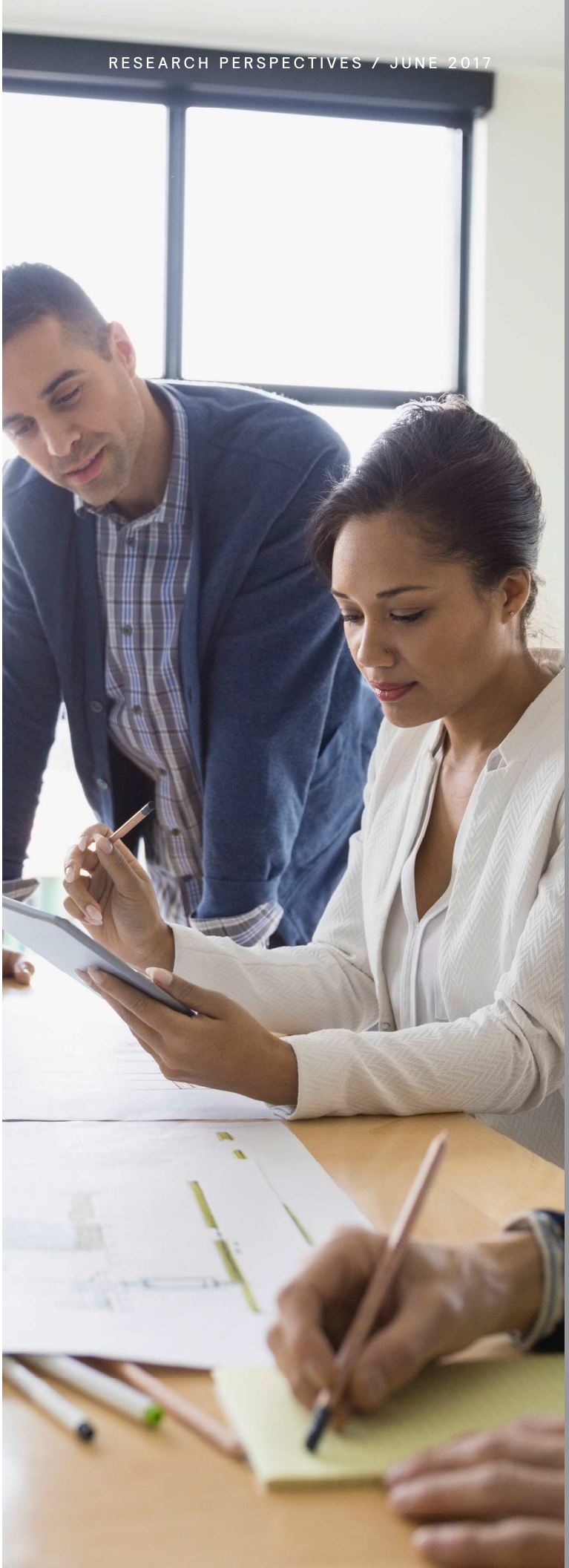

WE NEED TO BE BETTER THAN 'OPTIMAL'

PHIL EDWARDS

The dictionary definition of the word "optimal" is "best or most favorable." Though an investment strategy is hardly ever described as "the best" — perhaps for fear that this might sound somewhat hubristic or over-confident — it seems to be perfectly acceptable to describe a strategy as optimal, despite the same intended meaning.

So where did the over-use of optimal come from? Google's chart of use over time shows that "optimal" was rarely used until around 1950, after which time its use grew exponentially. This supports the hypothesis that optimal entered the investment lexicon following the widespread adoption of mean-variance optimization, which Harry Markowitz developed in the 1950s. Although the usage statistics for optimal have levelled off in recent years, the advent of robo-advice has given a fresh impetus for the use of mean-variance optimization as a portfolio construction tool.

Mean-variance optimization uses the expected returns, volatilities and correlations of a range of asset classes in order to arrive at an "efficient frontier." Any strategy sitting on the efficient frontier maximizes the expected return for a given level of volatility and is, therefore, described as efficient or optimal.

