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Judging Risk and Return of Financial Assets

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This article examines the relationship between judgments of risk and judgments of expected return of financial assets. It suggests that for unfamiliar assets, both risk and return judgments are derived from global preference toward the asset, whereas for familiar assets, these judgments tend to be derived from the ecological values of the asset's risk and expected return—their values in the financial markets. In addition, the article examines the role of causal schemas and the role of risk attitudes in mediating the relationships between judgments of risk and return of familiar and unfamiliar assets. Conceptual and practical questions concerning the nature, the meaning, and the assessment of risk and expected return are discussed. © 2000 Academic Press

Risk is a central feature of alternatives whose outcome is uncertain. It is one of the most important characteristics considered by people when evaluating alternative courses of action such as adapting new technologies, choosing a career, or making financial decisions. Despite the centrality of risk in decision making, there is a relative ambiguity regarding the meaning of this concept. Risk may mean different things to different people in different situations. Nevertheless, it is universally accepted that when other things—and particularly expected return—are being held constant, risk is negatively related to preference. The higher the risk, the less favorable the alternative. In the current article we examine this truism in the context of judgments regarding financial assets.

Risk is usually defined and measured in terms of the probability distribution of possible outcomes, and in particular, it is often equated with the variance of this distribution. However, variance based measures of risk often appear to be in disagreement with people's perception of risk, so other measures were

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offered as well, in particular, measures that emphasize negative outcomes, or outcomes that are below some reference point (e.g. Fishburn, 1977; Miller & Reurer, 1996).

In contrast to these "objective" treatments of risk, a number of scholars have treated risk as a perceptual variable: They defined risk in terms of people's reports about the riskiness associated with various alternatives (Pollatsek & Tversky, 1970; Coombs, 1975; Crouch & Wilson, 1982; MacCrimmon & Wehrung, 1986, 1990; Shapira, 1995; Sitkin & Pablo, 1992). For example, Payne (1975) presented participants with pairs of gambles and asked them to indicate which gamble appeared riskier to them; Weber and Milliman (1997) assessed risk perception by asking participants to evaluate the riskiness of alternatives on a scale ranging from 1 (*not at all risky*) to 100 (*extremely risky*) and used this evaluation as a measure of risk in a preference model; and Sitkin and Weingart (1995) used four rating scales, which, although did not ask subjects directly about subjective feeling of risk, were aimed at capturing risk perception.

Furthermore, people are comfortable with judging risk and feel that such judgments are meaningful. Weber et al. (1992) provide a good description of this aspect of risk judgment ". . . risk seems to fall into the category of other abstract concepts (e.g. 'beauty') that elude precise definition, yet which people are willing to judge. The well known statement of a supreme court justice about pornography ('I don't know whether I can define pornography, but I know it when I see it') could just as well have been made in reference to risk." Indeed, risk judgments are routinely used in many aspects of day-to-day life. Managers estimate the riskiness of various courses of actions and take these estimates into account in their decisions, investors estimate the risk of alternative assets and take these estimates into account in their investment decisions, and we all judge the risk associated with our interpersonal relationships and take it into account in our social decisions.

Despite the prevalence of risk judgment in our daily life, and the importance of risk perception in theories of preference, very few studies have examined the construct validity of risk judgment. Probably the most relevant of these is the study by Weber et al. (1992) in which participants judged both the risk and attractiveness of lotteries (but see also an earlier study by Nygren, 1977). The conclusions of Weber et al. were that risk judgments and attractiveness judgments represent two related, yet distinct, concepts. On the one hand, the two judgments were highly negatively correlated; the correlations between the two ranged from −.67 to −.81. On the other hand Weber et al. reported that the two types of judgment showed "qualitative differences" and concluded that risk and attractiveness are "distinct, measurable, and meaningful constructs" (1992, p. 517).

However, that study, as well others that have examined risk judgments, were based on nonrepresentative stimuli (usually paper-and-pencil lotteries) in which probabilities and outcomes were explicitly stated to the participants. As a result, the theoretical perspectives of these studies ignored perceptions about expected return (when probabilities and payoffs are explicit, expected return is *not* a perceptual variable) and were confined to the understanding of perceived risk in terms of weightings of probabilities and payoffs (Weber et al., 1992; Mellers & Chang, 1994; Mellers, Chang, Birnbaum, & Ordonez, 1992) or in terms of moments of the probability distribution (Coombs & Lehner, 1981). Furthermore, the participants in these studies were usually students who had little experience and scant knowledge in making financial decisions involving risk. These features detract from the generalizability of the results because (1) for most of the risky options we encounter, probabilities and outcomes are not explicitly stated; (2) many important risky options are governed by trade-offs between risk and return; and (3) in most real-life evaluations of risky options, we have access to the experience of others or to well-known theories which reflect the ecological relationships between risk and return.

