

The Math Behind Futility

An overlooked statistical concept shows why it's so hard to beat a benchmark.

by

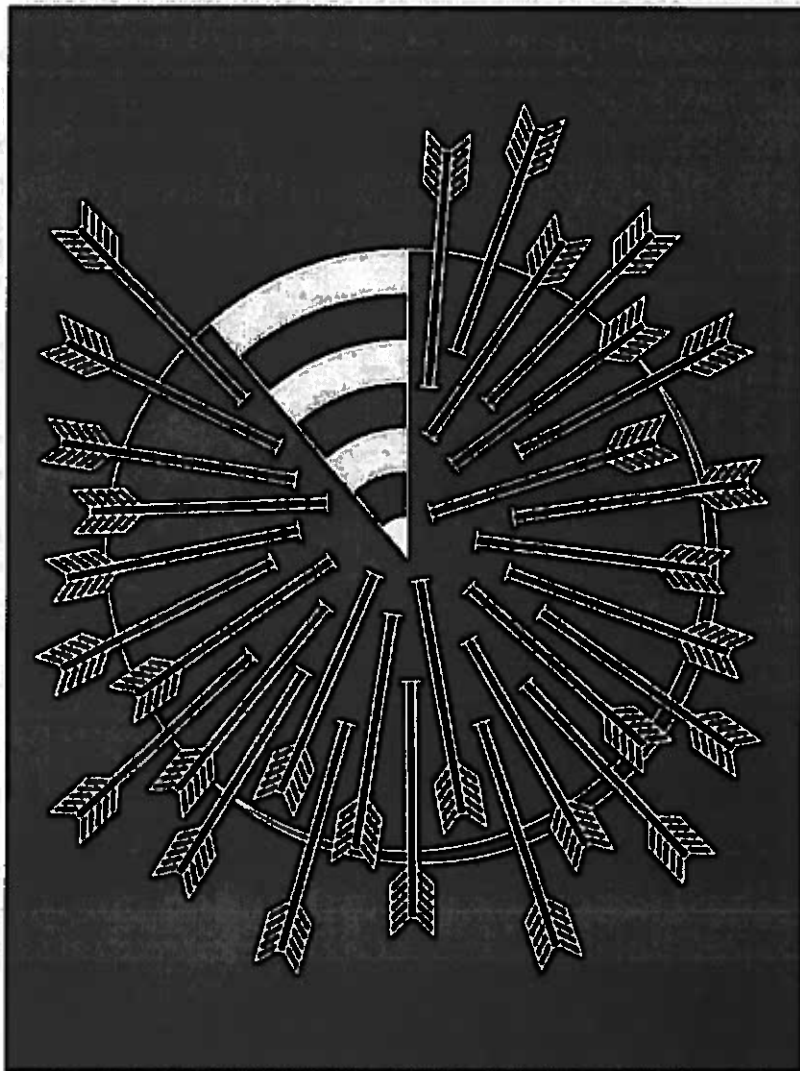
Oliver Renick

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J.B. Heaton is an unlikely stock market revolutionary. He doesn't work in investing, his academic research focuses on legal aspects of insolvency, and most of his holdings are index funds. Yet thanks to his intellectual wanderings, Heaton today finds himself championing a slightly different take on active management's decline—and, as it turns out, one that three professors advanced almost 20 years ago to scant recognition. Not only can't humans outdo benchmarks, they all say, we can't even fight them to a draw.

Let's begin with the simple coin flip. You'll call it correctly about half the time, right? Well, the collective efforts of active fund managers around the world come nowhere near even that, with the proportion besting benchmarks lately hovering around 19 percent, according to Bank of America. "How are so many smart people bad at their job?"

asks Heaton, a lawyer with dual doctorates from the University of Chicago. “We’ve always known in our gut that active managers aren’t losing to the S&P because they’re monkeys. What we haven’t understood is just how hard it is to beat passive investing because of this effect.”



