

Counterpoint Global Insights

Dispersion and Alpha Conversion

How Dispersion Creates the Opportunity to Express Skill

CONSILIENT OBSERVER | April 14, 2020

Introduction

Having skill at an activity tends to be a good thing in life. Skill can lead to success in academia, the arts, athletics, business, and politics. But for skill to have a payoff, there has to be opportunity. The winning formula is the combination of skill and the ability to express it.

Richard Grinold, who used to run research at Barclays Global Investors, came up with “the fundamental law of active management” in the late 1980s.¹ The law is really an equation that says an investor’s excess return equals skill times opportunity. More formally, it is:

$$\text{Information Ratio} = \text{Information Coefficient} * \sqrt{\text{Breadth}}$$

Information ratio (IR) measures the return of a portfolio adjusted for risk by dividing the portfolio’s excess return versus a benchmark by the tracking error. The numerator reflects how well the fund does versus its benchmark and the denominator reveals how much risk the investor took to attain those results. The IR is negative if a fund realizes returns less than its benchmark.²

Information coefficient (IC) is the average correlation between forecasts and outcomes. A correlation near 1.0 indicates skill and a correlation near zero reflects a lack of skill. In investing, skill is the ability to buy or sell securities that generate excess returns and to allocate the proper amount of capital to those opportunities.

Breadth (BR) is the number of independent opportunities for investments that offer excess returns over a period. Breadth tends to be related to the dispersion of asset returns. This is intuitive. Say you are an equity investor and your benchmark is the S&P 500. If the returns of all the stocks in the index are similar, it is difficult to distinguish yourself. If the returns are dispersed, you have the opportunity to generate high returns by owning the ones that go up a lot and avoiding, or even shorting, the ones that go down a lot.

AUTHORS

Michael J. Mauboussin
michael.mauboussin@morganstanley.com

Dan Callahan, CFA
dan.callahan1@morganstanley.com

Grinold, along with his colleague Ronald Kahn, share an example of a roulette wheel to illustrate how the relationship between the information coefficient and breadth leads to different information ratios.³ They assume the roulette wheel has 18 red spots, 18 black spots, and 1 green spot. The ball has a 1-in-37, or 2.7 percent, probability of landing on any individual spot. The green spot is the source of the casino’s edge.

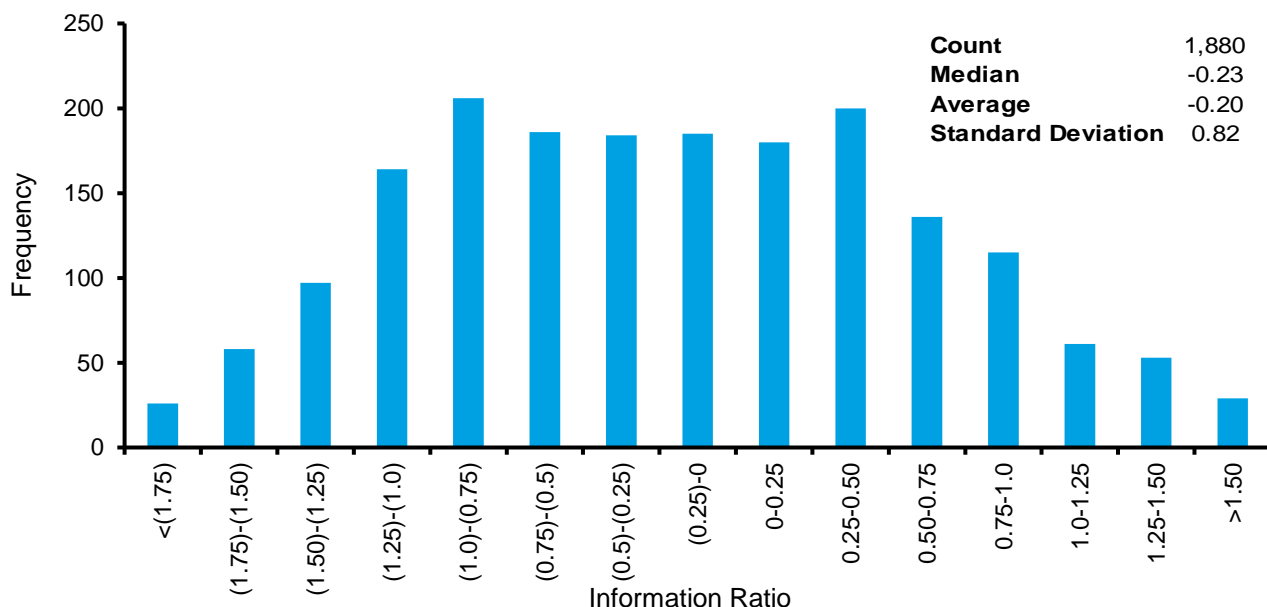
Assume a player bets \$1 on red. The casino’s information coefficient, or edge, is 2.7 percent ($19/37 * 100\% + 18/37 * -100\%$). Since there is only one bet, the information ratio is 0.027 [$0.027 (IR) = 0.027 (IC) * \sqrt{1} (BR)$]. The IR is low because there is a lot of variance with one bet.

Casinos make money based on a small edge spread over lots of bets. We now assume 1 million bets of \$1 on red. The IC remains the same, 0.027, but the IR jumps to 27.027 because the square root of breadth is 1,000 times larger [$27.027 (IR) = 0.027 (IC) * \sqrt{1,000,000} (BR)$]. The IR is high because there is little variance with one million bets.

You can now see the relationship between skill and opportunity. You need a lot of skill to generate attractive excess returns if the opportunity set is limited. You can have less skill and still achieve high returns if you have a bountiful opportunity set.

Exhibit 1 shows the distribution of information ratios for nearly 1,900 U.S. equity mutual funds for the 3 years ended March 31, 2020. The mean IR was -0.20, and the top quartile of funds had an average IR of 0.87. From a practical point of view, a long-term IR of 0.10 is good and one of 0.50 or better is excellent.⁴

Exhibit 1: Information Ratios for U.S. Mutual Funds (3 Years Ended March 31, 2020)



Source: Morningstar Direct.

Note: IR calculated on a geometric basis relative to a fund’s primary prospectus benchmark.

Note: The chart is provided for illustrative purposes only and is not meant to depict the performance of a specific investment. **Past performance is no guarantee of future results.**

This report delves into the topics of investment skill and opportunity set. The first point to make is that all the skill in the world is useless if there is no opportunity. There are a few ways this can happen. First, a skillful participant does not get to play the game. For example, a star athlete might have the ability to influence the outcome of a game but she cannot get in to play. In markets, this can be the result of capital or other constraints.⁵

Second, the cost to play may be too high. Finance professionals call these arbitrage costs, and they include aspects of executing a strategy such as finding and confirming mispricing, executing trades, and financing and funding securities.⁶ In these cases, the opportunity is clear but the cost to play prohibits substantial excess returns.

Finally, skill is obscured if the opportunity does not offer differentiated payoffs. We call this “the paradox of skill.”⁷ In this case, skill is high but uniform among competitors. Imagine two tennis players of excellent but identical skill. The outcomes of their matches will appear to be random even though they are highly-skilled players. This is what happens in an efficient market: the ability of investors to gather, process, and reflect information means that security prices accurately reflect expected values.

Markets are not perfectly efficient, and there is a great deal of variance in the skill of investors and the opportunity set the market presents. We now take a closer look at skill and opportunity set. Two essential themes for investors come out of the discussion. First, it is crucial to think about your source of edge and to align your organization’s process to serve that end. Second, a big part of winning is finding a game that allows you to show your skill. We’ll review some ways to think about that.

Investment Management Skill

Investors can express skill in three ways: market timing, security selection, and position sizing. Market timing means buying or selling asset classes in anticipation of favorable price changes. In other words, the capability to buy low and sell high. The evidence suggests that most investors are not skillful at timing the market.⁸

Security selection reflects an ability to find securities that realize returns in excess of a benchmark after adjusting for risk. One way to measure security selection is through a measure called “batting average” or “hit ratio.” Batting average is the number of investments that make money as a percentage of total investments made. For instance, if an investor makes 100 decisions in a year and 60 make money, the batting average is 60 percent.

Position sizing, a feature of portfolio construction, measures the proficiency to make each investment the appropriate size to earn the highest return possible for an assumed level of risk. For example, the Kelly Criterion is a sizing algorithm that relates the size of edge for an opportunity to the amount of your bankroll you should allocate to that opportunity.⁹

You can track sizing through “slugging ratio” or “win/loss rate.” This measures the average gains for the successful investments divided by the average losses for the unsuccessful ones.

