# Downside risk

*Capturing what's at stake in investment situations.*

*Frank A. Sortino and Robert van der Meer*





A growing number of academics and practitioners are claiming that standard deviation and beta are not relevant measures of risk for many investment situations because they do not capture what's at stake. *Business Week* in its survey of mutual funds proffers an ad hoc risk measure that "doesn't penalize a fund on the upside," because "few investors gripe about risk when it turns up handsome gains" (February 23, 1987, p. 65).

According to Arnott and Bernstein [1988, p. 98], "Elimination of risk does not refer to variability as such, but to the risk of having insufficient assets to meet the obligations as they come due." Hagigi and Kluger [1987] claim the investment objectives on which traditional CAPM measures are based might not accurately describe the case for a defined benefit plan and offer a "safety-first" rule that emphasizes the avoidance of downside risk. Leibowitz [1986] cites the need for a new risk measure that specifically takes into consideration the liability characteristics of investment decisions.

This article examines the problem of measuring risk in general and three downside risk measures in particular. We conclude that Downside Variance is the superior risk measure for many investment situations.

### WHAT IS RISK?

Hazard, peril, danger, jeopardy ... these synonyms for risk have to do with the "chance of bad consequences," the definition of risk given by the Oxford Dictionary. We will argue that risk is situation-specific and that none of these terms is adequate for describing investment risk. The body of knowledge that has developed for making investment decisions under conditions of uncertainty, and for which Harry Markowitz, William Sharpe, and Merton Miller received the Nobel Prize, requires a clear distinction between uncertainty and risk.

Risk and return are inseparable components of the concept of uncertainty, and the way we describe uncertainty in the financial markets is in terms of a range of possible returns and their chances of occurring. This is called a probability distribution, which describes the shape of uncertainty. The shape most often used is a bell shape, or normal distribution.

There is a great deal of research to indicate that, in reality, distributions are anything but normal. The shape is instead skewed, not symmetric, the high and low returns occur much more often than would be indicated by a bell shape, and the distribution is more "pointy."

We have chosen a triangle (Figure 1) to illustrate our basic points. This triangle is positively skewed, and the area within the triangle describes the uncertainty associated with achieving returns between -100% and +1000%. Some of these returns incur risk, others do not.

FRANK A. SORTINO is Professor of Finance and Director of the Pension Research Institute at San Francisco State University in San Francisco (CA 94132). ROBERT VAN DER MEER is a Member of the Executive Board and a Managing Director of Aegon Insurance Company, as well as Professor of Finance at the University of Gronengen in The Netherlands. The authors are grateful to Brian Rom at Sponsor-Software Systems Inc., for his assistance.