Efficiency, Diversification, and Information

By Hal Ratner

Diversification is a keyword in the financial lexicon. But it is neither well-defined nor desirable in and of itself. What investors really want is efficiency.

If asked to list the desirable properties for an investment portfolio, most advisors would place diversification near, if not at, the top of the list. The term serves as a sort of shorthand for a well-constructed portfolio, one designed to provide an acceptable level of risk for a given level of expected return. But there’s no universally accepted definition of what the term means. And diversification isn’t in and of itself desirable. Rather it’s a function of our competitive information on the market and our confidence in that information. What investors ultimately want is efficiency, which is the trade-off among risk and return and is ultimately a function of information.

What Is Diversification?

Diversification broadly refers to the mixing of different types of securities that respond differently to the same stimuli and therefore rise and fall in value at different times. This, in turn, prevents the portfolio from going south in the instance of one or two bad events. On the other hand, it will prevent the portfolio from going through the roof when terrific events occur. But this is a good trade-off because investors are risk-averse, and risk aversion is the operative concept in investing.1 If the future is uncertain and bad outcomes carry more weight—both mathematically and psychological—than proportionally good outcomes, then managing this uncertainty is critical.

A key concept in portfolio diversification is “systematic risk.” This is the risk that cannot be diversified away—the risk of the market itself. In other words, if you have one stock, nearly all the risk is coming from factors associated with the issuing firm (such as earnings projections, balance-sheet strength, product pipeline, etc.) and another part is coming from the market or some set of systematic factors that make up the market. As you combine different stocks, the risk particular to each company—the idiosyncratic risk—washes out, leaving only systematic risk. Therefore, the most perfectly diversified stock portfolio will still lose money in a bear market, but it’s likely to lose less than its less-diversified peers.

Although systematic risk usually is discussed with respect to equities, it’s vital to apply the definition to all investments, including putatively riskless fare such as money market funds and U.S. Treasury inflation-protected securities (TIPS), which face fluctuating interest rates and inflation uncertainty. In fact, unless one’s consumption basket is the same as that used to measure inflation, there are no riskless investments and systematic risk can truly be seen as inescapable.

At the time, insurance companies commonly focused on “ruin,” the probability and magnitude of loss. There was little thought of maximizing the risk–reward trade-off. De Finetti recast the problem within this context and produced what in effect was an optimal reinsurance strategy given a portfolio of insurance policies. His solution sought the right balance between diversification (in the form of reinsurance) and cost—in other words, efficiency.

A decade later, economist A. D. Roy (1952) published “Safety First and the Holding of Assets,” which explicitly tackled investment portfolio construction. Similar to how insurers of the time thought of the problem, Roy focused on loss minimization but did so relative to a return target. Specifically he sought to minimize the chance of a portfolio’s return falling below some threshold level at a given probability. His safety-first ratio can be expressed as follows:

\[
SFR_p = \frac{E[r_p] - r}{\sigma_p}
\]

Here \(E[r_p]\) is the expected return on the portfolio, \(r\) is the return threshold, and \(\sigma_p\) is the standard deviation of the portfolio. Modern investors will recognize this as an antecedent to the now-ubiquitous efficiency measure called the Sharpe ratio, with the threshold rate substituted for the risk-free rate of Sharpe’s capital asset pricing model.

Concurrently with Roy, Markowitz (1952) defined the investment efficiency problem in nearly the same terms as de Finetti but allowed the variables—stocks in this case—to be correlated either negatively or positively with each other. This was an enormous refinement. Indeed, Markowitz’s work forms the basis for most portfolio-construction

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work being done today and his model is, appropriately enough, called the mean-variance (MV) model. Mean, in this case, refers to the average or expected return and variance refers to the risk.

An MV-Efficient (MVE) portfolio is one for which no higher level of expected return can be achieved at the same level of risk. Or, similarly, it is the one that offers the same expected return at the lowest risk. The MV function is maximized by combining different assets such that there is no better combination. In this way, the word diversification often is used as a stand-in for MVE portfolios. But they aren't the same thing. Note that diversification applies to only the V part of MV; it says nothing about return and, thus, efficiency. Diversification is not, by itself, a desirable characteristic. This concept, lost on many or taken for granted, is critical.