Ronald Van Loon, a fixed income portfolio manager at BlackRock in London, disaggregates the information coefficient into terms that reflect batting average and slugging ratio.¹⁰ Specifically, he finds that when breadth is sufficiently large:¹¹

$$\text{Information coefficient} = 1.6[\text{Batting average} - 1/(1 + \text{slugging ratio})]$$

This is important because it allows you to consider the combinations of batting average and slugging ratio that generate attractive information ratios. Exhibit 2 shows the IRs that are the result of various combinations of batting average and slugging ratio assuming that breadth is 50. One of the crucial observations is that an investor can be correct much less than half of the time and still deliver a high IR if the slugging ratio is sufficiently high. It’s not how often you are right that matters, it’s how much money you make when you’re right versus how much money you lose when you’re wrong.

Exhibit 2: Information Ratios for Various Batting Averages and Slugging Ratios

		Batting Average																				
		0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
Slugging Ratio	0.0	-11.3	-10.7	-10.2	-9.6	-9.1	-8.5	-7.9	-7.4	-6.8	-6.2	-5.7	-5.1	-4.5	-4.0	-3.4	-2.8	-2.3	-1.7	-1.1	-0.6	0.0
	0.1	-10.3	-9.7	-9.2	-8.6	-8.0	-7.5	-6.9	-6.3	-5.8	-5.2	-4.6	-4.1	-3.5	-2.9	-2.4	-1.8	-1.2	-0.7	-0.1	0.5	1.0
	0.2	-9.4	-8.9	-8.3	-7.7	-7.2	-6.6	-6.0	-5.5	-4.9	-4.3	-3.8	-3.2	-2.6	-2.1	-1.5	-0.9	-0.4	0.2	0.8	1.3	1.9
	0.3	-8.7	-8.1	-7.6	-7.0	-6.4	-5.9	-5.3	-4.7	-4.2	-3.6	-3.0	-2.5	-1.9	-1.3	-0.8	-0.2	0.3	0.9	1.5	2.0	2.6
	0.4	-8.1	-7.5	-6.9	-6.4	-5.8	-5.3	-4.7	-4.1	-3.6	-3.0	-2.4	-1.9	-1.3	-0.7	-0.2	0.4	1.0	1.5	2.1	2.7	3.2
	0.5	-7.5	-7.0	-6.4	-5.8	-5.3	-4.7	-4.1	-3.6	-3.0	-2.5	-1.9	-1.3	-0.8	-0.2	0.4	0.9	1.5	2.1	2.6	3.2	3.8
	0.6	-7.1	-6.5	-5.9	-5.4	-4.8	-4.2	-3.7	-3.1	-2.5	-2.0	-1.4	-0.8	-0.3	0.3	0.8	1.4	2.0	2.5	3.1	3.7	4.2
	0.7	-6.7	-6.1	-5.5	-5.0	-4.4	-3.8	-3.3	-2.7	-2.1	-1.6	-1.0	-0.4	0.1	0.7	1.3	1.8	2.4	3.0	3.5	4.1	4.7
	0.8	-6.3	-5.7	-5.2	-4.6	-4.0	-3.5	-2.9	-2.3	-1.8	-1.2	-0.6	-0.1	0.5	1.1	1.6	2.2	2.8	3.3	3.9	4.5	5.0
	0.9	-6.0	-5.4	-4.8	-4.3	-3.7	-3.1	-2.6	-2.0	-1.4	-0.9	-0.3	0.3	0.8	1.4	2.0	2.5	3.1	3.7	4.2	4.8	5.4
	1.0	-5.7	-5.1	-4.5	-4.0	-3.4	-2.8	-2.3	-1.7	-1.1	-0.6	0.0	0.6	1.1	1.7	2.3	2.8	3.4	4.0	4.5	5.1	5.7
	1.1	-5.4	-4.8	-4.3	-3.7	-3.1	-2.6	-2.0	-1.4	-0.9	-0.3	0.3	0.8	1.4	2.0	2.5	3.1	3.7	4.2	4.8	5.4	5.9
	1.2	-5.1	-4.6	-4.0	-3.4	-2.9	-2.3	-1.7	-1.2	-0.6	-0.1	0.5	1.1	1.6	2.2	2.8	3.3	3.9	4.5	5.0	5.6	6.2
	1.3	-4.9	-4.4	-3.8	-3.2	-2.7	-2.1	-1.5	-1.0	-0.4	0.2	0.7	1.3	1.9	2.4	3.0	3.6	4.1	4.7	5.3	5.8	6.4
	1.4	-4.7	-4.1	-3.6	-3.0	-2.5	-1.9	-1.3	-0.8	-0.2	0.4	0.9	1.5	2.1	2.6	3.2	3.8	4.3	4.9	5.5	6.0	6.6
	1.5	-4.5	-4.0	-3.4	-2.8	-2.3	-1.7	-1.1	-0.6	0.0	0.6	1.1	1.7	2.3	2.8	3.4	4.0	4.5	5.1	5.7	6.2	6.8
	1.6	-4.4	-3.8	-3.2	-2.7	-2.1	-1.5	-1.0	-0.4	0.2	0.7	1.3	1.9	2.4	3.0	3.6	4.1	4.7	5.3	5.8	6.4	7.0
	1.7	-4.2	-3.6	-3.1	-2.5	-1.9	-1.4	-0.8	-0.2	0.3	0.9	1.5	2.0	2.6	3.2	3.7	4.3	4.9	5.4	6.0	6.6	7.1
	1.8	-4.0	-3.5	-2.9	-2.3	-1.8	-1.2	-0.6	-0.1	0.5	1.1	1.6	2.2	2.7	3.3	3.9	4.4	5.0	5.6	6.1	6.7	7.3
	1.9	-3.9	-3.3	-2.8	-2.2	-1.6	-1.1	-0.5	0.1	0.6	1.2	1.8	2.3	2.9	3.5	4.0	4.6	5.1	5.7	6.3	6.8	7.4
	2.0	-3.8	-3.2	-2.6	-2.1	-1.5	-0.9	-0.4	0.2	0.8	1.3	1.9	2.5	3.0	3.6	4.1	4.7	5.3	5.8	6.4	7.0	7.5
	2.1	-3.6	-3.1	-2.5	-2.0	-1.4	-0.8	-0.3	0.3	0.9	1.4	2.0	2.6	3.1	3.7	4.3	4.8	5.4	6.0	6.5	7.1	7.7
	2.2	-3.5	-3.0	-2.4	-1.8	-1.3	-0.7	-0.1	0.4	1.0	1.6	2.1	2.7	3.3	3.8	4.4	4.9	5.5	6.1	6.6	7.2	7.8
	2.3	-3.4	-2.9	-2.3	-1.7	-1.2	-0.6	0.0	0.5	1.1	1.7	2.2	2.8	3.4	3.9	4.5	5.1	5.6	6.2	6.8	7.3	7.9
	2.4	-3.3	-2.8	-2.2	-1.6	-1.1	-0.5	0.1	0.6	1.2	1.8	2.3	2.9	3.5	4.0	4.6	5.2	5.7	6.3	6.9	7.4	8.0
	2.5	-3.2	-2.7	-2.1	-1.5	-1.0	-0.4	0.2	0.7	1.3	1.9	2.4	3.0	3.6	4.1	4.7	5.3	5.8	6.4	6.9	7.5	8.1
	2.6	-3.1	-2.6	-2.0	-1.4	-0.9	-0.3	0.3	0.8	1.4	1.9	2.5	3.1	3.6	4.2	4.8	5.3	5.9	6.5	7.0	7.6	8.2
	2.7	-3.1	-2.5	-1.9	-1.4	-0.8	-0.2	0.3	0.9	1.5	2.0	2.6	3.2	3.7	4.3	4.9	5.4	6.0	6.6	7.1	7.7	8.3
	2.8	-3.0	-2.4	-1.8	-1.3	-0.7	-0.1	0.4	1.0	1.5	2.1	2.7	3.2	3.8	4.4	4.9	5.5	6.1	6.6	7.2	7.8	8.3
	2.9	-2.9	-2.3	-1.8	-1.2	-0.6	-0.1	0.5	1.1	1.6	2.2	2.8	3.3	3.9	4.5	5.0	5.6	6.2	6.7	7.3	7.8	8.4
3.0	-2.8	-2.3	-1.7	-1.1	-0.6	0.0	0.6	1.1	1.7	2.3	2.8	3.4	4.0	4.5	5.1	5.7	6.2	6.8	7.4	7.9	8.5	

Source: Based on Ronald J.M. Van Loon, "Timing versus Sizing Skill in the Investment Process," Journal of Portfolio Management, Vol. 44, No. 3, Winter 2018, 25-32.

