likely to be overexposed to equity.

We then used an unordered multinomial probit model to isolate the psychological and demographic characteristics that are related to membership in these three

groups.²² Throughout this analysis, unless otherwise indicated in the discussion of results in subsequent sections, we estimated standard errors by using procedures that are robust to forms of heteroscedasticity within the population of respondents. We chose to use an unordered multinomial procedure because our assumption was that both low-equity investing and very high equity investing are less desirable investment behaviors than medium-equity investing, although low- and high-equity holdings are not necessarily better or worse relative to each other. Keep in mind that psychological characteristics may have much to do with risk aversion but, here, we are attempting to distinguish between three separate groups—one of which, we maintain, is a group that has made the normatively best investment decision.

The assets on record at Vanguard may represent only a fraction of the overall assets of the individuals we studied. Therefore, and because we are concerned that an investor may devote less attention to an insignificant portion of his or her total portfolio than to a more significant portion, we also performed a separate analysis of only the subset of investors with a large percentage (more than 35 percent of their total estimated financial wealth) in the retirement account we were examining.

A summary of the results of the regression analysis is presented in **Exhibit 1**.²³ Examining the results obtained without controlling for various demographic characteristics and focusing only on results with statistical significance at the 10 percent level or better, we find that only the EI-Using score influenced membership in the low-equity group; those with higher EI-Using scores had higher likelihoods of being in this group. Membership in the high-equity group is related to aspects of both personality and EI; higher BF-Neuroticism and higher EI-Managing are both independently related to lower likelihood of being in the high-equity group.

When a set of controls was included for demographic and other individual and household characteristics in the analysis, high BF-Agreeableness emerged as a distinguishing characteristic of those in the low-equity group but high EI-Using scores remain associated with greater likelihood of membership in the low-equity group. Among those individuals who responded to the additional EI items,

²²These models are a standard statistical technique used for analyzing factors affecting “multiple choice” responses in which an ordering assumption around the choices is not imposed (in other words, “unordered” means that the choices are not assumed to represent alternatives that can be ordered in a way that is strictly increasing or decreasing in any single underlying quality that all the choices possess). Essentially the idea is to estimate the relationship that a particular characteristic has on the relative likelihood that one choice will be made over another (a so-called odds ratio), given the assumption that the error in predicting those odds is normally distributed. Some researchers criticize use of multinomial probit regressions; they emphasize the difficulties that can be encountered in maximizing the multinomial probit likelihood function. As a robustness check, we also estimated an otherwise identical multinomial logit specification (in which the error distribution *is* assumed to have a simpler, exponential distribution) of the regressions discussed here. Unless otherwise noted, we found that these regressions produced qualitatively similar results.

²³Details of the probit regression analyses are presented in Tables B1–B4 of Appendix B.

Exhibit 1. Equity Allocations (unrestricted): Summary of Multinomial Probit Results

Outcome	IRA Investors		401(k) Investors	
	Less Than 50% Stock	More Than 90% Stock	Less Than 50% Stock	More Than 90% Stock
Uncontrolled	EI-Using (+ +)	BF-Neuroticism (- -)	BF-Agreeableness (+ +)	None
Controlled	BF-Agreeableness (+)	EI-Managing (- -)	BF-Agreeableness (+ +)	BF-Agreeableness (+ +)
	EI-Using (+ +)	BF-Neuroticism (- -)	EI-Using (+)	EI-Using (+)
Demographics	EI-Perceiving (+ +)		EI-Managing (-)	EI-Understanding (- -)
	Age (+ +)	Male (+ +)	Age (+ +)	Age (- -)
	AcctBal (- -)	Age (- -)		MidEdu (+ +)
	FinIntrst (+ +)	AcctBal (- -)		
High assets at Vanguard	Children (- -)	Pension (-)		
		ReadsOften (+)		
	BF-Openness (- -)	BF-Neuroticism (-)	BF-Agreeableness (+)	EI-Using (+)
	Age (+ +)	IMP-Premeditation (- -)	BF-Conscientiousness (-)	EI-Managing (-)
	EI-Using (+ +)	EI-Managing (- -)	EI-Using (+ +)	EI-Understanding (- -)
		Male (+ +)	EI-Managing (- -)	Age (- -)
		AcctBal (-)	EI-Understanding (- -)	
	Married (- -)	Age (+ +)		
	ReadsOften (+ +)	LowEdu (+ +)		
		Pension (-)		

Notes: (+ +) means positive regression coefficient, significant at the 5 percent level. (- -) means negative regression coefficient, significant at the 5 percent level. (+) means positive regression coefficient, significant at the 10 percent level. (-) means negative regression coefficient, significant at the 10 percent level.

EI-Perceiving is also negatively related to the likelihood of membership in the low-equity group. Inclusion of the controls did not alter the uncontrolled results in the analysis of high-equity-group membership.

The results of the controlled regression analyses show that higher age and greater educational attainment or interest in math, finance, or statistics led to membership in the low-equity group whereas higher account balances and having children tended to lower the likelihood of being in this group. Older age, a higher account balance, and having a pension—all decreased the likelihood of being in the high-equity group.

Interpretation of these results is partially intuitive and partially backed by empirical findings from other areas. In terms of the psychological characteristics, popular belief holds that individuals high in BF-Neuroticism should be risk averse. Our results suggest that BF-Neuroticism could be an asset, because these individuals are neither risk seekers nor risk averse and are most likely to fall into the advantageous medium-equity group. This conclusion receives added weight when only those individuals who held a significant fraction of their financial wealth at Vanguard are considered. In those regressions, the only robust effect of the psychological and emotional measures is that of BF-Neuroticism, and it reduced the likelihood of being in the high-equity group. Because moods and emotions can be useful in decision making, individuals who experience *more* moods and emotions than others may have more opportunity to integrate them effectively into their decision making. Although more analysis is needed, these findings also highlight the importance of not jumping to simple conclusions about how individual differences such as neuroticism or “emotionality” influence real investment behavior.

Investors high in the ability to manage emotions should be less inclined to be either risk averse or risk seeking (Salovey 2001), and as predicted, those with a higher EI-Managing score were less likely to fall into the high-equity group. People who feel comfortable dealing with their emotions should be competent enough to avoid at least the largest emotional traps of the investment universe. The fact that the EI-Using score strongly influenced the likelihood of belonging to the low-equity group is less clear, and more analysis will be necessary to determine whether this finding is meaningful.

Given our assumption that a middle level of equity in the investment portfolios is the superior approach, the notion that those investors with greater backgrounds in math or finance are more likely to have low levels of equity in their retirement portfolios is somewhat puzzling. A possible explanation is that many of these individuals work in the field of finance or in an area where their future earnings are subject to financial risk related to the equity markets; they may tend to hold low-risk assets in their retirement or other portfolios to hedge these professional risks.²⁴

Within the 401(k) sample in Exhibit 1, in the set of results without demographic controls, only the BF-Agreeableness score had a strong positive influence on membership in the low-equity group; none of the psychological or EI measures played a significant role in differentiating members of the high-equity group from the medium-equity group. Nyhus and Webley (2001) found that agreeable individuals

²⁴Renowned financial economist and Goldman Sachs Group partner Fischer Black is said to have held the majority of his personal assets in investments of very low risk (Mehrling 2005, p. 12).

had less savings and were more likely to borrow money than other individuals.²⁵ This result was unchanged by the inclusion of the set of demographic controls in the regression framework.

Trading or Transaction Frequency. We examined transaction behavior in terms of the number of days our sample investors (i.e., survey respondents) made a transaction during 2004–2006.²⁶ Like Barber and Odean (2001), we found that within the group of respondents, men tended to trade more frequently than women. **Figure 1** shows the relationship for our 401(k) sample from the first quarter (Q1) of 2005 to the second quarter (Q2) of 2007. The same relationship held for the IRA respondents.²⁷ Similarly, **Figure 2** demonstrates a significant wealth effect for 401(k) respondents: Investors with the higher reported financial wealth also tended to trade more. We also found a positive relationship between the mutual fund balance held at Vanguard and total transactions.²⁸

To control for differences in these variables while assessing the importance of emotional intelligence and other characteristics in explaining differences in transaction activity, we used a mathematical model to predict the number of transactions an investor would be expected to make based on his or her education, wealth, income, gender, and psychological characteristics.²⁹ The model allowed us to estimate the effect of each characteristic, independent of the other characteristics, on the “incidence rate” (i.e., likelihood of occurrence) of a transaction. We could control for differences in education, wealth, and other variables when estimating the relationship between EI and transaction activity.

²⁵They explained this finding by suggesting that if agreeable people are more concerned with other people, they may prefer to spend their money on gift giving or other *inter vivos* transactions than on saving for their future. Agreeable people may place less value on money in a long-term sense and are thus less willing to invest in a long-term investment such as stocks.

²⁶The use of number of days rather than number of transactions allowed us to count a single transactional event, such as rebalancing (which might have involved multiple transactions in multiple funds), as one transaction.

²⁷During the sample period, retail investors had several transaction options. They could set up automatic exchanges between funds (e.g., between a money market fund and an equity fund), and they could make nonautomatic individual transactions. Although the number of automatic transactions was small, the same gender-to-transaction relationship existed for automatic transactions as for nonautomatic transactions.

²⁸As shown in Table A2 of Appendix A.

²⁹Formally, we estimated parameters in a Poisson model intended to capture variation in the incidence of transactions across investors. This specification assumed that the likelihood of a transaction occurring was a constant probability through time that varied with the characteristics of the investor. An obvious extension of this work, which we will pursue in subsequent analyses, is to implement a “hazard” model that would allow the probability of an event to vary potentially with the time since the last event as well as with investor characteristics.

Figure 1. Transaction Days vs. Gender: 401(k) Investors

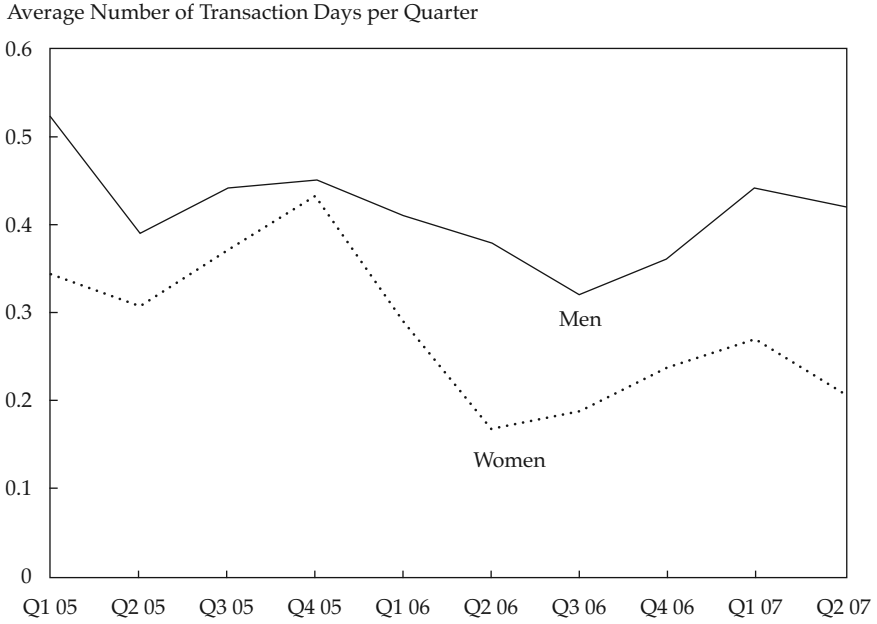
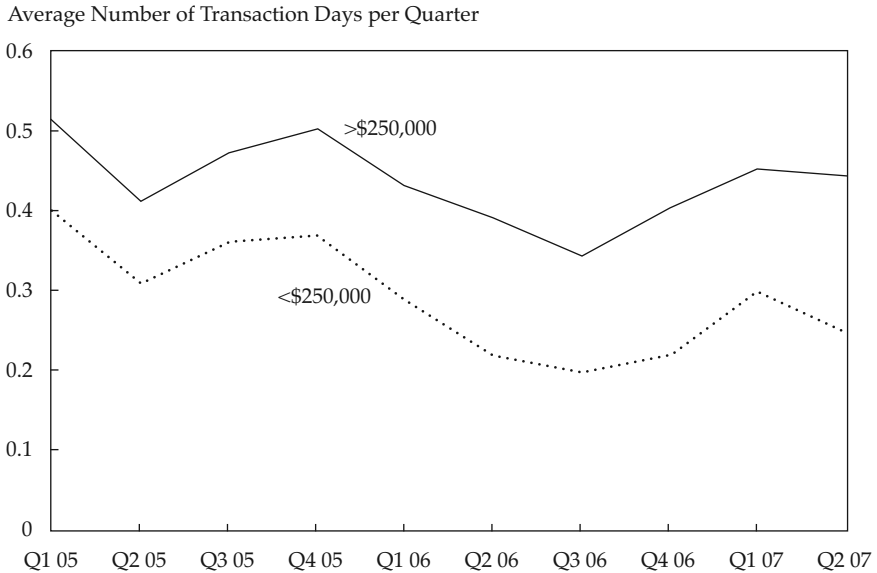


Figure 2. Transaction Days vs. Financial Wealth: 401(k) Investors



Because the subject of the analysis was explicitly transaction behavior, we had to use sampling weights to reweight our sample to reflect the explicit oversampling of individuals with transactions, or we had to treat the two groups for which we altered the sampling frame separately. We had the information needed to reweight the IRA sample by using broader population data, but this information was not readily available for the 401(k) sample. Therefore, we treated the two groups of sampled individuals differently in the 401(k) analysis.

Exhibit 2 summarizes the results of estimating the model parameters via a regression analysis.³⁰ These statistical results show strong effects of the reasoning aspects of emotional intelligence (EI-Using and EI-Managing) and of impulsiveness on the frequency of transaction behavior. (Recall that IMP-Urgency *decreases* with the degree of impulsiveness; thus, the result in Exhibit 2 indicates that the more impulsive individuals trade more.) The size of the effects from the regressions can be quantified; in the case of EI-Managing, the coefficient estimates (not reported in Exhibit 2) suggest that for each 1 unit increase in the EI-Managing score, the likelihood of a transaction occurring decreased by about 1.5 percentage points. Thus, a 10 percentage point difference in score on “managing emotions” led to a 15 percentage point difference in the likelihood of a transaction. Such a 10 percentage point difference in EI scores was quite common in the survey data; the standard deviation of the test score measure was roughly 10 percentage points.

Exhibit 2. Frequency of Transaction Behavior: Summary of Poisson Regression Results

Outcome	IRA Investors	401(k) Investors	
		Transactors	Nontransactors
Uncontrolled	EI-Managing (--)	BF-Agreeableness (--)	EI-Using (--)
		IMP-Urgency (--)	
Controlled	IMP-Urgency (-)	BF-Agreeableness (--)	IMP-Urgency (--)
	EI-Using (-)	IMP-Urgency (--)	IMP-Premeditation (-)
	EI-Managing (--)		EI-Using (--)
Demographics	Age (+ +)	Male (+ +)	Male (+)
	AcctBal (+ +)	Low assets (-)	AcctBal (+)
	%Stock (--)	Pension (-)	%Stock (--)
	ReadsOften (+ +)		Pension (-)
			Children (+)

Note: See the notes to Exhibit 1.

