

Preference for Risk in Investing as a Function of Trait Optimism and Gender

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This research examines the role of gender and optimism on the riskiness of investment choices of students ($N = 66$) in a semester long investment contest with both monetary and academic incentives. Data suggest that males make more risky investment choices than females, and that this difference was primarily due to the riskier choices of optimistic males. In addition, males demonstrated greater variability in final portfolio value than did females. Our results suggest that 1) the well documented gender difference in investment strategies of men and women may be due to a specific subgroup of males (i.e., optimists); 2) that optimism may lead to different behavioral tendencies in men and women depending on the domain; and 3) that the benefits of optimism may be restricted to domains in which continued effort and information seeking are likely to lead to desired outcomes.

Investors differ in the degree of risk they prefer in their portfolios. Financial analysts believe that this difference is important enough that they often use survey instruments to help them assess the relative degree of risk a new client is willing to take on. The goal of the current research is to evaluate the role of two individual difference variables, gender and optimism, in determining preference for risk in investment choices.

Gender and Risk Taking

A large body of psychological literature suggests that females tend to be more risk averse than males (see Byrnes, Miller, & Schafer [1999], for a review). This finding has been relatively robust across a wide variety of domains and using a wide variety of definitions of risk. Furthermore, the difference holds even when it is clear that the consequences of taking the risk are potentially severe. Both biological and socio-cultural explanations have been proposed to explain these basic differences.

For example, Wilson and Daly [1985] suggest that risk taking in males has evolved due to the adaptive mating advantage conferred on males willing to take risks to accumulate mates and resources that may at-

tract mates. Females, in contrast, have evolved a lower preference for risk in response to different evolutionary pressures faced because of their greater biological investment in any offspring (Buss [1999]). Some data provide a potential biological substrate through which such differences may be operating. Zuckerman [1994] found that women tend to have higher levels of the enzyme monoamine oxidase, which can serve to reduce sensation seeking.

Others, however, have argued that socialization may play a strong role in creating the observed sex differences. These authors suggest that pressures placed on children throughout their childhood to adopt appropriate sex roles can lead to greater caution and less confidence in women, and more risk seeking in men (Beyer & Bowden [1997], Deaux & Emswiller [1974], Slovic [1966]). Whatever the cause, however, the evidence clearly shows that men are more willing to make risky choices than women.

Research in the domain of investing has also found consistent support for this basic gender difference. For example, non-professional women investors have been found to allocate less of their portfolios to volatile assets (Barber & Odean [2000], Bernasek & Shwiff [2001], Chow & Riley [1992], Cohn, Lewellen, Lease, & Schlarbaum [1975], Jianakoplos & Bernasek [1998], Sunden & Surette [1998]). This risk aversion on the part of women has also been demonstrated in professional financial analysts. Olsen and Cox [2001] found that female professional investors more than male professional investors focused on the chance of loss in determining their portfolio makeup. In turn, they place more emphasis on the safety of an investment than do men. Thus, in general, the existing research suggests that women will be more risk averse in their investments than men.

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Optimism

Optimism may also play a role in preference for investment risk. Trait optimism is considered an enduring and stable difference in an individual's tendency to hold positive generalized outcome expectancies for future events (Scheier & Carver [1985]). Carver and Scheier [1982, 2001] have viewed this generalized outcome expectancy to be critical in regulating behavior. They argue that optimists will continue to pursue goals in the face of negative information because of the generalized belief that good things will happen to them in the future. Pessimists, in contrast, are more likely to disengage and withdraw when faced with negative information because of their generalized belief that good things will not happen to them in the future.

In general, research on optimism has identified a wide variety of ways that optimism is beneficial. For example, in health domains, optimists report better physical well-being (Scheier & Carver [1985]); have lower blood pressure (Raaijmakers, Matthews, Flory Owens, & Gump [1999]); have higher immune system functioning during stress (Segerstrom, Taylor, Kemeny, & Fahey [1998]); enjoy a better prognosis in recovery from cancer (Schulz, Bookwala, Knapp, Scheier, & Williamson [1996]) and coronary bypass surgery (Scheier et al. [1989]); and engage in more preventative health behaviors (Park, Moore, Turner, & Adler [1997], Taylor, et al. [1992], see Scheier & Carver [1992] for a review). Optimists are also less likely to become depressed (Bromberger & Matthews [1996], Carver & Gaines [1987]) and are more likely to make better psychological adjustments to difficult life events (Aspinwall & Taylor [1992], Brissette, Scheier, & Carver [2002], Chang & Sanna [2001], Cozzarelli [1993], Litt, Tennen, Affleck, & Klock [1992]). Thus, in many ways both physical and psychological, optimists seem to reap benefits from their positive world view.