Note: Breadth equals 50.

Note: The chart is provided for illustrative purposes only and is not meant to depict the performance of a specific investment. **Past performance is no guarantee of future results.**

To illustrate the point, let's look at an IR of 0.3. A portfolio manager can achieve that with an 80 percent batting average and a 0.3 slugging ratio or a 30 percent batting average and a 2.6 slugging ratio. In fact, the positive IRs highlighted in tan in exhibit 2 include those where the batting average is below 50 percent. The managers of these portfolios are wrong more often than they are right, but they make a lot of money when they are right.

This is where investment process becomes crucial. You can imagine very different paths to success. Scott Bessent is the former chief investment officer (CIO) of Soros Fund Management and is now the chief executive officer and CIO of Key Square Group, an investment partnership he founded. In an interview years ago, Bessent commented about George Soros and Warren Buffett, two of the greatest investors in the past half century:

"George Soros . . . is the opposite of Warren Buffett. Buffett has a high batting average. George has a terrible batting average—it's below 50 percent and possibly even below 30 percent—but when he wins it's a grand slam. He's like Babe Ruth in that respect. George used to say, 'If you're right in a position, you can never be big enough.'"¹²

You can think of this as the difference between riding and exploiting emotion. Momentum investors, and trend followers in particular, cut losses and let their winners run. They don't worry much about gaps between price and value.¹³ Bessent tells a wonderful story about being at a golf school in Florida with John Meriwether, founder

of Long-Term Capital Management, shortly after the firm's meltdown in 1998. The golf pro paired Bessent and Meriwether thinking they did "the same thing." Bessent replied, "No we don't—when a trade goes against John, he adds. When a trade goes against me, I cut."¹⁴

Value investors, and statistical arbitrageurs in particular, seek gaps between price and value and will expand positions when the gap widens if they feel the fundamental case remains solid. Bill Miller, a renowned value investor who is now chairman and CIO of Miller Value Partners, reflected this philosophy when he stated, "For most investors if a stock starts behaving in a way that is different from what they think it ought to be doing—say, it falls 15%—they will probably sell. In our case, when a stock drops and we believe in the fundamentals, the case for future returns goes up."¹⁵

Momentum and value investors have opposite reactions to securities that fall and rise. When down, momentum investors sell and value investors buy. When up, momentum investors hold (or buy) and value investors sell.

The Medallion Fund run by Renaissance Technologies, perhaps the most successful hedge fund ever, relies on modest skill and lots of breadth. Renaissance recognized early on that the fund could do very well if it had a batting average just over 50 percent, a slugging ratio slightly higher than 1.0, and lots of trading opportunities. The mathematician Elwyn Berlekamp, one of the early contributors to Renaissance, put it this way: "If you trade a lot, you only need to be right 51 percent of the time. We need a smaller edge on each trade."¹⁶

Careful consideration of the fundamental law of active management provides some guidance for how to shape your investment process and allocate resources. Venture capital can thrive with a low batting average and breadth and a high slugging ratio. High-frequency traders need to make a small sum on a modest majority of numerous trades. Exhibit 3 offers guidelines for the parameters in the fundamental law of active management.

Exhibit 3: Information Ratio Tradeoffs for Various Investment Strategies

Strategy	Batting Average	Slugging Ratio	Breadth
Venture capital	Low (< 50%)	High (>2.5)	Low
Buyouts	High (> 70%)	Medium (>1.5)	Low
Concentrated equity	High (> 70%)	Medium (>1.5)	Low
Russell 1000	Medium (~ 50%)	Medium (>1.5)	Medium
Diversified momentum	Low (< 50%)	High (>2.5)	Medium
High frequency	Medium (~ 50%)	Low (>1.0)	High

Source: Counterpoint Global; Gregory Brown, Robert S. Harris, Wendy Hu, Tim Jenkinson, Steven N. Kaplan, and David Robinson, "Private Equity Portfolio Companies: A First Look at Burgiss Holdings Data," Working Paper, January 2020; Hendrik Bessembinder, "Do Stocks Outperform Treasury Bills?" Journal of Financial Economics, Vol. 129, No. 3, September 2018, 440-457.

Note: The chart is provided for illustrative purposes only and is not meant to depict the performance of a specific investment. **Past performance is no guarantee of future results.**

The key for an investment manager is to make sure that time and resource allocation are congruent with the perceived source of edge. The fundamental law of active management can help quantify potential improvements in process via a higher batting average and slugging ratio or greater idea generation.

How an investment firm is set up makes a big difference. Research shows that the organization is roughly twice as important as individuals in explaining the difference between fund results and that the skills of successful investment professionals often don't transfer to new organizations.¹⁷ Further, it is crucial to have clients who understand the process and who are ready to ride out periods of inevitable underperformance.

Opportunity Set: Breadth and Dispersion

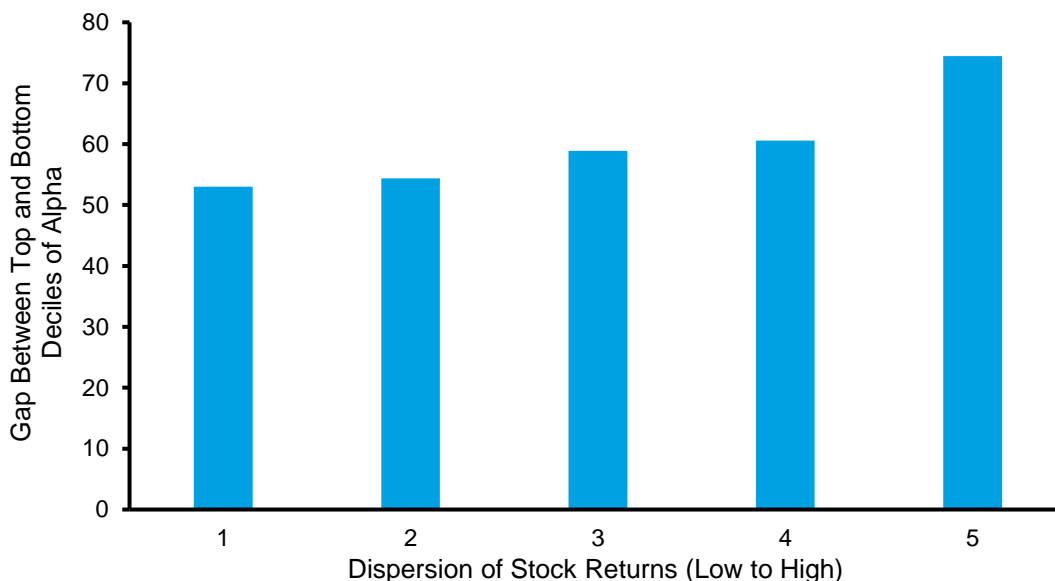
Napoleon Bonaparte purportedly said, “Ability is nothing without opportunity.” We now turn to measuring breadth.¹⁸ We seek to quantify the opportunity through the concept of dispersion.

Dispersion measures the range of returns for a group of stocks. There is a natural connection between the ability to generate excess returns and dispersion. Generating a return in excess of that of the benchmark is really hard if the gains or losses in the underlying stocks are all very similar to those of the benchmark. The homogeneous performance of the stocks that comprise the benchmark make it hard to deliver distinctive results.

