

A Two-Dimensional Risk Measure

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Abstract

The measurement of “risk” is a critical component of enterprise risk management, insurance pricing and reserving, and strategic and operational decision-making. Some commonly used measures attempt to quantify risk by considering volatility or downside “potential.” Other measures examine ratios of upside versus downside potential, or upside potential versus volatility. A general characteristic of such measures is that they describe risk in a single dimension—placing risk along a number line and providing a single quantitative value. In this paper, we suggest that risk is too complex to quantify with a single number. We suggest a two-dimensional risk measure and introduce the concept of iso-risk curves.

“Risk is synonymous with uncertainty—lack of knowledge.”

- Irving Fisher, *The Theory of Interest*, 1930

“But Uncertainty must be taken in a sense radically distinct from the familiar notion of Risk, from which it has never been properly separated.”

- Frank Knight, *Risk, Uncertainty, and Profit*, 1921