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## BOOK REVIEW

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Mark Kritzman, Senior Editor

### **FORTUNE'S FORMULA**

*By William Poundstone*

*(Reviewed by Javier Estrada, IESE Business School, Barcelona, Spain)*

Have you ever read a book that combines stories about telecommunication, mobsters, investing, academics, gambling, traders, TV quiz shows, mathematics, and more? Have you ever read a book that on top of all that is both hugely entertaining and insightful? If not, then William Poundstone's *Fortune's Formula* is a must-read for you.

This fantastic book touches upon so many issues that it is difficult to say what it is ultimately about. Poundstone tackles *many* topics (and for that reason this brief review will hardly do justice to it) and tells *many* fascinating stories, but it is probably fair to say that it is a book about gambling and investing—and a method that links both.

In a nutshell, Poundstone puts the so-called Kelly criterion at center stage and discusses its origin, evolution, and applications to gambling and investing. The amazing and amusing tale involves Claude Shannon, a Bell Labs scientist, MIT professor, inventor, and founder of the field of information theory. “It's said that it is one of the few times in history where somebody founded the field, asked all the right questions . . . , and answered them all at once,” says Cornell professor Toby Berger of Shannon.

The tale also involves Ed Thorp, a mathematics professor, author of the books *Beat the Dealer* and *Beat the Market*, famous gambler and investor, and founder of the Princeton–Newport hedge fund. And of course it involves John Kelly, another Bell Labs scientist and author of the 1956 seminal paper, “A New Interpretation

of Information Rate,” in which he described a gambler's optimal strategy given a goal of maximizing the rate of capital growth.

Kelly's method, based on Shannon's information theory, essentially determines the amount of money a gambler should bet given his edge (based on *private* information) and the odds (based on *public* information). Kelly's formula, given by the deceptively-simple expression *edge/odds*, has been extensively studied in the gambling arena and widely applied to optimal betting in card games and horse races.

If you are not familiar with these topics, you may be wondering at this point what does this gambling method have to do with investing. It turns out a lot. Poundstone discusses in detail how the Kelly criterion translates into an

investing approach that results in the maximization of a portfolio's rate of growth (the portfolio's geometric mean return), and relates the approach to the logarithmic utility function proposed by Daniel Bernoulli back in 1738.

Poundstone amusingly discusses some of the main contributions from supporters and critics of this criterion, highlighting those of Latané, Markowitz (both supporters), Samuelson, and Merton (both critics). This controversy is of course far too deep to discuss in this brief review, but its essence is not difficult to understand.

Academics and practitioners have long optimized portfolios using Markowitz's mean-variance approach. This criterion, which is solidly grounded in economic theory, is not free from criticism, and two of its shortcomings are relevant to this discussion. First, mean-variance optimization is a one-period, static approach. And second, it does not really yield one portfolio but many (the efficient frontier), from which an investor has to choose the one that maximizes his utility.

Supporters of the geometric mean criterion argue that

investors do not deal with the static problem of building a portfolio to simply sell it at a later date. Rather, investors build a portfolio and adjust it over time (reinvesting proceeds and rebalancing), thus dealing with a multi-period, dynamic problem that the mean-variance approach is not designed to handle. Supporters of the geometric mean criterion also argue that this approach enables investors to determine *one* optimal portfolio, which is independent from any specific utility function.

The geometric mean criterion has other desirable characteristics: It selects the portfolio that delivers the highest terminal (long-term) wealth; it minimizes the time it takes to attain any target level of wealth; and it never risks ruin. How can someone argue against a criterion that, ultimately, maximizes the rate at which an invested capital grows? Basically by showing that the optimal portfolio selected by the geometric mean criterion is not necessarily the one that maximizes expected utility.

Still, the Kelly criterion is not devoid of support among academics and practitioners. Robert Hagstrom, biographer of Warren Buffett, argues that the "Kelly

concept is a rational process and ... it neatly echoes Buffett's thinking." Star manager Bill Miller wrote in the 2003 annual report of the Legg Mason Value Trust that the "Kelly criterion is integral to the way we manage money." And Markowitz himself has written extensively supporting this approach—despite the fact that academics and practitioners widely adopted *his* mean-variance approach!

Perhaps you are wondering why is it that a criterion that seems to be so intuitively plausible has not gained more widespread attention. Poundstone entertains some possible answers and seems to lean toward the "not invented here" explanation. In other words, being the work of information theorists, economists defended their turf by supporting an approach (mean-variance optimization) pioneered by one of their own.

Whatever the answer to that and many of the other questions and issues that Poundstone tackles in his book, I recommend it without reservations. It is, in short, one of the most entertaining and insightful books I have read in a long time.