The current studies attempt to overcome these shortcomings. First, they examine both risk and return judgments. Second, they examine the construct validity of these judgments within the risk–return perspective, which, by and large, reflect the ecological relationships between risk and return. Third, they examine risk and return judgments of risky options for which probabilities and outcomes are not explicitly stated. Finally, the participants in our experiments were very familiar with the concepts of risk and expected return and experienced in making financial decisions.

A Model for Risk and Return Judgments of Familiar and Unfamiliar Financial Assets

Our model distinguishes between risk and return judgments of unfamiliar assets and risk and return judgments of familiar assets. We conjecture that different cognitive processes underlie the production of these judgments for these two types of assets.

Unfamiliar financial assets. Our model of the judgment of risk and return of unfamiliar assets is presented in Fig. 1a. It suggests that, with regard to these assets, people base their judgments of risk and return on a global attitude toward, or global preference for, the asset under consideration. According to this model, unfamiliar assets are unidimensionally perceived on a continuum ranging from “good” to “bad.” Judgments of risk and return are derived from this unidimensional attitudinal continuum. If an asset is perceived as good, it will be judged to have both high return and low risk, whereas if it is perceived

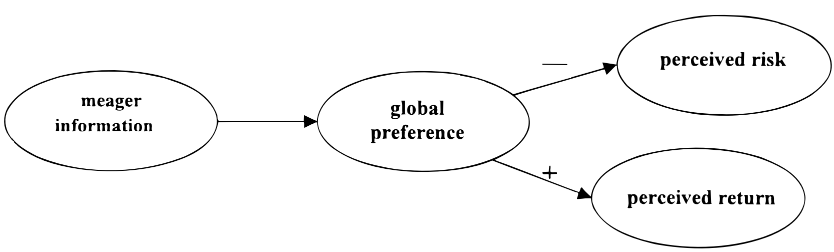

FIG. 1a. Model of judgments of unfamiliar assets.

as bad, it will be judged to have both low return and high risk. Thus, we expect the relationship between the judgments of risk and return of unfamiliar assets to be negative.

It is a common notion in psychology that, when information is meager, specific perceptions and judgments are derived from global internal attitudes. For example, it is argued that social judgments are governed by "halo effect"—a tendency to "form an overall impression of another person as either good or bad on the basis of partial information, and then allow this global impression to influence subsequent judgments of the person" (Perlman & Cozby, 1983, p. 162). That is, when information is scarce, judgments and perceptions tend to reflect previously formed overall evaluations or preferences toward objects rather than specific distinct attributes of objects.

Another body of research that is relevant to our model of risk and return judgments of unfamiliar assets is the heuristic and biases research. The models underlying this research are similar to our model in that they also suggest that when asked to make one type of judgment (e.g., a probability judgment), people respond by making other types of judgment (e.g., judgment of similarity or judgment of ease of recall; see Kahneman & Tversky, 1972; Tversky & Kahneman, 1973).

Familiar financial assets. Our model of the judgments of risk and return of familiar assets is presented in Fig. 1b. In this model, perceived risk and return are the determinants, rather than the results, of global preference: the higher the perceived return and the lower the perceived risk, the more favorable will be the global preference. In this respect, this model is similar to the standard economic model of the risk and return of financial assets (e.g., the Capital Assets Pricing Model; see, for example, Sharpe, 1981).

Our model also suggests that, for familiar assets, perceived risk and return are determined by the actual values of risk and expected return; that is, that for these assets people can generate risk and return judgments on the basis of appropriate ecological information. There are a number of processes by which such judgments can be generated. People can think about various scenarios, their outcomes, and the probability they will occur, or they can recall past returns and use them to construct a probability distribution of future returns

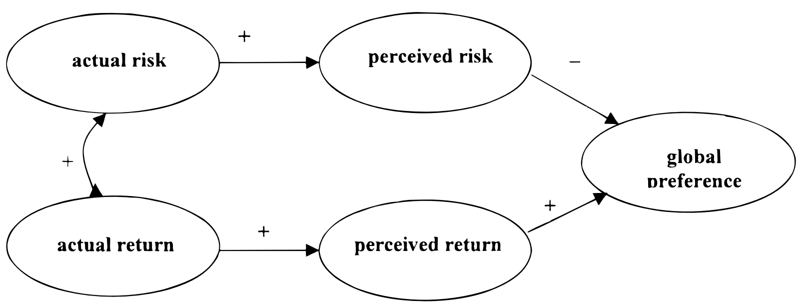

FIG. 1b. Model of judgments of familiar assets.

under the assumption that the future will be similar to the past.[1] In many cases people do not even have to generate scenarios or construct return distribution, but can rely on summary statistics of risk and return, which are widely available in textbooks, financial reports, and news media.