On the other hand, there is a bountiful opportunity to pick the winners, avoid the losers, and create a portfolio that meaningfully beats the benchmark if the dispersion of the constituent stocks is high. Research shows that dispersion is a reasonable proxy for breadth and that the results for skillful mutual fund managers are better when dispersion is high.¹⁹

Exhibit 4 shows that the gap in excess returns between the best and worst mutual funds grows with higher dispersion. High dispersion allows the skillful managers to express their ability and distinguish themselves from the pack.²⁰

Exhibit 4: Higher Dispersion Allows for Enhanced Expression of Skill



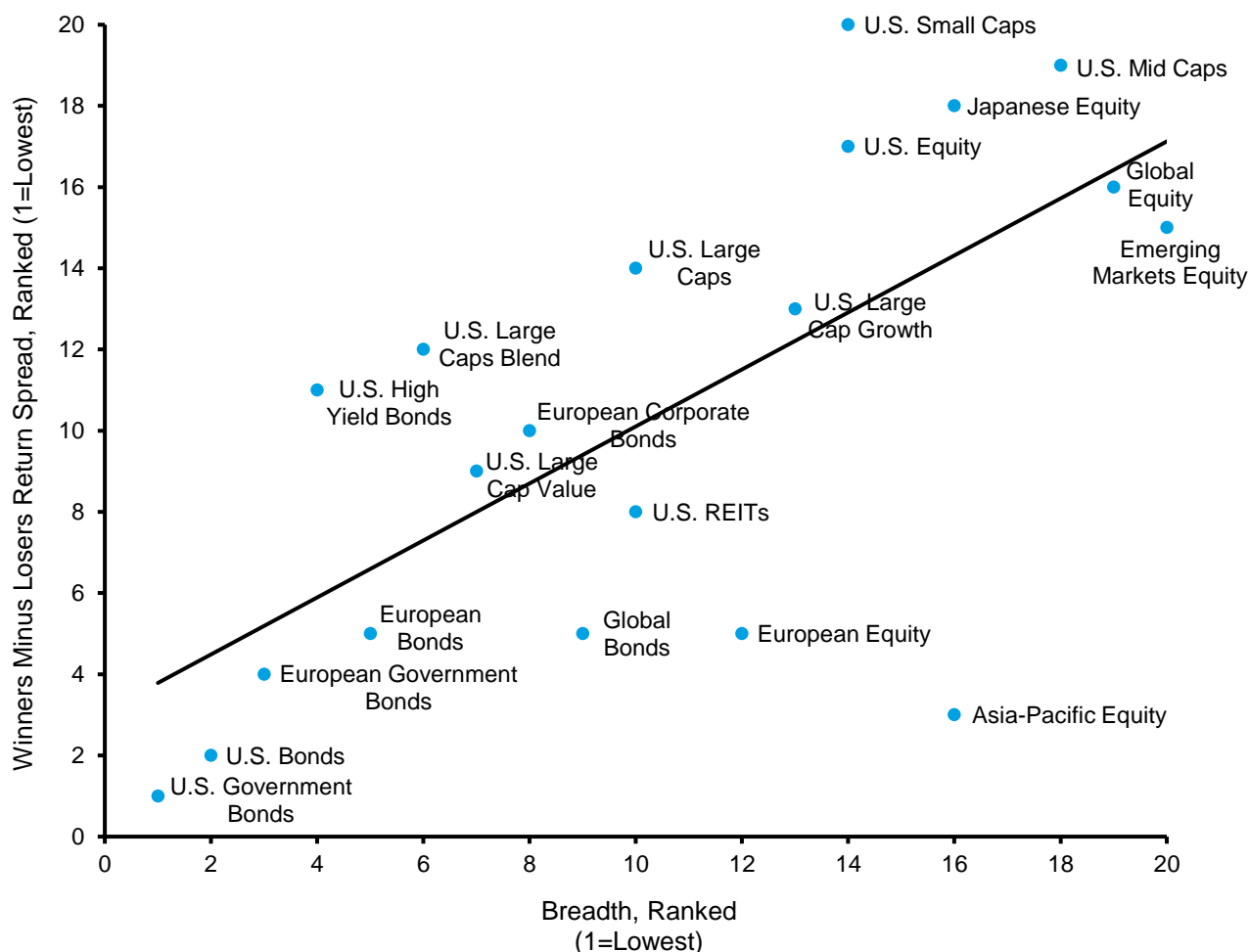
Source: Larry R. Gorman, Steven G. Saprà, and Robert A. Weigand, “The Cross-Sectional Dispersion of Stock Returns, Alpha, and the Information Ratio,” *Journal of Investing*, Vol. 19, No. 3, Fall 2010, 113-127.

Note: Median alphas are used for each decile; alpha is for the subsequent year (252 trading days).

Note: The chart is provided for illustrative purposes only and is not meant to depict the performance of a specific investment. **Past performance is no guarantee of future results.**

While our primary focus is on stocks, the concept that dispersion is a measure of opportunity set holds across other asset classes as well.²¹ Exhibit 5 shows the relationship between breadth and the gap between winners and losers. The data reveal that it is very difficult for a manager to distinguish him- or herself in an asset class with low breadth and that the gap between winners and losers is much more pronounced in asset classes with high breadth.

Exhibit 5: Higher Dispersion Allows for Enhanced Expression of Skill Across Asset Classes



Source: Joop Huij and Simon Lansdorp, "Mutual Fund Performance Persistence, Market Efficiency, and Breadth," Working Paper, October 25, 2012.

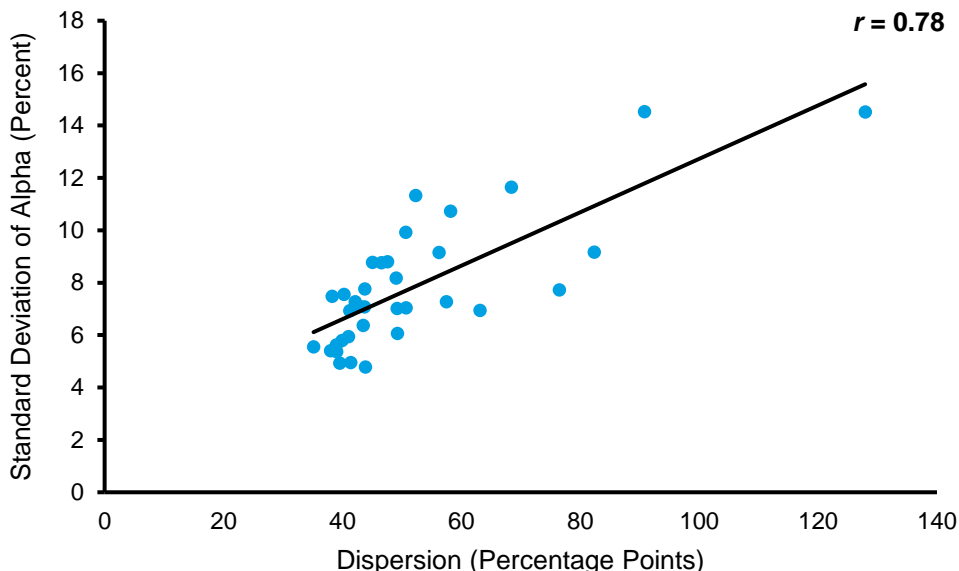
Note: The chart is provided for illustrative purposes only and is not meant to depict the performance of a specific investment. **Past performance is no guarantee of future results.**

Here's another way to think about it. Alpha is a measure of risk-adjusted excess return. The alphas for a large number of funds generally follow a bell-shaped, or normal, distribution with a mean close to zero before fees. Winners and losers largely offset one another relative to the benchmark.

The width of the normal distribution matters. When the distribution is wide, there is a lot of positive and negative alpha. That's good news if you are skillful, because it's easy to find a loser that allows you to win. When the distribution is narrow, there is not a lot of positive alpha, and it's hard to separate the skilled from the unskilled.

