Preface

The modern development of the Kelly, or growth optimal, approach to allocating investments began with J.L. Kelly's seminal 1956 paper, over two hundred years after Daniel Bernoulli's 1738 introduction to the notion of logarithmic utility. Kelly's paper was followed by Latané's (1959) intuitive economic analysis and theoretical advances by Breiman (1960, 1961). Breiman showed that the Kelly maximization of expected utility with a logarithmic utility function also maximized the long run asymptotic growth of wealth while minimizing the expected time to reach arbitrarily large goals. Thorp (1962, 1966, 1969, 1971) pioneered the application of the Kelly criterion to actual gambling and investment. Ziemba and Vickson (1975) surveyed the literature presenting key papers, introductions and problems up to that time; for an update, see Ziemba and Vickson (2006). Algoet and Cover (1988) generalized the Breiman results to wider classes of assets and arbitrary ergodic market processes. MacLean, Ziemba and Blazenko (1992) show applications to a wide variety of sports and gambling events following Hausch, Ziemba and Rubinstein's (1981) application to racetrack betting.

Thorp (1960) suggested the term *Fortune's Formula* which later became the title of William Poundstone's 2005 book. This was in an abstract for a talk Thorp gave to the American Mathematical Society in January 1961, presenting his blackjack card counting discovery and his use of the Kelly approach to size bets in favorable situations. The term Kelly criterion appears to date from Thorp (1966) and is used in Thorp (1969)

Over the years both theory and practice have developed prolifically. The theory has been extended to managing portfolios of investments, results have been obtained for a broad range of distributional assumptions, the simultaneous management of assets and liabilities has been elaborated upon, and the various properties, advantages and disadvantages have been clarified.

We now have a fuller understanding of the tradeoff between risk and reward for fractional Kelly versus full Kelly and for Kelly subject to minimizing the underperformance of a benchmark or specified desired wealth path.

The theory has also benefitted from the practical experience of gamblers, traders, hedge

fund managers and investors, especially from some of the greatest investors.

In this volume we present a selection of many of the most important papers from the now vast and growing literature on the subject. While we could not publish all the important papers, we feel that the main results appear here.

The volume is organized into six sections that cover the early ideas and contributions, classic papers and theories, relations to asset allocation including optimization with withdrawals, fractional Kelly wagering and its relations to benchmarks, assessing the good and bad properties of Kelly wagering, utility foundations and the use of Kelly type strategies by various investors including the greatest investors.

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