One prediction of this process of generating risk and return judgments is that the relationship between these two types of judgment will reflect the ecological relationship between risk and return. That is, it will reflect the relationship between risk and return as it exists in the financial markets. Since the relationship between risk and return in these markets is positive, we expect the relationship between the judgments of risk and return of familiar financial assets to be positive.

Organization of the Article

We present four experiments that demonstrate various aspects of the relationships between the judgments of risk and return. All the participants in these experiments were very familiar with the concepts of risk and expected return of financial assets. Experiments 1, 2, and 3 deal only with the relationship between risk judgment and return judgment, whereas Experiment 4 deals with preference judgment as well. The first two experiments examine the relationship between risk judgment and return judgment for unfamiliar assets. Experiment 1 shows that, according to our model, for unfamiliar assets this relationship is negative. Experiment 2 replicates and extends the findings of Experiment 1 and examines the influence of causal schemas on the relationship between risk and return judgments. Experiment 3 shows that, for familiar assets, the relationship between risk judgments and return judgments is positive. Finally, Experiment 4 extends our study of risk and return judgments in two directions: (1) it examines the relationship between *preference* judgments and risk and return judgments of familiar and unfamiliar assets and (2) it examines the effect of risk attitudes on the relationship between risk and return judgments for the two types of assets.

EXPERIMENT 1: JUDGMENTS OF UNFAMILIAR ASSETS (BETWEEN-SUBJECTS DESIGN)

The design of this experiment was a two-group between-subjects design. One group judged the risk of investing in 30 relatively unfamiliar international stock markets, and the other group judged the expected return of these investments. On the basis of our model for unfamiliar assets (Fig. 1a), and under the assumption that global preferences are largely shared in the population of our participants, the hypothesis, which was examined, was that the correlation between the judgments of the two groups would be negative.

[1] This assumption is in fact the assumption underlying reliance on beta estimates in portfolio management.

Method

Participants. Participants comprised 29 finance majors in the M.B.A. program of Tel Aviv University, 16 in the return-judgment group and 13 in the risk-judgment group (Tel Aviv University is considered a top business school, with an average quantitative GMAT of 44, or the 95th percentile). All participants were in the last semester of their studies and had taken at least eight courses in economics and finance. Thus, all our participants were very familiar with the economic concepts of risk and return. The average age of the population from which the participants were drawn is about 27 years, and about 95% of them have held managerial or professional positions.

Stimuli and procedure. Participants received a list of 30 international stock markets. These stock markets were chosen randomly from a comprehensive list of the world stock markets (a few stock markets, such as the local market and the famous American markets, which were judged to be familiar to our participants, were excluded from the list). One group of participants was asked to judge the expected return of the market portfolio of these stock markets, and the other was asked to judge the level of risk associated with investing in these portfolios. As in a number of other studies (e.g., Slovic, 1967; Payne, 1975; Weber et al., 1992; Weber & Milliman, 1997), perceived risk and return were measured on a single-item instrument that asked participants to directly rate these concepts on a numerical scale ranging from 1 (*very low*) to 9 (*very high*). The experiment was conducted during class hours. Participation was voluntary.

Results

For each group we calculated the mean judgment for each of the 30 portfolios. Subsequently, the 30 mean judgments of risk were correlated with the 30 mean judgments of return. In agreement with our model, this correlation was negative, $r = -.55$. This result is consistent with the notion that global attitudes, or global preference, underlie both risk and return judgments of unfamiliar assets.[2]

If both risk and return judgments are measures of individuals' global preferences, and if these global preferences are shared by our participants' population, then it could be asked which of the two judgments is a more reliable measure of this preference? The appropriate index to use is the interrater reliability of these measures across the 30 assets. Estimated by Cronbach's alpha, these interrater reliabilities were .93 for the risk judgments and .76 for the return judgments. So, within our sample of participants, risk judgment seems to be the more reliable measure of global preference.

[2] In fact, this analysis tests jointly the model of Fig. 1a and the assumption that global preferences are largely shared by the population of our participants.