Exhibit 6 shows the relationship between annual dispersion and standard deviation of alpha, a measure of the width of the distribution of alpha. The relationship is quite clear. More dispersion tends to spell more opportunity. Talented managers need dispersion in order to ply their skill.²²

Exhibit 6: Dispersion of Returns for Russell 1000 and Standard Deviation of Alpha, 1985-2019



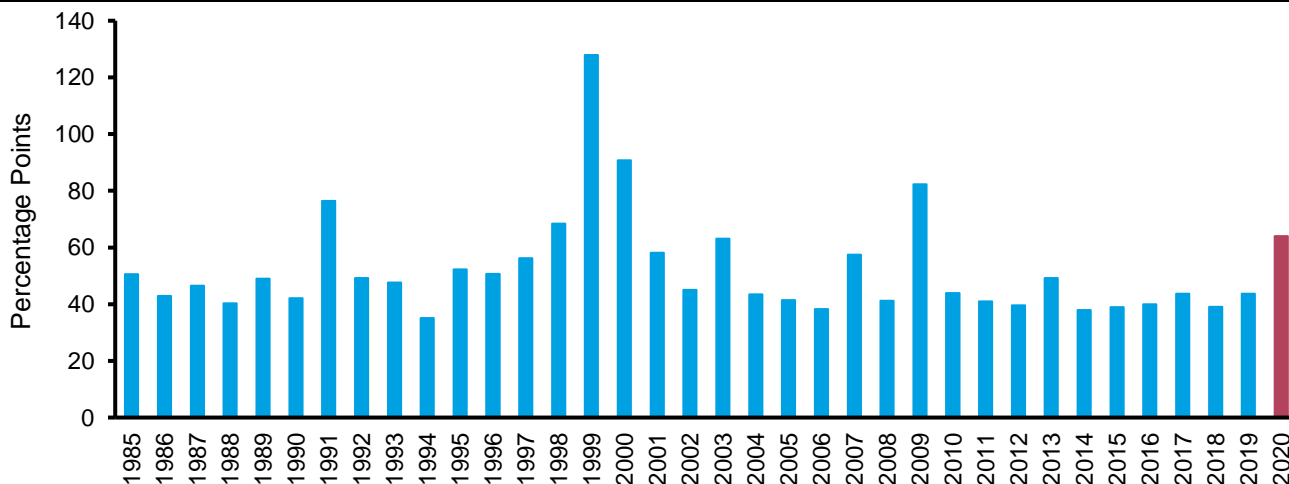
Source: FactSet and Morningstar Direct.

Note: The chart is provided for illustrative purposes only and is not meant to depict the performance of a specific investment. **Past performance is no guarantee of future results.**

How do we measure dispersion? One approach begins by calculating the median return for the stocks within the index for a particular year.²³ That number was 29.2 percent in 2019 for the Russell 1000, which roughly reflects the top thousand stocks in the U.S. based on market capitalization. Next, you determine the average total shareholder returns (TSR) for the stocks in the top half, which was 52.2 percent, and the average return for the bottom half, which was 8.5 percent. Dispersion is the difference between the two, or 43.7 percentage points (52.2 minus 8.5). Dispersion and the standard deviation of returns for an index are highly correlated.

Exhibit 7 shows the dispersion of annual returns for the Russell 1000 from 1985-2020. Over that time, the lowest dispersion was 35.1 percent in 1994, the highest was 127.9 percent in 1999, and the average was 51.8 percent.

Exhibit 7: Dispersion of Returns for the Russell 1000, 1985-2020



Source: FactSet.

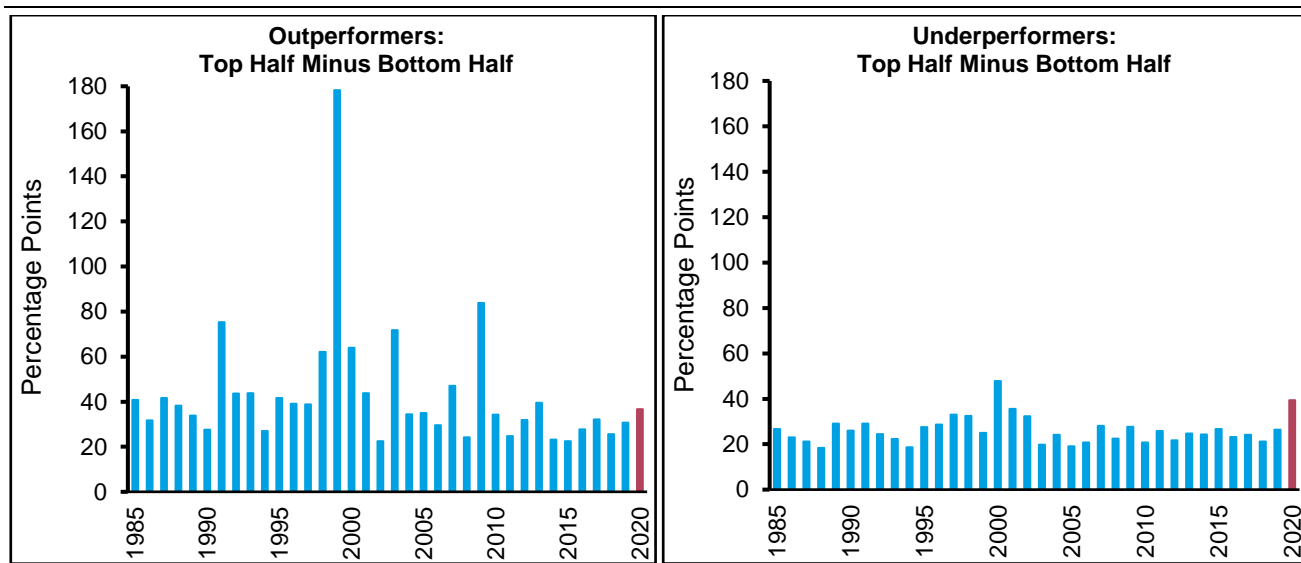
Note: Figure for 2020 is annualized using year-to-date data through March 31.

Note: Forecasts and/or estimates provided herein are subject to change and may not actually come to pass.

Assuming a portfolio manager can anticipate which stocks will outperform the benchmark, there is an additional opportunity to identify and own the stocks in the top quartile. Figuring out which stocks will outperform boosts batting average. Figuring out which stocks among those that will do the best, and sizing them appropriately, increases the slugging ratio. We can measure this through dispersion of dispersion.

In effect, what we are measuring is the ability to identify the best of the best and the worst of the worst. To do this, we examine the average returns for the stocks in the highest quartile of returns and subtract the returns for the stocks in the second-highest quartile. It is the top half of the outperformers minus the bottom half of the outperformers. In 2019, the top half of the outperformers in the Russell 1000 were up 67.5 percent, and the bottom half of the outperformers were up 36.9 percent. The dispersion of dispersion for the winners was 30.7 percent (see left panel of exhibit 8).

Exhibit 8: Dispersion of Dispersion for the Russell 1000, 1985-2020



Source: FactSet.

Note: Figure for 2020 is annualized using year-to-date data through March 31.

Note: Forecasts and/or estimates provided herein are subject to change and may not actually come to pass.

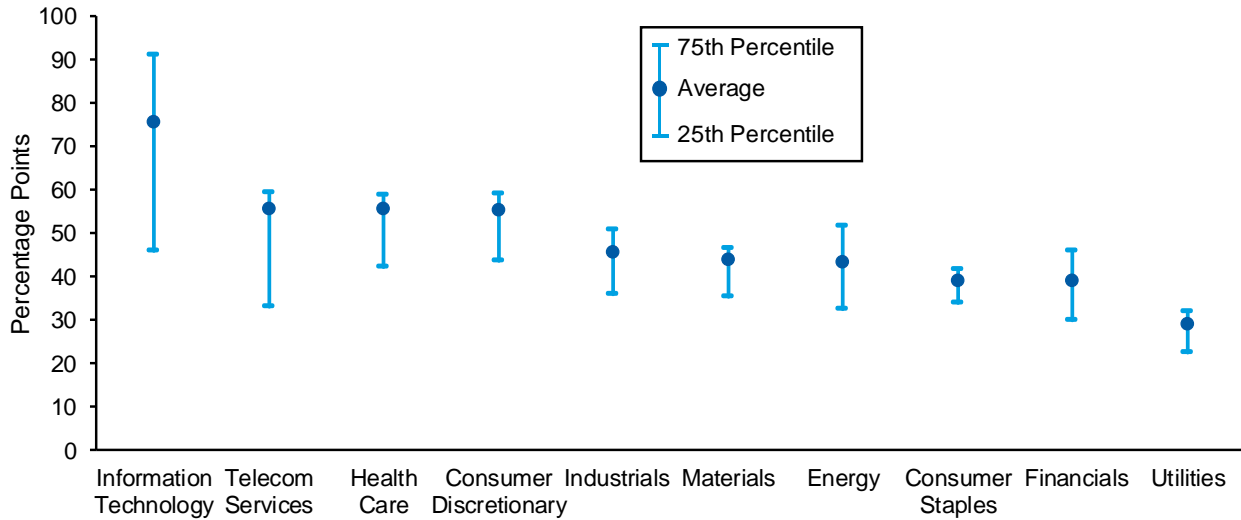
Likewise, we can do the exercise for the underperformers. In 2019, the top half of the underperformers were up 21.7 percent, and the bottom half of the underperformers were down 4.7 percent. The dispersion of dispersion for the losers was 26.3 percent (see right panel of exhibit 8).

We maintained the same scale for the vertical axis for the dispersion of dispersion of outperformers and underperformers to show that the figure is on average much higher for the outperformers than for the underperformers. This is important for slugging ratio.