But is optimism always beneficial? Some have suggested that a potential drawback to optimism may be a greater tendency to choose risky options (Tennen & Affleck [1987], Weinstein [1980, 1982, 1984]). The reasoning is that if one has positive expectancies about the future, then there is little need to worry about the potentially negative consequences of a risky decision.

There is little evidence, however, showing that optimists are more likely to take risks than pessimists (Scheier, Carver, & Bridges [2001]). In health related domains, for example, optimists seem to take active preventative steps when faced with a potentially negative health outcome (Lin & Peterson [1990]; Taylor et al. [1992]). In general, optimists are more likely to engage in active coping in an attempt to overcome negative life events, while pessimists are more likely to withdraw and disengage (Aspinwall & Taylor [1992], Fontaine, Manstead, & Wagner, [1993], Carver, Scheier,

& Weintraub [1989], Scheier et al. [1989], Scheier, Weintraub, & Carver [1986]). These data support Carver and Scheier's [1982; 2001] self-control theory of behavior in which they propose that optimism exerts beneficial effects because it leads the optimist to believe that further effort can be useful. Thus, optimists take more active steps to stay healthy, in part because their positive beliefs about the future encourage continued effort.

Similarly, optimists are also more likely than pessimists to seek out information relevant to their health condition. For example, optimistic patients following coronary bypass surgery were more likely to seek out such information (Scheier, et al. [1989]). Optimists also paid greater attention to information regarding relevant health concerns (Aspinwall & Brunhart [1996]).

Scheier et al. [2001] suggest that when faced with negative feedback optimists seek information, while pessimists suppress thoughts. The kind of information gathered is also likely to be different for optimists and pessimists. Recent research suggests that optimists have an unconscious attentional bias for positive information, while pessimists have an unconscious attentional bias for negative information (Segerstrom, [2001]). Thus, optimists are more likely to seek information when faced with adversity, and this information is more likely to be positive.

The research reviewed to this point suggests that the adaptiveness of optimism in health domains arises in part from optimists' tendency to attend more readily to positive information in the environment, which leads to more positive expectations about future health outcomes, which in turn leads to taking more active measures in the face of negative health information. The benefits of optimism in health domains, however, may arise because the optimists' general coping strategies happen to be the strategies that lead to beneficial outcomes in this domain. It is unlikely; however, that these strategies will prove equally adaptive in all domains (see Zuckerman [2001]).

For example, taking action when faced with a health problem is likely to be more adaptive than withdrawal and inaction. Health related questions often have clear cut, expertly prescribed courses of action that will tend to maximize outcomes. Optimists' tendency to engage in active coping, particularly in the face of negative information, may increase the likelihood that they will benefit from the expert advice of medical professionals.

In other domains, however, taking action increases rather than decreases risk. Gambling, for example, involves a decision to place or not place a bet. In this case, optimists' tendency to prefer active forms of coping may lead them to be more likely to choose the more risky alternative (see Gibson & Sanbonmatsu [2002]). Similarly, when faced with a downturn in market performance, optimists' tendency to engage in active forms of coping may lead to a greater propensity to sell

holdings that have recently performed poorly and shift money into more risky investments in an attempt to regain losses. Pessimists, in contrast, tend to withdraw when faced with negative information. In this case, that may mean holding assets and riding out the market downturn, which in the long run may be a more optimal strategy.

Another potential benefit of optimism in health domains is the optimists' tendency to seek more information regarding their condition, and to attend more readily to positive information. In investment domains, however, this tendency may mean that they are more likely to seek out and evaluate information regarding risky investment opportunities. Given the well documented tendency for individuals to engage in selective hypothesis testing strategies that lead to the confirmation of the hypothesis (Hilton [2001]; Sanbonmatsu, Posavac, Kardes, & Mantel [1998]), optimists may be more likely to conclude that such investments are likely to pay off. Selective hypothesis testing has been shown to increase other risky behavior in a laboratory setting (see Gibson, Sanbonmatsu, & Posavac [1997]; on selective hypothesis testing and gambling). Thus, the very strategies that make optimism valuable in health related domains may lead to more risky decisions in financial domains.

Another difference between optimism in health versus optimism in investing is that the high stakes of some health decisions may lead optimists to choose a conservative strategy, even if they believe that the riskier strategy is unlikely to lead to negative consequences. For example, Taylor et al. [1992] found that optimistic gay men were less worried about HIV and perceived themselves to be at less risk than did pessimistic gay men. Despite these beliefs, however, optimists were no more likely to engage in unsafe sex than pessimists. Thus, optimistic gay men believed that their risk was less, but they took preventative steps nonetheless. It may be that because of the relative ease of practicing safe sex, the minimal consequences of doing so, and the potentially dire consequences of not doing so, optimists overrode their tendency to choose the risky alternative and despite their lower estimates of risk, practiced safe sex.