Discussion

If perceptions about risk and return are the result rather than the cause of global preference, a natural question to ask is what determines global preference. A thorough answer to this question is beyond the scope of the current research, but one possible determinant of global preference is familiarity. There are two important lines of research that support this conjecture. First, the relationship between familiarity and preference received extensive empirical support in laboratory experiments. The mere exposure effect—the tendency to prefer familiar over unfamiliar objects—has been tested and confirmed in a number of social psychological experiments (e.g., Zajonc, 1968; Mita, Dermer, & Knight, 1977). In a recent study Ganzach (1999) also provided an example of this effect in evaluation of financial assets: He found that, controlling for financial measures of risk, analysts' risk judgments of various stocks traded in the Israeli Stock Exchange showed a significantly negative correlation with their familiarity with these stocks. In fact, the absolute value of this correlation was greater than the absolute value of the (positive) correlation between those risk judgments and the financial measures of risk.

Second, familiarity was also shown to affect preference in the analysis of financial data. In particular, a number or researchers have shown that investors prefer investments in local stocks, a phenomenon which was labeled the home country bias (for review, see Uppal, 1992; Tesar & Werner, 1992; Kilka & Weber, 1997): Investors put much more of their wealth into home assets than empirical optimizing models predict they should.

Alternative explanations. One alternative explanation for the negative relationship between risk and return judgments observed in the current experiment is that our participants are unaware of the ecological relationship between risk and return or, alternatively, that they do not accept what they are taught about this relationship in their finance and economics courses. Instead, they believe risk and return to be negatively related in the world stock markets, so that markets promising high return are also less risky. This alternative explanation is ruled out by studies 2 and 3, in which participants from the same participant population exhibited agreement with the convention that, for financial assets, risk is positively associated with return.

A number of authors (e.g., March & Shapira, 1987; Baird & Thomas, 1990; Hoskisson, Hitt, & Hill, 1991) have suggested that people view risk as pertaining primarily to the negative aspects of an asset (downside risk). Could it be argued that our participants *are* aware of the environmental relationship between conventional measures of risk (i.e., variance-based measures) and return, but generate their risk judgment on the basis of the assets' downside risk? This, explanation is, in our view, not a valid one, since ecologically based judgments should lead to a positive, rather than a negative, relationship between judgment of downside risk and judgment of expected return; downside risk, like variance-based risk, is positively related to expected return in financial markets.

EXPERIMENT 2: JUDGMENTS OF UNFAMILIAR ASSETS (WITHIN-SUBJECTS DESIGN)

The first experiment was a between-subjects experiment—each participant made either risk judgments or return judgments. The second experiment was a within-subjects experiment—each participant made both risk judgments and return judgments. One group of participants, the risk-first group, made risk judgments first and then return judgments. The other group, the return-first group, made return judgments first and then risk judgments. In its first stage the experiment was exactly similar to Experiment 1. In this stage the risk-first (return-first) group made risk (return) judgments of the same assets used in Experiment 1. Then, in the second stage, the risk-first (return-first) group made return (risk) judgments of the same assets for which they had judged the risk (return) in the first stage.

There are six correlations that could be examined in this experiment. Table 1 summarizes these correlations. In this table, K1 represents the mean ris**K** judgments of the risk-first group, and N2 represents the mean retur**N** judgments of the risk-first group. N1 and K2 represent, respectively, the mean return judgments and the mean risk judgments of the return-first group. (That is, in this notation K1 and N1 represent first-stage judgments of risk and return, respectively, and K2 and N2 represent second-stage judgments, respectively; K1 and N2 are the mean judgments of the risk-first group, and N1 and K2 are the judgments of the return-first group). In this table the correlation between the mean risk and return judgments of the risk-first group is labeled $\mathbf{r}_{K1N2}$; the correlation between the mean risk and return judgments of the return-first group is labeled $\mathbf{r}_{K2N1}$; the correlation between the mean risk judgments of the risk-first group and the mean return judgments of the return-first group is labeled $\mathbf{r}_{K1N1}$; the correlation between the mean risk judgments of the return-first group and the mean return judgments of the risk-first group is labeled $\mathbf{r}_{K2N2}$; the correlation between the mean risk judgment of the risk-first group and the mean risk judgment of the return-first group is labeled $\mathbf{r}_{K1K2}$; and the correlation between the mean return judgment of the return-first group and the mean return judgment of the risk-first group is labeled $\mathbf{r}_{N1N2}$.