Illustrator: Matt Chase for Bloomberg Markets

The effect Heaton is referring to is the subject of a five-page paper he published in 2015 with colleagues Nicholas Polson and Jan Hendrik

Witte; Hendrik Bessembinder of Arizona State University recently expanded their findings. In short: The distribution of returns in the stock market is bizarrely lopsided. Often, equity benchmarks are so reliant on gigantic gains in just a handful of stocks that missing them—as most managers do—consigns the majority to futility. “Your intuition is that you can randomly pick stocks and start at zero,” Heaton says. “But the empirical fact is if you randomly pick, you are starting behind zero.” What Heaton and his colleagues didn’t realize when trying to solve the riddle of chronic underperformance is that someone already had done it, for the most part, in a 1998 study, “Why Active Managers Underperform the S&P 500: The Impact of Size and Skewness,” published in the inaugural issue of the *Journal of Private Portfolio Management*. One of the original authors of the study is Richard Shockley, an associate professor of finance at Indiana University. At the time of publication, Shockley and his colleagues were investigating their observation that the drag from manager fees and the cost of managing a portfolio didn’t explain the degree of consistent underperformance by mutual funds to their benchmarks. The culprit as they saw it: the concept known as positive skew.

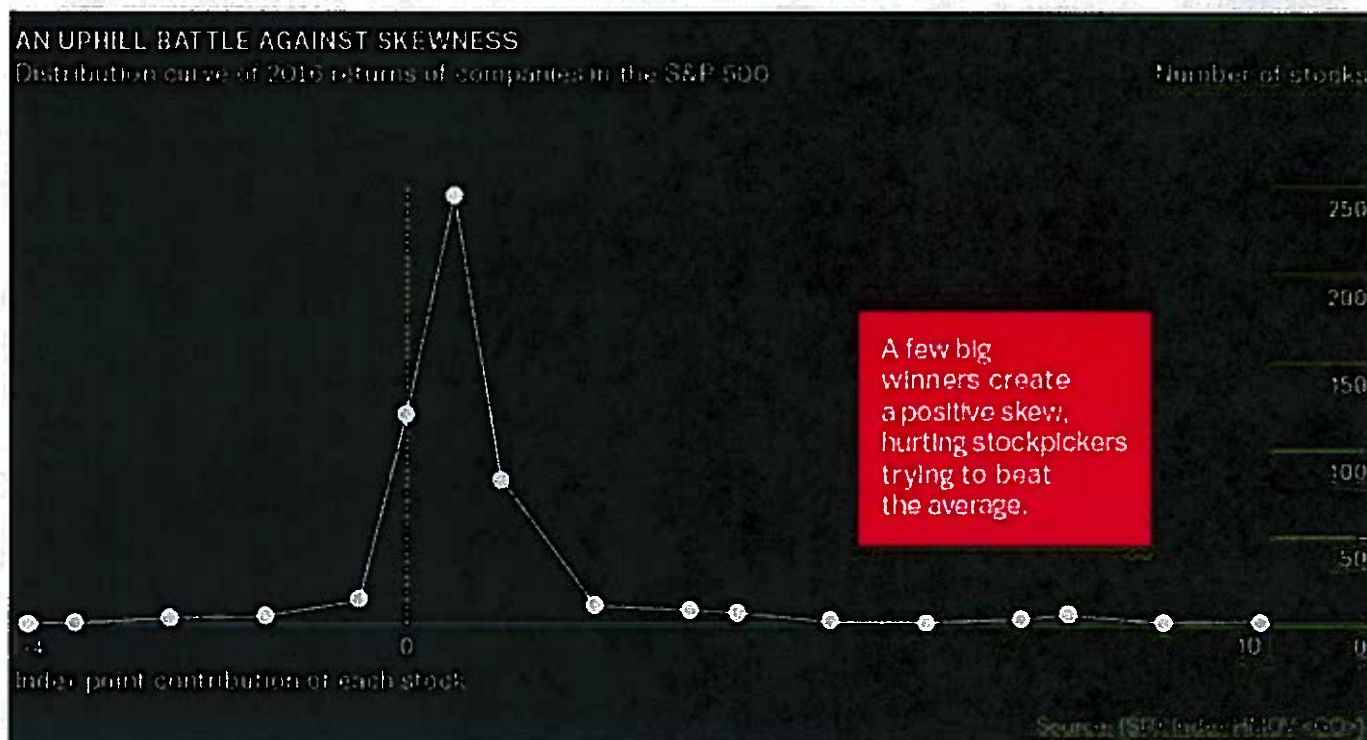
The implication, like it or not, is that a concentration of outsize gains in a minority of index members is tantamount to a death sentence for anyone who gets paid for beating a benchmark. It’s a pattern of returns that virtually ensures everyone outside of an indexer owns mostly deadbeat stocks. “It gets very little attention,” says Rob Arnott, the

Research Affiliates co-founder and smart-beta pioneer who's no stranger to pontificating in the academic realm. "The focus is often on the random walk and the coin toss analogy, and the impact of skewness is overlooked."