Turning to investment decisions, however, it may be that optimists would have a less powerful incentive to rein in their optimistic views and limit their risky decisions. Of course, it is true that risky investments may lead to loss of money. We are not arguing that this is inconsequential. The lure of the risky investment, however, is that the loss may be proportionately small when compared to the potential gain. In conclusion, despite optimism's general adaptiveness in health domains, there is reason to believe that the same coping strategies and cognitive tendencies that prove beneficial in health domains may lead to more risky choices in investment domains.

How this risk will translate into tangible outcomes, however, is an interesting question. By suggesting that optimists (and males) are more likely to select risky investments, we do not mean to imply that these decisions are irrational or will always lead to negative outcomes. By definition, risky investments have more volatile returns. Thus, we would expect that some investors choosing the risky option will do very well, while others will do very poorly. We therefore predict that groups prone to making more risky investment choices (males and optimists, in this case) will exhibit greater variability in their outcomes than groups prone to making more conservative investment choices (females and pessimists, in this case).

Summary

We hypothesize that males and optimists are more likely to choose riskier investment strategies than females and pessimists. How these variables may interact, however, is unclear. One possibility is that each variable will have a separate and independent effect on investment decisions. If so, optimistic males and optimistic females will select riskier investments than their pessimistic counterparts, but the overall level of risk will be greater for males than for females. Another possibility is that women's general tendency to avoid risk may minimize any effect of trait optimism within this group, but that optimism will emerge as an important predictor of the riskiness of investment decisions of men. Finally, we expect that individuals taking on greater risk would also display greater variability in their outcomes. The current research was designed to explore these possibilities.

Method

Participants

The participants were 93 undergraduate business majors (43 females and 50 males) enrolled in two sections of Principles of Finance taught by the first author. Of these participants, 27 elected to participate in the Stock-Trak competition with partners. Given the ambiguities arising in attempting to identify which partner was making an investment decision in a given partnership, data were analyzed for only the remaining 66 participants (34 females and 32 males) who participated individually.

Procedure

The Stock-Trak competition. At the beginning of the semester, each student paid \$17.95 for a Stock-Trak account. Stock-Trak is a portfolio simulation, and

each student had an online brokerage account for the thirteen weeks from September 2, 1997 to November 26, 1997. Each account started with an imaginary \$500,000. Students were required to spend at least \$300,000 on at least 10 different common stocks within the first four weeks of the contest. Once this requirement was met, they were free to do whatever they wanted with their accounts for the remaining nine weeks. A maximum of 100 trades involving stocks, options, and futures contracts were allowed as students attempted to outperform the market. There were strong academic and financial incentives to beat the market because 1) 20% of students' grades was based on their Stock-Trak performance, and 2) all participants were entered in a university-wide investment contest of 270 students that was sponsored by the Nasdaq Stock Market that offered \$500 for the first prize, and cash prizes for the top twenty student accounts.

The Stock-Trak portion of students' grades was calculated based on portfolio performance relative to the S&P 500. The S&P 500 rose by 2.59% during the contest (from 927.58 to 951.64). A portfolio that started with \$500,000 and rose by 2.59% would have had an ending value of \$512,969.23. Grades for Stock-Trak were calculated by taking a student's final portfolio balance divided by \$512,969.23 and multiplying it by 88%. This meant that a student who matched the market's performance during the semester would earn a grade of B+ for the Stock-Trak portion of the class. Exceeding the market's performance led to higher grades. For example, a portfolio worth \$553,773.60 earned a grade of 95% for Stock-Trak. There was a ceiling of 100% and a floor of 80% for Stock-Trak grades, so student's downside risk was limited.

Students who under-performed the market made 80% to 87%, those whose returns were the same as the market made 88%, and those who outperformed the market made 89% to 100%. The period of the Stock-Trak competition was volatile for world stock markets due to the Asian Crisis. The S&P 500 reached a low for the contest of 855.27 on October 28, down 7.80% from the beginning of the contest but rebounded to finish at 951.64 at the end of the contest. Similarly, the Nasdaq Composite was at 1618.09 at the beginning of the contest, dropped 9.41% by October 28, but rebounded to 1594.50 for an overall drop of 1.46% by the end of the contest.

Measures. At the beginning of the semester, each participant completed the Revised Life Orientation Test (LOT-R) as a measure of dispositional optimism (see Scheier, Carver, & Bridges [1994]). Four separate indices of risk were evaluated in this study: 1) the overall number of futures and options contracts traded by participants over the course of the competition; 2) the overall number of transactions made during the competition; 3) the number of companies invested in that

trade on the Nasdaq Stock Market; and 4) the number of companies invested in that trade on the New York Stock Exchange and the American Stock Exchange. Given the potential for large gains or losses in futures and options, this was considered the primary index of risk in the current research.