We now derive predictions regarding the signs of the six correlations. These predictions are based not only on our basic model of the relationships between global preference, risk judgment, and return judgment, but also on the tenet

TABLE 1

The Labels of the Correlations between Risk and Return Judgments

	K1	K2	N1
K1			
K2	$\mathbf{r}_{K1K2}$		
N1	$\mathbf{r}_{K1N1}$	$\mathbf{r}_{K2N1}$	
N2	$\mathbf{r}_{K1N2}$	$\mathbf{r}_{K2N2}$	$\mathbf{r}_{N1N2}$

that our participants have a causal schema suggesting that higher risk leads to higher return, but not a diagnostic, or correlational, schema suggesting that return is positively correlated with risk. Thus, when asked to make return judgments *after* making risk judgments, participants will become aware that riskier markets compensate investors *with* higher returns, whereas safer markets provide lower returns. But when asked to make risk judgments after making return judgments, participants will not become aware that risk and return are correlated in financial markets. Such biases toward causal thinking are well documented in the behavioral decision-making literature (Tversky & Kahneman, 1980; Ajzen, 1977).

Our model for the judgments in Experiment 2 is presented in Fig. 2. The model suggests that the first-stage judgments, K1 and N1 (respectively, the risk judgments of the risk-first group and the return judgments of the return-first group), are derived directly from global preference. In addition, the model suggests that K2, the second-stage judgments of risk (elicited from the return-first group), are also derived directly from global preference, but that N2, the second-stage judgments of return (elicited from the risk-first group) are derived from K1 rather than from global preference.

One prediction that can be derived from this model is that the two within-group correlations of risk and return judgments will be opposite in sign. We expect that $\mathbf{r}_{K1N2}$, the correlation between the mean risk and return judgments of the risk-first group will be positive, whereas $\mathbf{r}_{K2N1}$, the correlation between the mean risk and return judgments of the return-first group will be negative. In the risk-first group, risk judgments are likely to influence subsequent return judgments. In the return-first group, return judgments are *not* likely to influence subsequent risk judgments; rather, this group will likely derive both types of judgments from global preferences.

Another prediction that can be derived from the model is that the two between-groups correlations of risk judgments with return judgments will be opposite in sign. We expect $\mathbf{r}_{K2N2}$ to be positive, since the return judgments of the risk-first group are influenced by prior risk judgments and therefore are likely to be positively correlated with the risk judgments of the return-first group, which are *not* influenced by the prior return judgments of the return-first group. On the other hand, we expect $\mathbf{r}_{K1N1}$ to be negative: the risk judgments of the risk-first group and the return judgments of the return first group provide a precise replication of Experiment 1.

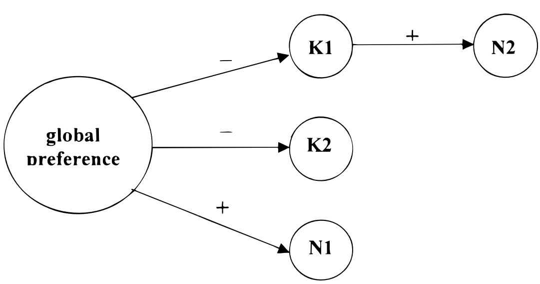

FIG. 2. Model of judgments or risk and return in Experiment 2.

Finally, the model suggests that $\mathbf{r}_{K1K2}$, the correlation between the risk judgments of the two groups will be positive, whereas $\mathbf{r}_{N1N2}$, the correlation between the return judgments of the two groups will be negative.

Method

Participants. There were 33 participants, 16 in the risk-first group and 17 in the return-first group. They were taken from the same participant pool as those in Experiment 1.

Stimuli and procedure. The stimuli and the measures were similar to those used in Experiment 1. The procedure was also similar except that after completing their initial risk (return) judgments, participants were instructed to add their return (risk) judgments of the same 30 assets that they had already judged in the first stage. The second-stage judgments were made on the same form as the first set. That is, the first-stage judgments of risk (return) were available to the participants while they made the judgments return (risk) in the second stage.

Results

For each group, we calculated the mean judgments of risk and the mean judgments of return for each of the 30 assets. The values of the six possible correlations are presented in Table 2. These values are consistent with our model of the generation of risk and return judgments of unfamiliar assets. In accordance with the model's predictions, of the two within-group correlations of risk and return judgments, that of the risk-first group was positive ($\mathbf{r}_{K1N2} = .71$), whereas that of the return-first group was negative ($\mathbf{r}_{K2N1} = -.66$); of the two between groups-correlations of risk and return judgments, one was positive ($\mathbf{r}_{K2N2} = .69$) and one was negative ($\mathbf{r}_{K1N1} = -.64$); and of the two between-groups correlations of the same type of judgment, one was strongly positive (the correlation between the risk judgments of the two groups, $\mathbf{r}_{K1K2} = .91$), and one was weakly negative (the correlation between the return judgments of the two groups, $\mathbf{r}_{N1N2} = -.17$). This later correlation was weak, most likely because of the low interrater reliability of the return judgments. Indeed, the interrater reliabilities of N1 and N2 in the current experiment

TABLE 2
The Correlations between Risk and Return Judgments in Experiment 2

	K1	K2	N1
K1			
K2	.91		
N1	−.64	−.66	
N2	.71	.69	−.17

were only .46 and .58, respectively, as opposed to the high reliabilities of the risk judgments, .90 for both K1 and K2.