³⁰For brevity, Exhibit 2 reports only the estimates for statistically significant regressors; the full regression results are reported in Tables B5 and B6 in the online supplemental material.

Our finding that “managing emotion” has the strongest statistical significance and largest quantitative effect on propensity to trade is similar to past findings. Previous research has shown that the managing-emotions branch of EI has the best predictive power for several behavioral outcomes, including everyday behavior of young adults (Brackett, Mayer, and Warner 2004), quality of social interactions (Lopes, Brackett, Nezlek, Schütz, Sellin, and Salovey 2004), perceived quality of social relationships (Lopes, Salovey, and Straus 2003), and such job-related variables as performance, affect, attitudes at work, and leadership potential (Lopes, Grewal, Kadis, Gall, and Salovey 2006).

Indexing vs. Active Investing. In addition to the asset allocation decision, investors must decide whether to use index funds, active investment management, or both for their mutual fund assets. Many factors may play a role in this active versus passive decision, including the investor’s beliefs about market efficiency, desire to minimize costs, and willingness to accept the risk in actively managed funds (in exchange for positive *expected* risk-adjusted return). To our knowledge, no empirical research has been carried out on what factors influence investors’ choice of active versus passive management.

Our focus here is on the following question: Given that the investor has some positive percentage in equities, what proportion of that equity allocation is indexed? For IRA investors in our sample, approximately 25 percent had an all-active portfolio whereas about 12 percent had an equity portfolio that was entirely indexed; a fairly uniform distribution lay between these two endpoints. As was shown in Table 5, the median allocation to indexed equities was 35.2 percent for IRA investors and 24.5 percent for 401(k) investors.

To model the passive–active decision, we formed three groups of investors with different degrees of indexed–equity exposure in their retirement accounts: individuals whose equity funds were all actively managed (the 0 percent, or no-index, group), those who held both active and passive funds (the 1–99 percent, or some-index, group), and those who held only equity index funds (the 100 percent, or all-index, group).

Again, we used an unordered multinomial probit model to isolate psychological and demographic characteristics related to membership in these three groups. We elected to use this procedure because our prior assumption was that both the no-index and all-index investors had investment philosophies different from those of the some-index investors. We do not assume that membership in any of these groups implies better investment decision making; the purpose was simply to distinguish and describe membership in the groups.

Summary details of the regression analyses for the no-index and all-index investors in IRA and 401(k) groups are presented in **Exhibit 3**.³¹ Examining the IRA results obtained without controls for various demographic characteristics, we see that only the IMP-Premeditation score influenced membership in the no-index group. Membership in the all-index group was related to two aspects of EI: Higher EI-Using and lower EI-Perceiving scores were independently related to a higher likelihood of being in the all-index group.

Exhibit 3. Percent of Equity Allocation Indexed: Summary of Multinomial Probit Results

Outcome	IRA Investors		401(k) Investors	
	0% Indexed	100% Indexed	0% Indexed	100% Indexed
Uncontrolled	IMP-Premeditation (+ +)	EI-Perceiving (- -)	EI-Understanding (-)	None
Controlled	EI-Perceiving (-)	EI-Using (+ +) EI-Perceiving (- -) EI-Using (+ +)	None	None
Demographics	AcctBal (- -) %Stock (- -)	AcctBal (- -) %Stock (- -)	AcctBal (- -) %Stock (- -)	AcctBal (- -) %Stock (- -) Income < \$250,000 (+)

Note: See the notes to Exhibit 1.

When we controlled for the demographic variables in the IRA investors group, the IMP-Premeditation and EI results from the uncontrolled analysis remained. In addition, we found that IRA investors with low EI-Perceiving scores are more likely to have an all-active equity portfolio.

For 401(k) investors, in the uncontrolled regressions, the EI-Understanding score had a weak influence on the active-passive allocation. Those investors with a low EI-Understanding score had a higher likelihood of an all-active equity portfolio; those with a higher EI-Understanding score had a higher likelihood of having not an all-indexed portfolio but an equity portfolio that had both actively and passively managed funds. This result is consistent with the positive and statistically significant correlation between percentage of equity allocation indexed and the EI-Understanding score.³² When we controlled for the demographic variables, we found no statistically significant relationships.

³¹The full regression results are in Tables B7 and B8 in the online supplemental material.

³²This correlation is shown in Tables B7 and B8 in the online supplemental material.

Retirement account balances and the percentage allocation to equities demonstrate the same tendency for both the IRA and 401(k) investors. Those with higher balances and those with higher equity allocations had higher likelihoods of owning both active and index equity funds. In addition, for 401(k) investors, those with incomes less than \$250,000 were more likely to use all-index funds for their equity allocations.

In addition to these results, which were obtained via a multinomial probit approach, we also considered a simpler probit specification in which the dependent variable was set to 1 if all of the equity mutual funds owned in the IRA accounts were invested in index funds and set to 0 otherwise. In these regressions, we found that none of the personality or impulsiveness variables was statistically significant (either with or without demographic controls). The coefficient on EI-Understanding was positive, relatively large, and statistically significant both with and without controls. In terms of controls in this framework, we found that relatively low education had a negative influence on being an all-index investor, as did the size of the IRA account.

Interpretations of these active–passive results and their relationships with impulsiveness and EI scores should be made with caution. In terms of the results in the 401(k) sample, the opportunity to use index funds in the 401(k) may be significantly influenced by the choices made by investors' employers rather than by the investors; that we found no strong results is perhaps not surprising. Within the IRA universe, scores in IMP-Premeditation (recall that our scoring convention is that higher IMP-Premeditation implies greater tendency to premeditate) suggest that investors who have chosen an all-active portfolio may have put great care and energy into selecting active managers. Higher scores in EI-Using reflect the ability to use emotions to enhance thinking and problem solving. Thus, investors skilled in this ability may believe a better use of emotional energy is to place money into indexed funds rather than deal with the risks of active management. Why EI-Perceiving seems to work in the opposite direction is not clear.

Finally, that investors choose both active and passive funds as their account balances and equity allocations rise may reflect a tendency for investors to spread holdings over more and more funds as they gain investment experience.

Adoption of International Funds. Because mutual fund inflows have been shown to be strongly correlated with past fund performance (Ippolito 1992; Goetzmann, Massa, and Rouwenhorst 1999; Grinblatt and Keloharju 2001), we investigated whether relationships existed between adding international funds and the psychological and demographic characteristics of our IRA investors during the period of our study—a time when international equities performed exceptionally well on both an absolute and a relative basis.³³ For the dependent categorical

³³Because some 401(k) plans offer no international equity funds, a 401(k) investor may not have had the option to invest in this asset class.

variable, we subdivided these investors into three groups: those who owned no international fund(s) as of September 2007, those who had at least one international fund as of either December 2003 or December 2004 (early adopters), and those who had at least one international fund as of either December 2005, December 2006, or September 2007 (late adopters).³⁴

From 31 December 2003 to 30 September 2007, the number of IRA investors who had at least one international fund gradually increased. Only 25 percent owned international funds at the end of 2003, but by the end of September 2007, 52 percent of the IRA investors in the study had some international exposure.

To isolate the psychological and demographic characteristics related to membership in the three adopter groups, we again used an unordered multinomial probit model. In this case, our prior assumption was that adding international funds during a strong performance period may be chasing performance and thus be suboptimal. Investors who witnessed the subpar performance of many non-U.S. equity markets in the 1990s and early part of this decade, however, may have been slow to revise their beliefs that domestic equities offer the best risk-adjusted returns. Thus, the outperformance of international equities witnessed since 2003 may have been a wake-up call that a more diversified portfolio would be prudent.

Exhibit 4 summarizes the results of the regressions for the IRA investors.³⁵ Examining the uncontrolled IRA results, we find that BF-Agreeableness has a statistically significant negative coefficient for both the early adopter and late

Exhibit 4. Adoption of International Equity Funds by IRA Investors: Summary of Multinomial Probit Results

Outcome	Early Adopter (before 2005)	Late Adopter (after 2005)
Uncontrolled	BF-Agreeableness (--)	BF-Agreeableness (--)
	BF-Extraversion (+)	BF-Neuroticism (--)
	EI-Using (-)	
Controlled	BF-Agreeableness (-)	BF-Agreeableness (--)
	BF-Conscientiousness (-)	BF-Neuroticism (--)
	BF-Extraversion (+)	
	EI-Using (-)	
Demographics	AcctBal (+ +)	%Stock (+)
	Married (- -)	Married (- -)

Note: See the notes to Exhibit 1.

³⁴As a first approximation, we defined a fund as “international” if its name contained the words “international,” “global,” “developed,” “emerging,” “European,” or “Pacific.”

³⁵See Table B9 in the online supplemental material for the full regression results.

adopter groups; those with higher BF-Agreeableness scores had a higher likelihood of having had no international exposure during 2004–2007. Those with high BF-Extraversion scores were more likely to have been early adopters, those with high EI-Using scores were less likely to have been early adopters, and those with high BF-Neuroticism scores were less likely to have been late adopters.

All of these significant results remained when we included the set of demographic controls in the analysis. In addition, investors with high BF-Conscientiousness scores were more likely to have had no international exposure. Married investors were more likely to have had no international exposure. And those with higher account balances were more likely to have been early adopters, whereas those with higher allocations to equities were more likely to have been late adopters.

Note that the BF-Agreeableness and EI-Using variables were also significant for the regressions involving percentage of equity in the investor's portfolio (see Exhibit 3). In the case of both variables, a higher score made it more likely that the investor had a lower stock allocation (i.e., less than 50 percent). In Exhibit 4, those IRA investors with higher BF-Agreeableness scores were less likely to have any allocation to international equities and those with higher EI-Using scores were less likely to have invested in international equities before 2005.

The positive relationship between BF-Extraversion and adoption of international equity may relate to willingness among extraverts to try new things because it shows up most strongly in the early adopters (the point estimate for late adopters is of the same sign and magnitude but with no statistical significance). In addition, BF-Neuroticism negatively affected the likelihood of being either an early or late adopter, although it is not statistically significant in the case of early adopters. International equity is widely perceived to be less familiar to U.S. investors (and perhaps more risky) than domestic equity, and BF-Neuroticism here may reflect a lower level of comfort with this kind of uncertainty.³⁶

Internal Rate of Return. To analyze variations in internal rates of return achieved by investors, we began by computing quarterly IRRs at the account level for all survey respondents in both samples. Our data for IRA investors cover Q1 2004 through Q1 2007, and for 401(k) investors, Q1 2005 through Q2 2007. In both the IRA and 401(k) samples, given that the IRR calculation requires a beginning and an ending balance, we necessarily excluded observations for which we had no beginning and/or ending asset balance for the

³⁶In most cases, BF-Neuroticism is simply a measure of anxiety. Anxiety, in turn, is primarily defined as greater sensitivity to uncertainty. Therefore, higher BF-Neuroticism (or anxiety) reflects greater sensitivity to uncertainty. This trait is not the same as risk aversion because even highly anxious people may feel comfortable taking risk in domains in which they have expertise and knowledge. Thus, if the anxious person believes that his or her level of knowledge in finance and investment is sufficient to reduce uncertainty, that person is just as likely to take risk as a person low in BF-Neuroticism.

quarter. In addition, in the 401(k) sample, we excluded observations for those investors who had an outstanding loan during the quarter.³⁷

We computed the account opening balance (treated as a positive cash flow), IRRs from all net cash flows to the set of accounts monitored for each investor on each day of each quarter, and the closing balance (treated as a negative cash flow). The IRRs reflect both the returns generated by the particular set of funds that each investor selected and held over each period and the impact of the timing of cash flows in or out of the various accounts and funds. IRRs can be volatile, especially when large amounts of money remain invested for a small number of days or when cash flows are similar in magnitude to the overall invested balance.³⁸

To estimate the relationship between the various psychological characteristics and the attained rates of return, we used a “stacked” or panel regression technique in which all quarterly observations of each member of the sample over the period were included:

$$R_{it} = \alpha_i + \Gamma P_i + \mathbf{B}X_i + T_t + \varepsilon_{it}, \quad (1)$$

where the dependent variable, R_{it} , is the quarterly rate of return for individual i at time t . The independent variables and controls include the vector of psychological characteristics of interest, for each individual; a set of control variables for other individual characteristics, X ; and a set of period dummy variables, T , that captures differences in the average returns achieved by sample members in each period.

We estimated several specifications of Equation 1. In **Exhibit 5**, we summarize the results from a random-effects panel model in which we assumed that the error term in the equation can be decomposed into two components—an investor-specific random effect and a standard noise term.³⁹ The results in Exhibit 5 show that BF-Extraversion had a direct effect on the IRRs of IRA investors and that IMP-Urgency and IMP-Premeditation played a role in the IRRs of 401(k) investors, although the effects of these two variables tended to offset one another. The fact that a psychological variable showed a direct effect on investment returns in these regression analyses is impressive. Controlling for other characteristics weakened the impact of IMP-Urgency, but the IMP-Premeditation result remained. This outcome suggests that those with low levels of impulsiveness (high IMP-Premeditation on our scale) receive lower returns on their investments.

³⁷We excluded individuals with loans because we did not know the exact dates of these cash flows in an investor’s plan balance.

³⁸We excluded a small number of individuals from both samples for whom computed IRRs exceeded ± 35 percent in one quarter.

³⁹The full results are shown in Tables B10–B13 in the online supplemental material.

Exhibit 5. Internal Rates of Return: Summary of Panel Regression Results

Outcome	IRA Investors	401(k) Investors
Uncontrolled	BF-Extraversion (+)	IMP-Urgency (+ +)
	EI-Using (-)	IMP-Premeditation (- -)
Controlled	None	IMP-Premeditation (- -)
		EI-Perceiving (+)
Demographics	Age (- -)	Low education (- -)
	Low assets (- -)	High AcctBal (- -)
	%Stock (+ +)	Low income (-)
		%Stock (+ +)
High assets at Vanguard	High AcctBal (-)	IMP-Premeditation (-)
	Low asset (- -)	Low education (- -)
	%Stock (+ +)	Mid education (- -)
		%Stock (+ +)

Note: See the notes to Exhibit 1.

Several explanations are possible. In the case of IRA investors, it could be that extraverts gather more information from various sources and are thus better equipped than their peers to make good decisions (Wanberg and Kammeyer-Mueller 2000). In the case of 401(k) investors, investors high in openness are probably also open to risk (Nicholson, Soane, Fenton-O’Creevy, and Willman 2005). Extraverts are also more willing to take risks (Nicholson et al. 2005). Finally, Whiteside and Lynam (2001) and Zuckerman and Kuhlman (2000) documented that individuals high in impulsiveness are more willing than others to take risk.