A greater number of transactions involving futures and options was seen as indicative of greater preference for risk, as students were speculating with futures and options contracts rather than using the derivative contracts to hedge risk. We considered overall number of transactions to be an additional index of risk. Large numbers of transaction may be indicative of the common strategy seen in day traders of attempting to predict precisely when stocks are going to rise or fall. Some data suggest that a greater tendency to switch between investments is more risky and does lead to lower overall performance (Moore, Kurtzberg, Fox & Bazerman [1999]).

A third potential index of risk is the overall number of transactions made by participants in the Nasdaq exchange. Because of its abundance of volatile technology stocks, we assumed that greater numbers of transactions in the Nasdaq exchange were indicative of greater risk. Finally, the overall number of transactions made in the New York Stock Exchange (NYSE) was also viewed as an index of risk. Because of the NYSE's preponderance of relatively stable blue chip stocks, investing in this market was considered an indication of a more conservative approach.

Results

Preliminary Evaluation of Data

Final portfolio value averaged \$477,459, with a standard deviation of \$121,320. One participant, however, was over 5 1/2 standard deviations away from the mean. In addition, this participant did not comply with the rule that at least \$300,000 of common stock had to be purchased within the first four weeks of the contest. This participant was removed from all further data analysis, leaving a total of 65 participants in the final sample. The final sample of 65 participants averaged a final portfolio value of \$488,279, with a standard deviation of \$84,268.

Gender, Optimism, and Risk

To evaluate the effect of gender and optimism on risk, each of the 4 indices of risk were entered as a criterion variable into separate moderated regression analyses. Gender and optimism were entered as predictors on the first step, and the gender by optimism interaction term was entered on the second step.

Futures and options. The overall regression was significant after the first step, Multiple $R = .39$, $F(2,61) = 5.53$, $p < .01$. Examination of the beta weights indicated that gender was a significant predictor of futures and options purchased, $\beta = .37$, $t = 3.20$, $p < .005$. Men were more likely than women to invest in the futures and options market. Optimism did not produce a significant effect. There was a significant change in R^2 after the second step, Multiple $R = .49$, $F(1,61) = 6.71$, $p < .02$. This was the result of a significant gender by optimism interaction, $\beta = 1.30$, $t = 2.59$, $p < .02$. To determine the form of this interaction, follow up correlations between optimism and number of futures and options transactions was carried out separately for men and women. These analyses showed that the relationship between optimism and futures transactions was significant for men, $r(31) = .37$, $p < .05$, but was not significant for women, $r(32) = -.23$. Thus, men took on significantly greater risk in the form of futures and options contracts than did women, and this difference was driven primarily by optimistic men.

Overall number of transactions and number of transactions on the Nasdaq market. Neither the regression focusing on overall number of transactions nor the regression focusing on investment in the Nasdaq market yielded significant effects. Considering the effects of gender on number of transactions without including optimism, however, yielded a significant effect, $t(63) = 2.10$, $p < .05$. Males made significantly more transactions ($M = 31.6$) than females ($M = 22.6$).

Number of transactions on the New York Stock Exchange. The overall regression focusing on the number of transactions on the NYSE was not significant after the first step, Multiple $R = .16$. There was a significant change in R^2 after the second step, however, Multiple $R = .32$, $F(1,61) = 5.71$, $p < .03$. This effect was due to the significant interaction between gender and optimism, $\beta = -1.23$, $t = -2.27$, $p < .03$. To further explore this interaction, the correlation between optimism and number of transactions on the New York Stock Exchange was carried out separately for men and women. For men, this relationship was significant, $r(31) = -.38$, $p < .05$, indicating that optimistic men were less likely to invest in NYSE stocks. The relationship was not significant for women, $r(32) = .24$.

Overall Portfolio Performance

In order to explore the effects of gender and optimism on overall investment performance, the participants' final portfolio value was entered as the criterion variable in a moderated regression, again entering gender and optimism on the first step, and the gender by optimism interaction term on the second step. This regression yielded no significant effects. Average final

portfolio value, however, is not the only relevant index of performance to consider. Individuals selecting more risky investments should not be uniformly expected to under perform those making more conservative investments. What we might expect to see is greater variability in the performance of those making more risky investments.

