This paper examines the results of surveys of professional investment managers' risk perceptions and investment preferences. Managers are found to exhibit loss aversion, to be risk averse for gains and risk loving for loss; and to believe in time diversification. The results are consistent with the implications of the S-shaped value function of Prospect Theory.

Since the publication of The Theory of Games and Economic Behavior by Von Neuman and Morgenstem (1944) and Portfolio Selection by Markowitz (1959), academic finance has had a strong normative bent. It has emphasized Expected Utility (E.U.) models to prescribe and interpret financial market behavior. On the other hand, practicing investment advisors and portfolio managers have been reluctant to wholeheartedly adopt recommendations from academic finance because many of the assumptions and behavioral implications of E.U. Theory did not seem to fit the environment in which managers worked. The development of Prospect Theory (Kahneman and Tversky, 1979, 1992) presents an opportunity for a reapproachment between academic finance and investment management because of its more palatable behavioral assumptions, but close connection to E.U. Theory. In particular, Prospect Theory belongs to a new class of models referred to as Generalized Utility (GU) Theory (see Camerer, 1992). In addition, key assumptions underlying Shefrin and Statman's (1994) recently developed Behavioral Capital Asset Pricing Theory are integral to Prospect Theory.

The principal objective of this paper is to examine the degree to which the investment behavior of portfolio managers is consistent with the implications of the unique value function of Prospect Theory.

**Prospect Theory: A Thumbnail Sketch**

Prospect Theory postulates three phases in the decision process:

**Phase 1. Translation**
- a. Possible outcomes are assigned subjective value.
- b. Probabilities are converted to decision weights.

**Phase 2. Combination**
Values and weights are combined to arrive at Prospect Value.

**Phase 3. Decision**
In Prospect Theory, the value function plays the role of the utility function in E.U. Theory. Its properties include diminishing marginal value of gains and losses; greater sensitivity (steepness) to loss as opposed to gain; and a reference or reflection point above which outcomes are coded as gains and below which they are coded as losses. In addition, outcomes are coded as changes instead of levels.

The decision weights in Prospect Theory function in a role similar to probabilities in E.U. Theory but differ in a number of significant respects. These differences include an over weighting of lower probability events (but with some small non-zero probabilities being ignored) and an over weighting of high probability events. All events between low and high probability events are underweighted.
"Editing" is a key process in Prospect Theory. Decision makers edit or reframe a problem until they are able to simplify the choice or decision. While some of the peculiarities of the Prospect Theory value and weight functions can be handled by other generalized utility models, the framing effects pose significant problems.

The Value Function: Implications for Behavior
The Prospect Theory value function has three implications:

**Decision makers should exhibit "loss aversion."**
Because the value function is steeper in the loss than in the gain region, decision makers should give greater emphasis to outcomes coded as losses, as opposed to outcomes coded as gains. Studies by Slovic (1967, 1987); Goszczynska (1991); Payne (1973); Cooley (1977); Shapira (1995); Kahneman (1990); and Olsen (1995) tend to confirm this result for risky decisions involving artificial gambles, natural hazards and investment decisions made by members of the public, and non-financial business executives.

**Decision makers should exhibit a "reflection effect."**
Diminishing marginal value of gain and losses on either side of the value function reference point should lead to risk aversion for gains and risk seeking for losses. Studies by Kahneman (1974); Laughhunn (1980); Thaler (1980); and March (1992) confirm this result for artificial gambles and actual business decisions made by naive and sophisticated decision makers.

**Decision makers should exhibit a "Time-Diversification Effect."**
Loss aversion coupled with a finite investment horizon should cause decision makers with longer (shorter) horizons to accept assets with more (less) variable return distributions, ceteris paribus. Thorley (1995) has recently pointed out that if decision makers have a specified financial goal and are more concerned with falling short as opposed to exceeding the goal, it is appropriate for them to invest less money in assets with more variable returns, as the length of the planned investment horizon shrinks. Benartzi (1993) comes to a similar conclusion where he suggests that loss-averse investors, with short holding periods, should exhibit myopic loss aversion. In spite of advice to the contrary, (Bodie, 1995), the matching of asset risk with time horizon has long been an axiom of the investment literature (Malkiel, 1996).