The hypothetical portfolios discussed below illustrate the point. Using returns from the 10 years ended December 2015, I calculated three portfolios (see table 1). All three have the same level of risk as defined by standard deviation (the square root of the variance). At first glance, portfolio A appears to be the most diversified option and portfolio B the least. But B dominates A if we look at the Sharpe ratio and, in fact, portfolio C is the only one that would qualify as efficient, because it has the highest expected return. Allocations across more asset classes—to say nothing of managed products such as mutual funds and exchange-traded funds, which can share economic exposures—are a warning sign that a portfolio has been improperly constructed with the investor having too little information about the investments (and how they work together). This leads to the investor choosing a “minimax” approach in which the goal is to minimize the maximum mistake. The diversification concept has become so ubiquitous that it often is misused.

### Information Ratio (Uses and Abuses of Diversification)

Despite its status as a core investment principle, diversification wasn’t always so central to the investment process. In his paean to quantitative finance, Bernstein (1992) uses two pre-Markowitz investors—the now-obscure but once-influential Wall Street executive and pundit Gerald Loeb, and the legendary economist and successful institutional investor J. M. Keynes—to illustrate what he held to be an antediluvian approach.

In his book *The Battle for Investment Survival*, Loeb (1935) wrote of diversification as a kind of training wheel set for the neophyte investor: “Diversification is a necessity for the beginner … an admission of not knowing what to do and an effort to strike on average. The really great fortunes,” he said, “were made in concentration.” This last statement may be true, but one could substitute “losses” for “fortunes” to state the more-common case. Critically, Loeb was writing for individual investors, who owned most of the U.S. equity market at the time.

Keynes, who apparently was a heavy consumer of sell-side research, took a similar view. He managed institutional portfolios and his own fortune to considerable success. Given that he was what we’d now describe as a macroeconomist, it’s unsurprising that he started out with a top-down approach using primarily currencies and commodities. But after being wiped out several times, his approach evolved to what we’d now call a value investor.

At the time (1920s–1930s), the average institutional portfolio held less than 10 percent in equities. Indeed, as Chambers and Dimson (2013) point out in an analysis of Keynes’ investment strategy, stocks effectively constituted an “alternative” asset class for institutional investors. This left the bulk of equities with the low-information individual investors whom Keynes regarded as trading on emotion and only able to profit from insider information. In other words, he viewed the market as chronically mispriced and felt that he could do better. Keynes’s approach was to maximize information, and he developed what we’d now refer to as a fundamental approach (concentrating on book value, break-up value, and management) with a bias toward dividend-paying stocks and likely more frequently mispriced smaller companies. Keynes wrote that it was preferable to “hold as large a market unit as positions will allow” to being allocated across many firms on which he had little information. And it is this idea of “information” that is key to the Loeb and Keynes positions or, rather, this idea of “competitive information.” You need to know something that the market doesn’t.

To illustrate this concept, consider this thought experiment. Let’s say it’s January 1995 and we can invest among the asset classes in table 2; we have a 20-year investment period in which our goal is to maximize the inflation-adjusted value of the account at the end of that period; once the portfolio is established we cannot trade; and all dividends (this is a qualified account) must be reinvested in the initial position.

To express uncertainty on the quality of the information—a sort of signal-to-noise ratio—I specify an information quality score of the same value on all forecasts and assume our forecasts are uncorrelated and

### Table 1: Diversified Portfolios with Different Levels of Efficiency

<table>
<thead>
<tr>
<th>Portfolio A</th>
<th>Portfolio B</th>
<th>Portfolio C</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Large Cap</td>
<td>10%</td>
<td>2%</td>
</tr>
<tr>
<td>U.S. Small Cap</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Developed Market International</td>
<td>40%</td>
<td>5%</td>
</tr>
<tr>
<td>Intermediate-Term Government Bond</td>
<td>13%</td>
<td>6%</td>
</tr>
<tr>
<td>Long-Term Government Bond</td>
<td>15%</td>
<td>85%</td>
</tr>
<tr>
<td>Cash</td>
<td>12%</td>
<td>3%</td>
</tr>
<tr>
<td>Expected Return</td>
<td>5.29</td>
<td>6.52</td>
</tr>
<tr>
<td>Risk (standard deviation)</td>
<td>10.00</td>
<td>10.00</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>0.42</td>
<td>0.54</td>
</tr>
</tbody>
</table>
subject to the same amount of noise. In other words, the quality of information is on the entire market and thus the same for all asset classes. As this number declines our ability to see across the next 20 years degrades and the portfolios go from the single-best investment (small-cap value) to a 1/N portfolio in which our information is so bad that an equal allocation is the only defensible strategy.