The IRRs in Exhibit 5 are raw returns that do not take volatility into account. When assessing the skill of investors or the value of an investment in relation to portfolio performance, however, controlling for risk or volatility of the return sequence is usually important. Therefore, in addition to the regression summarized in Exhibit 5, we examined a second specification in which we computed Sharpe ratios for those investors for whom we could compute quarterly IRRs for all quarters in the panel regressions of Equation 1. The Sharpe ratios were formed by subtracting the average quarterly return for the Vanguard Prime Money Market Account for each quarter from the investor’s quarterly IRRs, computing the average of these “quarterly excess return” numbers for each investor, and dividing by its standard deviation (again, for each investor). We then used this “individual Sharpe ratio” as the dependent variable in a standard ordinary least-squares (OLS) regression. These results are summarized in Exhibit 6.⁴⁰

⁴⁰The results are presented in full in Tables B14 and B15 of the online supplemental material.

Exhibit 6. Sharpe Ratios of Internal Rates of Return, Summary of OLS Regression Results

Outcome	IRA Investors	401(k) Investors
Uncontrolled	BF-Agreeableness (-)	None
	IMP-Urgency (-)	
	EI-Using (-)	
Controlled	BF-Agreeableness (-)	None
	IMP-Urgency (-)	
	EI-Using (-)	
Demographics	Male (- -)	No advice (- -)
	Age (- -)	FinIntrst (+ +)
	AcctBal (+ +)	Children (-)
	Low assets (- -)	
	No advice (-)	
	FinIntrst (- -)	
High assets at Vanguard, controlled	EI-Using (-)	EI-Managing (-)
	EI-Managing (+ +)	Low education (- -)
	Low assets (- -)	No advice (- -)
	Children (-)	FinIntrst (+ +)

Note: See the notes to Exhibit 1.

These results show that in the overall population of respondents, we found negative effects on IRRs (with marginal statistical significance) for BF-Agreeableness, IMP-Urgency, and EI-Using within the IRA sample and found no significant effects within the 401(k) sample. In the cases of the impulsiveness result and the EI result, however, our regression estimates provided offsetting and quantitatively similar point estimates for other characteristics within the same group of personality traits in the same regression. Specifically, in these regressions, the magnitude of the coefficient on IMP-Premeditation is of nearly the same size but of the opposite sign from the coefficient on IMP-Urgency, whereas the coefficient on EI-Managing is of nearly the same size but of the opposite sign from the coefficient on EI-Using. In both of these cases, formal *F*-tests of the hypotheses that these pairs of coefficients are jointly zero could not be rejected at the 10 percent level.

Finding relatively strong relationships between our psychological characteristics and the investment behaviors we measured but finding only weak and unclear relationships between these same characteristics and investor account IRRs suggests, on the basis of our model, that no single character trait dramatically increases

or decreases IRRs. Rather, psychological characteristics only help predict specific behavior and attitudes, which *within specific situational constraints*, may help predict differences in IRR. Therefore, it makes sense to gain an understanding of which characteristics are related to which behaviors before building complex economic models of “investment skill” that may include specific traits.

A notable point about the demographic controls is that in the analysis of Sharpe ratios for IRA respondents, the effect of the financial interest variable is statistically significant and negative. In the previous set of results (which examined raw returns), IRA investors with greater financial interest appeared to achieve higher returns, but these investors did not receive higher returns than peers when volatility-adjusted returns were considered.⁴¹ In the sample of 401(k) investors, however, Exhibit 6 shows that the effect of financial interest on IRRs remained positive despite the volatility adjustment.

An important element in interpreting these results is recognizing that 401(k) investors may have very different motives in forming their portfolios from the motives of IRA investors. In particular, many IRA investors may hold only a portion of their total retirement assets in IRAs at Vanguard. Thus, the Sharpe ratio we computed would not include the diversifying effect of other holdings. A relatively larger portion of 401(k) investors may have the bulk of their financial assets in that plan and, therefore, be holding a balanced portfolio within their Vanguard account. Indeed, when we examined the results for the Sharpe ratios among only those investors who (in our estimate) held a significant portion of their reported wealth at Vanguard, we found the estimated coefficient on financial interest lost statistical significance; it was roughly one-half the size of the same coefficient in the overall sample regression.

Summary and Discussion

Exhibits 7–9 summarize the results presented in previous sections, but the information is organized by psychological construct rather than by investment behavior. In each exhibit, we broke out the major areas of investment behavior/results that we studied (risk taking, various aspects of the asset management process, and investment returns) and show how each component of the three overarching psychological constructs (emotional intelligence, personality, and impulsiveness) relate to each specific behavior in uncontrolled and controlled regression specifications. We hope that these summaries provide a clear picture of the roles that EI, personality, and impulsiveness play in overall investment behavior.

⁴¹ See Table B10 in the online supplemental material.

Emotional Intelligence. In general, those high in EI were somewhat more conservative and less aggressive in risk taking than those low in EI (see **Exhibit 7**). In particular, they often held less than 50 percent of their assets in stocks and were unlikely to hold more than 90 percent in stocks. They were also less likely to trade or make changes to their portfolios; at the same time, they were more likely to use index funds as a part of their portfolios. Together, these results suggest that individuals high in EI are less likely to make extreme decisions and prefer to pursue a more balanced investment approach. We found no systematic relationship between EI and either IRRs or Sharpe ratios.

Although all EI groups contributed to the overall investor profile, the Using group showed the strongest overall effect. We had originally hypothesized that the Managing and Using branches would play the largest role in investment decisions, which is the reason all participants were asked to fill out at least these two sections of the EI survey (and had the option of stopping after these two sections). Indeed, the Understanding branch did play a minor role and the Perceiving branch did play an intermediate role.

The minor role played by Understanding emotions could point to the difference between conceptual knowledge of emotions and practical, procedural knowledge. Understanding emotions is useful in decision making only if the person also knows how to perceive, use, and manage emotions. Thus, although understanding emotions contributed to the overall role of EI in our measures of financial behavior, it had only a minor main effect.

Finally, individual differences in the Perception of emotion are especially important for the quality of social relationships but apparently play a minor role in the types of financial decision-making behavior we measured.

Personality. Each of the Big Five dimensions played a somewhat different role for investment decision making (see **Exhibit 8**). First, Openness did not play any systematic role. Second, Conscientiousness played only a minor role; the only result was that those who scored high on this trait were less likely to be early adopters of new investment strategies. This finding probably reflects the reflective and planning dimensions of this trait; conscientious investors may wait to see how things evolve before making a decision. Third, those high in Extraversion were more likely to be early adopters, which may reflect the excitement-seeking dimension of this trait. This last result could also reflect the larger social network these individuals might have, which could provide a greater opportunity to hear about new investment possibilities. The fact that Extraversion is related to IRR could simply reflect the market conditions during this period, which favored the decision to invest in international stock and other forms of risk taking. (The effect of extraversion did not survive risk adjustment of the return numbers.) Possibly, in periods in which momentum investing and early adoption of new types of investments or investment strategies pay off, extraverts will earn higher-than-average returns.

Exhibit 7. Summary of Results for Emotional Intelligence

EI Metric	Risk Taking		Management Activities		Returns	
	Uncontrolled	Controlled	Uncontrolled	Controlled	Uncontrolled	Controlled
Perceiving	No effect	(+ +) More likely to allocate <50% stock (IRA)	(- -) Less likely to have 100% indexed funds (IRA)	(- -) Less likely to have 100% indexed funds (IRA)	No effect	(+) Positively related to IRR [401(k)]
Using	(+ +) More likely to allocate <50% stock (IRA)	(+ +) More likely to allocate <50% stock (IRA)	(+ +) More likely to allocate 100% indexed funds (IRA)	(+ +) More likely to allocate 100% indexed funds (IRA)	(-) Negatively related to IRR (IRA)	No effect
	(-) More likely to allocate <50% stock [401(k)]	(-) Less likely to be an early adopter of international funds (pre-2005) (IRA)	(- -) Less likely to trade in the non-transactors [401(k)]	(- -) Less likely to trade in the non-transactors [401(k)]		
	(-) Less likely to be an early adopter of international funds (pre-2005) (IRA)		(-) Negatively related to transaction behavior (IRA)			
Understanding	No effect	No effect	(-) Less likely to have 0% indexed funds [401(k)]	No effect	No effect	No effect
Managing	(- -) Less likely to allocate >90% stocks (IRA)	No effect	No effect	(- -) Negatively related to transaction behavior (IRA)	No effect	No effect

Note: See the notes to Exhibit 1.

Exhibit 8. Summary of Results for Personality

BFI Metric	Risk Taking		Management Activities		Returns	
	Uncontrolled	Controlled	Uncontrolled	Controlled	Uncontrolled	Controlled
Agreeableness	(-) Less likely to be an early adopter (IRA)	(+) More likely to allocate <50% stock (IRA)	No effect	(-) Less likely to trade in the transactors group [401(k)]	No effect	No effect
	(-) Less likely to be a late adopter (IRA)	(-) Less likely to be an early adopter (IRA)				
	(++) More likely to allocate <50% stock [401(k)]	(-) Less likely to be a late adopter (IRA)				
		(++) More likely to allocate <50% stock [401(k)]				
		(++) More likely to allocate >90% stock [401(k)]				
Conscientiousness	No effect	No effect	No effect	(-) Less likely to be an early adopter (pre-2005) (IRA)	No effect	No effect
Extraversion	(+) More likely to be an early adopter (pre-2005) (IRA)	(+) More likely to be an early adopter (pre-2005) (IRA)	No effect	No effect	(+) Positively related to IRR (IRA)	No effect
Neuroticism	(-) Less likely to allocate >90% stock (IRA)	(-) Less likely to allocate >90% stock (IRA)	No effect	No effect	No effect	No effect
	(-) Less likely to be a late adopter (post-2005) (IRA)	(-) Less likely to be a late adopter (post-2005) (IRA)				
Openness	No effect	No effect	No effect	No effect	No effect	No effect

Note: See the notes to Exhibit 1.

Perhaps, the most interesting relationships are in the realm of Agreeableness and Neuroticism. At first glance, the findings for agreeable investors send mixed messages. They were more likely to place less than 50 percent of their assets into stocks *but also* more likely to place more than 90 percent of their assets into stocks. These results indicate extreme behavior because 50–90 percent in equities is often considered a reasonable, balanced level of exposure. They were less likely to trade within their 401(k) accounts, however, which shows conservative behavior or inertia. Finally, they were neither early adopters nor late adopters of international investing but were somewhere in the middle. This result supports a conclusion that they had passive or “wait and see” attitudes.

In summary, they were extreme (in choosing a level of risk) yet conservative (in trading and adopting new trends). How can this result be explained? Taking note of several studies on the impact of 401(k) plan design on investor behavior (Madrian and Shea 2001; Utkus and Young 2004; Holden and VanDerhei 2005), we believe part of the answer lies in the 401(k) structure, which is where we found agreeable investors taking extreme levels of equity risk. Most companies control important aspects of the design of their employees’ 401(k) plans. Some sponsors opt for a “default” arrangement in the plan that can lead to high equity exposure (for example, if the employer matches savings with company stock). Other sponsors use a default investment strategy that involves low equity exposure—for example, defaulting participants into a “guaranteed investment account” (sometimes called a “guaranteed insurance contract”) or a money market account. If employees do not opt out of the default plan, their assets will simply be placed in the default plan chosen by the employer. Thus, agreeable people may be ones who are unlikely to make changes to the default strategy and find themselves in whatever strategy the employer chose. This explanation is supported by the fact that agreeable investors are least likely to trade within their 401(k) accounts. If one accepts this explanation, then the rest of the data make sense: Agreeable IRA investors are more likely to choose less than 50 percent equity and are neither late nor early adopters. Agreeable investors are thus apparently likely to be relatively conservative and passive. A detailed analysis of the relationship between Agreeableness and an investor’s susceptibility to accepting default plans is an interesting and important topic for future research.

Popular belief holds that individuals high in Neuroticism are highly anxious or emotional and that this trait is a disadvantage in investment decision making. Our results provide a more balanced picture. Although we found that investors high in Neuroticism were less likely to put more than 90 percent of their assets into stocks, we also found they did not place less than 50 percent in stocks. They were conservative and less likely to be early adopters, but they did not exhibit extreme emotional, risk-averse, or “fear-based” behavior. Indeed, we found that being anxious can have positive as well as negative effects. If anxious individuals worry about their financial future, they may spend more time searching for information

and choosing the best options. A nonanxious person may falsely believe that things will work out no matter what and thus not take the time to select the best investment option. Of course, if an individual is too anxious, or does not know how to manage the anxiety, the anxiety may lead to “freezing” behavior in which no decision is made.

Future research should examine the cumulative and interaction effects of various psychological variables. For example, do individuals high in Neuroticism and also high in EI make good decisions? In contrast, do individuals high in Neuroticism and high in Impulsiveness make counterproductive decisions?

Impulsiveness. First, we found Impulsiveness, especially the measure of Urgency, to be strongly related to high transaction activity in both IRA and 401(k) accounts (see **Exhibit 9**). Second, those high in Premeditation were more likely to have none of their assets (in the Vanguard accounts) in indexed funds. Because a high volume of trading and a lack of indexed funds are considered less-than-optimal behavior (Barber and Odean 2000; French 2008), this result would help explain why both Impulsiveness dimensions were strongly and negatively related to IRR. In summary, Impulsiveness is the only psychological construct that seems to have clearly negative relationships with the chosen financial indicators.

Exhibit 9. Summary of Results for Impulsiveness

Impulsiveness Metric	Risk Taking		Management Activities		Returns	
	U	C	U	C	U	C
Lack of premeditation	No effect	No effect	(+ +) Less likely to have 0% indexed funds (IRA)	No effect	(--)	(--)
					Positively related to IRR [401(k)]	Positively related to IRR [401(k)]
Urgency	No effect	No effect	(--)	(-) More likely to trade in the transactors group [401(k)]	(+ +) Negatively related to IRR [401(k)]	No effect
				(--)	(--)	
				(-) More likely to trade in the transactors group [401(k)]		
				(--)	(--)	
				(-) More likely to trade in the nontransactors group [401(k)]		

Notes: The impulsiveness metrics have values that decrease with greater impulsiveness, which is why the signs of the effects (+/-) and the verbal interpretations of those effects are in opposite directions. See also the notes to Exhibit 1.

U = Uncontrolled; C = Controlled.

Conclusions

We followed a conservative and robust strategy in analyzing the data for this report; nevertheless, we found some strong and consistent relationships between our psychological constructs and real financial behavior. As a result, we can conclude that individual differences are not simply noise within economic models but, rather, play a larger role than even we expected.

The psychological variables we examined played a larger role within IRA accounts than within 401(k) accounts. This finding makes sense because the decision to place money into an IRA account is an individual one whereas the placement of assets in 401(k) accounts depends on the sponsor's offerings. In particular, the choice may depend on the default option. As a result of mental accounting or similar phenomena, investors may view assets within the two types of account very differently, and our results may reflect those differences.

