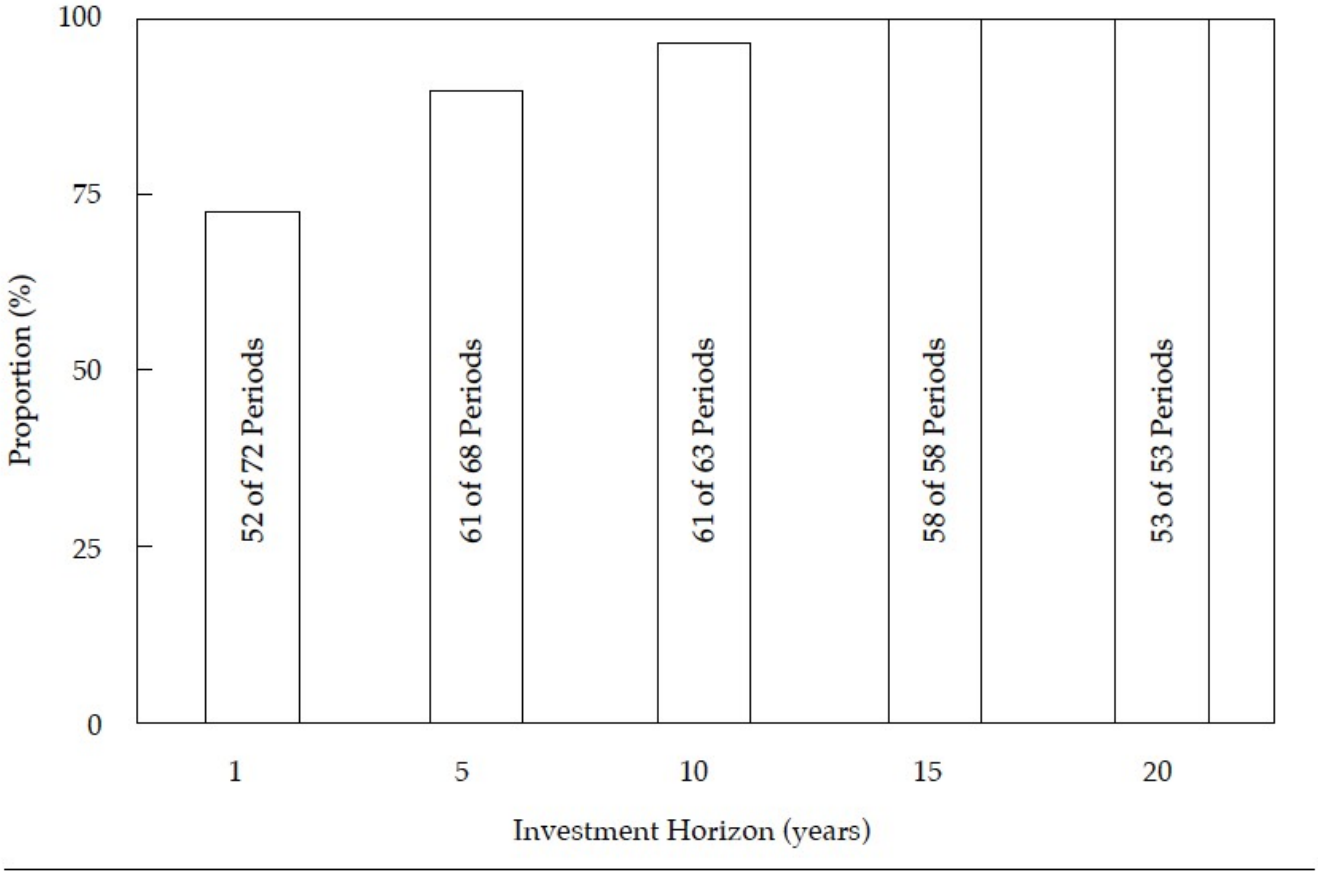
A Behavioral Framework for Time Diversification

Figure 1. Proportion of Periods When Stock Returns Were Positive, 1926–97



Time diversification has two aspects.

(1) The belief that the risk of stocks declines as the investment horizon increases.