Practically, no one uses the 1/N approach. A given investor may have no special information, but the market presumably does, and therefore the fallback position for the low-information investor is typically the market.

Competitive information (degree and quality) and the ability to act on it is vital. If market participants don’t have good information, then it stands to reason that careful research and concentrated bets are the best strategy. But if the market is informationally efficient and reflects all or most relevant information, then careful research is less likely to pay off and concentrated positions become riskier. If in the limit—as embodied in the strong-form efficient market hypothesis (EMH)—all information is reflected in share prices, then only an unforeseeable piece of news can change prices. In this paradigm, because there’s no systematic way of seeing the unforeseeable, beating the market is a matter of luck.

This is an extreme and controversial view, but there can be little doubt that markets have become more informationally efficient since the days of Loeb and Keynes. As anecdotal evidence, consider figure 1.

Using 17 developed markets for the period 1976 through 2015, I perform a statistical analysis to determine the extent to which a common market factor is dominating returns. Using a seven-year rolling window, we can see that from the early 1980s through the early 1990s less than half of the covariance structure of the market could be attributed to the common market factor. But as the markets have become more integrated and efficient in the EMH sense, this number has grown. The implication is that 20 years ago, diversifying among countries unconditionally (e.g., strategically) could benefit a portfolio, because at least half the risk was coming from factors other than the common equity market. But now the proportion of risk explained by the common factor dominates, and the diversification benefit is lessened.

![Figure 1: Common Market Factor (%) Rolling Seven-Year Window (1976–2015)](image)

Table 2: Twenty-Year Horizon Portfolios Using Varying Levels of Information

<table>
<thead>
<tr>
<th>Index Proxies</th>
<th>Forecasted Real Geometric Return</th>
<th>Noise Factor 0.10</th>
<th>Noise Factor 0.25</th>
<th>Noise Factor 0.50</th>
<th>Noise Factor 1.00</th>
<th>Noise Factor 3.00</th>
<th>Noise Factor 5.00</th>
<th>Noise Factor 10.00</th>
<th>Noise Factor 100.00</th>
<th>Noise Factor 10000.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russell 1000 Growth TR USD</td>
<td>6.53</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>22%</td>
<td>17%</td>
<td>15%</td>
<td>13%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Russell 1000 Value TR USD</td>
<td>7.42</td>
<td>0%</td>
<td>9%</td>
<td>30%</td>
<td>31%</td>
<td>20%</td>
<td>16%</td>
<td>14%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Russell 2000 Growth TR USD</td>
<td>5.06</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>7%</td>
<td>12%</td>
<td>12%</td>
<td>11%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Russell 2000 Value TR USD</td>
<td>7.62</td>
<td>100%</td>
<td>91%</td>
<td>70%</td>
<td>33%</td>
<td>21%</td>
<td>17%</td>
<td>14%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>MSCI EAFE GR USD</td>
<td>2.88</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>5%</td>
<td>7%</td>
<td>9%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>MSCI EM GR USD</td>
<td>2.66</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
<td>7%</td>
<td>9%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Barclays US Govt/Credit 1–3 Yr TR USD</td>
<td>1.98</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
<td>6%</td>
<td>8%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Barclays US Agg Bond TR USD</td>
<td>3.65</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>7%</td>
<td>9%</td>
<td>9%</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>Barclays High Yield Corporate TR USD</td>
<td>5.01</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>7%</td>
<td>12%</td>
<td>12%</td>
<td>11%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Realized Real Geometric Return</td>
<td>7.62%</td>
<td>7.61%</td>
<td>7.57%</td>
<td>7.02%</td>
<td>6.19%</td>
<td>5.79%</td>
<td>5.47%</td>
<td>5.13%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The characterization of Loeb and Keynes as hostile to diversification by Bernstein (1992) is not entirely fair. Both actually prescribed some level of diversification—Loeb suggesting a modicum of industry diversification and what weéd now refer to as sector rotation. And Keynes stated that the ideal portfolio, though concentrated, was allocated among stocks with “opposing risks”—low or negative correlation in modern parlance. Indeed, if one chooses correctly, only a handful of stocks are required to achieve a mean-variance efficiency.