We found indications of important relationships among EI, other psychological characteristics, and investment behavior in several, but not all, areas that we examined. The value of these findings, and of the growing body of similar research, is that they underscore the importance of identifying the specific psychological mechanisms that guide investment decisions. Although these early results are suggestive, they are not the final word.

Applied to our data, this logic means that we should examine more complex patterns of behaviors in relation to our psychological characteristics. For example, we found a relatively strong effect of psychological variables on risk taking. But individuals high in impulsiveness may demonstrate other types of risk-taking behavior; for example, these individuals may be especially likely to have nonindexed stocks and never ask for advice. People high in openness may invest in indexed funds and have portfolios high in equity only if they also take advice and read financial information.

In addition, we should examine interaction effects. For example, even though men apparently trade more frequently than women, the reason could be that women high in EI or high in impulsiveness trade more than women who are low in these traits. Perhaps, women high in impulsiveness or in EI trade more than men who are low in impulsiveness or in EI. Teasing out such subtle differences should shed more light on the relative influence of different psychological characteristics for investment behavior patterns.

As researchers pinpoint the sources of investor biases, particularly those that lead to investor mistakes, the investment industry can use this information to develop products and services that may help save investors from sabotaging their financial futures. Further pursuit of this line of research might result in tailoring asset allocation advice on the basis of information from in-depth interaction

between the investor and financial adviser, which could even include simple psychological tests. The advice would be based not only on an investor's financial goals and risk tolerance but also on the investor's psychological characteristics (including his or her emotional intelligence).

Our data suggest that simply identifying personality types might reveal particular biases or predispositions that affect investment outcomes. A key question would be whether investors would make the same choices or would alter their behavior after having their biases revealed. New portfolio construction methods that combine the best of mathematical finance with rigorously quantified psychological metrics could be used to improve the models that practitioners use in giving financial advice and could create portfolios that enhance investors' likelihood of reaching their financial goals.

Appendix A. Correlations and Mean Test Scores

Table A1. Pearson Correlation Coefficients between Psychological Test Scores

Category	MSCEIT (EI)				BFI					UPPS IMP	
	PER	USG	UND	MNG	AGR	CON	EXT	NEU	OPN	PRE	URG
<i>IRA investors</i>											
EI-Perceiving	1.00										
EI-Using	0.40	1.00									
EI-Understanding	0.23	0.19	1.00								
EI-Managing	0.25	0.37	0.21	1.00							
BF-Agreeableness	0.12	0.18	0.01	0.23	1.00						
BF-Conscientiousness	0.12	0.22	0.04	0.19	0.25	1.00					
BF-Extraversion	0.03	0.02	<i>-0.06</i>	0.12	0.18	0.17	1.00				
BF-Neuroticism	<i>-0.04</i>	<i>-0.05</i>	0.03	<i>-0.09</i>	<i>-0.45</i>	<i>-0.31</i>	<i>-0.26</i>	1.00			
BF-Openness	0.04	0.09	0.12	0.12	0.13	0.17	0.27	<i>-0.15</i>	1.00		
IMP-Premeditation	0.14	0.17	0.08	0.12	0.12	0.38	<i>-0.24</i>	<i>-0.09</i>	0.03	1.00	
IMP-Urgency	0.13	0.17	0.05	0.18	0.40	0.45	0.07	<i>-0.53</i>	0.23	0.40	1.00
<i>401(k) investors</i>											
EI-Perceiving	1.00										
EI-Using	0.34	1.00									
EI-Understanding	0.20	0.27	1.00								
EI-Managing	0.24	0.33	0.19	1.00							
BF-Agreeableness	0.08	0.10	<i>-0.04</i>	0.22	1.00						
BF-Conscientiousness	0.08	0.16	<i>-0.01</i>	0.17	0.26	1.00					
BF-Extraversion	<i>-0.01</i>	<i>-0.03</i>	<i>-0.03</i>	0.09	0.14	0.17	1.00				
BF-Neuroticism	0.00	<i>-0.10</i>	<i>-0.06</i>	<i>-0.13</i>	<i>-0.39</i>	<i>-0.30</i>	<i>-0.24</i>	1.00			
BF-Openness	0.02	0.03	0.11	0.11	0.08	0.14	0.28	<i>-0.19</i>	1.00		
IMP-Premeditation	0.09	0.12	0.02	0.08	0.16	0.41	<i>-0.18</i>	<i>-0.08</i>	<i>0.05</i>	1.00	
IMP-Urgency	0.05	0.19	0.10	0.19	0.33	0.45	0.05	<i>-0.52</i>	0.24	0.37	1.00

Notes: MSCEIT = Mayer–Salovey–Caruso Emotional Intelligence Test; EI = emotional intelligence; BFI = Big Five Inventory; UPPS = Whiteside and Lyman’s test of “Urgency, Premeditation, Perseverance and Sensation Seeking”; and IMP = Impulsive Behavior Scale. Italic font signifies significance at the 10 percent level. Bold font signifies that the measured coefficient is statistically different from zero at a 5 percent confidence level or better based on a *t*-test.

Table A2. Pearson Correlation Coefficients between Demographic and Financial Variables

Category	Male	Married	Children	No College	College	Postgrad.	Income <\$250,000	No Advice	Fin. Int.	Reads Fin. Lit.	Balance	% Stock Indexed	% Stock Trans. Days
<i>IRA investors</i>													
Male	1.00												
Married	0.11	1.00											
Children	0.09	0.44	1.00										
No college degree	-0.08	0.03	0.03	1.00									
College graduate	0.01	0.01	0.02	-0.42	1.00								
Postgraduate degree	0.06	-0.03	-0.04	-0.40	-0.66	1.00							
Income <\$250,000	-0.07	-0.16	-0.06	0.18	0.08	-0.23	1.00						
No advice	0.05	-0.06	-0.01	-0.03	0.07	-0.04	0.00	1.00					
Finance interest	0.11	-0.04	0.03	-0.19	0.01	0.15	-0.11	0.05	1.00				
Reads financial literature	0.06	0.01	0.02	0.03	0.00	-0.02	-0.05	-0.03	0.03	1.00			
ln(AcctBal) ^a	0.13	0.07	0.03	-0.09	-0.02	0.10	-0.20	-0.03	0.09	0.02	1.00		
%Stock ^a	0.02	-0.03	-0.02	-0.06	0.00	0.05	-0.07	0.01	-0.04	-0.03	-0.03	1.00	
%Stock indexed ^a	0.04	0.02	-0.01	-0.08	-0.01	0.07	-0.07	0.02	0.04	-0.01	0.00	0.11	1.00
Exchange days total ^b	0.02	0.01	0.00	0.08	0.00	-0.06	0.02	-0.05	-0.04	0.03	0.09	-0.12	-0.05
<i>401(k) investors</i>													
Male	1.00												
Married	0.24	1.00											
Children	0.11	0.47	1.00										
No college degree	-0.05	-0.01	0.03	1.00									
College graduate	0.03	-0.02	-0.02	-0.61	1.00								
Postgraduate degree	0.02	0.04	-0.02	-0.46	-0.43	1.00							
Income <\$250,000	-0.09	-0.19	-0.09	0.27	0.00	-0.31	1.00						

(continued)

Table A2. Pearson Correlation Coefficients between Demographic and Financial Variables (continued)

Category	Male	Married	Children	No College	College	Postgrad.	Income <\$250,000	No Advice	Fin. Int.	Reads Fin. Lit.	Balance	% Stock Indexed	% Stock Trans. Days
No advice	0.09	-0.01	0.02	0.03	0.00	-0.04	0.10	1.00					
Finance interest	<i>0.05</i>	0.01	0.01	-0.22	0.10	0.14	-0.12	0.03	1.00				
Reads financial literature	0.09	0.04	-0.01	-0.01	-0.02	0.03	-0.03	0.00	0.02	1.00			
ln(AcctBal) ^a	0.22	0.13	0.07	-0.19	0.10	0.11	-0.25	-0.13	<i>0.05</i>	<i>0.03</i>	1.00		
%Stock ^a	0.10	0.03	-0.01	-0.06	<i>0.05</i>	0.01	0.00	0.03	0.03	0.02	-0.02	1.00	
%Stock indexed ^a	-0.04	-0.04	-0.03	-0.05	0.00	0.06	0.00	0.03	0.01	-0.03	0.02	0.03	1.00
Exchange days total ^b	0.12	<i>0.05</i>	0.02	0.01	-0.04	0.03	0.00	-0.01	0.02	<i>0.05</i>	0.14	-0.02	1.00

Notes: Italic font signifies significance at the 10 percent level. Bold font signifies significance at the 5 percent level.

^aAs of 31 December 2005.

^bTotal for 2004–2006 for IRA investors, total for 2005 through Q2 2007 for 401(k) investors.

Table A3. Pearson Correlation Coefficients between Control Variables and Psychological Test Scores

Category	MSCEIT (EI)				BFI					UPPS IMP	
	PER	USG	UND	MNG	AGR	CON	EXT	NEU	OPN	PRE	URG
<i>IRA investors</i>											
Male	-0.16	-0.09	-0.08	-0.15	-0.10	-0.15	-0.06	-0.06	0.05	0.06	0.04
Age	0.01	0.05	-0.05	0.05	0.04	0.05	-0.01	-0.06	-0.01	0.06	0.02
Married	-0.05	-0.02	-0.07	-0.01	-0.01	-0.02	0.06	-0.02	-0.13	-0.06	-0.06
Children	-0.03	-0.03	-0.04	0.01	0.00	-0.01	0.06	-0.03	-0.15	-0.01	-0.04
No college degree	-0.04	-0.01	-0.19	-0.06	-0.02	-0.06	-0.01	0.04	-0.15	-0.05	-0.09
College graduate	0.05	-0.03	0.01	-0.01	0.01	-0.03	-0.02	-0.01	-0.02	-0.05	-0.01
Postgraduate degree	-0.02	0.04	0.14	0.06	0.00	0.08	0.03	-0.03	0.15	0.09	0.09
Income <\$150,000	0.03	0.02	-0.06	-0.02	0.03	-0.06	-0.09	0.03	-0.05	-0.03	-0.08
Assets <\$250,000	0.05	0.03	-0.06	0.05	0.08	-0.02	0.01	0.03	0.03	-0.01	-0.01
Have pension	-0.09	-0.06	-0.07	-0.02	-0.03	-0.05	0.02	-0.01	-0.10	-0.01	-0.03
No advice	-0.03	0.01	0.06	-0.06	-0.05	-0.03	-0.09	0.07	-0.01	-0.01	-0.02
Finance interest	-0.08	-0.02	0.06	0.03	-0.04	0.01	0.02	0.00	-0.04	-0.04	0.00
Reads financial literature	-0.05	-0.01	-0.11	-0.12	0.04	0.06	0.15	-0.06	0.06	0.01	0.04
ln(AcctBal) ^a	-0.03	-0.02	-0.01	-0.01	-0.02	0.04	0.02	-0.05	0.00	-0.01	0.05
%Stock ^a	-0.07	-0.06	-0.04	-0.03	0.02	0.00	0.05	-0.08	0.00	-0.01	0.05
%Indexed ^a	-0.03	0.03	0.06	0.03	0.01	-0.01	-0.01	0.03	0.02	0.01	0.00
%Stock indexed ^a	-0.01	0.06	0.08	0.03	0.00	0.00	-0.02	0.04	0.03	0.02	0.01
Exchange days 0	-0.02	0.02	0.00	0.04	0.02	0.00	-0.02	-0.07	0.02	0.05	0.08
Exchange days 1-5	0.01	0.02	0.02	0.02	0.03	0.01	0.05	0.06	0.02	-0.03	-0.07
Exchange days 6+ ^b	0.01	-0.06	-0.03	-0.07	-0.07	-0.01	-0.04	0.00	-0.04	0.02	0.01
<i>401(k) investors</i>											
Male	-0.16	-0.12	-0.12	-0.19	-0.14	-0.09	-0.08	-0.05	0.06	0.07	0.06
Age	-0.03	-0.01	-0.08	0.10	0.06	0.07	0.01	-0.03	-0.03	0.00	0.00
Married	-0.05	0.01	-0.09	-0.06	-0.04	-0.04	0.03	0.01	-0.05	-0.03	-0.04
Children	-0.03	-0.03	-0.05	-0.01	0.11	0.01	0.07	-0.04	-0.06	-0.01	-0.03
No college degree	0.12	-0.03	-0.18	-0.02	0.06	-0.07	0.01	0.05	-0.17	-0.02	-0.18
College graduate	-0.06	-0.02	0.06	0.04	-0.03	0.05	-0.01	0.00	0.00	0.04	0.07
Postgraduate degree	-0.07	0.06	0.13	-0.02	-0.03	0.02	0.01	-0.05	0.19	-0.02	0.13
Income <\$150,000	0.01	-0.04	-0.05	-0.02	0.00	-0.02	-0.10	0.10	-0.12	0.11	-0.08
Assets <\$250,000	0.10	-0.03	-0.02	-0.03	0.04	-0.05	-0.06	0.08	-0.08	0.00	-0.11
Has pension	-0.03	-0.03	-0.09	0.02	0.08	0.07	0.02	-0.04	-0.05	0.02	0.03
No advice	0.00	-0.04	-0.05	-0.13	-0.06	-0.07	-0.06	0.04	-0.06	-0.02	-0.04
Finance interest	-0.05	0.00	0.04	0.03	0.03	0.08	0.03	-0.05	-0.01	0.07	0.11

(continued)

Table A3. Pearson Correlation Coefficients between Control Variables and Psychological Test Scores (continued)

Category	MSCEIT (EI)				BFI					UPPS IMP	
	PER	USG	UND	MNG	AGR	CON	EXT	NEU	OPN	PRE	URG
Reads financial literature	0.00	-0.01	0.01	-0.02	-0.03	0.05	0.03	<i>-0.07</i>	0.07	0.00	0.07
ln(AcctBal) ^a	-0.07	0.00	0.03	0.02	-0.08	-0.01	-0.02	0.01	-0.01	-0.02	0.01
%Stock ^a	0.00	0.00	0.04	0.01	-0.06	-0.02	0.01	-0.01	0.01	-0.03	0.02
%Indexed ^a	0.03	0.03	0.07	0.01	0.00	0.03	-0.02	-0.04	0.03	-0.01	0.03
%Stock indexed ^a	0.04	0.05	0.08	0.00	-0.01	0.02	0.00	<i>-0.05</i>	0.03	-0.01	0.02
Exchange days 0	0.02	0.01	0.00	-0.04	-0.03	-0.03	-0.03	0.03	0.01	0.01	0.00
Exchange days 1–5	0.08	0.05	0.04	0.09	0.08	0.07	0.06	-0.03	0.02	0.01	<i>0.05</i>
Exchange days 6+ ^b	-0.10	<i>-0.06</i>	-0.05	-0.07	-0.07	-0.06	-0.05	0.01	-0.02	-0.01	<i>-0.05</i>

Notes: See definitions in Table A1. Italic font signifies significance at the 10 percent level. Bold font signifies significance at the 5 percent level.