Opportunity Set by Sector and Industry

Portfolio managers, even those who run concentrated portfolios, seek to have some diversification. By the same token, investing in sectors with high dispersion provides the prospect of distinctive results. Exhibit 9 shows the average annual dispersion of sectors from 1985 through 2019. Consistent with common sense, the technology and health care sectors provide higher average dispersions than do consumer staples and utilities. Further, while sectors such as financials and staples have similar average dispersions, the difference between the 75th and 25th percentiles of results is much larger for financials than for staples.

Exhibit 9: Dispersion of Sectors, 1985-2019

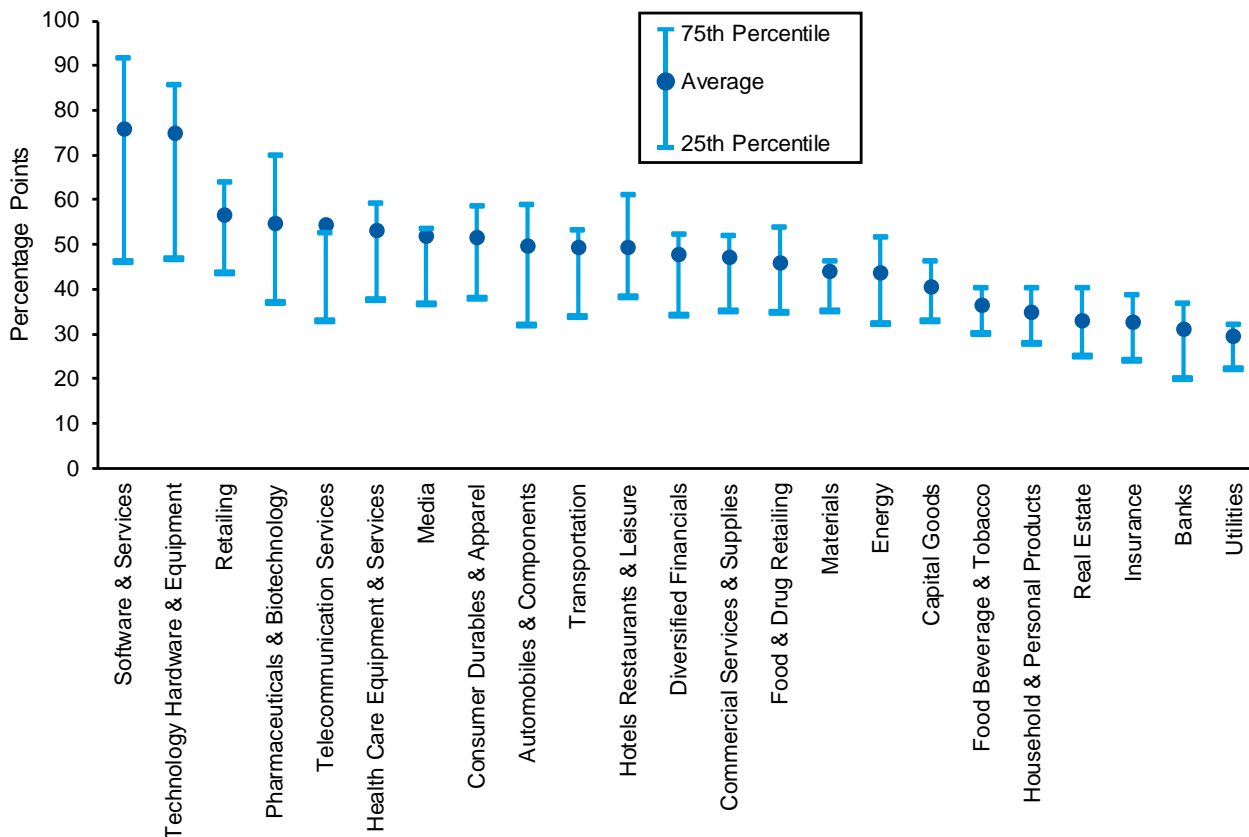


Source: FactSet.

Note: The chart is provided for illustrative purposes only and is not meant to depict the performance of a specific investment. **Past performance is no guarantee of future results.**

Exhibit 10 breaks down average annual dispersion even further, examining 23 industry groups. Here again, technology industries tend to offer the highest dispersion and staples and utilities provide among the lowest.

Exhibit 10: Dispersion of Industry Groups, 1985-2019



Source: FactSet.

Note: The chart is provided for illustrative purposes only and is not meant to depict the performance of a specific investment. **Past performance is no guarantee of future results.**

Skillful investment managers need dispersion in returns to let their skill shine. We have focused on annual dispersion figures because that time frame most closely matches the average holding period of an equity mutual fund. We now turn to how to use these components to understand past results.

Practical Applications for Active Managers

There are four diagnostic steps that can help decompose performance into the elements of security selection, position sizing, and opportunity set.²⁴ While not precise, these steps will prompt introspection and potentially lead to shifts in emphasis within the investment process.²⁵ Here are the steps:

- 1. Security selection.** Examine the securities in the portfolio at the beginning of a given period, generally one quarter or one year, and build a portfolio with each security having the same weight. You can then measure batting average, or what percent made money relative to the total number of securities, and you can calculate the return of the portfolio. You can then compare the equal-weighted portfolio to the returns for an appropriate benchmark.
- 2. Position sizing.** The next step is to take the same securities at their weights in the portfolio and evaluate the portfolio, with no adjustments, through the end of the measurement period. You can then compare this do-nothing portfolio with actual initial weights to a do-nothing portfolio with equal weights. Most portfolio managers attempt to take larger positions in securities they expect to have higher returns and where they have strong conviction in the thesis. This calculation will indicate whether you sized effectively versus having equal weights. The result also sheds light on slugging ratio.
- 3. Portfolio activity.** The following step is to compare the returns of the do-nothing portfolio with actual initial weights to the portfolio's actual returns, which will include all decisions to buy and sell securities during the period. You can then further examine the impact of buying and selling as separate decisions.
- 4. Opportunity set.** Finally, you can measure the dispersion of the sectors or industries in which you were active. This measures whether you were operating where the opportunity is attractive, a prerequisite to the ability to express skill. For example, a portfolio manager who has the S&P 500 as a benchmark can monitor dispersion by sector and be more active in high-dispersion sectors and neutral in low dispersion sectors. The goal is to fish in the pond where there are plenty of fish.

Summary

This report addressed the relationship between skill and opportunity set in assessing investment returns. The first point is that there must be a chance to express skill. Even the most talented will not fare well if they have no occasion to do so.

Investment skill boils down to security selection and position sizing. Security selection is what you bet on, and position sizing is how much you bet on each security. We measured these through batting average, or what percentage of your total security transactions went up, and slugging ratio, or how much you made when you were right versus how much you lost when you were wrong. We pointed out that there are lots of ways to get to attractive outcomes, including low batting averages and high slugging ratios.

But no matter how you seek to generate excess returns, it is vital that you have a roadmap to those returns and that your process is congruent with that objective.

Dispersion is one way to measure the opportunity set, and there is solid research behind the idea that high dispersion presents the opportunity for skilled managers to generate excess returns. We further examined dispersion by sector and industry group, illustrating which areas of the market present the greatest potential sources of alpha.

Finally, we offer a simple, four-step diagnostic process to allow a portfolio manager to disentangle performance. These tools are meant to encourage self-examination and to reveal areas where an investment process can improve.