Diverse Definitions

The mean-variance approach has long served as a sort of the first principle of portfolio construction. But the 2008 financial crisis caused many to rethink the concepts of risk and diversification. Perhaps simply mixing securities to ameliorate nonsystematic risk wasn’t enough. Strategies such as risk parity, which seeks to equalize risks across positions, and independent risk allocation, in which portfolios are constructed to minimize the correlation among statistical (i.e., non-observable in the manner used in table 1) factors driving portfolio performance, became more popular. More recently, economic factor diversification, where diversification is sought through underlying market factors such as the value premium and changes in credit spreads, are gaining traction. These represent different ways of defining risk by redefining diversification, more specifically by thinking in terms of the sources of risk and allocating a “risk budget” as opposed to a “capital budget.” In other words, instead of solving for how much to put into each security or asset class, we solve for how much to put into each systematic return driver.

Table 3 illustrates the concept. Four traditional (i.e., no leverage or shorting) portfolios are optimized to achieve a 3.49-percent return but use different methods of managing risk through diversification—mean-variance, mean Conditional Value-at-Risk (mean-CVaR), mean-CVaR surplus optimization, risk parity, independent risk, and economic factor equalization. The highlighted areas indicate the risk criteria used for each portfolio based on asset class returns for the 1970 through 2015.

The first column shows the MV approach in which we minimize variance given a return target. Portfolio B substitutes CVaR for variance. This statistic focuses on downside risk and although results in this example look similar to the MV portfolio, in cases where the returns depart significantly from a normal distribution (e.g., especially over shorter time horizons) the results can differ meaningfully. Portfolio C uses CVaR but defines risk with respect to a liability proxy, an asset held short that is meant to mimic the nature of a specific consumption goal or liability. This technique, known as surplus optimization (see Sharpe 2002), has been most commonly used for defined benefit portfolios and is used increasingly in the retail space as robo-advisors look for better ways of constructing goals-based portfolios. In this example, the liability is a synthetic 17-year bond. The goal here is to reduce the tracking error of the portfolio relative to the proxy, subject to—in this case—the return constraint. It’s important to note that this sort of portfolio almost always will be less diversified than one with a total return orientation. But if the goal is to minimize risk relative to the liability, it is substantially more efficient than one that ignores the liability.

Portfolio D attempts to diversify risk across asset classes such that—within the limits of our constraints—we come as close as possible to avoiding any asset class dominating risk contribution. This is essentially the risk-parity approach minus leverage. The idea here is that because correlations change through time, it is very possible that the risk of one or two investments could dominate thereby making the portfolio inefficient (not diversified). Portfolio E takes this further by defining risks as statistical factors uncorrelated with each other (this is akin to the approach taken in figure 1, which shows the evolution of the largest factor). The implication is that if something bad happens to factor 1 it will have no impact on any other factor. This is certainly the most diversified approach in our example, but it suffers from at least two complications. First, it’s possible, if unlikely, that some additional factor not implied by the data series could impact results and, more seriously, this approach requires frequent trading, particularly if short positions are restricted. In fact the reason the highlighted areas in table 3 for portfolios D and E are not all the same number is due to the long-only restriction.

The case of the economic factor-based approach in portfolio F perhaps warrants more attention. That asset classes are bundles of macro- and microeconomic factors has been an area of study for many years beginning with Ross’s arbitrage pricing theory in the mid-1970s, which held that if two or more securities have exactly the same factor exposures, they should be priced the same and, if not, present an arbitrage opportunity. The Fama and French (1992) three-factor model composed of the stock market, a value factor, and a size factor is now a workhorse for investment analysts and academics. It was only a matter of time before new products designed to mimic factors flooded the market, and the possibility of constructing a portfolio directly from a set of factors is now possible. Factors, in theory, have the advantage of being less correlated with each other than asset classes that are bundles of typically overlapping factors. The factor-based approach is most commonly discussed with respect to factor premiums—such as the well-known size and value premiums. But they also can be used to manage risk, in which case what matters is their covariance with each other. In fact, in the example below, we simply seek to hit our return target while ensuring that no one factor dominates with respect to risk contribution. Again, we’re limited by our constraints but it’s easy to see a comparatively even distribution of factors.

The economic factor approach looks promising and is certainly more intuitive than the statistical factor approach. But despite its promise, at least two areas of caution emerge. First, there’s no agreement on a factor set. The number of identified factors has ballooned to around 300, with an average of 40 new ones being “discovered” each
year (see Harvey et al. 2016). We now have what financial economist John Cochrane (2011) has described as a “zoo of new factors” in which many entrants cannot be shown to be statistically significant, have no premium, or become traded away as more investors enter the space. It seems our menagerie of 300-plus is populated by many mythical and now-extinct beasts.