Since prior risk judgments influence subsequent return judgments, but not vice versa, assets that are perceived to be riskier (safer) are the ones that, in terms of perceptions of return, "gain" (lose) from prior risk judgments. This can be demonstrated by computing for each asset the difference between the mean return judgment of the risk-first group and the mean return judgment of the return-first group and correlating this difference with the mean risk judgment of the 30 assets (because the risk judgments of the two experimental groups were very similar, the mean risk judgment for each asset was derived from the responses of all the participants). The value of this correlation was .87. This result suggests that it is possible to manipulate participants' perception of return by inducing them to make risk judgments first (see also Ganzach, 1994).

Discussion

The current experiment rules out the alternative explanation discussed above in relation to Experiment 1 that our participants believe risk and return to be negatively related in the world stock markets. The results of this experiment also suggest that when a causal schema regarding the relationship between risk and return is triggered, return judgments must *not* be a simple reflection of preference. In this case, return judgments are influenced by people's theories about the relationship between risk and return of financial assets.

EXPERIMENT 3: FAMILIAR FINANCIAL ASSETS

The current experiment examines risk and return judgments of financial assets familiar to the participants. Since in financial markets risk and return are positively correlated, and since our model proposes that, for familiar assets, judgment of risk is based on the ecological value of risk and judgment of return is based on the ecological value of return, our hypothesis is that risk and return judgments will be positively correlated for familiar assets. Furthermore, since, according to our model, participants directly access information about the ecological values of risk and return when making their judgments (rather than relying on global preference or on previous judgments), an order effect is not to be expected with regard to the relationships between the two judgments. That is, we predict that, for familiar assets, the correlation between risk and return judgments will be independent of the order in which the judgments are made.

Method

Participants. There were 36 participants, 18 in the risk-first group and 18 in the return-first group. They were taken from the same participant pool as those in Experiments 1 and 2.

TABLE 3
The Correlations between Risk and Return Judgments in Experiment 3

	K1	K2	N1
K1			
K2	.94		
N1	.86	.93	
N2	.98	.97	.86

Stimuli. The stimuli in this experiment were 14 financial assets familiar to the participants. They included the major local stock market indices, two well-known American indices (the Dow Jones and the NASDAQ index), portfolios of various types of bonds, and specialized portfolios (e.g., real estate, venture capital, and index options).

Procedure. The procedure was the same as that used in Experiment 2. That is, participants made risk (return) judgments in the first stage and return (risk) judgments in the second.

Results

For each group we calculated the mean judgments of risk and the mean judgments of return for each of the 14 assets. The six possible correlations are presented in Table 3 (the notations are the same as those used in the previous experiment). They were all strongly positive, and the order effect was small. These results are consistent with our model of the generation of risk and return judgments of familiar assets.[3]

The reliabilities of the risk and return judgments were very high, with little difference between the two (Cronbach's α of 0.93, 0.98, 0.97, and 0.96 for N1, N2, K1, and K2, respectively). This result is also consistent with the notion that in making risk and return judgments of familiar assets, participants directly access relevant ecological information.

Discussion

In the introductory section we suggested two possible mechanisms by which risk and return judgments of familiar assets can be generated. They can be generated by mentally constructing a probability distribution of possible outcomes or by using precomputed summary statistics regarding risk and expected return. Since the stimuli of the current experiment were familiar portfolios, which are analyzed almost solely in terms of summary statistics of risk and

[3] I examined the robustness of the results by eliminating from the calculations the three bond portfolios. The correlations of the remaining 11 assets were very similar to those of the entire set of 14 assets.

return (e.g., stocks are high-risk/high-return assets, bonds are low-risk/low-return assets), we think that reliance on summary statistics, rather than probability distributions, underlies the results of the current experiment (and note that the design of the current experiment, which involved widespread range of assets in terms of risk and return, also encouraged reliance on these summary statistics). Thus, in this experiment, "familiarity" is likely to be familiarity with the summary statistics of the risk and return of the experimental stimuli rather than familiarity with probability distributions of past returns.