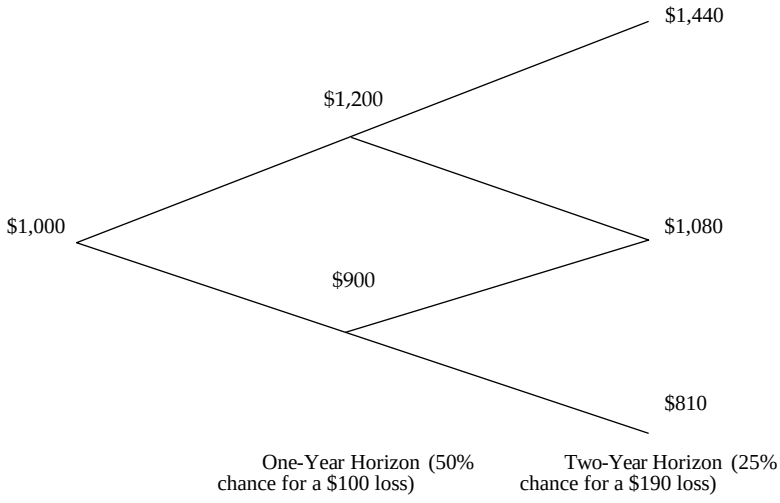
(2) A recommendation to young people to allocate high proportions of their portfolios to stocks and reduce these proportions as they age.

Opponents of Time Diversification (TD)

Samuelson's mathematical proof that TD does not work.

Samuelson's mathematical truth is that under his assumptions, the effect of time on the amount of losses is perfectly balanced in the mind of investors with the effect of time on the probability of losses. *If so, risk neither increases nor decreases as the horizon increases.*

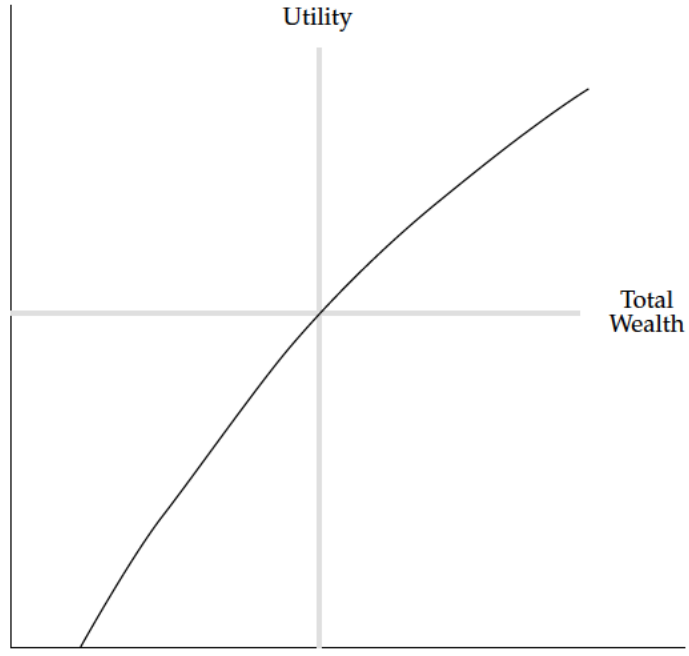
An unstated assumption under the mathematical truth is that investors correctly assess the probabilities of losses.



Proponents of Time Diversification

1. Samuelson's mathematical proof is based on the assumptions that investors are always risk averse and their utility is a function of wealth.

Figure 2. Standard Utility Function



2. However, investors are not always risk averse and investors do not always maximize the utility of wealth (Prospect Theory)