In order to evaluate this possibility, Levene's test for equality of variances was used to test for equal variances in the male and female samples. This test was significant, $F(1,64) = 6.56$, $p < .02$, indicating that males and females did exhibit different degrees of variability in their overall performance. As expected given males' greater propensity for risk, their performance varied to a significantly greater degree ($sd = \$106,677$) than females' performance did ($sd = \$53,586$). To evaluate whether optimists and pessimists differed in the variability of their portfolio performance, each individual's final portfolio value was subtracted from the mean portfolio performance (\$488,279). The absolute value of this number was then used as an indicator of variability in a moderated regression that again entered gender and optimism on the first step and the gender by optimism interaction on the second step. This analysis was significant after the first step, Multiple $R = .31$, $F(2,62) = 3.19$, $p < .05$. Examination of the beta weights indicated that this effect was due to gender, $\beta = .29$, $t = 2.39$, $p < .03$. Addition of the interaction term did not produce a significant change in R^2 .

This finding does not support the idea that optimists experience greater variability than pessimists in their investment outcomes. The greater variability of outcomes within the male group suggests that some men making these risky choices are experiencing good results while some are suffering poor outcomes. As seen in Table 1, in the current data set, 6 of the top 10 performers were male, and 8 of the bottom 10 performers were male. This observation is reinforced by examining the outcomes of 8 semesters of data from similar Stock-Trak competitions (from Fall 1997 to Spring 2001). During these semesters approximately 60% of students were male and 40% were female. Examination of the top 10 and bottom 10 performers in Stock-Trak, however, demonstrates the all or nothing consequences of risky decisions: Over these 8 semesters, 79% of the top 10 performers were male, and 81% of the bottom 10 performers were male. Data on trait optimism was not available for these samples.

Discussion

As a number of prior studies have found, men in our sample took on significantly greater investment risk than women (e.g., Barber & Odean [2001], Bernasek & Shwiff [2001], Chow & Riley [1992], Cohn et al. [1975], Jianakoplos & Bernasek [1998], Olsen & Cox

Table 1. Gender and Optimism of the Top and Bottom Ten Performers in the Stock-Trak Competition

Final Stock-Trak Rank	Final Portfolio Value	Gender	R-LOT Score
1	\$748,991	Male	17
2	\$669,750	Female	10
3	\$648,539	Female	13
4	\$614,324	Male	16
5	\$586,011	Male	12
6	\$570,489	Female	10
7	\$565,825	Male	16
8	\$564,727	Male	7
9	\$555,119	Male	19
10	\$545,150	Female	15
56	\$468,112	Male	19
57	\$425,500	Male	17
58	\$422,359	Female	16
59	\$421,826	Female	17
60	\$396,245	Male	17
61	\$388,842	Male	20
62	\$381,021	Male	21
63	\$249,237	Male	15
64	\$247,373	Male	15
65	\$209,335	Male	18

[2001], Sunden & Surette [1998]). Unique in our data, however, is the finding that this gender difference may be driven predominantly by optimistic men. Optimistic men were active in the futures and options market, while pessimistic men were more active in the more conservative New York Stock Exchange.

In contrast, trait optimism was unrelated to the investment choices made by women. Very few gender differences in how optimism relates to outcomes have been reported in the literature, and those that have been reported have tended to show that optimism is a slightly stronger predictor of certain outcomes for women than for men (see Scheier & Carver [1985], Scheier, Carver, & Bridges [1994]).

Other gender effects related to optimism have usually been viewed as the result of Type I errors. For example, Scheier et al. [1994] state that "the few gender differences that did emerge seemed random in nature and were basically uninterpretable" (p.1066). Would it be prudent, therefore, to view the interaction of gender and optimism found in our study to also be the result of random variation? Although a final answer can only be gained through further research, we propose some tentative reasons to accept these results.

First, we believe this result is readily interpretable within the framework of the literature we reviewed. Men have been consistently found to be more willing to take on risk than women (Byrnes et al. [1999]). Given this well documented preference for risk, it seems reasonable to ask who among the men are the individuals making these risky decisions? Our review of the literature on optimism led to the possibility that optimistic men may be the subgroup of men who are

making these risky choices. Thus, though the lack of documented interaction effects between gender and optimism precluded making a strong, *a priori* hypothesis regarding such an interaction, the interaction is consistent with existing literature.

Second, the consistency of the effects we identified argues against random variation as a potential explanation. Of our four measures of risk, two were significantly affected by gender in our regression analyses and both were qualified by a significant gender by optimism interaction in the expected direction. Though it is possible that these findings resulted from random variation within our sample, the consistency of the effect across two very different indices of risk provides some suggestive evidence that there is more to our findings than that.