The findings have implications for everything from how active funds are judged to whether the explosion in passive investing will ever subside. It also offers insight into the number of stocks a manager can own before becoming a "closet indexer"—a term used to refer to stockpickers who choose enough stocks to essentially replicate an index. Seldom is the concept trotted out in the debate over investing styles, and you hardly hear "skewness" as a reason for a money manager's bad year.

Dozens of interviews with fund managers showed that few were familiar with the equity market's degree of skewness and its impact on performance relative to a benchmark. "The paper didn't get read," Shockley concedes. "We undersold it. We thought it was going to be a bang-up journal, and they didn't market it very well." Part of the problem, he says, is that the math isn't terribly easy to understand. And that's where Heaton comes in.



Heaton, Polson, and Witte distill the statistical argument into a straightforward five-page paper that uses a simple illustration, adapted here to a bag of poker chips: Say you have five poker chips, four worth \$10 and one worth \$100. The five chips have an average value of \$28, but what if you reach into the bag and pull out two chips over and over? That's roughly how mutual funds approach stocks, with managers

picking portfolios that are subsets of the broader group. The problem is, the majority of selections will fail to snag the \$100 chip.

Mathematically, there is an average value of \$56 across the 10 two-chip combinations—the problem is, 6 of 10 times you'll grab a pair with a sum of \$20. The same thing happens with stocks chosen from a benchmark. Only a few managers will own the biggies, relegating the rest of the industry to mediocrity—or worse.

The ratios in the above example are a generous illustration of what happens in the market. In reality, there are thousands more combinations, and the number of outcomes that will trail the average far outnumber those that will beat it. As a result, waiting to catch the winners over time becomes an impractical strategy. Sure, a couple of funds will own the flavor of the week (or month, or quarter) and rise above the benchmark, but for most the result will be far less than the average. And the poker chip illustration leaves out a key fact—that some stocks will fall in a given quarter, offsetting the influence of the gainers. While that's true, Bessembinder's study, expanding on Polson and Witte's work, found that over time, instances of outsize declines in most indexes are much lower than instances of eye-popping gains.

Of course, part of the reason is there's a limit to how far stocks can drop: 100 percent. But beyond that, what stood out to Bessembinder is how lopsided returns really are. Indeed, according to his work, so precious is the performance of the tiny cohort of gainers that it masks that your

average stock historically has been a worse investment choice than a one-month Treasury bill.

“At a practical level, skewness matters,” Bessembinder says by phone.

“The underlying statistical issue is underappreciated. Even if there weren’t fees and expenses, the odds are you’ll underperform.”

According to his findings, roughly 70 percent of stocks will do worse than the Treasury bill, with the rate of performance improving directly with company size. Yet even in the top decile of market capitalization, 30 percent still offer smaller gains than the T-bill.

By itself, the observation that you need to pick winners to beat the benchmark isn’t news. What else are fund managers paid for? The point of this vein of research is that the contours of the market itself make the odds against picking winners prohibitively long. Active managers may be doomed, but that doesn’t make them idiots. With investor cash pouring out of actively managed strategies and into passive ones, the stakes for stockpickers have rarely been higher. Even as individual stock returns show more variation since last year’s U.S. presidential election—a characteristic active managers often hail as crucial to selecting stocks—investors have taken money out of mutual funds and piled into exchange-traded funds this year. On a personal level, fund managers might find some solace in the research. The degree of skewness changes in any given year, and 2016 was an unfavorable one for stockpickers, according to Heaton. Put one way, the average stock in the S&P 500

returned 1.5 percentage points more than the median one, creating a scenario akin to the poker chip narrative.

Despite all the academic evidence, some on Wall Street expect the tide to turn back to active management. A December note from David Kostin, Goldman Sachs Group Inc.'s chief U.S. equity strategist, market as imminent. "I think they're flat-out wrong in saying it's a stockpicker's market," says Research Affiliates' Arnott, referring to Goldman. "Wider dispersion increases the opportunity set, yes. But it also increases the opportunity to get it wrong, and the active manager will get it wrong as often as they get it right."

While the notion of a stockpicker's market can surely be debated, Heaton, Shockley, and Bessembinder would probably take a bigger issue with the wording of the latter part of Arnott's statement: "as often as they get it right."

After all, skewness says otherwise.

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