Please see Important Disclosures on pages 15-17

Endnotes

- ¹ Richard C. Grinold, "The Fundamental Law of Active Management," *Journal of Portfolio Management*, Vol. 15, No. 3, Spring 1989, 30-37. Also, see Richard C. Grinold and Ronald N. Kahn, *Active Portfolio Management: A Quantitative Approach for Producing Superior Returns and Controlling Risk, Second Edition* (New York: McGraw Hill, 2000), 147-169.
- ² The information ratio is similar to the Sharpe Ratio but uses returns relative to a benchmark, such as the Standard & Poor's 500 Index, whereas the Sharpe Ratio compares results to a risk-free asset.
- ³ Grinold and Kahn, 150-151.
- ⁴ "Mutual Fund Closet Indexing," *Peer Analytics*, May 21, 2018.
- ⁵ Andrei Shleifer and Robert W. Vishny, "The Limits of Arbitrage," *Journal of Finance*, Vol. 52, No. 1, March 1997, 35-55. The authors write, "When arbitrage requires capital, arbitrageurs can become most constrained when they have the best opportunities, that is, when the mispricing they have bet against gets even worse." Also, Roger Clarke, Harindra de Silva, and Steven Thorley, "Portfolio Constraints and the Fundamental Law of Active Management," *Financial Analysts Journal*, Vol. 58, No. 5, September/October 2002, 48-66.
- ⁶ Charles M.C. Lee and Eric So, "Alphanomics: The Informational Underpinnings of Market Efficiency," *Foundations and Trends in Accounting*, Vol. 9, No. 2-3, 2014, 175-206.
- ⁷ Michael J. Mauboussin, *The Success Equation: Untangling Skill and Luck in Business, Sports, and Investing* (Boston, MA: Harvard Business Review Press, 2012), 53-58.
- ⁸ Xuemin (Sterling) Yan, "The Determinants and Implications of Mutual Fund Cash Holdings: Theory and Evidence," *Financial Management*, Vol. 35, No. 2, June 2006, 67-91; Mikhail Simutin, "Cash Holdings and Mutual Fund Performance," *Review of Finance*, Vol. 18, No. 4, July 2014, 1425-1464; Laura Andreu, Juan Carlos Matallín-Sáez, and José Luis Sarto, "Mutual Fund Performance Attribution and Market Timing Using Portfolio Holdings," *International Review of Economics & Finance*, Vol. 57, September 2018, 353-370; and Guy Metcalfe, "The Mathematics of Market Timing," *PLoS ONE*, Vol. 13, No. 7, July 18, 2018. For evidence that some investors can time the market, see Andreas Neuhierl and Bernd Schlusche, "Data Snooping and Market-Timing Rule Performance," *Journal of Financial Econometrics*, Vol. 9, No. 3, Summer 2011, 550-587 and Marcin Kacperczyk, Stijn Van Nieuwerburgh, and Laura Veldkamp, "Time-Varying Fund Manager Skill," *Journal of Finance*, Vol. 69, No. 4, August 2014, 1455-1484.
- ⁹ William Poundstone, *Fortune's Formula: The Untold Story of the Scientific Betting System That Beat the Casinos and Wall Street* (New York: Hill and Wang, 2005). One simple formula to express the Kelly Criterion is $2p - 1 = f$. Where p is probability and f is the percent of your bankroll you should bet. For example, if you have a biased coin that shows up heads 60 percent of the time when the payoff reflects a fair coin, you should bet 20 percent of your bankroll. [$2(0.60) - 1 = 0.20$]. No other betting strategy will lead to a greater accumulation of wealth, on average, than that one.
- ¹⁰ Ronald J.M. Van Loon, "Timing versus Sizing Skill in the Investment Process," *Journal of Portfolio Management*, Vol. 44, No. 3, Winter 2018, 25-32.
- ¹¹ The constant, 1.6, in this equation is based on returns that follow a normal distribution. For distributions of returns that exhibit kurtosis, a measure of fat tails, the constant declines as the kurtosis rises. A high level of kurtosis reduces the constant to about 1.4. The basic relationship between the drivers of excess returns remains intact.
- ¹² Steven Drobny, *Inside the House of Money: Top Hedge Fund Traders on Profiting in the Global Markets* (Hoboken, NJ: John Wiley & Sons, 2006), 278. Considering quarterly results from December 1985 through April 2000, the Sharpe Ratio for Berkshire Hathaway and the Quantum Fund were similar. See exhibit 3 in William T. Ziemba, "The Symmetric Downside-Risk Sharpe Ratio," *Journal of Portfolio Management*, Vol. 32, No. 1, Fall 2005, 108-122.
- ¹³ Michael W. Covell, *Trend Following: How to Make Money in Bull, Bear, and Black Swan Markets, Revised and Extended Fifth Edition* (Hoboken, NJ: John Wiley & Sons, 2017).
- ¹⁴ Drobny, 270.
- ¹⁵ David Rynnecki, "How To Profit From Falling Prices: Interview with Bill Miller," *Fortune*, September 15, 2003.
- ¹⁶ Gregory Zuckerman, *The Man Who Solved the Market: How Jim Simons Launched the Quant Revolution* (New York: Portfolio/Penguin, 2019), 108.

¹⁷ Klaas P. Baks, "On the Performance of Mutual Fund Managers," *Working Paper*, June 2003 and Boris Groysberg, *Chasing Stars: The Myth of Talent and the Portability of Performance* (Princeton, NJ: Princeton University Press, 2010).

¹⁸ Measuring breadth is tricky. See David Buckle, "How to Calculate Breadth: An Evolution of the Fundamental Law of Active Portfolio Management," *Journal of Asset Management*, Vol. 4, No. 6, April 2004, 393-405.

¹⁹ Frank J. Fabozzi, ed., *Active Equity Portfolio Management* (New Hope, PA: Frank J. Fabozzi Associates, 1998); Harindra de Silva, Steven Sapra, and Steven Thorley, "Return Dispersion and Active Management," *Financial Analysts Journal*, Vol. 57, No. 5, September/October 2001, 29-42; Richard C. Grinold and Mark P. Taylor, "The Opportunity Set: Market Opportunities and the Effective Breadth of a Portfolio," *Journal of Portfolio Management*, Vol. 35, No. 2, Winter 2009, 12-24; Larry R. Gorman, Steven G. Sapra, and Robert A. Weigand, "The Role of Cross-Sectional Dispersion in Active Portfolio Management," *Investment Management and Financial Innovations*, Vol. 7, No. 3, October 2010, 58-68; Anna Agapova, Robert Ferguson, and Jason Greene, "Market Diversity and the Performance of Actively Managed Portfolios," *Journal of Portfolio Management*, Vol. 38, No. 1, Fall 2011, 48-59; and Anna von Reibnitz, "When Opportunity Knocks: Cross-Sectional Return Dispersion and Active Fund Performance," *Critical Finance Review*, Vol. 6, No. 2, September 2017, 303-356.

²⁰ Larry R. Gorman, Steven G. Sapra, and Robert A. Weigand, "The Cross-Sectional Dispersion of Stock Returns, Alpha, and the Information Ratio," *Journal of Investing*, Vol. 19, No. 3, Fall 2010, 113-127.

²¹ Joop Huij and Simon Lansdorp, "Explaining Differences in Mutual Fund Performance Persistence," *Working Paper*, 2011.

²² Ernest M. Ankrim and Zhuangxin Ding, "Cross-Sectional Volatility and Return Dispersion," *Financial Analysts Journal*, Vol. 58, No. 5, September/October 2002, 67-73.

²³ We follow the method described in Joe Peta, "The Worst Year Ever for Hedge Funds," *Novus Research*, January 2015.

²⁴ This approach is less relevant for funds that trade very actively or infrequently.

²⁵ Much of this is based on Drew Dickson, "The Sacrilegious Diaries: Measuring the Impact of Portfolio Turnover," *Albert Bridge Capital*, July 2, 2019. For the classic approach, see Gary P. Brinson, L. Randolph Hood, and Gilbert L. Beebower, "Determinants of Portfolio Performance," *Financial Analysts Journal*, Vol. 42, No. 4, July/August, 1986, 39-44.

IMPORTANT INFORMATION

The views and opinions and/or analysis expressed are those of the author as of the date of preparation of this material and are subject to change at any time due to market or economic conditions and may not necessarily come to pass. Furthermore, the views will not be updated or otherwise revised to reflect information that subsequently becomes available or circumstances existing, or changes occurring, after the date of publication. The views expressed do not reflect the opinions of all investment personnel at Morgan Stanley Investment Management (MSIM) and its subsidiaries and affiliates (collectively "the Firm"), and may not be reflected in all the strategies and products that the Firm offers.

Forecasts and/or estimates provided herein are subject to change and may not actually come to pass. Information regarding expected market returns and market outlooks is based on the research, analysis and opinions of the authors or the investment team. These conclusions are speculative in nature, may not come to pass and are not intended to predict the future performance of any specific strategy or product the Firm offers. Future results may differ significantly depending on factors such as changes in securities or financial markets or general economic conditions.

Past performance is no guarantee of future results. This material has been prepared on the basis of publicly available information, internally developed data and other third-party sources believed to be reliable. However, no assurances are provided regarding the reliability of such information and the Firm has not sought to independently verify information taken from public and third-party sources. The views expressed in the books and articles referenced in this whitepaper are not necessarily endorsed by the Firm.