**Data: Source and Method**
The empirical findings reported in this paper are based upon responses to three separate, anonymous and non-overlapping mail surveys of professional investment managers. While the number of respondents varied in each survey, all response rates exceed 25%, which tends to be typical for this type of research (Shapira, 1995). All questionnaires were structured to avoid biases associated with question order and presentation. All respondents were Chartered Financial Analysts (CFA) who had major responsibility for the investment positioning of an institutional investment portfolio. The names were drawn at random from a national listing of portfolio managers possessing a CFA certificate. The CFA designation was used as a selection criterion because of a desire to obtain the attitudes and preferences of the more highly formally trained investment managers.
The first survey obtained information about investment managers perceptions of, and attitudes toward, investment risk. The second two studies were designed to study investment preferences.

**Empirical Results**

**Loss Aversion**

A previous study (Olsen, 1997) suggested that professional investment managers see investment risk to be a multidimensional construct with possible downside returns playing the dominant role. This result has also been found for professional decision makers in other domains (Slovic, 1987). Therefore, the first survey was conducted to focus more closely on potential risk attributes.

Table 1 presents the results of this survey. In this survey, respondents were requested to rate each mentioned risk attribute in terms of its importance as a component or measure of risk. (The list of attributes was developed from an examination of risk descriptors prominent in the investment literature.)

Consistent with the previous studies, Table 1 suggests that risk is most highly related to the possibility of obtaining an outcome which is below some reference or target level. The most highly rated risk attributes are "large loss relative to what is expected" and "less than minimum needed to meet the clients needs." Conversely, the least important attribute is the "large gain relative to what is expected." It is interesting to note that "overall variability in asset return" is rated equal to "asset will earn less than what is expected," suggesting that inclusion of the upside of the distribution of possible returns, does not make for a significantly better measure of risk.

Table 1 also gives some indication of the nature and influence of the reference level in investment managers value functions. In particular, it is clear that the reference levels are likely to differ among investors since "what is expected" would be influenced by one's goal, information and level of optimism. Thus, investors faced with identical asset choices may perceive different levels of risk to be associated with the assets, depending upon their individual reference or aspiration levels.

**Reflection Effect**

Table 2 presents results from a second survey where an identical investment choice was framed as either a gain or a loss.

As can be seen, when the decision was framed as a gain, the majority of respondents selected strategy A and acted risk averse. Conversely, when the decision was framed as a loss, the majority selected strategy B and acted as "risk lovers." The magnitude of these percentages is very similar to those reported by others using a similar decision situation (Kahneman, 1984).

**Time Diversification Effect**

Table 3 presents results of decisions based on the following investment alternatives.

Table 3 indicates that investment managers tend to match the level of volatility, as measured by the spread of the distribution of possible investment returns, with the length of the planned holding period. In particular, when the holding period was one year, a majority favored a lower volatility asset (B). However, when the holding period was lengthened to ten years, a majority saw the volatile asset (A) as the most preferred asset.

In addition, a majority of the respondents felt safer putting their funds in the most volatile asset (A) when the holding period was lengthened from one to ten years.
Summary and Conclusions
The Prospect Theory value function implies that investment decision makers should exhibit loss aversion, reflection and a time diversification effect. The results of this study are consistent with these implications. Thus, this study adds to the growing body of research which indicates that the behavioral assumptions of Prospect Theory may offer a richer and more appropriate picture of the determinants of risky choice. This study did not examine the implications of the unique weighting function of Prospect Theory. This would seem to be an important area of inquiry since a previous study by Yap (1988) suggests that investment analysts tend to be poorly calibrated and generate forecasts that exhibit "overconfidence." In addition, more recent studies of professional investors indicate that estimated probabilities contain "Desirability Bias" (Olsen, 1996) and are subadditive (Fox, 1996). Finally, the editing or framing process needs further investigation since it appears that representativeness, availability, affect and attribution biases may play a role in the investment decision process because of its complexity and the tendency for decision makers to simplify and rely on more holistic information in such complex situations (see Etzioni, 1993; Timmermans, 1993).