Will a positive relationship between risk and return exist for *familiar individual* assets whose risk/return features are not as salient to the participants? A recent study by Shefrin and Statman (1999) indicates that this is the case. The study examined how various measures of stock risk affect analysts' expectations about the return of these stocks on the one hand, and how they affect actual returns on the other. The results of the study indicated that, whereas actual returns tend to be positively related to measures of risk, expectations about return are *negatively* related to these measures. These results are consistent with our model, since financial measures of risk are likely to influence analysts' global attitudes toward a company in a direction opposite their influence actual returns. For analysts a "good" company is a large company (in terms of market equity), whose sales growth is high, price-earning ratio high, book-to-market value low, and past returns high. Since these measures are positively related to analysts' perceptions about the "goodness" of the company, they are also positively related to analysts' expectations about return. However, these measures are also negatively related to financial risk (Fama & French, 1993) and—since risk is positively related to return—are negatively related to actual returns. That is, the factors that cause analysts to develop positive attitudes toward a company, and therefore favorable expectations about return, are associated with *low* risk and therefore with low actual returns.

Note that Shefrin and Statman's (1999) results suggest that the model of Fig. 1a, rather than the model of Fig. 1b, describes analysts' judgments of stock returns. That is, they suggest that analysts evaluate stocks not in terms of risk/return relationships, but in terms of global attitudes toward these stocks.

EXPERIMENT 4: RISK ATTITUDES, PREFERENCE JUDGMENTS, AND RISK AND RETURN JUDGMENTS OF FAMILIAR AND UNFAMILIAR ASSETS

One feature of Experiment 4 is that it attempts to directly measure global preference toward financial assets by asking participants to state their preference for investing in each asset. Another feature of the experiment is that it explores the role of risk attitudes in determining the relationship between perceived risk and preference.

One hypothesis (hypothesis 1) that can be derived from our model is that familiar and unfamiliar assets will differ with regard to the correlation between risk/return judgments and preference judgments. For unfamiliar assets, our model (Fig. 1a) predicts that both risk and return judgments will be highly correlated (with opposite signs) with preference judgments. On the other hand, our model (Fig. 1b) predicts that—because risk and return are positively correlated in the environment but have opposite effects on preference—for familiar assets, preference judgments are likely to show very low correlations with either risk judgments or return judgments.

Another hypothesis (hypothesis 2) stemming from our model is that familiar and unfamiliar assets will exhibit a different pattern of partial correlations between preference judgment and risk (return) judgment when return (risk) judgment is controlled for. For unfamiliar assets, controlling for risk (return) judgment will reduce the magnitude of the zero-order correlation between preference judgment and return (risk) judgment, since risk and return judgments, as well as preference judgments, are all measures of the same underlying construct (global preference). Thus partialing out either the risk or the return judgment simply reduces the true variance and increases the noise. On the other hand, for familiar assets, partialing out risk (return) judgment will increase the magnitude of the correlation between return (risk) judgment and preference judgment because although perceptions of risk and return are positively correlated, they have opposite effects on preference (Fig. 1b).

Finally, a third hypothesis (hypothesis 3) arising from our model is that the effect of risk attitudes on the relationship between risk judgment and preference judgment may be different for familiar and unfamiliar assets. For familiar assets, risk attitudes will influence the correlation between risk judgments and preference judgments—the more positive the attitude toward risk, the more positive the correlation—since for these assets perceived risk is a determinant of preference (Fig. 1b). On the other hand, for unfamiliar assets, risk attitudes will not influence the correlation between risk judgments and preference judgments, since for these assets preference is the determinant of perceived risk (Fig. 1a).

Method

Participants. There were 31 participants taken from the same participant pool as those in Experiments 1, 2, and 3.

Stimuli. The stimuli in this experiment were the 30 unfamiliar assets from Experiments 1 and 2 and the 14 familiar assets from Experiment 3.

Procedure. Participants were asked to state the level of their preference for investing in each of the 44 assets on a scale ranging from low preference (1) to high preference (9). Subsequently, they answered three questions regarding their risk attitudes. The first two questions asked them to indicate the level of their agreement with the statement “Low risk investment strategy is the strategy appropriate for me” and “Risky investments will cause me difficulty sleeping at night.” The third question asked them to estimate their tendency to “Take risk in financial investments.” Answers were given on a 1-to-9 numerical scale ranging from agree to disagree for the first two questions and from high tendency to low tendency for the third question. The answers to the first

TABLE 4

Correlations between Risk/Return Judgment and Preference Judgments in Experiment 4

	Correlation between risk and preference judgments		Correlation between return and preference judgments	
	Zero-order (1)	Partial[a] (2)	Zero-order (3)	Partial[b] (4)
Familiar assets	−0.02	−0.44	0.23	0.49
Unfamiliar assets	−0.86	−0.75	0.80	0.64

Note. n = 14 for familiar assets; n = 30 for unfamiliar assets.
[a] Controlling for judgments of return.
[b] Controlling for judgments of risk.

two questions were reversed to create a scale of risk proneness. The internal reliability of this scale was .70.