This material is a general communications which is not impartial and has been prepared solely for information and educational purposes and does not constitute an offer or a recommendation to buy or sell any particular security or to adopt any specific investment strategy. The material contained herein has not been based on a consideration of any individual client circumstances and is not investment advice, nor should it be construed in any way as tax, accounting, legal or regulatory advice. To that end, investors should seek independent legal and financial advice, including advice as to tax consequences, before making any investment decision.

Charts and graphs provided herein are for illustrative purposes only. Any securities referenced herein are solely for illustrative purposes only and should not be construed as a recommendation for investment.

The S&P 500® Index measures the performance of the large cap segment of the U.S. equities market, covering approximately 80% of the U.S. equities market. The Index includes 500 leading companies in leading industries of the U.S. economy. The Russell 3000® Index measures the performance of the largest 3,000 U.S. companies representing approximately 98% of the investable U.S. equity market. The Russell 3000 Index is constructed to provide a comprehensive, unbiased, and stable barometer of the broad market and is completely reconstituted annually to ensure new and growing equities are reflected. The index is unmanaged and does not include any expenses, fees or sales charges. It is not possible to invest directly in an index. The index referred to herein is the intellectual property (including registered trademarks) of the applicable licensor. Any product based on an index is in no way sponsored, endorsed, sold or promoted by the applicable licensor and it shall not have any liability with respect thereto.

This material is not a product of Morgan Stanley's Research Department and should not be regarded as a research material or a recommendation.

The Firm has not authorised financial intermediaries to use and to distribute this material, unless such use and distribution is made in accordance with applicable law and regulation. Additionally, financial intermediaries are required to satisfy themselves that the information in this material is appropriate for any person to whom they provide this material in view of that person's circumstances and purpose. The Firm shall not be liable for, and accepts no liability for, the use or misuse of this material by any such financial intermediary.

The whole or any part of this work may not be directly or indirectly reproduced, copied, modified, used to create a derivative work, performed, displayed, published, posted, licensed, framed, distributed or transmitted or any of its contents disclosed to third parties without MSIM's express written consent. This work may not be linked to unless such hyperlink is for personal and non-commercial use. All information contained herein is proprietary and is protected under copyright and other applicable law.

Eaton Vance is part of Morgan Stanley Investment Management. Morgan Stanley Investment Management is the asset management division of Morgan Stanley.

This material may be translated into other languages. Where such a translation is made this English version remains definitive. If there are any discrepancies between the English version and any version of this material in another language, the English version shall prevail.

DISTRIBUTION

This communication is only intended for and will only be distributed to persons resident in jurisdictions where such distribution or availability would not be contrary to local laws or regulations.

MSIM, the asset management division of Morgan Stanley (NYSE: MS), and its affiliates have arrangements in place to market each other's products and services. Each MSIM affiliate is regulated as appropriate in the jurisdiction it operates. MSIM's affiliates are: Eaton Vance Management (International) Limited, Eaton Vance Advisers International Ltd, Calvert Research and Management, Eaton Vance Management, Parametric Portfolio Associates LLC, and Atlanta Capital Management LLC.

This material has been issued by any one or more of the following entities:

EMEA

This material is for Professional Clients/Accredited Investors only.

In the EU, MSIM and Eaton Vance materials are issued by MSIM Fund Management (Ireland) Limited ("FMIL"). FMIL is regulated by the Central Bank of Ireland and is incorporated in Ireland as a private company limited by shares with company registration number 616661 and has its registered address at 24-26 City Quay, Dublin 2, D02 NY19, Ireland.

Outside the EU, MSIM materials are issued by Morgan Stanley Investment Management Limited (MSIM Ltd) is authorised and regulated by the Financial Conduct Authority. Registered in England. Registered No. 1981121. Registered Office: 25 Cabot Square, Canary Wharf, London E14 4QA.

In Switzerland, MSIM materials are issued by Morgan Stanley & Co. International plc, London (Zurich Branch) Authorised and regulated by the Eidgenössische Finanzmarktaufsicht ("FINMA"). Registered Office: Beethovenstrasse 33, 8002 Zurich, Switzerland.

Outside the US and EU, Eaton Vance materials are issued by Eaton Vance Management (International) Limited ("EVM") 125 Old Broad Street, London, EC2N 1AR, UK, which is authorised and regulated in the United Kingdom by the Financial Conduct Authority.

Italy: MSIM FMIL (Milan Branch), (Sede Secondaria di Milano) Palazzo Serbelloni Corso Venezia, 16 20121 Milano, Italy. The **Netherlands:** MSIM FMIL (Amsterdam Branch), Rembrandt Tower, 11th Floor Amstelplein 1 1096HA, Netherlands. **France:** MSIM FMIL (Paris Branch), 61 rue de Monceau 75008 Paris, France. **Spain:** MSIM FMIL (Madrid Branch), Calle Serrano 55, 28006, Madrid, Spain. **Germany:** MSIM FMIL Frankfurt Branch, Große Gallusstraße 18, 60312 Frankfurt am Main, Germany (Gattung: Zweigniederlassung (FDI) gem. § 53b KWG). **Denmark:** MSIM FMIL (Copenhagen Branch), Gorrissen Federspiel, Axel Towers, Axeltorv2, 1609 Copenhagen V, Denmark.

MIDDLE EAST

Dubai: MSIM Ltd (Representative Office, Unit Precinct 3-7th Floor-Unit 701 and 702, Level 7, Gate Precinct Building 3, Dubai International Financial Centre, Dubai, 506501, United Arab Emirates. Telephone: +97 (0)14 709 7158).

This document is distributed in the Dubai International Financial Centre by Morgan Stanley Investment Management Limited (Representative Office), an entity regulated by the Dubai Financial Services Authority ("DFSA"). It is intended for use by professional clients and market counterparties only. This document is not intended for distribution to retail clients, and retail clients should not act upon the information contained in this document.

U.S.

NOT FDIC INSURED | OFFER NO BANK GUARANTEE | MAY LOSE VALUE | NOT INSURED BY ANY FEDERAL GOVERNMENT AGENCY | NOT A DEPOSIT

ASIA PACIFIC

Hong Kong: This material is disseminated by Morgan Stanley Asia Limited for use in Hong Kong and shall only be made available to “professional investors” as defined under the Securities and Futures Ordinance of Hong Kong (Cap 571). The contents of this material have not been reviewed nor approved by any regulatory authority including the Securities and Futures Commission in Hong Kong. Accordingly, save where an exemption is available under the relevant law, this material shall not be issued, circulated, distributed, directed at, or made available to, the public in Hong Kong. **Singapore:** This material is disseminated by Morgan Stanley Investment Management Company and should not be considered to be the subject of an invitation for subscription or purchase, whether directly or indirectly, to the public or any member of the public in Singapore other than (i) to an institutional investor under section 304 of the Securities and Futures Act, Chapter 289 of Singapore (“SFA”); (ii) to a “relevant person” (which includes an accredited investor) pursuant to section 305 of the SFA, and such distribution is in accordance with the conditions specified in section 305 of the SFA; or (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA. This publication has not been reviewed by the Monetary Authority of Singapore. **Australia:** This material is provided by Morgan Stanley Investment Management (Australia) Pty Ltd ABN 22122040037, AFSL No. 314182 and its affiliates and does not constitute an offer of interests. Morgan Stanley Investment Management (Australia) Pty Limited arranges for MSIM affiliates to provide financial services to Australian wholesale clients. Interests will only be offered in circumstances under which no disclosure is required under the Corporations Act 2001 (Cth) (the “Corporations Act”). Any offer of interests will not purport to be an offer of interests in circumstances under which disclosure is required under the Corporations Act and will only be made to persons who qualify as a “wholesale client” (as defined in the Corporations Act). This material will not be lodged with the Australian Securities and Investments Commission.

Japan

This material may not be circulated or distributed, whether directly or indirectly, to persons in Japan other than to (i) a professional investor as defined in Article 2 of the Financial Instruments and Exchange Act (“FIEA”) or (ii) otherwise pursuant to, and in accordance with the conditions of, any other allocable provision of the FIEA. This material is disseminated in Japan by Morgan Stanley Investment Management (Japan) Co., Ltd., Registered No. 410 (Director of Kanto Local Finance Bureau (Financial Instruments Firms)), Membership: the Japan Securities Dealers Association, The Investment Trusts Association, Japan, the Japan Investment Advisers Association and the Type II Financial Instruments Firms Association.