

# Plight of the Fortune Tellers: Why We Need to Manage Risk Differently

by Riccardo Rebonato

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reviewed by Lisa R. Goldberg\*

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Finance involves risk. It is impossible to effectively construct a portfolio, allocate capital, or evaluate fund performance without accounting for the uncertainty inherent in markets. However, risk is difficult to comprehend. Countless behavioral and neurobiological studies show that human beings tend to avoid risk whenever possible and misconstrue it otherwise.<sup>1</sup> Even a simple and precisely specified question involving risk can have a counter-intuitive answer.<sup>2</sup> The situation is often exacerbated by a specification that is only approximate.

A natural response is to increase the precision by adding parameters or constraints or decimal places. However, it is sometimes impossible to be more precise without making grave errors. This is one of the main messages in Riccardo Rebonato's *Plight of the Fortune Tellers*, which argues that approximately-specified probabilities are intrinsic to finance, and that it is dangerous to pretend otherwise. The implications are substantial, given the size of the market for securities with payoffs that depend on future events.

The first half of *Plight of the Fortune Tellers* is a gentle and illustrative overview of probability and decision theory. Rebonato draws the distinction between a frequentist probability, such as the likelihood of tossing three heads in a row, and a subjective probability, such as the likelihood that a particular stock price will go down tomorrow. In the former case, the likelihood can be assessed to arbitrary accuracy by experimentation. In the latter case, each individual is entitled to his own view of the likelihood, so long as it is consistent with the axioms of probability theory.<sup>3</sup> As a result, subjective probabilities

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<sup>1</sup>See, for example Kahneman and Tversky (1979) and Montague (2006).

<sup>2</sup>In the Monty Hall Problem, we suppose there is a wonderful prize behind one of three doors. You have the opportunity to select a door and keep whatever is behind it. You choose door 2, and then Monty shows you there is nothing behind door 3. Given the opportunity, should you switch to 1 or stay with your original choice?

<sup>3</sup>Any likelihood must be non-negative and the sum of likelihoods over an exhaustive set of distinct possible outcomes is one.

are inherently approximate.

Once the required background is established, Rebonato embarks on an analysis of value at risk. Since its inception in the early 1990s, value at risk has been used throughout the investment community as a guide to allocating economic capital. That is the amount of cash that a bank or a fund needs to set aside for a rainy day, and it serves as a normalization for computing the return on an unfunded investment.<sup>4</sup> The recent plenitude of rainy days combined with the severe inadequacy of the economic capital set aside by financial practitioners to cover losses has raised doubts about the merits of value at risk, or at least about the way in which it is estimated.

Conceptually, value at risk is straightforward. The one-day value at risk at the 95% confidence level is the greatest loss experienced on the 19 relatively tame days out of twenty. In other words, is a worst-case scenario on an ordinary day.<sup>5</sup> Value at risk is defined over any horizon and at any confidence level, and a statistician might describe it concisely as a percentile of a portfolio loss distribution.

From a practical point of view, value at risk is anything but straightforward. There is widespread disagreement about estimation methodology, relevance of data, and validity of estimates—especially at long horizons and high confidence levels. With an apparent taste for the absurd, Rebonato focuses on the common practice of determining economic capital with an estimate of one-year value at risk at the 99.97% confidence level. This odd-sounding choice is driven by the desire to establish an implicit double-A rating: a standard rating agency estimate of annual double-A default rate is three basis points. Rebonato argues forcefully and from many angles that the probability of a rare event such as default is subjective, not frequentist. It is inescapably approximate. Suppose that the three basis point estimate is inaccurate and that the true double-A default rate is five basis points. This would mean that the relevant value-at-risk confidence level is 99.95%. The difference in confidence level may seem slight, but it leads to a huge difference in a return estimate based on economic capital.

Rebonato belongs to an elite group of practitioner-scholars in a position to take a broad, abstract view of quantitative finance without losing sight of the practical problems that constitute the discipline's *raison d'être*. In spite of the copious criticism it offers, *Plight of the Fortune Tellers* is a constructive book with a positive message. The concluding chapter, "What Can We Do Instead?," is application driven and offers specialized advice for different segments of the finance community. However, there are several themes that apply to us all:

- Think Bayesian: Don't get so caught up in the numbers that you abandon your common sense view of the world.
- Think broadly: Insist on looking at any important problem from multiple perspectives, don't put too much faith in a particular model.

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<sup>4</sup>An investment is unfunded if it has zero value at inception. Examples include swaps, futures, and dollar-neutral portfolios. Economic capital is frequently used in place of present value as the denominator in return calculations for these investments.

<sup>5</sup>It is also a best-case scenario for that one, really miserable day in twenty when everything is going wrong. This formulation suggests a conceptual disconnect between value at risk and the problem of estimating the magnitude of rainy-day losses.

- Think critically: Question everything.
- Maintain a sense of humor.

*Plight of the Fortune Tellers* is insightful and entertaining. It provides a non-technical yet sophisticated introduction to the perils of modern risk management and it has the potential to lead us in a better direction. Don't miss it.

## References

Daniel Kahneman and Amos Tversky. An Analysis of Decision Making Under Risk. *Econometrica*, 47(2):263–291, 1979.

P. Read Montague. *Why Buy This Book? How We Make Decisions*. Dutton, 2006.