Results and Discussion

We first calculated the mean judgments of preference for each of the 44 assets. We then correlated—separately for each of the two groups of assets—these mean preference judgments with the mean risk judgment of the risk-first group, K1, and with the mean return judgments of the return-first group, N1, obtained from Experiments 2 (for the 30 unfamiliar assets) and Experiment 3 (for the 14 familiar assets).[4]

Columns 1 and 3 of Table 4 present, respectively, the zero-order correlations between risk judgment and preference judgment, and between return judgment and preference judgment, for familiar and unfamiliar assets. The values of these correlations are consistent with hypothesis 1.

Column 2 of Table 4 presents partial correlations between risk judgment and preference judgment controlling for return judgment. Column 4 presents partial correlations between return judgment and preference judgment controlling for risk judgment. The values of these correlations are consistent with hypothesis 2.

Across the 31 participants, the correlation between risk and preference judgments was strongly correlated with risk proneness (r = .63) for familiar assets, but weakly correlated with risk proneness for unfamiliar assets (r = .17). This difference is consistent with hypothesis 3.

Finally, the interrater reliability of the *preference* judgments of familiar assets was .87, weaker than the reliabilities of risk and return judgments of

[4] The results reported below are similar if we correlate the 14 mean preference judgments of the familiar assets with K2 and N2 from Experiment 3. The results are also similar if we correlate the 30 mean preference judgments of the unfamiliar assets with the mean risk and return judgments from Experiment 1 and with K2 from Experiment 2. The results are not similar if we use N2 from Experiment 2, but this discrepancy is not interesting, since this second stage return judgment were influenced by prior risk.

these assets in Experiment 3. On the other hand, the reliability of preference judgments of unfamiliar assets was .93, at least as strong as the reliability of risk and return judgments of these assets in Experiments 1 and 2. The first reliability is consistent with our model of familiar assets, since for these assets interrater agreement about risk and return is strengthened by common ecological information, but agreement about preference is weakened by variations in risk attitudes. The second reliability is consistent with our model of unfamiliar assets, since if risk and return judgments of these assets are indirect measures of preference, then a direct measures of preference (i.e., preference judgment) should be more reliable.

CONCLUSIONS

It is clear from the results presented in this article that the meaning of risk and return judgments depends on the situation. In some situations (e.g., when unfamiliar financial assets are being judged) these two judgments differ little one from the other, and they both represent global attitudes toward, or global preference of, the judged objects. In other situations (e.g., when familiar assets, or when lotteries, are being judged) judgments of risk and return represent distinct psychological constructs that are different from global preference and that are often consistent with ecological values of risk and return.

Our results raise questions about the measurement of perceptions of risk and return when these perceptions are not clearly distinguished. In these situations, unable to provide meaningful judgments of risk or return, people fall into judging preference when asked to judge risk or return. Training and experience does not seem to alleviate this problem.

Yet, because of the central role of perceptions about risk and return in decision making, particularly in decision making in financial markets, it seems to be important to find valid means of measuring these perceptions. In finance, this measurement problem is dealt with by using actual past performance (e.g., historical β) as proxies for current perceptions (e.g., current risk). However, this method clearly introduces error into the measurement. Thus it still remains to be seen whether perceptual measures other than overall evaluations of risk and expected return—for example, direct assessment of the probability distribution of future returns from which perceptions about risk and return could be derived—can add to our understanding of financial markets beyond the commonly used financial measures.

What implications do our results have for the operation of financial markets? In view of Shefrin and Statman's (1999) results, the current data suggest that, to a large extent, analysts evaluate stocks not in terms of risk/return relationships, but in terms of global attitudes toward these stocks. Since analysts' recommendations have substantial impact on stock prices (Amir, Lev, & Suganis, 1999), this model can explain some of the "anomalies" observed in recent studies of stock market returns and, in particular, Fama and French's (1993; see also Fama & French, 1996) findings that investors are compensated not only for investing in high-risk stocks, but also in investing in small firms, whose sales growth is low, price-earning ratio is low, book-to-market value is high, and past returns are low. All these parameters are correlates of low preference, which, according to our model, leads to higher perceived risk and lower perceived expected return. These perceptions result in an unwarranted depression in price. When this unwarranted depression disappears, excessive returns are realized.

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