^aAs of 31 December 2005.

^bTotal for 2004–2006 for IRA investors, total for 2005 through Q2 2007 for 401(k) investors.

Table A4. Mean Emotional Intelligence Test Scores by Demographic Category

Category	IRA Investors					401(k) Investors				
	PER	USG	UND	MNG	TOT	PER	USG	UND	MNG	TOT
Gender	91.88	98.03	96.76	96.05	94.43	92.93	97.44	94.89	96.64	94.35
Female	95.69	100.22	98.05	98.23	97.76	97.04	100.45	96.74	99.64	98.77
Male	90.24	97.07	96.20	95.09	92.99	91.21	96.19	94.12	95.35	92.50
Age	91.88	98.03	96.76	96.05	94.43	92.93	97.44	94.89	96.64	94.35
Under 49	92.26	97.89	97.51	96.12	94.55	93.62	98.08	95.80	95.62	94.73
50–54	92.07	97.53	96.40	95.20	94.08	91.89	96.50	94.89	96.06	93.43
55+	91.51	98.46	96.47	96.53	94.55	93.09	97.53	93.74	98.41	94.79
Marital status	91.91	98.03	96.81	96.06	94.46	92.91	97.43	94.87	96.64	94.34
Married	91.43	97.83	96.39	95.99	94.00	92.47	97.51	94.40	96.35	93.86
Not married	93.38	98.63	98.07	96.28	95.86	94.61	97.15	96.66	97.81	96.18
Education	92.03	98.08	96.84	96.10	94.52	93.00	97.45	94.98	96.68	94.43
No college degree	90.63	97.73	93.02	94.96	91.59	95.57	96.85	92.57	96.36	94.46
College graduate	93.04	97.45	96.98	96.01	95.11	91.74	96.98	95.77	97.24	94.00
Postgraduate degree	91.66	98.92	98.57	96.79	95.32	91.14	99.05	97.29	96.35	95.02
Income	91.88	98.03	96.76	96.05	94.43	92.93	97.44	94.89	96.64	94.35
<\$250,000	92.17	98.14	96.42	95.93	94.41	93.00	97.11	94.59	96.55	93.96
\$250,000+	90.88	97.56	97.87	96.33	94.34	92.70	98.45	95.91	96.96	95.63
Total assets	91.88	98.03	96.76	96.05	94.43	92.93	97.44	94.89	96.64	94.35
Under \$150,000	90.54	96.66	94.36	95.75	92.31	93.64	96.47	94.38	95.35	93.70
\$150,000–\$249,000	95.98	101.15	96.57	98.24	98.13	96.40	97.50	94.89	97.53	96.08
\$250,000–\$499,000	91.36	96.12	96.32	95.30	93.00	91.45	97.82	94.35	96.54	93.71
\$500,000–\$999,000	91.77	99.08	97.15	95.97	94.90	91.95	96.96	95.05	97.75	94.13
\$1.00 million– \$1.49 million	89.78	96.58	96.06	95.76	92.63	90.63	97.75	96.35	95.22	93.45
\$1.5 million+	92.93	98.84	98.68	96.32	95.95	92.30	100.83	96.65	98.08	96.27
Vanguard account ^a	91.88	98.03	96.76	96.05	94.43	92.93	97.44	94.89	96.64	94.35
\$5,000–\$45,000	92.38	99.60	96.47	96.35	94.88	94.01	97.24	94.56	96.82	94.63
\$45,000–\$110,000	92.46	96.59	98.34	96.26	95.15	93.42	97.54	94.95	96.22	94.61
\$110,000–\$236,000	89.50	97.99	95.70	94.75	92.48	93.49	97.02	95.15	96.29	94.43
\$236,000–\$1.8 million	93.01	98.18	96.48	96.74	95.07	90.60	98.05	94.82	97.42	93.69

Notes: PER = EI-Perceiving; USG = EI-Using; UND = EI-Understanding; MNG = EI-Managing. Because not every respondent answered every question, each group contains missing observations. Bold font indicates that at least one sample mean is statistically different from the others at the 5 percent significance level; for example in the set of rows for gender, both rows are highlighted, as in all cases, male scores are statistically significantly different from female scores. In the set of rows for marital status, however, only the EI-Understanding scores differ by marital status for IRA Investors whereas EI-Understanding and the EI-Total scores are different for 401(k) Investors.

^aAccount balances are as of 31 December 2005.

Table A5. Mean BFI and IMP Test Scores by Demographic Category

Category	IRA Investors										401(k) Investors										
	BFI					UPPS IMP					BFI					UPPS IMP					
	AGR	CON	EXT	NEU	OPN	PRE	URG	AGR	CON	EXT	NEU	OPN	PRE	URG	AGR	CON	EXT	NEU	OPN	PRE	URG
Gender	3.86	4.17	3.11	2.54	3.65	3.20	3.11	3.99	4.16	3.21	2.49	3.63	3.13	3.03	3.99	4.16	3.21	2.49	3.63	3.13	3.03
Female	3.96	4.30	3.19	2.61	3.60	3.16	3.08	4.12	4.23	3.31	2.55	3.57	3.08	2.98	4.12	4.23	3.31	2.55	3.57	3.08	2.98
Male	3.82	4.11	3.08	2.51	3.67	3.21	3.12	3.93	4.13	3.17	2.46	3.65	3.14	3.05	3.93	4.13	3.17	2.46	3.65	3.14	3.05
Age	3.86	4.17	3.11	2.54	3.65	3.20	3.11	3.99	4.16	3.21	2.49	3.63	3.13	3.03	3.99	4.16	3.21	2.49	3.63	3.13	3.03
Under 49	3.87	4.13	3.15	2.60	3.65	3.16	3.09	3.95	4.08	3.19	2.51	3.64	3.12	3.02	3.95	4.08	3.19	2.51	3.64	3.12	3.02
50-54	3.81	4.17	3.06	2.55	3.65	3.21	3.11	3.96	4.22	3.23	2.47	3.64	3.13	3.04	3.96	4.22	3.23	2.47	3.64	3.13	3.04
55+	3.89	4.21	3.11	2.50	3.65	3.22	3.13	4.06	4.19	3.23	2.47	3.60	3.13	3.04	4.06	4.19	3.23	2.47	3.60	3.13	3.04
Marital status	3.86	4.17	3.11	2.54	3.65	3.20	3.11	3.99	4.16	3.21	2.49	3.63	3.13	3.03	3.99	4.16	3.21	2.49	3.63	3.13	3.03
Married	3.86	4.16	3.14	2.53	3.60	3.18	3.09	3.97	4.15	3.22	2.49	3.61	3.12	3.02	3.97	4.15	3.22	2.49	3.61	3.12	3.02
Not married	3.87	4.19	3.03	2.57	3.80	3.24	3.16	4.03	4.20	3.17	2.47	3.69	3.15	3.07	4.03	4.20	3.17	2.47	3.69	3.15	3.07
Education	3.86	4.17	3.11	2.54	3.65	3.19	3.11	3.99	4.16	3.21	2.48	3.63	3.13	3.03	3.99	4.16	3.21	2.48	3.63	3.13	3.03
No college degree	3.83	4.11	3.10	2.61	3.45	3.15	3.02	4.03	4.11	3.22	2.53	3.50	3.12	2.91	4.03	4.11	3.22	2.53	3.50	3.12	2.91
College graduate	3.87	4.15	3.08	2.54	3.64	3.17	3.10	3.96	4.20	3.20	2.48	3.63	3.15	3.09	3.96	4.20	3.20	2.48	3.63	3.15	3.09
Postgraduate degree	3.86	4.23	3.14	2.52	3.77	3.24	3.17	3.96	4.18	3.23	2.41	3.85	3.11	3.15	3.96	4.18	3.23	2.41	3.85	3.11	3.15
Income	3.86	4.17	3.11	2.54	3.65	3.20	3.11	3.99	4.16	3.21	2.49	3.63	3.13	3.03	3.99	4.16	3.21	2.49	3.63	3.13	3.03
<\$250,000	3.87	4.15	3.06	2.56	3.63	3.19	3.09	3.99	4.15	3.17	2.53	3.59	3.15	3.01	3.99	4.15	3.17	2.53	3.59	3.15	3.01
\$250,000+	3.83	4.23	3.24	2.50	3.71	3.22	3.19	3.98	4.18	3.36	2.35	3.76	3.04	3.11	3.98	4.18	3.36	2.35	3.76	3.04	3.11
Total assets	3.86	4.17	3.11	2.54	3.65	3.20	3.11	3.99	4.16	3.21	2.49	3.63	3.13	3.03	3.99	4.16	3.21	2.49	3.63	3.13	3.03
Under \$150,000	3.99	4.12	3.19	2.55	3.70	3.12	3.06	4.03	4.09	3.10	2.61	3.56	3.12	2.94	4.03	4.09	3.10	2.61	3.56	3.12	2.94
\$150,000-\$249,000	3.97	4.17	3.07	2.62	3.68	3.24	3.14	3.99	4.17	3.23	2.47	3.59	3.13	2.99	3.99	4.17	3.23	2.47	3.59	3.13	2.99
\$250,000-\$499,000	3.83	4.10	3.07	2.59	3.63	3.16	3.07	3.96	4.13	3.19	2.51	3.64	3.15	3.05	3.96	4.13	3.19	2.51	3.64	3.15	3.05

(continued)

Table A5. Mean BFI and IMP Test Scores by Demographic Category (continued)

Category	IRA Investors										401(k) Investors												
	BFI					UPPS IMP					BFI			UPPS IMP									
	AGR	CON	EXT	NEU	OPN	PRE	URG	AGR	CON	EXT	NEU	OPN	PRE	URG	AGR	CON	EXT	NEU	OPN	PRE	URG		
\$500,000–\$999,000	3.87	4.15	3.09	2.49	3.66	3.21	3.12	3.98	4.19	3.31	2.41	3.67	3.17	3.07									
\$1.00 million– \$1.49 million	3.85	4.24	3.15	2.56	3.57	3.20	3.09	3.94	4.23	3.23	2.34	3.71	3.08	3.16									
\$1.5 million+	3.76	4.27	3.13	2.52	3.68	3.22	3.19	3.98	4.24	3.35	2.29	3.77	2.99	3.17									
Vanguard account ^a	3.86	4.17	3.11	2.54	3.65	3.20	3.11	3.99	4.16	3.21	2.49	3.63	3.13	3.03									
\$5,000–\$45,000	3.90	4.14	3.10	2.60	3.68	3.19	3.06	4.08	4.17	3.31	2.44	3.67	3.13	3.02									
\$45,000–\$110,000	3.83	4.17	3.08	2.54	3.64	3.22	3.13	4.01	4.17	3.16	2.51	3.64	3.14	3.04									
\$110,000–\$236,000	3.84	4.16	3.10	2.54	3.66	3.20	3.12	3.93	4.14	3.15	2.50	3.57	3.13	3.01									
\$236,000– \$1.8 million	3.87	4.22	3.15	2.48	3.64	3.17	3.14	3.95	4.13	3.27	2.48	3.66	3.11	3.05									

Notes: Because not every respondent answered every question, each group contains missing observations. AGR = Agreeableness; CON = Conscientiousness; EXT = Extraversion; NEU = Neuroticism; OPN = Openness; PRE = Premeditation; URG = Urgency. Bold font indicates that at least one sample mean is statistically different from the others at the 5 percent significance level; see notes to Table A4.

^aAccount balances are as of 31 December 2005.

Appendix B. Multinomial Probit Analyses with Levels of Equity Ownership as Dependent Variables

The tables here provide a sample of the full details of the regression analyses we performed and describe in the text.⁴² Each table provides details on the specific dependent variable used in each regression, the estimation technique, and other special information about the sample used. In each regression, the right-hand-side (independent) variables we used varied only slightly. For reference, definitions for all of the right-hand-side variables are provided in Exhibit B1.

Exhibit B1. Definition of Right-Hand-Side Variables

Variable	Definition
BF-Agreeableness, BF-Conscientiousness, BF-Extraversion, BF-Neuroticism, BF-Openness	Individual participant's composite scores for each of the five components of the BFI personality test—each variable is an average of different item responses on the test and takes on real values from 1 to 5
Ind-Dec-2006, Ind-Jun-2006, Ind-Dec-2005	Indicator/dummy variables equal to 1 if the observation time period was, respectively, December 2006, June 2006, or December 2005; 0 otherwise
Male	Indicator variable equal to 1 if the investor was male, 0 otherwise
Age	Reported age of the investor
Low education	Indicator variable equal to 1 if the reported investor's level of education was below high school, 0 otherwise
Medium education	Indicator variable equal to 1 if the reported investor's level of education was no more than a college degree

(continued)

⁴²Additional tests using alternative methods can be found in the online supplemental material at www.cfapubs.org.