Problem 1: You have been given $1,000. You are now asked to choose between

A1 = $500 with P = 1

B1 = $1,000 with P = 0.5
$0 with P = 0.5

Problem 2: You have been given $2,000. You are now asked to choose between

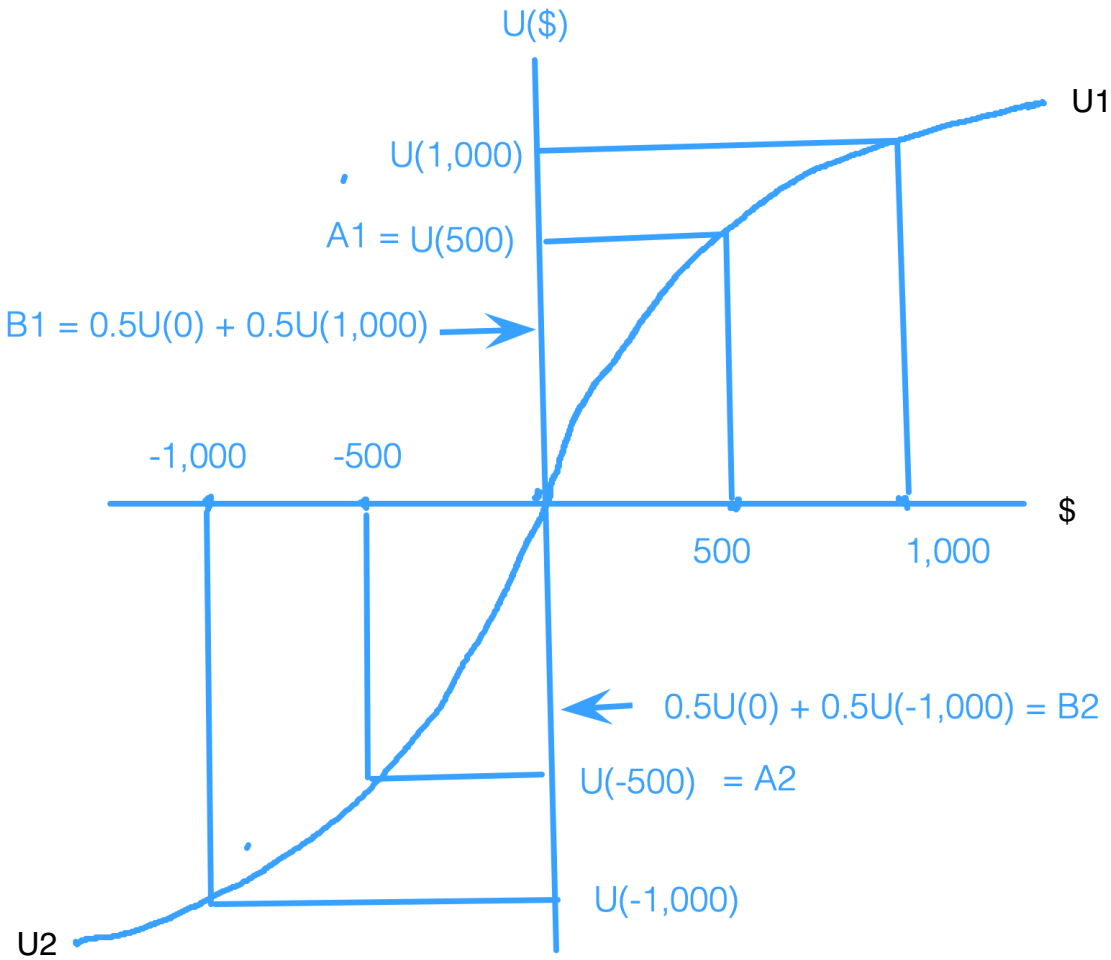
A2 = - $500 with P = 1

B2 = - $1,000 with P = 0.5
$-0 with P = 0.5

Kahneman and Tversky found that 84 percent of subjects chose A1 , the sure amount, in the first problem, but 69 percent of subjects chose B2 , the gamble, in the second problem.

Choice of A1 over B1 implies that you have utility function U1.

Choice of B2 over A2 implies that you have utility function U2.


U($)
U1
U(1,000)
A1 = U(500)
B1 = 0.5U(0) + 0.5U(1,000)
-1,000
-500
$
500
1,000
0.5U(0) + 0.5U(-1,000) = B2
U(-500) = A2
U(-1,000)
U2

When the initial $1,000 wealth is integrated into the choice between A1 and B1 in Problem 1, the overall choice is between

A3 = $1,500 with P = 1

B3 = $2,000 with P = 0.5
$1,000 with P = 0.5

When the initial $2,000 is integrated into the choice between A2 and B2 in Problem 2, the overall choice is between

A4 = $1,500 with P = 1

B4 = $1,000 with P = 0.5
$2,000 with P = 0.5

The two problems are identical in their effect on wealth. So, if investors were standard finance investors, the two problems would lead to identical choices.

The fact that the two problems lead to different choices teaches us that investors are behavioral investors. Gains and losses, not wealth, affect their choices.

