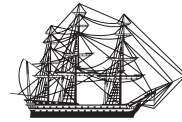


Vanguard's Investment Philosophy

We Believe #7

Risk has many dimensions, and investors should weigh “shortfall risk”—the possibility that a portfolio will fail to meet longer-term financial goals—against “market risk,” or the chance that returns will fluctuate.



Vanguard[®]

Successful investment management companies base their business on a core investment philosophy, and Vanguard is no different. Although we offer many strategies with both internally and externally managed funds, common themes run through the investment advice we provide our clients. Indeed, these tenets have been a part of the company since our inception and are embedded in Vanguard's culture. We've distilled our philosophy into nine statements, the seventh of which is presented here. For Vanguard, these nine statements represent both the past and the future—enduring principles that guide the investment decisions we help our clients make.

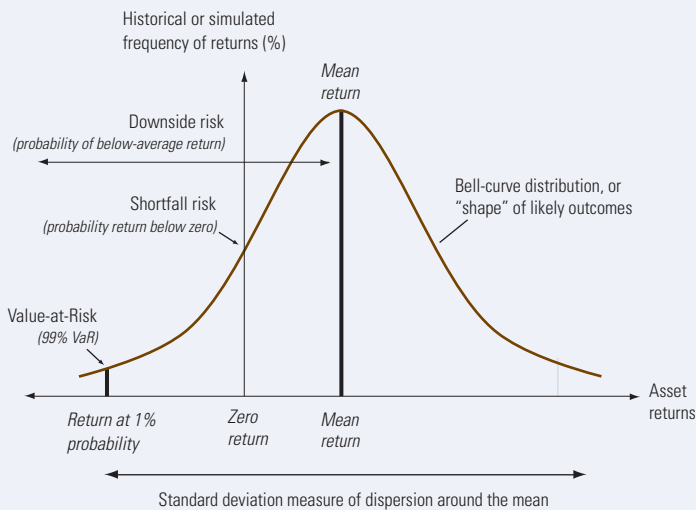
Vanguard believes that . . .

7. Risk has many dimensions, and investors should weigh “shortfall risk”—the possibility that a portfolio will fail to meet longer-term financial goals—against “market risk,” or the chance that returns will fluctuate.

To achieve long-term financial goals, many investors must pursue the relatively high expected returns available from stocks and bonds. Risk is undesirable, but a fundamental law of the financial markets is that higher returns are associated with a higher level of market risk. *Market risk*, or *variability risk*, can be defined as the variability of returns.

A second, equally important, concept is *shortfall risk*—the possibility that a portfolio's value will be insufficient to finance the targeted goal. Paradoxically, a portfolio that takes a conservative approach to market risk may in fact be exposed to a high degree of shortfall risk.

Figure 1. Different risk measures for investment returns



Source: Vanguard Investment Counseling & Research.

Variability risk

Common measures of variability risk, or the degree of volatility in an investment's value, include *standard deviation*, *downside risk*, and *Value-at-Risk (VaR)*. These popular risk measures are presented conceptually in Figure 1.¹ Standard deviation measures the variability of return, which is useful because the less dispersed the returns, the easier it is to determine whether an investment plan will meet one's objectives.

While standard deviation includes any result different from the average return—positive or negative—alternative risk measures consider only returns below a targeted threshold. For example, downside risk is the dispersion of returns *below* the average return or, in other words, the likelihood that returns will fall below the average return.

Value-at-Risk is an estimate of the maximum loss that can be expected over relatively short periods. In Figure 1, Value-at-Risk is calculated at the 99% confidence level. (As the term suggests, *confidence level* refers to the expected reliability of the estimate.)

When the dispersion of returns is "bell-shaped," as in Figure 1, the correlation between standard deviation and downside risk is very high, and financial-optimization models incorporating either standard deviation or downside risk yield practically the same long-term asset allocation. Over short periods, however, return distributions may not be symmetrical, making downside risk a useful measure.

Shortfall risk

In addition to the variability of returns, investors should also consider shortfall risk, the possibility that portfolio wealth could fall short of a required level. A shortfall occurs when the value of a portfolio ends up being less than needed at an endpoint.

Considering assets without also considering the value or timing of liabilities can limit an investor's chances of success. Corporate planners or defined benefit plans, for example, often seek a minimum expected rate of return to ensure against deficits in anticipated financing needs or promised benefits. Households may take a similar approach in planning for college tuition or retirement.

To explore the relationship between market risk and shortfall risk, consider a financial "stress-test" for two different investors, *Investor A* and *Investor B* (see Figure 2). Assume that both investors have an initial investment of \$1 million and that they plan to withdraw 4% annually, adjusted for inflation. *Investor A* assumes a high degree of market risk, allocating the entire portfolio to a U.S. stock market index fund; *Investor B* takes a more conservative approach to market risk, holding 50% of assets in a U.S. stock index fund and 50% in a U.S. bond index fund.