It is important to note that our findings are not due to higher levels of optimism in men than in women. The mean score on the LOT-R for men and women in our sample was virtually identical ($M = 15.84$ for males and $M = 16.06$ for females). Thus it is not that men are significantly more optimistic than women, it is that this trait is leading to different actions in men than in women. This suggests that what it means to be optimistic may be different for men and women. In particular, the optimistic beliefs that characterize both optimistic men and optimistic women may not be translated into behavior in the same fashion. Women's general risk aversion may buffer them against any optimistic tendency to behave in a manner consistent with their optimistic evaluations. Men's general preference for risk, however, may mean they are more likely to implement risky alternatives. Although these ideas are speculative, our data would fit with this view.

So what does it mean that optimistic men are more likely to make risky investments? Does this finding bring into question the many benefits of optimism documented in the optimism literature? Our answer is, of course, no. The benefits of optimism in the domains of health and adjustment are well documented. What we would like to propose, however, is that a trait that is beneficial in one domain is not always beneficial in other domains (see Gibson & Sanbonmatsu [2002], Zuckerman [2001]). The tendency to seek information and use active coping techniques in health domains is certainly a major benefit of optimism. But these same tendencies may have different consequences in investment domains.

We also do not argue that the beneficial trait of optimism in health domains becomes the detrimental trait of optimism in financial domains. Risky investments sometimes pay off. This was demonstrated in the greater variability in portfolio value for men than women. Although optimism was not significantly related to portfolio variability in the current research, the volatile nature of riskier investments would likely lead optimistic men to experience greater fluctuations in

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their portfolio value over the long run. Thus, although riskier investment choices are not inherently "worse", they leave one open to worse outcomes. In summary, we do not argue that trait optimism is detrimental for male investors, but rather that it leads them to open themselves up to greater risk than their pessimistic counterparts.

Another important question to consider is the external validity of this research. How closely do choices made by students in a hypothetical stock trading contest match investment choices made in the real world? We would argue that there are good reasons to believe that the results are generalizable.

First, just as in real world investing, there were real consequences for good and bad performance, and some of these consequences were monetary. Second, our findings on the main effects of gender on risk taking replicate a large body of existing data, some gathered on investment decisions made by real investors. One notable difference between our stock trading contest and real-world investments is the floor of 80% for the students, which artificially limits downside risk. We find that optimistic females are not willing to make risky investments even when downside risk is artificially limited. Thus, even when there is no chance of "losing it all" and it therefore may be beneficial to make some risky investment choices; optimistic women do not seem willing to do so.

Another question related to the external validity of our results focuses on the persistence of the risky choices made by optimistic men in real world investing. There may be reason to believe that these risky choices would not persist indefinitely. Data from the health literature suggest that when faced with a negative health prognosis, optimists are more likely to accept the information, while pessimists are more likely to use overt denial (Scheier et al.[2001]). This occurs, however, only when control of the situation is truly out of the optimist's hands. We would suggest that as negative investment outcomes accumulate, optimistic men would be likely to appropriately adjust their specific expectations regarding risky investments and adjust their investment strategies and expectations accordingly.

In conclusion, our data replicate the now familiar result that men are willing to take on more investment risk than women, but with an important additional finding. Our data suggest that optimistic men are primarily responsible for this greater preference for risk. This is important because it provides heretofore hard to find evidence that optimism can lead to riskier decisions. This suggests that the domain being examined may play a large role in determining whether optimists make more risky choices. In addition, it provides preliminary evidence of a sex difference in the manner in which optimism influences behavior. Both of these findings present potentially fruitful avenues for future research.