Exhibit B1. Definition of Right-Hand-Side Variables (continued)

Variable	Definition
ln(AcctBal)	The natural logarithm of the investor's total balance in the included accounts as of period end
Low assets	Indicator variable equal to 1 if the investor's reported total household financial assets were less than \$250,000; 0 otherwise
Low income	Indicator variable equal to 1 if investor's annual household income is less than or equal to \$150,000; 0 otherwise
%Stock	Percentage of the investor's portfolio invested in equities as of the beginning of the period; value of 1 is 1 percent and so on (i.e., value of 100 = 100 percent)
Has pension	Indicator variable equal to 1 if the investor had a traditional pension benefit from a current or former employer, 0 otherwise
No advice	Indicator variable equal to 1 if the investor did not report receiving and/or acting on advice from a financial adviser, 0 otherwise
Finance top 2 boxes	Indicator variable equal to 1 if the investor reported "finance" in the top two boxes of the interest matrix on the survey: "majored or specialized in this subject" or "I love the subject or work in this field"; 0 otherwise
Reads finance literature	Indicator variable equal to 1 if investor reported reading major newspapers or publications, specialized newspapers or publications, <i>and</i> Vanguard papers/materials—doing so in each case either daily, several times a week, or once a week
Married	Indicator variable equal to 1 if the investor was married, 0 otherwise
Has children	Indicator variable equal to 1 if the investor reported having any children, 0 otherwise
IMP-Urgency, IMP-Premeditation	Individual participant's composite scores for the two components of the Impulsiveness test—each variable was an average of various item responses on the test and took on real values from 1 to 4; item responses were coded in such a way that higher values of these variables corresponded to <i>lower</i> levels of impulsiveness
EI-Using, EI-Managing, EI-Perceiving, EI-Understanding	Individual investor's composite scores for the four components of the emotional intelligence test (the <i>Mayer-Salovey-Caruso Emotional Intelligence Test</i>)—each variable was constructed from a different set of item responses on the test, and each variable took on real values ranging roughly from 30 to 135

Table B1. Multinomial Probit Analysis of Equity Ownership: IRA Respondents
(*p*-values in parentheses)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Equation for low equity ownership</i>										
BFI-Agreeableness	0.178 (0.119)	0.202* (0.091)							0.141 (0.218)	0.171 (0.157)
BFI-Conscientiousness	-0.013 (0.913)	-0.009 (0.941)							-0.073 (0.588)	-0.063 (0.659)
BFI-Extraversion	-0.077 (0.356)	-0.030 (0.732)							-0.051 (0.567)	-0.007 (0.942)
BFI-Neuroticism	0.086 (0.357)	0.121 (0.216)							0.091 (0.364)	0.129 (0.216)
BFI-Openness	0.034 (0.757)	-0.022 (0.894)							0.024 (0.831)	-0.028 (0.810)
Ind-Dec-2006	-0.141** (0.046)	-0.092 (0.228)	-0.136* (0.053)	-0.084 (0.267)	-0.138* (0.051)	-0.087 (0.251)	-0.084 (0.268)	-0.033 (0.691)	-0.143** (0.044)	-0.094 (0.220)
Ind-Dec-2005	-0.087 (0.103)	-0.065 (0.250)	-0.086 (0.105)	-0.064 (0.258)	-0.085 (0.111)	-0.063 (0.265)	-0.076 (0.181)	-0.056 (0.361)	-0.086 (0.108)	-0.065 (0.257)
Ind-Jun-2006	-0.170*** (0.007)	-0.138** (0.040)	-0.164*** (0.009)	-0.131* (0.050)	-0.167*** (0.008)	-0.135** (0.044)	-0.141** (0.033)	-0.110 (0.121)	-0.172*** (0.007)	-0.141** (0.037)
Male		0.243 (0.130)		0.215 (0.167)		0.230 (0.140)		0.276 (0.105)		0.232 (0.158)
Age		0.076*** (0.000)		0.075*** (0.000)		0.074*** (0.000)		0.073*** (0.000)		0.076*** (0.000)
Low education		-0.030 (0.880)		-0.023 (0.905)		-0.021 (0.914)		-0.049 (0.818)		-0.016 (0.935)
Medium education		-0.192 (0.235)		-0.182 (0.258)		-0.168 (0.294)		-0.312* (0.072)		-0.168 (0.294)

(continued)

Table B1. Multinomial Probit Analysis of Equity Ownership: IRA Respondents
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
In(AccrBal)	-0.213*** (0.001)	-0.213*** (0.001)	-0.220*** (0.001)	-0.220*** (0.001)	-0.217*** (0.001)	-0.217*** (0.001)	-0.213*** (0.002)	-0.213*** (0.002)	-0.213*** (0.001)	-0.213*** (0.001)
Low assets	-0.006 (0.975)	-0.006 (0.975)	0.007 (0.972)	0.007 (0.972)	-0.001 (0.998)	-0.001 (0.998)	0.015 (0.945)	0.015 (0.945)	-0.015 (0.942)	-0.015 (0.942)
Low income	0.256 (0.159)	0.256 (0.159)	0.264 (0.148)	0.264 (0.148)	0.254 (0.163)	0.254 (0.163)	0.289 (0.154)	0.289 (0.154)	0.256 (0.161)	0.256 (0.161)
Has pension	-0.220 (0.112)	-0.220 (0.112)	-0.223 (0.103)	-0.223 (0.103)	-0.202 (0.141)	-0.202 (0.141)	-0.243 (0.105)	-0.243 (0.105)	-0.204 (0.142)	-0.204 (0.142)
No advice	0.123 (0.376)	0.123 (0.376)	0.121 (0.381)	0.121 (0.381)	0.105 (0.452)	0.105 (0.452)	0.073 (0.634)	0.073 (0.634)	0.104 (0.453)	0.104 (0.453)
Finance top 2 boxes	0.282* (0.080)	0.282* (0.080)	0.292* (0.068)	0.292* (0.068)	0.290* (0.068)	0.290* (0.068)	0.353** (0.039)	0.353** (0.039)	0.296* (0.068)	0.296* (0.068)
Married	0.041 (0.818)	0.041 (0.818)	0.054 (0.759)	0.054 (0.759)	0.051 (0.775)	0.051 (0.775)	0.186 (0.327)	0.186 (0.327)	0.049 (0.783)	0.049 (0.783)
Has children	-0.319* (0.055)	-0.319* (0.055)	-0.320* (0.051)	-0.320* (0.051)	-0.319* (0.054)	-0.319* (0.054)	-0.440*** (0.015)	-0.440*** (0.015)	-0.320* (0.056)	-0.320* (0.056)
Reads finance literature	0.148 (0.548)	0.148 (0.548)	0.091 (0.705)	0.091 (0.705)	0.075 (0.755)	0.075 (0.755)	-0.051 (0.855)	-0.051 (0.855)	0.112 (0.649)	0.112 (0.649)
IMP-Urgency			0.037 (0.789)	0.033 (0.815)					0.069 (0.695)	0.083 (0.634)
IMP-Premeditation			0.099 (0.548)	0.072 (0.666)					0.010 (0.957)	-0.004 (0.985)
EI-Using					0.012** (0.014)	0.011** (0.029)	0.012** (0.029)	0.011* (0.057)	0.011** (0.026)	0.010** (0.048)

(continued)

Table B1. Multinomial Probit Analysis of Equity Ownership: IRA Respondents
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EI-Managing					-0.007 (0.356)	-0.007 (0.383)	-0.012 (0.188)	-0.013 (0.154)	-0.007 (0.348)	-0.007 (0.359)
EI-Perceiving							0.009* (0.050)	0.012** (0.013)		
EI-Understanding							-0.008 (0.277)	-0.008 (0.281)		
Constant	-1.722** (0.031)	-3.595*** (0.007)	-1.410** (0.011)	-2.895** (0.013)	-1.484** (0.029)	-2.980** (0.018)	-1.112 (0.247)	-2.672* (0.095)	-2.040* (0.050)	-3.841** (0.010)
<i>Equation for high equity ownership</i>										
BFI-Agreeableness	0.001 (0.994)	0.025 (0.812)							0.028 (0.796)	0.052 (0.642)
BFI-Conscientiousness	-0.077 (0.463)	-0.037 (0.731)							-0.084 (0.469)	-0.015 (0.902)
BFI-Extraversion	0.026 (0.710)	0.052 (0.471)							0.051 (0.486)	0.058 (0.452)
BFI-Neuroticism	-0.241*** (0.007)	-0.272*** (0.002)							-0.237** (0.016)	-0.283*** (0.004)
BFI-Openness	-0.040 (0.661)	-0.150 (0.120)							-0.030 (0.742)	-0.135 (0.165)
Ind-Dec-2006	-0.002 (0.963)	0.056 (0.328)	-0.002 (0.972)	0.053 (0.348)	-0.001 (0.983)	0.053 (0.350)	0.007 (0.896)	0.074 (0.224)	-0.002 (0.976)	0.058 (0.316)
Ind-Dec-2005	-0.020 (0.607)	0.001 (0.974)	-0.018 (0.635)	0.002 (0.963)	-0.018 (0.639)	0.002 (0.967)	-0.015 (0.708)	0.012 (0.789)	-0.019 (0.614)	0.002 (0.964)
Ind-Jun-2006	0.036 (0.462)	0.072 (0.165)	0.036 (0.460)	0.069 (0.177)	0.037 (0.454)	0.069 (0.180)	0.056 (0.296)	0.097* (0.083)	0.037 (0.452)	0.073 (0.161)

(continued)

Table B1. Multinomial Probit Analysis of Equity Ownership: IRA Respondents
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Male	0.410*** (0.003)	0.396*** (0.003)	0.378*** (0.005)	0.378*** (0.005)	0.378*** (0.005)	0.378*** (0.005)	0.378*** (0.005)	0.378*** (0.005)	0.378*** (0.005)	0.378*** (0.005)
Age	-0.027** (0.034)	-0.025** (0.046)	-0.024* (0.059)	-0.024* (0.059)	-0.024* (0.059)	-0.024* (0.059)	-0.024* (0.059)	-0.024* (0.059)	-0.024* (0.059)	-0.024* (0.059)
Low education	-0.116 (0.508)	-0.073 (0.669)	-0.102 (0.548)	-0.102 (0.548)	-0.102 (0.548)	-0.102 (0.548)	-0.102 (0.548)	-0.102 (0.548)	-0.102 (0.548)	-0.102 (0.548)
Medium education	-0.199 (0.130)	-0.195 (0.138)	-0.191 (0.146)	-0.191 (0.146)	-0.191 (0.146)	-0.191 (0.146)	-0.191 (0.146)	-0.191 (0.146)	-0.191 (0.146)	-0.191 (0.146)
In(AccrBal)	-0.207*** (0.000)	-0.201*** (0.000)	-0.198*** (0.000)	-0.198*** (0.000)	-0.198*** (0.000)	-0.198*** (0.000)	-0.198*** (0.000)	-0.198*** (0.000)	-0.198*** (0.000)	-0.198*** (0.000)
Low assets	-0.120 (0.472)	-0.129 (0.433)	-0.110 (0.507)	-0.110 (0.507)	-0.110 (0.507)	-0.110 (0.507)	-0.110 (0.507)	-0.110 (0.507)	-0.110 (0.507)	-0.110 (0.507)
Low income	-0.156 (0.280)	-0.155 (0.281)	-0.167 (0.244)	-0.167 (0.244)	-0.167 (0.244)	-0.167 (0.244)	-0.167 (0.244)	-0.167 (0.244)	-0.167 (0.244)	-0.167 (0.244)
Has pension	-0.226* (0.061)	-0.196* (0.098)	-0.199* (0.094)	-0.199* (0.094)	-0.199* (0.094)	-0.199* (0.094)	-0.199* (0.094)	-0.199* (0.094)	-0.199* (0.094)	-0.199* (0.094)
No advice	0.077 (0.524)	0.046 (0.705)	0.031 (0.798)	0.031 (0.798)	0.031 (0.798)	0.031 (0.798)	0.031 (0.798)	0.031 (0.798)	0.031 (0.798)	0.031 (0.798)
Finance top 2 boxes	-0.125 (0.368)	-0.113 (0.413)	-0.102 (0.458)	-0.102 (0.458)	-0.102 (0.458)	-0.102 (0.458)	-0.102 (0.458)	-0.102 (0.458)	-0.102 (0.458)	-0.102 (0.458)
Married	-0.201 (0.185)	-0.186 (0.216)	-0.182 (0.228)	-0.182 (0.228)	-0.182 (0.228)	-0.182 (0.228)	-0.182 (0.228)	-0.182 (0.228)	-0.182 (0.228)	-0.182 (0.228)
Has children	-0.225 (0.119)	-0.165 (0.249)	-0.166 (0.247)	-0.166 (0.247)	-0.166 (0.247)	-0.166 (0.247)	-0.166 (0.247)	-0.166 (0.247)	-0.166 (0.247)	-0.166 (0.247)

(continued)

Table B1. Multinomial Probit Analysis of Equity Ownership: IRA Respondents
(*p*-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Reads finance literature		0.327 (0.105)		0.345* (0.081)		0.341* (0.084)		0.377* (0.088)		0.287 (0.157)
IMP-Urgency			0.170 (0.165)	0.178 (0.156)					0.000 (1.000)	-0.053 (0.732)
IMP-Premeditation			-0.074 (0.630)	-0.131 (0.400)					0.058 (0.733)	-0.023 (0.895)
EI-Using					0.004 (0.248)	0.004 (0.337)	0.004 (0.343)	0.004 (0.439)	0.005 (0.255)	0.004 (0.341)
EI-Managing					-0.013** (0.036)	-0.009 (0.144)	-0.023*** (0.001)	-0.021*** (0.005)	-0.015** (0.018)	-0.011* (0.092)
EI-Perceiving							0.003 (0.461)	0.004 (0.374)		
EI-Understanding							-0.011* (0.095)	-0.014** (0.038)		
Constant	0.658 (0.391)	4.916*** (0.000)	-0.629 (0.205)	3.425*** (0.001)	0.485 (0.403)	4.028*** (0.000)	2.289*** (0.008)	6.626*** (0.000)	1.309 (0.163)	5.632*** (0.000)
<i>N</i>	3,464	3,464	3,464	3,464	3,464	3,464	2,953	2,953	3,464	3,464

Notes: Multinomial probit estimation was carried out with three categories as dependent variable: Low equity ownership (less than 50 percent stock), medium equity ownership (50–90 percent stock), and high equity ownership (more than 90 percent stock). Results in the first panel of the table are for the low-equity category (relative to the medium-equity category); results in the second panel are for the high-equity category (again relative to the medium). Data are coefficient values. The *p*-values were computed by using a Huber–White heteroscedasticity-robust procedure. Columns with odd numbers as headers present regressions without demographic control variables; columns with even numbers as headers include controls.

*Indicates significance at 10 percent.
 **Indicates significance at 5 percent.
 ***Indicates significance at 1 percent.