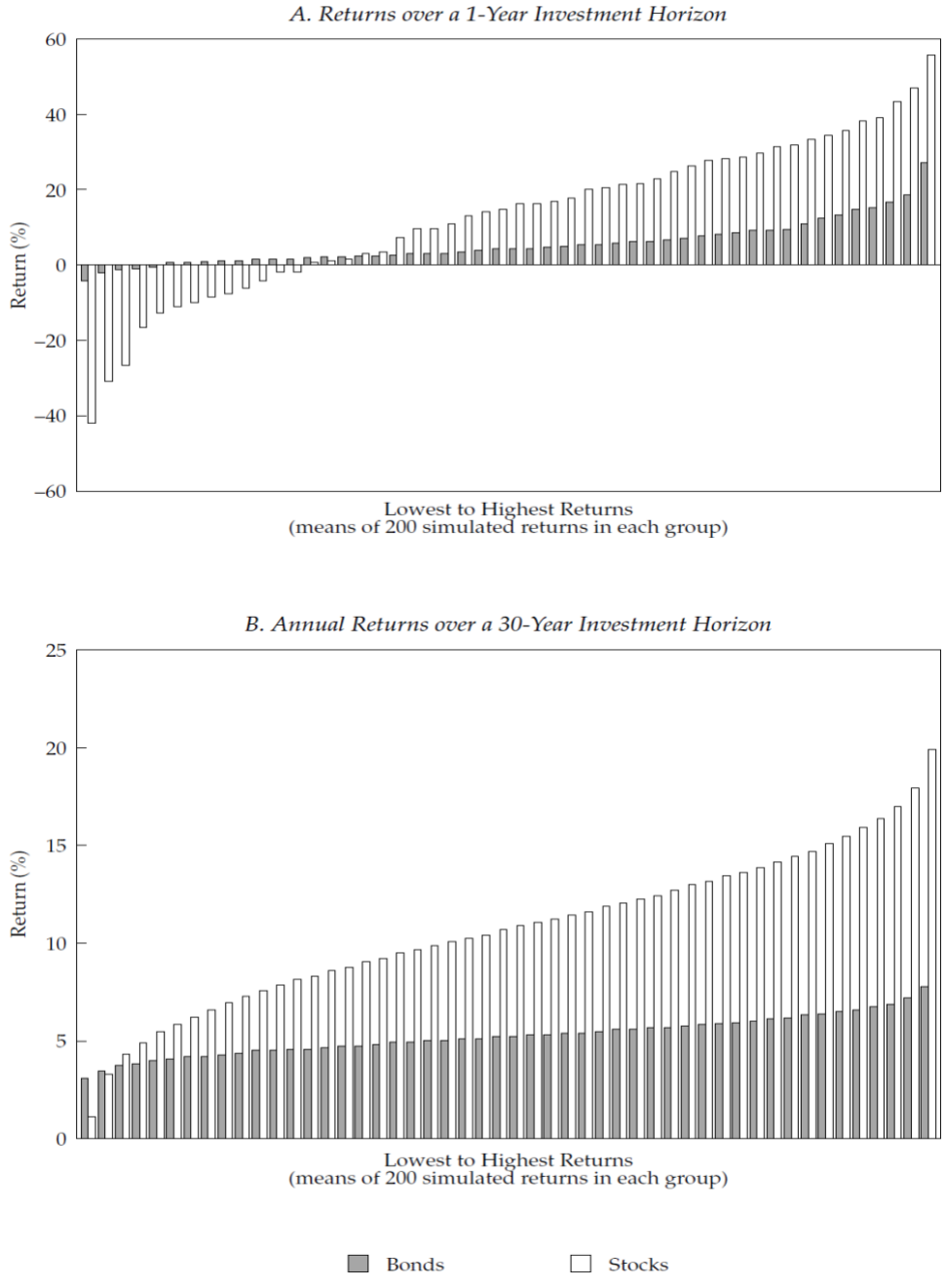
2. Cognitive Errors are Pervasive

An unstated assumption under Samuelson's mathematical proof, however, is that investors correctly assess the probabilities of losses. They do not.

Common presentations of long-term returns of stocks, such as the picture in Figure 1, facilitate the cognitive error because they show no long periods with negative returns.

The "happy end" cognitive error that Samuelson pointed out stands in contrast to another cognitive error—"myopic loss aversion"—which was pointed out by Benartzi and Thaler (1995, 1997). See Figure 5. **The median allocation to stocks among those who saw the 1-year chart was 40 percent. The median allocation to stocks among those who saw the 30-year chart was 90 percent.**

Figure 5. Distribution of Returns over Different Horizons



3. Cognitive Errors and Self-Control

Three years of losses often turn investors with thirty-year horizons into investors with three-year horizons; they want out. The tendency of investors to extrapolate recent trends in stock prices is well documented.

This tendency is a manifestation of representativeness, a cognitive error. Resisting the temptation to action based on this cognitive error is an aspect for which investor self-control is important.

Some investors, recognizing their tendency to extrapolate three bad stock market years into a world-is-coming-to-the-end conclusion, use the stay-the-course rules of time diversification to stop themselves from cashing in their stocks.

4. Aversion to Regret

A stock bought for $1,000 might rise to $1,200, or it might fall to $900. The $200 monetary gain is accompanied by pride; the $100 monetary loss is accompanied by regret.

Kahneman and Tversky (1982) described regret as the frustration that comes, *ex post*, when a choice results in a bad outcome.