- Aspinwall, L. G., & S. M. Brunhart. "Distinguishing Optimism from Denial: Optimistic Beliefs Predict Attention to Health Threats." *Personality and Social Psychology Bulletin*, 22, (1996), pp. 993-1003.
- Aspinwall, L. G., & S. E. Taylor. "Modeling Cognitive Adaptation: A Longitudinal Investigation of the Impact of Individual Differences and Coping on College Adjustment and Performance." *Journal of Personality and Social Psychology*, 63, (1992), pp. 989-1003.
- Barber, B., & T. Odean. "Boys Will Be Boys: Gender, Overconfidence and Common Stock Investments." *Quarterly Journal of Economics*, 116, (2000), pp. 261-292.
- Bernasek, A., & S. Shwiff. "Gender, Risk, and Retirement." *Journal of Economic Issues*, 35, (2001), pp. 345-356.
- Beyer, S., & E. M. Bowden. (1997). "Gender Differences in Self-Perception: Convergent Evidence from Three Measures of Accuracy and Bias." *Personality and Social Psychology Bulletin*, 23, (1997), pp. 157-172.
- Brissette, I., M. F. Scheier, & C. S. Carver. "The Role of Optimism in Social Network Development, Coping, and Psychological Adjustment During a Life Transition." *Journal of Personality and Social Psychology*, 82, (2002), pp. 102-111.
- Bromberger, J. T., & K. A. Matthews. "A Longitudinal Study of the Effects of Pessimism, Trait Anxiety, and Life Stress on Depressive Symptoms in Middle-Aged Women." *Psychology and Aging*, 11, (1996), pp. 207-213.
- Buss, D. *Evolutionary Psychology*. Boston: Allyn and Bacon, 1999.
- Byrnes, J. P., D. C. Miller, & W. D. Schafer. "Gender Differences in Risk Taking: A Meta-analysis." *Psychological Bulletin*, 125, (1999), pp. 367-383.
- Carver, C. S., & J. G. Gaines. "Optimism, Pessimism, and Postpartum Depression." *Cognitive Therapy and Research*, 11, (1987), pp. 449-462.
- Carver, C. S., & M. F. Scheier. "Control Theory: A Useful Conceptual Framework for Personality-Social, Clinical, and Health Psychology." *Psychological Bulletin*, 92, (1982), pp. 111-135.
- Carver, C. S., & M. F. Scheier, M. F. "Optimism, Pessimism, and Self-regulation." In E. C. Chang, ed., *Optimism and Pessimism: Implications for Theory, Research, and Practice*. Washington, DC: American Psychological Association, 2001.
- Carver, C. S., M. F. Scheier, & J. K. Weintraub. "Assessing Coping Strategies: A Theoretically Based Approach." *Journal of Personality and Social Psychology*, 56, (1989), pp. 267-283.
- Chang, E. C., & L. J. Sanna. "Optimism, Pessimism, and Positive and Negative Affectivity in Middle-Aged Adults: A Test of a Cognitive-Affective Model of Psychological Adjustment." *Psychology & Aging*, 16, (2001), pp. 524-531.
- Chow, K. V., & W. Riley. "Asset Allocation and Individual Risk Aversion." *Financial Analysts Journal*, 48, (1992), pp. 32-37.
- Cohn, R. A., W. G. Lewellen, R. C. Lease, & G. G. Schlarbaum. "Individual Investor Risk Aversion and Investment Portfolio Composition." *Journal of Finance*, 30, (1975), pp. 605-620.
- Cozzarelli, C. "Personality and Self-efficacy as Predictors of Coping With Abortion." *Journal of Personality and Social Psychology*, 65, (1993), pp. 1224-1236.
- Deaux, K., & T. Emswiller. "Explanations of Skillful Performance on Sex Linked Tasks: What is Skill for the Male is Luck for the Female." *Journal of Personality and Social Psychology*, 29, (1975), pp. 80-85.
- Fontaine, K. R., A. S. Manstead, H. Wagner. "Optimism, Perceived Control Over Stress, and Coping." *European Journal of Personality*, 7, (1993), pp. 267-281.
- Gibson, B., D. M. Sanbonmatsu & S. S. Posavac. "The Effects of Selective Hypothesis Testing on Gambling." *Journal of Experimental Psychology: Applied*, 3, (1997), pp. 126-142.