Table B2. Multinomial Probit Analysis of Equity Shares: 401(k) Respondents
(p-values in parentheses)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Equation for low equity ownership</i>										
BFI-Agreeableness	0.359** (0.117)	0.329** (0.033)							0.403*** (0.007)	0.370** (0.017)
BFI-Conscientiousness	-0.113 (0.394)	-0.136 (0.308)							-0.074 (0.641)	-0.135 (0.397)
BFI-Extraversion	-0.023 (0.810)	-0.018 (0.855)							-0.028 (0.791)	-0.004 (0.968)
BFI-Neuroticism	0.115 (0.275)	0.116 (0.283)							0.060 (0.624)	0.076 (0.533)
BFI-Openness	-0.053 (0.649)	-0.025 (0.852)							-0.017 (0.886)	0.006 (0.967)
Ind-Dec-2006	-0.198** (0.011)	-0.198** (0.024)	-0.193* (0.014)	-0.191** (0.028)	-0.193** (0.013)	-0.193** (0.027)	-0.115 (0.181)	-0.115 (0.230)	-0.197** (0.012)	-0.196** (0.026)
Ind-Dec-2005	-0.180*** (0.002)	-0.193*** (0.002)	-0.176*** (0.003)	-0.191*** (0.002)	-0.177*** (0.003)	-0.192*** (0.002)	-0.128* (0.050)	-0.145** (0.037)	-0.181*** (0.002)	-0.194*** (0.002)
Ind-Jun-2006	-0.137* (0.066)	-0.143* (0.072)	-0.134* (0.071)	-0.139* (0.078)	-0.133* (0.070)	-0.139* (0.078)	-0.052 (0.514)	-0.059 (0.493)	-0.135* (0.071)	-0.140* (0.080)
Male		-0.012 (0.943)		-0.065 (0.697)		-0.076 (0.651)		-0.200 (0.291)		-0.015 (0.930)
Age		0.060*** (0.000)		0.062*** (0.000)		0.064*** (0.000)		0.072*** (0.000)		0.063*** (0.000)
Low education		0.144 (0.489)		0.173 (0.391)		0.221 (0.274)		0.056 (0.798)		0.145 (0.484)
Medium education		0.168 (0.378)		0.184 (0.321)		0.226 (0.225)		0.154 (0.441)		0.193 (0.309)

(continued)

Table B2. Multinomial Probit Analysis of Equity Shares: 401(k) Respondents
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
In(AcctBal)	-0.043 (0.598)	-0.043 (0.598)	-0.050 (0.532)	-0.046 (0.567)	-0.046 (0.532)	-0.046 (0.567)	-0.046 (0.532)	-0.054 (0.535)	-0.046 (0.567)	-0.045 (0.577)
Low assets	0.199 (0.235)	0.199 (0.235)	0.208 (0.216)	0.219 (0.191)	0.219 (0.191)	0.219 (0.191)	0.219 (0.191)	0.231 (0.208)	0.219 (0.191)	0.190 (0.256)
Low income	-0.151 (0.410)	-0.151 (0.410)	-0.169 (0.369)	-0.152 (0.416)	-0.152 (0.416)	-0.152 (0.416)	-0.152 (0.416)	-0.225 (0.276)	-0.152 (0.416)	-0.158 (0.395)
Has pension	-0.153 (0.333)	-0.153 (0.333)	-0.150 (0.338)	-0.137 (0.380)	-0.137 (0.380)	-0.137 (0.380)	-0.137 (0.380)	-0.079 (0.659)	-0.137 (0.380)	-0.144 (0.363)
No advice	0.019 (0.902)	0.019 (0.902)	0.015 (0.920)	-0.003 (0.985)	-0.003 (0.985)	-0.003 (0.985)	-0.003 (0.985)	-0.084 (0.614)	-0.003 (0.985)	0.011 (0.941)
Finance top 2 boxes	0.317 (0.125)	0.317 (0.125)	0.318 (0.124)	0.323 (0.115)	0.323 (0.115)	0.323 (0.115)	0.323 (0.115)	0.332 (0.137)	0.323 (0.115)	0.340* (0.100)
Married	0.076 (0.709)	0.076 (0.709)	0.042 (0.835)	0.034 (0.867)	0.034 (0.867)	0.034 (0.867)	0.034 (0.867)	0.114 (0.607)	0.034 (0.867)	0.041 (0.840)
Has children	-0.097 (0.619)	-0.097 (0.619)	-0.028 (0.886)	0.009 (0.961)	0.009 (0.961)	0.009 (0.961)	0.009 (0.961)	0.108 (0.594)	0.108 (0.594)	-0.077 (0.695)
Reads finance literature	-0.310 (0.348)	-0.310 (0.348)	-0.326 (0.318)	-0.354 (0.272)	-0.354 (0.272)	-0.354 (0.272)	-0.354 (0.272)	-0.321 (0.376)	-0.354 (0.272)	-0.286 (0.386)
IMP-Urgency			-0.159 (0.298)	-0.139 (0.366)	-0.139 (0.366)	-0.139 (0.366)	-0.139 (0.366)		-0.221 (0.274)	-0.171 (0.387)
IMP-Premeditation			0.104 (0.611)	0.138 (0.498)	0.138 (0.498)	0.138 (0.498)	0.138 (0.498)		0.051 (0.828)	0.110 (0.644)
EI-Using					0.006 (0.179)	0.008* (0.098)	0.011** (0.034)	0.012* (0.022)	0.008 (0.103)	0.009* (0.064)

(continued)

Table B2. Multinomial Probit Analysis of Equity Shares: 401(k) Respondents
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EI-Managing					-0.006 (0.419)	-0.010 (0.127)	-0.006 (0.436)	-0.015* (0.061)	-0.009 (0.216)	-0.012* (0.080)
EI-Perceiving							0.000 (0.983)	0.000 (0.954)		
EI-Understanding							-0.029*** (0.000)	-0.027*** (0.002)		
Constant	-2.064** (0.032)	-4.615*** (0.005)	-0.919 (0.162)	-3.743*** (0.007)	-1.139* (0.087)	-3.702*** (0.007)	1.155 (0.232)	-1.354 (0.411)	-1.779 (0.146)	-4.503** (0.011)
<i>Equation for high equity ownership</i>										
BFI-Agreeableness	0.154 (0.126)	0.203* (0.051)							0.179* (0.083)	0.224** (0.035)
BFI-Conscientiousness	-0.086 (0.410)	-0.062 (0.565)							-0.064 (0.594)	-0.022 (0.860)
BFI-Extraversion	0.104 (0.160)	0.106 (0.160)							0.102 (0.189)	0.094 (0.233)
BFI-Neuroticism	-0.006 (0.946)	0.033 (0.709)							0.012 (0.900)	0.040 (0.687)
BFI-Openness	-0.113 (0.231)	-0.110 (0.258)							-0.107 (0.266)	-0.098 (0.327)
Ind-Dec-2006	0.021 (0.705)	0.041 (0.517)	0.021 (0.703)	0.041 (0.515)	0.021 (0.712)	0.041 (0.520)	0.096 (0.109)	0.116* (0.092)	0.021 (0.705)	0.041 (0.522)
Ind-Dec-2005	-0.001 (0.984)	0.010 (0.835)	-0.001 (0.983)	0.009 (0.840)	-0.001 (0.973)	0.009 (0.851)	0.022 (0.650)	0.032 (0.533)	-0.001 (0.985)	0.009 (0.840)
Ind-Jun-2006	0.077 (0.146)	0.092 (0.107)	0.077 (0.144)	0.092 (0.106)	0.076 (0.150)	0.091 (0.109)	0.134** (0.019)	0.149** (0.017)	0.077 (0.145)	0.092 (0.107)

(continued)

Table B2. Multinomial Probit Analysis of Equity Shares: 401(k) Respondents
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Male	0.257*	(0.072)	0.199	(0.152)	0.211	(0.135)	0.127	(0.417)	0.290**	(0.047)
Age	-0.038***	(0.002)	-0.037***	(0.002)	-0.036***	(0.003)	-0.040***	(0.002)	-0.037***	(0.002)
Low education	0.208	(0.222)	0.281*	(0.096)	0.293*	(0.080)	0.169	(0.365)	0.239	(0.163)
Medium education	0.363***	(0.020)	0.396***	(0.011)	0.408***	(0.008)	0.258	(0.128)	0.395**	(0.011)
In(AcctBal)	-0.036	(0.583)	-0.036	(0.582)	-0.037	(0.568)	-0.034	(0.622)	-0.034	(0.600)
Low assets	-0.048	(0.738)	-0.044	(0.756)	-0.043	(0.763)	-0.008	(0.957)	-0.043	(0.765)
Low income	-0.231	(0.131)	-0.229	(0.135)	-0.247	(0.102)	-0.327*	(0.052)	-0.214	(0.163)
Has pension	-0.044	(0.735)	-0.026	(0.838)	-0.022	(0.866)	0.021	(0.886)	-0.037	(0.774)
No advice	-0.082	(0.494)	-0.093	(0.434)	-0.091	(0.450)	-0.085	(0.531)	-0.091	(0.452)
Finance top 2 boxes	0.233	(0.156)	0.252	(0.126)	0.254	(0.119)	0.232	(0.196)	0.241	(0.140)
Married	0.179	(0.291)	0.169	(0.323)	0.149	(0.382)	0.114	(0.534)	0.149	(0.383)
Has children	0.092	(0.579)	0.157	(0.338)	0.174	(0.289)	0.304**	(0.088)	0.114	(0.497)

(continued)

Table B2. Multinomial Probit Analysis of Equity Shares: 401(k) Respondents
(*p*-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Reads finance literature		-0.197 (0.411)		-0.224 (0.350)		-0.226 (0.340)		-0.156 (0.533)		-0.207 (0.393)
IMP-Urgency			0.056 (0.630)	0.049 (0.686)					0.037 (0.807)	-0.006 (0.970)
IMP-Premeditation			-0.164 (0.278)	-0.178 (0.255)					-0.131 (0.441)	-0.185 (0.291)
EI-Using					0.006 (0.122)	0.007* (0.089)	0.009* (0.055)	0.010*** (0.040)	0.007* (0.094)	0.008* (0.058)
EI-Managing					-0.007 (0.235)	-0.004 (0.458)	-0.006 (0.417)	-0.004 (0.613)	-0.009 (0.134)	-0.006 (0.320)
EI-Perceiving							-0.002 (0.667)	-0.002 (0.712)		
EI-Understanding							-0.017*** (0.008)	-0.019*** (0.006)		
Constant	-0.505 (0.501)	1.061 (0.371)	0.006 (0.990)	1.946* (0.063)	-0.278 (0.618)	1.240 (0.257)	1.165 (0.171)	3.095*** (0.024)	-0.254 (0.787)	1.091 (0.412)
<i>N</i>	3,290	3,290	3,290	3,290	3,290	3,290	2,736	2,736	3,290	3,290

Note: See notes to Table B1.

*Indicates significance at 10 percent.

**Indicates significance at 5 percent.

***Indicates significance at 1 percent.

Table B3. Multinomial Probit Analysis of Equity Ownership: IRA Respondents with High Assets at Vanguard
(p-values in parentheses)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Equation for low equity ownership</i>										
BFI-Agreeableness	0.436* (0.100)	0.382 (0.150)							0.371 (0.189)	0.293 (0.321)
BFI-Conscientiousness	-0.022 (0.940)	0.006 (0.984)							-0.281 (0.353)	-0.317 (0.335)
BFI-Extraversion	0.102 (0.584)	0.153 (0.418)							0.209 (0.266)	0.279 (0.145)
BFI-Neuroticism	-0.096 (0.606)	-0.073 (0.734)							0.029 (0.875)	0.038 (0.857)
BFI-Openness	-0.608*** (0.004)	-0.564*** (0.013)							-0.623*** (0.004)	-0.588** (0.013)
Ind-Dec-2006	-0.344** (0.020)	-0.341** (0.034)	-0.281** (0.049)	-0.272* (0.075)	-0.302** (0.041)	-0.287* (0.064)	-0.274* (0.087)	-0.205 (0.250)	-0.341** (0.028)	-0.320* (0.052)
Ind-Dec-2005	-0.180 (0.114)	-0.167 (0.189)	-0.147 (0.178)	-0.134 (0.275)	-0.159 (0.159)	-0.145 (0.237)	-0.178 (0.182)	-0.141 (0.359)	-0.182 (0.152)	-0.160 (0.253)
Ind-Jun-2006	-0.224* (0.087)	-0.204 (0.156)	-0.181 (0.151)	-0.160 (0.250)	-0.193 (0.134)	-0.174 (0.219)	-0.149 (0.287)	-0.086 (0.582)	-0.216 (0.110)	-0.189 (0.202)
Male		0.231 (0.507)		0.142 (0.685)		0.296 (0.401)		0.024 (0.953)		0.117 (0.756)
Age		0.102*** (0.003)		0.095*** (0.003)		0.089*** (0.007)		0.111*** (0.004)		0.088** (0.011)
Low education		0.160 (0.713)		0.507 (0.238)		0.471 (0.269)		0.242 (0.626)		0.404 (0.315)
Medium education		-0.431 (0.230)		-0.308 (0.396)		-0.288 (0.433)		-0.601 (0.154)		-0.137 (0.678)

(continued)

Table B3. Multinomial Probit Analysis of Equity Ownership: IRA Respondents with High Assets at Vanguard
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
In(AccrBal)	-0.067 (0.755)	-0.168 (0.424)	-0.183 (0.390)	-0.354 (0.107)	-0.136 (0.546)					
Low assets	0.575 (0.208)	0.377 (0.411)	0.346 (0.439)	0.220 (0.640)	0.424 (0.362)					
Low income	0.395 (0.358)	0.476 (0.256)	0.474 (0.225)	0.739 (0.136)	0.431 (0.324)					
Has pension	-0.250 (0.376)	-0.079 (0.784)	-0.099 (0.729)	-0.402 (0.214)	-0.306 (0.305)					
No advice	0.264 (0.379)	0.197 (0.486)	0.141 (0.642)	0.002 (0.996)	0.206 (0.516)					
Finance top 2 boxes	0.481 (0.165)	0.636* (0.067)	0.536 (0.125)	1.016*** (0.009)	0.581* (0.091)					
Married	-0.469 (0.231)	-0.414 (0.312)	-0.430 (0.316)	0.044 (0.923)	-0.402 (0.335)					
Has children	0.011 (0.976)	0.081 (0.815)	0.078 (0.827)	0.118 (0.791)	0.116 (0.750)					
Reads finance literature	-0.004 (0.994)	-0.211 (0.626)	0.118 (0.777)	-0.299 (0.547)	-0.098 (0.856)					
IMP-Urgency		0.238 (0.391)		0.451 (0.205)	0.580 (0.119)					
IMP-Premeditation		0.066 (0.858)		0.174 (0.642)	0.200 (0.602)					

(continued)

Table B3. Multinomial Probit Analysis of Equity Ownership: IRA Respondents with High Assets at Vanguard
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EI-Using					0.025** (0.013)	0.018* (0.094)	0.030*** (0.004)	0.022** (0.043)	0.024** (0.020)	0.017* (0.096)
EI-Managing					-0.015 (0.306)	0.001 (0.924)	-0.032* (0.065)	-0.023 (0.197)	-0.019 (0.275)	-0.007 (0.698)
EI-Perceiving							0.033*** (0.007)	0.043*** (0.001)		
EI-Understanding							-0.039*** (0.007)	-0.036** (0.032)		
Constant	-0.636 (0.679)	-5.983 (0.112)	-2.124* (0.055)	-6.124* (0.057)	-2.151 (0.175)	-6.260* (0.072)	-0.365 (0.849)	-4.145 (0.311)	-2.431 (0.238)	-6.956* (0.082)
<i>Equation for high equity ownership</i>										
BFI-Agreeableness	-0.005 (0.983)	-0.025 (0.917)							0.035 (0.879)	0.225 (0.920)
BFI-Conscientiousness	-0.321 (0.140)	-0.145 (0.503)							-0.122 (0.613)	0.142 (0.575)
BFI-Extraversion	0.118 (0.400)	0.213 (0.132)							0.051 (0.736)	0.113 (0.466)
BFI-Neuroticism	-0.355* (0.073)	-0.338* (0.094)							-0.337 (0.119)	-0.321 (0.143)
BFI-Openness	0.003 (0.986)	-0.062 (0.733)							0.033 (0.854)	-0.064 (0.731)
Ind-Dec-2006	0.004 (0.973)	0.089 (0.491)	0.003 (0.975)	0.122 (0.345)	0.002 (0.986)	0.103 (0.418)	-0.006 (0.960)	0.120 (0.376)	0.002 (0.989)	0.118 (0.373)
Ind-Dec-2005	-0.070 (0.278)	-0.041 (0.556)	-0.069 (0.292)	-0.023 (0.740)	-0.070 (0.269)	-0.031 (0.646)	-0.064 (0.338)	-0.019 (0.794)	-0.075 (0.253)	-0.034 (0.625)