Table 1. Risk Attribute Ratings
Mean
Attribute Rating

1. The chance of incurring a large loss relative to what is expected. 2.2
2. The chance that the asset will earn less than the minimum needed to meet the client's needs. 2.6
3. The overall variability in the assets return over time. 4.0
4. The chance that the asset will earn less than what is expected. 4.1
5. The chance that the asset will earn less than it has historically. 4.7
6. The chance of obtaining a large gain relative to what is expected. 5.7
Notes: N = 102 respondents
1 = very important to 7 = very unimportant (26% response rate)
Difference between attribute means significant at 1% level, except attributes (3) and (4). (Mann-Whitney Test)

Table 2. Reflection Results
Panel A: Gain Frame*
Imagine that a client has $60,000 invested in common stock and that the market is experiencing a downturn. You have two investment strategies that you can recommend under the existing circumstances to preserve your client's capital.
If strategy A is followed, $20,000 of your client's investment will be saved.
If strategy B is followed, there is a one-third probability that the entire $60,000 will be saved, and a two-third probability that none of the principal will be saved.
Given this information, which of these two strategies would you favor? Place a checkmark in front of your choice:

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy A</td>
<td>65% [*]</td>
</tr>
<tr>
<td>Strategy B</td>
<td>35%</td>
</tr>
</tbody>
</table>

Panel B: Loss Frame[**]
Imagine that a client has $60,000 invested in common stock and that the market is experiencing a downturn. You have two investment strategies that you can recommend under the existing circumstances to preserve your client's capital.
If strategy A is followed, $40,000 of your client's investment will be lost.
If strategy B is followed, there is a one-third probability that nothing will be lost, and a two-third probability that the entire $60,000 will be lost.
Given this information, which of these two strategies would you favor? Place a checkmark in front of your choice:

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy A</td>
<td>32% [**]</td>
</tr>
<tr>
<td>Strategy B</td>
<td>68%</td>
</tr>
</tbody>
</table>

Notes: *N = 107 respondents (36% response rate)
** N = 111 respondents (37% response rate)
"Difference significant at 1% (t-test).

Table 3. Time Diversification Preferences

<table>
<thead>
<tr>
<th>Asset</th>
<th>Most</th>
<th>Least</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2%</td>
<td>70%</td>
</tr>
</tbody>
</table>

A. Given a 1-year investment horizon, I prefer:
B. Given a 10-year investment horizon, I prefer:

<table>
<thead>
<tr>
<th>Choice</th>
<th>Belief</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>59%</td>
</tr>
<tr>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>41%</td>
</tr>
<tr>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0%</td>
</tr>
<tr>
<td>82%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
<tr>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

C. Given a 10-year, as opposed to a 1-year horizon, I feel safe with asset (A):

<table>
<thead>
<tr>
<th>Choice</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>More safe</td>
<td>60%</td>
</tr>
<tr>
<td>Less safe</td>
<td>32%</td>
</tr>
<tr>
<td>About same</td>
<td>8%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Notes: all N = 52 respondents for each question (35% response rate)

GRAPH: In the exhibit below is information about possible yearly rates of return for three different investments. Notice that yearly rate of return can vary from a high of +54% in one year to a low of -26% in another year for investment (A), versus a high of +8% to a low of +4% for investment (C). In addition, note that investment (A) promises an "average" yearly return of 14%, versus 6% for investment (C). However, note that it is not possible to predict in advance the exact return that will be earned on investment (A), (B) or (C) in any particular year but assume that the yearly distributions of returns are independent and normally distributed.
References