- Gibson, B., & D. M. Sanbonmatsu. *Dispositional Optimism and Gambling: The Downside of Optimism*. Unpublished manuscript, 2002.
- Hilton, D. J. "The Psychology of Financial Decision-Making: Applications to Trading, Dealing, and Investment Analysis." *The Journal of Psychology and Financial Markets*, 2, (2001), pp. 37-53.
- Jianakoplos, N., & A. Bernasek. "Are Women More Risk Averse?" *Economic Inquiry*, 36, (1998), pp. 620-630.
- Lin, E. H., & C. Peterson. "Pessimistic Explanatory Style and Response to Illness." *Behaviour Research and Therapy*, 28, (1990), pp. 243-248.
- Litt, M. D., H. Tennen, G. Affleck, & S. Klock. "Coping and Cognitive Factors in Adaptation to In Vitro Fertilization Failure." *Journal of Behavioral Medicine*, 15, (1992), pp. 171-187.
- Moore, D. A., T. R. Kurtzberg, C. R. Fox, & M. H. Bazerman. "Positive Illusions and Forecasting Errors in Mutual Fund Investment Decisions." *Organizational Behavior and Human Decision Processes*, 79, (1999), pp. 95-114.
- Olsen, R. A., & C. M. Cox. "The Influence of Gender on the Perception and Response to Investment Risk: The Case of Professional Investors." *The Journal of Psychology and Financial Markets*, 2, (2001), pp. 29-36.
- Park, C. L., P. J. Moore, R. A. Turner, & N. E. Adler. "The Roles of Constructive Thinking and Optimism in Psychological and Behavioral Adjustment During Pregnancy." *Journal of Personality and Social Psychology*, 73, (1997), pp. 584-592.
- Raeikkoenen, K., K. A. Matthews, J. D. Flory, J. F. Owens, & B. B. Gump. "Effects of Optimism, Pessimism, and Trait Anxiety on Ambulatory Blood Pressure and Mood During Everyday Life." *Journal of Personality and Social Psychology*, 76, (1999), pp. 104-113.
- Sanbonmatsu, D. M., S. S. Posavac, F. R. Kardes, & S. P. Mantel. "Selective Hypothesis Testing." *Psychonomic Bulletin & Review*, 5, (1998), pp. 197-220.
- Scheier, M. F., & C. S. Carver. "Optimism, Coping, and Health: Assessment and Implications of Generalized Outcome Expectancies." *Health Psychology*, 4, (1985), pp. 219-247.
- Scheier, M. F., & C. S. Carver. "Effects of Optimism on Psychological and Physical Well Being: Theoretical Overview and Empirical Update." *Cognitive Therapy and Research*, 16, (1992), pp. 201-228.
- Scheier, M. F., & C. S. Carver, & M. W. Bridges. "Distinguishing Optimism from Neuroticism (and Trait Anxiety, Self-Mastery, and Self-Esteem): A Re-Evaluation of the Life Orientation Test." *Journal of Personality and Social Psychology*, 67, (1994), pp. 1063-1078.
- Scheier, M. F., & C. S. Carver, & M. W. Bridges. "Optimism, Pessimism, and Psychological Well-being." In E. C. Chang, ed., *Optimism and Pessimism: Implications for Theory, Research, and Practice*. Washington, DC: American Psychological Association, 2001.
- Scheier, M. F., K. A. Matthews, J. F. Owens, G. J. Magovern, R. C. Lefebvre, R. A. Abbot, & C. S. Carver. "Dispositional Optimism and Recovery from Coronary Artery Bypass Surgery: The Beneficial Effects on Physical and Psychological Well-Being." *Journal of Personality and Social Psychology*, 57, (1989), pp. 1024-1040.
- Scheier, M. F., J. K. Weintraub, & C. S. Carver. "Coping With Stress: Divergent Strategies of Optimists and Pessimists." *Journal of Personality and Social Psychology*, 51, (1986), pp. 1257-1264.
- Schulz, R., J. Bookwala, J. E. Knapp, M. Scheier, & G. M. Williamson. (1996). "Pessimism, Age, and Cancer Mortality." *Psychology and Aging*, 11, (1996), pp. 304-309.
- Segerstrom, S. C. "Optimism and Attentional Bias for Negative and Positive Stimuli." *Personality and Social Psychology Bulletin*, 27, (2001), pp. 1334-1343.
- Segerstrom, S. C., S. E. Taylor, M. E. Kemeny, & J. L. Fahey. "Optimism is Associated With Mood, Coping, and Immune Change in Response to Stress." *Journal of Personality and Social Psychology*, 74, (1998), pp. 1646-1655.
- Slovic, P. "Risk Taking in Children: Age and Sex Differences." *Child Development*, 37, (1966), pp. 169-176.
- Sunden, A., & B. Surette. "Gender Differences in the Allocation of Assets in Retirement Plans." *American Economic Review*, 88, (1998), pp. 207-221.
- Taylor, S. E., M. E. Kemeny, L. G. Aspinwall, S. G. Schneider, R. Rodriguez, & M. Herbert. (1992). "Optimism, Coping, Psychological Distress, and High-Risk Sexual Behavior Among Men at Risk for Acquired Immunodeficiency Syndrome (AIDS)." *Journal of Personality and Social Psychology*, 63, (1992), pp. 460-473.
- Tennen, H., & G. Affleck. (1987). The Costs and Benefits of Optimistic Explanations and Dispositional Optimism. *Journal of Personality*, 55, (1987), pp. 377-393.
- Weinstein, N. D. Unrealistic Optimism About Future Life Events. *Journal of Personality and Social Psychology*, 39, (1980), pp. 806-820.
- Weinstein, N. D. Unrealistic Optimism and Susceptibility to Health Problems. *Journal of Behavioral Medicine*, 5, (1982), pp. 441-460.
- Weinstein, N. D. Why it Won't Happen to Me: Perceptions of Risk Factors and Susceptibility. *Health Psychology*, 3, (1984), pp. 431-457.
- Wilson, M. & M. Daly. Competitiveness, Risk Taking, and Violence: The Young Male Syndrome. *Ethology and Sociobiology*, 6, (1985), pp. 59-73.
- Zuckerman, M. *Behavioral Expressions and Biosocial Bases of Sensation Seeking*. New York: Cambridge University Press, 1994.
- Zuckerman, M. Optimism and Pessimism: Biological Foundations. In E. C. Chang, ed., *Optimism and Pessimism: Implications for Theory, Research, and Practice*. Washington, DC: American Psychological Association, 2001.