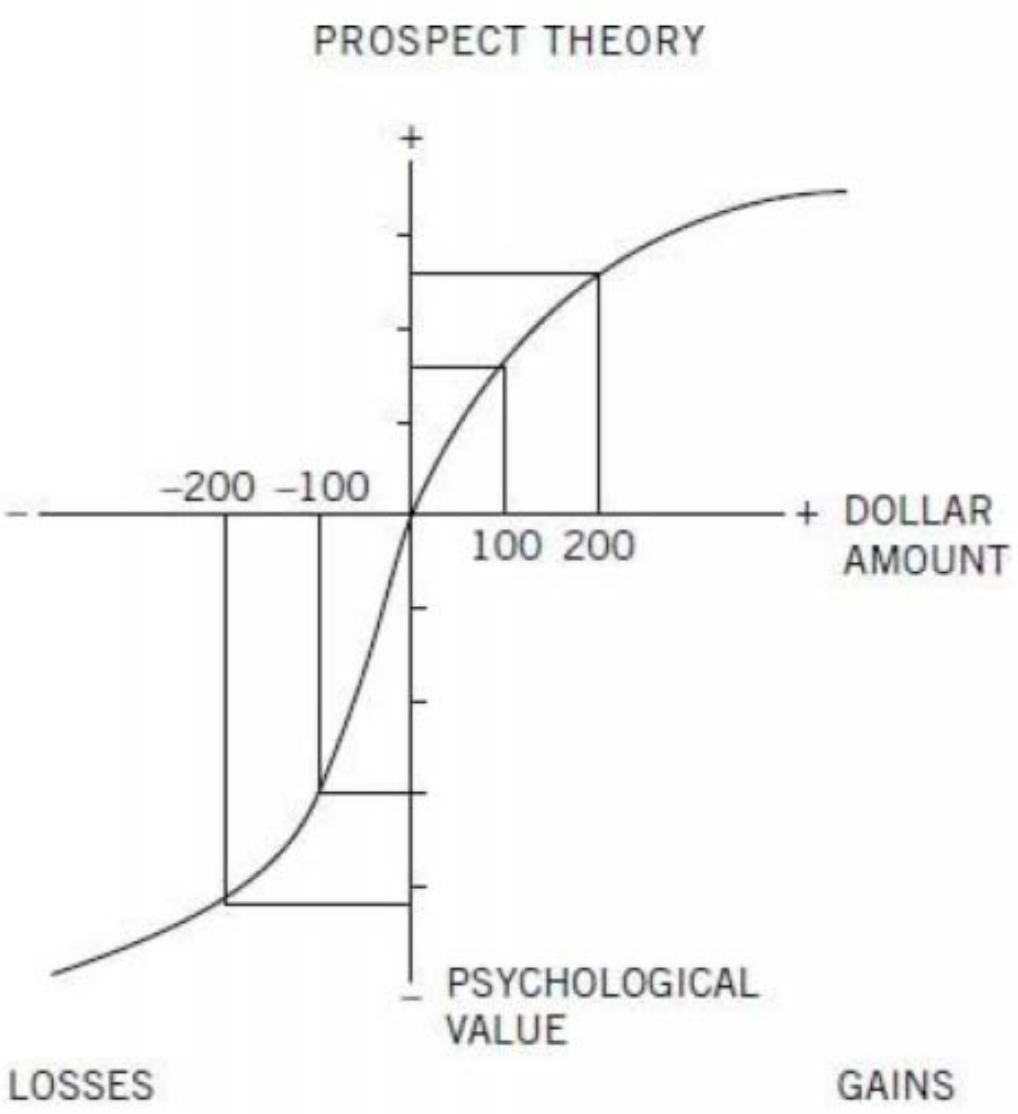
Ignorance is one way to combat regret. Investors who avoid information about the ups and downs of the market avoid the regret that comes when markets are down.

A shift of responsibility is another way to combat regret, because there is no regret without responsibility for choices.

Responsibility can be shifted to rules, such as rigid schedules. Time diversification comes with stay-the-course rules. These rules reduce regret over paper losses because paper losses leave alive the hope of breaking even.

Disposition effect

People dislike incurring losses much more than they enjoy making gains, and people are willing to gamble in the domain of losses. Consequently, investors will hold onto stocks that have lost value...and will be eager to sell stocks that have risen in value.


PROSPECT THEORY
+
–200 –100
100 200
– +
DOLLAR
AMOUNT
– PSYCHOLOGICAL
VALUE
LOSSES
GAINS