(continued)

Table B3. Multinomial Probit Analysis of Equity Ownership: IRA Respondents with High Assets at Vanguard
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ind-Jun-2006	0.007 (0.939)	0.060 (0.572)	0.008 (0.933)	0.085 (0.424)	0.006 (0.954)	0.068 (0.517)	0.018 (0.858)	0.100 (0.373)	0.005 (0.956)	0.076 (0.486)
Male	0.832*** (0.007)	0.007 (0.007)	0.008 (0.933)	0.085 (0.424)	0.006 (0.954)	0.068 (0.517)	0.018 (0.858)	0.100 (0.373)	0.005 (0.956)	0.965*** (0.002)
Age	0.011 (0.670)	0.011 (0.670)	0.029 (0.275)	0.029 (0.275)	0.019 (0.489)	0.019 (0.489)	0.034 (0.252)	0.034 (0.252)	0.019 (0.477)	0.019 (0.477)
Low education	-0.184 (0.590)	-0.184 (0.590)	-0.340 (0.334)	-0.340 (0.334)	-0.212 (0.528)	-0.212 (0.528)	-0.299 (0.430)	-0.299 (0.430)	-0.400 (0.276)	-0.400 (0.276)
Medium education	-0.324 (0.265)	-0.324 (0.265)	-0.462 (0.102)	-0.462 (0.102)	-0.363 (0.201)	-0.363 (0.201)	-0.359 (0.217)	-0.359 (0.217)	-0.429 (0.140)	-0.429 (0.140)
In(AcctBal)	-0.291 (0.171)	-0.291 (0.171)	-0.368* (0.074)	-0.368* (0.074)	-0.332 (0.102)	-0.332 (0.102)	-0.424* (0.055)	-0.424* (0.055)	-0.367* (0.080)	-0.367* (0.080)
Low assets	-0.110 (0.785)	-0.110 (0.785)	-0.231 (0.565)	-0.231 (0.565)	-0.207 (0.600)	-0.207 (0.600)	-0.053 (0.900)	-0.053 (0.900)	-0.165 (0.685)	-0.165 (0.685)
Low income	0.359 (0.307)	0.359 (0.307)	0.254 (0.462)	0.254 (0.462)	0.220 (0.531)	0.220 (0.531)	-0.135 (0.720)	-0.135 (0.720)	0.253 (0.467)	0.253 (0.467)
Has pension	-0.116 (0.636)	-0.116 (0.636)	-0.120 (0.619)	-0.120 (0.619)	-0.080 (0.738)	-0.080 (0.738)	-0.100 (0.705)	-0.100 (0.705)	-0.127 (0.609)	-0.127 (0.609)
No advice	0.280 (0.247)	0.280 (0.247)	0.188 (0.437)	0.188 (0.437)	0.168 (0.492)	0.168 (0.492)	0.044 (0.869)	0.044 (0.869)	0.242 (0.332)	0.242 (0.332)
Finance top 2 boxes	-0.091 (0.756)	-0.091 (0.756)	-0.080 (0.785)	-0.080 (0.785)	-0.055 (0.853)	-0.055 (0.853)	-0.062 (0.848)	-0.062 (0.848)	-0.206 (0.495)	-0.206 (0.495)
Married	-0.725*** (0.019)	-0.725*** (0.019)	-0.795*** (0.009)	-0.795*** (0.009)	-0.729*** (0.018)	-0.729*** (0.018)	-0.775*** (0.022)	-0.775*** (0.022)	-0.773** (0.013)	-0.773** (0.013)

(continued)

Table B3. Multinomial Probit Analysis of Equity Ownership: IRA Respondents with High Assets at Vanguard
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Has children		-0.310 (0.337)		-0.383 (0.235)		-0.283 (0.384)		-0.413 (0.245)		-0.367 (0.256)
Reads finance literature		0.843* (0.053)		0.790* (0.081)		0.942** (0.031)		1.162** (0.014)		0.773* (0.097)
IMP-Urgency			0.401 (0.108)	0.429* (0.094)					0.156 (0.608)	0.083 (0.789)
IMP-Premeditation			-0.852*** (0.005)	-1.019*** (0.001)					-0.683** (0.043)	-0.948*** (0.009)
EI-Using					0.006 (0.489)	0.006 (0.533)	0.006 (0.523)	0.006 (0.593)	0.007 (0.422)	0.005 (0.542)
EI-Managing					-0.022* (0.089)	-0.011 (0.422)	-0.033** (0.023)	-0.029* (0.059)	-0.024* (0.084)	-0.012 (0.442)
EI-Perceiving							0.005 (0.599)	0.006 (0.523)		
EI-Understanding							-0.015 (0.248)	-0.011 (0.389)		
Constant	1.351 (0.390)	3.486 (0.304)	0.925 (0.289)	4.538 (0.114)	1.086 (0.325)	3.194 (0.292)	2.988** (0.044)	6.123* (0.079)	3.686** (0.046)	6.405* (0.062)
N	902	902	902	902	902	902	808	808	902	902

Notes: Sample is only those individuals whose account balance equaled 35 percent or more of the upper bound on the category of reported total financial assets. See the notes to Table B1.

*Indicates significance at 10 percent.
 **Indicates significance at 5 percent.
 ***Indicates significance at 1 percent.

Table B4. Multinomial Probit Analysis of Equity Ownership: 401(k) Respondents with High Assets at Vanguard
(p-values in parentheses)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Equation for low equity ownership</i>										
BFI-Agreeableness	0.335 (0.111)	0.358 (0.101)							0.362* (0.086)	0.368* (0.094)
BFI-Conscientiousness	-0.268 (0.115)	-0.298* (0.096)							-0.356* (0.072)	-0.460** (0.027)
BFI-Extraversion	0.017 (0.900)	0.039 (0.774)							0.067 (0.638)	0.116 (0.420)
BFI-Neuroticism	0.034 (0.810)	0.055 (0.711)							-0.036 (0.819)	-0.008 (0.959)
BFI-Openness	0.003 (0.983)	0.021 (0.906)							0.039 (0.809)	0.056 (0.752)
Ind-Dec-2006	-0.239** (0.017)	-0.227** (0.047)	-0.236** (0.018)	-0.210* (0.063)	-0.236** (0.018)	-0.213* (0.062)	-0.127 (0.254)	-0.078 (0.543)	-0.245** (0.016)	-0.231** (0.047)
Ind-Dec-2005	-0.168** (0.014)	-0.176** (0.015)	-0.166** (0.013)	-0.170** (0.017)	-0.166** (0.015)	-0.172** (0.017)	-0.117 (0.122)	-0.118 (0.147)	-0.174** (0.012)	-0.185** (0.012)
Ind-Jun-2006	-0.081 (0.369)	-0.082 (0.401)	-0.081 (0.366)	-0.075 (0.434)	-0.078 (0.386)	-0.073 (0.451)	0.042 (0.674)	0.067 (0.533)	-0.082 (0.375)	-0.083 (0.404)
Male		-0.123 (0.595)		-0.156 (0.497)		-0.184 (0.411)		-0.358 (0.165)		-0.241 (0.315)
Age		0.059*** (0.009)		0.058** (0.012)		0.060*** (0.009)		0.063** (0.011)		0.067*** (0.002)
Low education		0.558* (0.066)		0.598** (0.038)		0.622** (0.033)		0.581* (0.056)		0.582* (0.053)
Medium education		0.303 (0.303)		0.307 (0.282)		0.345 (0.225)		0.347 (0.242)		0.382 (0.196)

(continued)

Table B4. Multinomial Probit Analysis of Equity Ownership: 401(k) Respondents with High Assets at Vanguard
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
In(AccrBal)	-0.095 (0.509)	-0.134 (0.340)	-0.127 (0.367)	-0.204 (0.204)	-0.120 (0.407)					
Low assets	-0.261 (0.316)	-0.278 (0.290)	-0.295 (0.262)	-0.486* (0.094)	-0.311 (0.234)					
Low income	-0.141 (0.613)	-0.259 (0.377)	-0.175 (0.551)	-0.427 (0.180)	-0.158 (0.579)					
Has pension	-0.411* (0.054)	-0.416** (0.046)	-0.392* (0.061)	-0.335 (0.163)	-0.398* (0.063)					
No advice	0.048 (0.806)	0.039 (0.839)	-0.004 (0.982)	-0.049 (0.824)	0.043 (0.824)					
Finance top 2 boxes	0.343 (0.244)	0.348 (0.259)	0.343 (0.256)	0.460 (0.163)	0.354 (0.242)					
Married	0.164 (0.508)	0.150 (0.544)	0.137 (0.580)	0.289 (0.304)	0.145 (0.563)					
Has children	-0.318 (0.240)	-0.221 (0.398)	-0.174 (0.498)	0.069 (0.796)	-0.253 (0.356)					
Reads finance literature	-0.397 (0.468)	-0.443 (0.396)	-0.403 (0.419)	-0.118 (0.851)	-0.330 (0.525)					
IMP-Urgency		-0.212 (0.342)			-0.261 (0.341)					
IMP-Premeditation		0.334 (0.263)			0.464 (0.149)					
EI-Using			0.012** (0.039)	0.018** (0.015)	0.013** (0.031)					

Table B4. Multinomial Probit Analysis of Equity Ownership: 401(k) Respondents with High Assets at Vanguard
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EI-Managing					-0.016* (0.088)	-0.018** (0.039)	-0.019* (0.083)	-0.030** (0.010)	-0.018* (0.056)	-0.021** (0.023)
EI-Perceiving							-0.003 (0.618)	-0.004 (0.578)		
EI-Understanding							-0.033*** (0.004)	-0.028** (0.017)		
Constant	-1.389 (0.304)	-3.132 (0.220)	-1.411 (0.103)	-2.711 (0.215)	-0.682 (0.440)	-1.852 (0.395)	2.656** (0.047)	2.655 (0.295)	-1.490 (0.377)	-3.365 (0.211)
<i>Equation for high equity ownership</i>										
BFI-Agreeableness	-0.064 (0.660)	-0.060 (0.696)							-0.041 (0.784)	-0.045 (0.772)
BFI-Conscientiousness	-0.145 (0.328)	-0.048 (0.760)							-0.178 (0.297)	-0.069 (0.696)
BFI-Extraversion	0.151 (0.136)	0.156 (0.140)							0.184* (0.093)	0.178 (0.113)
BFI-Neuroticism	-0.046 (0.706)	0.026 (0.836)							-0.052 (0.713)	0.027 (0.851)
BFI-Openness	0.023 (0.856)	0.051 (0.704)							0.045 (0.730)	0.078 (0.563)
Ind-Dec-2006	-0.036 (0.612)	-0.009 (0.919)	-0.038 (0.593)	-0.016 (0.855)	-0.039 (0.577)	-0.019 (0.822)	0.038 (0.630)	0.076 (0.424)	-0.038 (0.598)	-0.010 (0.909)
Ind-Dec-2005	-0.012 (0.817)	0.001 (0.985)	-0.014 (0.789)	-0.002 (0.972)	-0.015 (0.775)	-0.004 (0.938)	0.010 (0.854)	0.027 (0.665)	-0.014 (0.800)	-0.001 (0.988)
Ind-Jun-2006	0.121* (0.063)	0.141* (0.050)	0.119* (0.066)	0.136* (0.057)	0.118* (0.071)	0.134* (0.061)	0.155** (0.029)	0.183** (0.021)	0.121* (0.065)	0.142 (0.050)

(continued)

Table B4. Multinomial Probit Analysis of Equity Ownership: 401(k) Respondents with High Assets at Vanguard
(p-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Male		0.310 (0.138)		0.318 (0.121)		0.282 (0.174)		0.227 (0.326)		0.272 (0.206)
Age		-0.044** (0.010)		-0.046*** (0.007)		-0.043** (0.010)		-0.048** (0.012)		-0.042 (0.014)
Low education		0.382 (0.138)		0.381 (0.136)		0.403 (0.116)		0.473* (0.089)		0.412 (0.110)
Medium education		0.383 (0.105)		0.375 (0.109)		0.403* (0.085)		0.373 (0.145)		0.425 (0.072)
In(AcctBal)		-0.066 (0.611)		-0.048 (0.711)		-0.044 (0.733)		-0.093 (0.517)		-0.064 (0.617)
Low assets		-0.172 (0.470)		-0.170 (0.476)		-0.174 (0.467)		-0.320 (0.233)		-0.181 (0.451)
Low income		-0.340 (0.156)		-0.353 (0.140)		-0.342 (0.151)		-0.518* (0.055)		-0.318 (0.190)
Has pension		-0.161 (0.384)		-0.183 (0.322)		-0.177 (0.337)		-0.315 (0.124)		-0.148 (0.426)
No advice		-0.161 (0.329)		-0.154 (0.348)		-0.168 (0.310)		-0.149 (0.432)		-0.187 (0.264)
Finance top 2 boxes		0.160 (0.523)		0.125 (0.614)		0.118 (0.627)		0.210 (0.445)		0.156 (0.531)
Married		0.238 (0.290)		0.228 (0.307)		0.199 (0.370)		0.187 (0.451)		0.206 (0.362)
Has children		0.136 (0.578)		0.131 (0.581)		0.178 (0.459)		0.395 (0.129)		0.184 (0.454)

(continued)

Table B4. Multinomial Probit Analysis of Equity Ownership: 401(k) Respondents with High Assets at Vanguard
(*p*-values in parentheses) (continued)

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Reads finance literature		-0.691* (0.085)		-0.608 (0.132)		-0.590 (0.140)		-0.519 (0.266)		-0.695 (0.088)
IMP-Urgency			-0.012 (0.946)	-0.004 (0.981)					-0.014 (0.951)	0.024 (0.919)
IMP-Premeditation			-0.052 (0.819)	-0.068 (0.772)					0.120 (0.640)	0.025 (0.925)
EI-Using					0.008 (0.150)	0.008 (0.160)	0.013** (0.044)	0.014** (0.036)	0.009 (0.115)	0.009 (0.117)
EI-Managing					-0.016** (0.049)	-0.013 (0.117)	-0.021** (0.041)	-0.019* (0.071)	-0.017** (0.035)	-0.015 (0.074)
EI-Perceiving							-0.001 (0.895)	-0.001 (0.859)		
EI-Understanding							-0.024*** (0.007)	-0.024** (0.009)		
Constant	0.021 (0.985)	2.053 (0.325)	-0.189 (0.770)	2.483 (0.168)	0.352 (0.643)	2.592 (0.183)	2.701** (0.027)	5.923** (0.015)	0.353 (0.796)	2.220 (0.338)
<i>N</i>	1,783	1,783	1,783	1,783	1,783	1,783	1,468	1,468	1,783	1,783

Notes: Sample is only those individuals whose account balance equaled 35 percent or more of the upper bound on the category of reported total financial assets. See the notes to Table B1.

*Indicates significance at 10 percent.

**Indicates significance at 5 percent.

***Indicates significance at 1 percent.

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