The problems with the term "optimal" as a descriptor of investment strategies are, therefore, intimately connected with the weaknesses of mean-variance optimization as a portfolio construction tool.

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These weaknesses include:

- The use of volatility as the only measure of risk. As a result, volatility and risk have become synonymous, despite the fact that a highly volatile asset might be much less risky than one exhibiting low volatility if risk is viewed as the possibility of suffering a large drawdown or losing money in real terms, for example. This isn't to say that volatility is useless as a measure of risk — far from it — simply that it shouldn't be the only measure of risk.

- Volatility and correlation inputs for a mean-variance optimization process are typically backward-looking and assumed to be stable over time. The output based on such assumptions is, therefore, vulnerable to regime changes that materially alter correlation and volatility dynamics. "Optimality" based on backward-looking inputs is fragile when looking forward.

- Setting the expected return assumptions that go into an optimization can be approached in many possible ways, each with their own strengths and weaknesses. Different approaches can produce very different numbers, but the high level of uncertainty in these assumptions is frequently ignored, with many of them often specified to an accuracy of two decimal places. Given the sensitivity of an optimization to the input parameters and the high level of uncertainty inherent in the assumptions, to describe the output as optimal is misguided at best.

The problems with the term "optimal" as a descriptor of investment strategies are, therefore, intimately connected with the weaknesses of mean-variance optimization as a portfolio construction tool.

Mean-variance optimization had not been invented when John Maynard Keynes wrote *The General Theory of Employment, Interest and Money*,[1] yet the essence of the problem it has created is captured nicely in this quote from the book: "Too large a proportion of recent mathematical economics are merely concoctions, as imprecise as the initial assumptions they rest on, which allow the author to lose sight of the complexities and interdependencies of the real world in a maze of pretentious and unhelpful symbols."

However, this is not to say that mean-variance optimization should be avoided altogether. With a clear-sighted recognition of its limitations, optimization can be used sensibly as one input within a wide-ranging investment strategy discussion.

Such a discussion would seek to address the many unquantifiable trade-offs investors face: the attractions of investing in less-liquid assets versus the opportunity cost of reduced flexibility, the costs and benefits of leverage, and a desire to diversify versus a preference for simplicity, among many others. This discussion should make use of a mix of quantitative and qualitative inputs, with expert judgment playing an important role.

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[1] Keynes John Maynard. *The General Theory of Employment, Interest and Money,* London: Palgrave Macmillan, 1936.

BIAS TOWARD QUANTITATIVE TOOLS WIDESPREAD

Many investors already follow such an approach when setting strategy and may consider this tirade largely unnecessary. However, a bias toward quantitative and precise numerical tools remains prevalent in the investment industry, as highlighted in Andrew Lo and Mark Mueller's fascinating paper "Warning: Physics Envy Can Be Hazardous to Your Wealth!"[2] Perhaps more worryingly, a few minutes spent on the websites of some well-known robo-advisors demonstrates that efficient frontiers and optimal portfolios are very much alive and kicking.

In today's environment of heightened political uncertainty, with monetary stimulus of a type and on a scale never seen before, and with structural trends such as climate change, global aging and technological disruption likely to change the investing environment radically, we need thoughtful, constructive debate like never before.

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Instead, we need to face the radical complexity of the real world. Rather than aiming for some quantitative definition of optimality, we should seek the more humble and realistic aim of robustness under a range of plausible scenarios. Stress testing and scenario analysis — straightforward deterministic tools — provide a useful, powerful alternative to the relatively complex stochastic and optimization tools that are more frequently used.

Optimality is an illusion — it's time we removed it from the investment lexicon.

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ABOUT THE AUTHOR

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[2] Lo A, Mueller M. "Warning: Physics Envy Can Be Hazardous to Your Wealth!" MIT Management Sloan School, 2010.