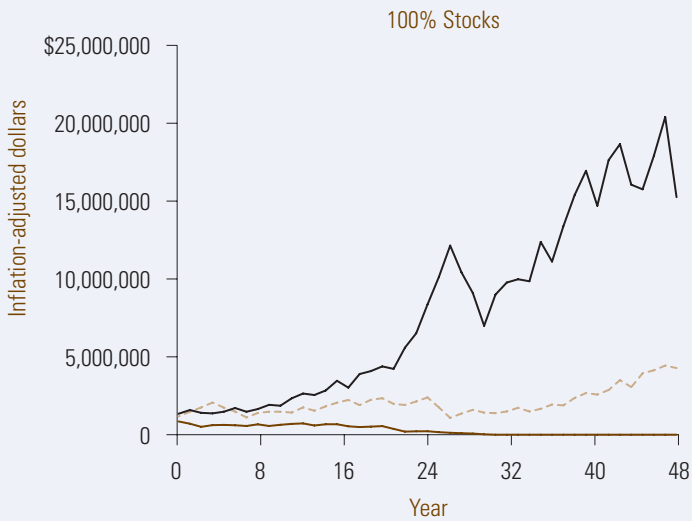
¹ Certain risk measures, especially Value-at-Risk (VaR), are more appropriate when discussing the variability in the distribution of portfolio *wealth*, rather than period-by-period investment *returns*.

Figure 2. Real growth of \$1 million: Looping time-paths, 1960 through 2005

Assumptions:

Asset balance	\$1 million
Taxes	None
Planning horizon	45 years
Withdrawal percentage	4% of initial balance, grown by inflation thereafter

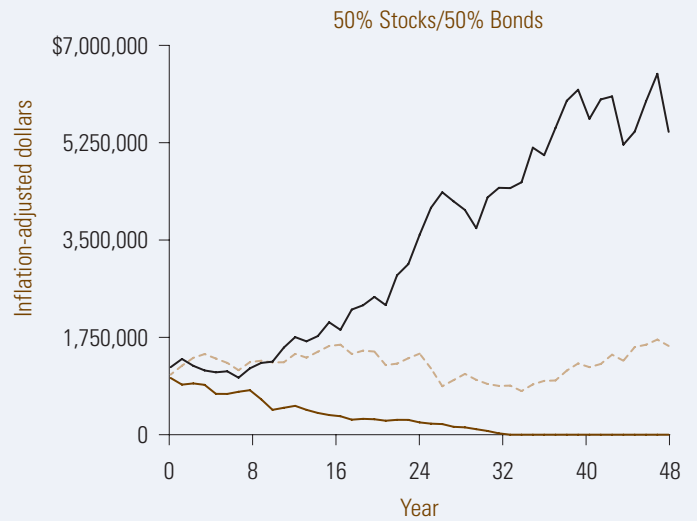
Investor A



— Best path — Worst path - - - Median path

Maximum terminal wealth	\$15,251,760
Minimum terminal wealth	\$0
Median terminal wealth	\$4,279,470
Success rate	93%
Earliest shortfall year	year 28

Investor B



— Best path — Worst path - - - Median path

Maximum terminal wealth	\$5,444,824
Minimum terminal wealth	\$0
Median terminal wealth	\$1,595,888
Success rate	85%
Earliest shortfall year	year 30

Source: Vanguard Investment Counseling & Research.

Notes: "Success rate" is defined as a positive ending balance. "Shortfall" is defined as reaching zero balance. Stock market returns represented by Standard & Poor's 500 Index from 1960 through 1970, Dow Jones Wilshire 5000 Composite Index from 1971 through April 22, 2005, and MSCI US Broad Market Index thereafter. Bond market returns represented by S&P High Grade Corporate Index from 1960 through 1968, Citigroup High Grade Index from 1969 through 1972, and Lehman Brothers U.S. Government/Credit Bond Index from 1973 through 2005. Returns on cash investments represented by Citigroup 3-Month U.S. Treasury Bill Index.

Figure 2 displays three wealth scenarios generated for each portfolio: the best, worst, and median scenarios. The tables beneath the figure provide terminal values as well as the success rate and earliest shortfall year of each portfolio.

The simulation shows that the median terminal wealth of the all-stock portfolio exceeds that of the more conservative stock/bond allocation. In addition, the all-stock portfolio has a higher success rate, or probability of meeting the investor's needs—higher market risk, but lower shortfall risk.

A close look at the full range of wealth scenarios yields two important insights. First, the timing of returns is critical to an investor. For example, strong market returns in the early years of spending enhance the portfolio's final value far more than the same level of returns in later years.

A second important observation is that the concept of average expected loss isn't adequately captured by typical variability measures such as standard deviation. Indeed, shortfall risk should consider not only the probability of the shortfall but also the magnitude of the potential shortfall. Stating that the shortfall risk of an investment strategy is one-in-a-hundred does not make a distinction between an expected loss of 20% or 90%.

Conclusion

Risk has many dimensions, each with an impact on investors' ability to meet their financial goals. Prudent portfolio construction requires an evaluation not only of an investor's tolerance for market risk but also of the tolerance for shortfall risk. In fact, investors should keep in mind that a decision to minimize market risk can, paradoxically, increase a portfolio's long-term shortfall risk.



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