Death, Taxes, and Fees

Because fees are a component of return, they are vital to efficiency. Like death and taxes, they are inescapable. But like death and taxes they can be managed or at least reduced. The portfolio construction methods above all imply different cost structures. For example, the equal-risk approach is employed typically as a risk-parity strategy in which the fixed-income position is levered up. This increases costs—and risk—and in fact risk-parity portfolios have on average higher expense ratios than plain-vanilla stock and bond portfolios. Even if one chose to exercise this approach without leverage, the trading costs associated with keeping risks within budget could make it unattractive. This last point is particularly true of the independent risk approach, which needs frequent—often extreme—reallocation to maintain its risk budget. Even with the comparatively tame economic factor approach, an increasing body of evidence (Beck et al. 2016) shows that many factor premiums disappear once transaction costs are accounted for.

In addition to new ways of thinking about portfolio construction, the wake of the

| Table 3: Portfolios Optimized for a 3.49% Return Using Different Risk Criteria |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 | A               | B               | C               | D               | E               | F               |
| Asset Class     | Variance        | CVaR            | CVaR (Surplus Opt) | Contribution to Variance | Independent Risk | Economic Factor |
| US Large Cap    | 2%              | 4%              | 0%              | 9%              | 0%              | 0%              |
| US Small Cap    | 12%             | 11%             | 0%              | 0%              | 0%              | 0%              |
| Dev Mkt Intl    | 2%              | 0%              | 0%              | 11%             | 18%             | 40%             |
| IT Govt Bond    | 76%             | 74%             | 29%             | 51%             | 42%             | 60%             |
| LT Govt Bond    | 0%              | 1%              | 71%             | 15%             | 18%             | 0%              |
| Commodity Futures | 7%          | 9%              | 0%              | 14%             | 21%             | 0%              |
| Er              | 3.49            | 3.49            | 3.49            | 3.49            | 3.49            | 3.49            |
| Stdev (sqrt variance) | 5.35       | 5.38            | 8.96            | 5.98            | 6.79            | 7.63            |
| CVaR            | −8.45           | −8.36           | −15.13          | −9.77           | −11.26          | −13.67          |
| CVaR (Surplus Opt) | −18.21    | −18.25          | −4.85           | −18.36          | −20.21          | −23.82          |
| Contribution to Variance | ( = ) | ( = )         | ( = )           | ( = )           | ( = )           | ( = )           |
| US Large Cap    | 3%              | 7%              | 0%              | 13%             | 0%              | 0%              |
| US Small Cap    | 29%             | 26%             | 0%              | 0%              | 0%              | 0%              |
| Dev Mkt Intl    | 3%              | 0%              | 0%              | 19%             | 27%             | 81%             |
| IT Govt Bond    | 56%             | 53%             | 15%             | 30%             | 17%             | 19%             |
| LT Govt Bond    | 0%              | 1%              | 85%             | 16%             | 14%             | 0%              |
| Commodity Futures | 8%          | 13%             | 0%              | 21%             | 41%             | 0%              |
| Independent Risk | ( = )           | ( = )           | ( = )           | ( = )           | ( = )           | ( = )           |
| factor 1        | 12.4%           | 11.6%           | 0.0%            | 3.4%            | 1.5%            | 3.8%            |
| factor 2        | 1.6%            | 0.7%            | 1.3%            | 0.0%            | 1.3%            | 2.2%            |
| factor 3        | 42.0%           | 44.7%           | 88.4%           | 39.1%           | 26.3%           | 3.9%            |
| factor 4        | 0.3%            | 0.0%            | 5.8%            | 12.6%           | 16.5%           | 41.1%           |
| factor 5        | 0.2%            | 1.4%            | 4.3%            | 6.2%            | 22.0%           | 0.9%            |
| factor 6        | 43.6%           | 41.6%           | 0.2%            | 38.6%           | 32.3%           | 48.1%           |
| Economic Factor | ( = )           | ( = )           | ( = )           | ( = )           | ( = )           | ( = )           |
| Equity Market (global) | 17.9%       | 17.3%           | −7.6%           | 24.3%           | 27.9%           | 41.5%           |
| Size (global)   | 15.3%           | 14.9%           | −2.8%           | 3.5%            | 11.8%           | −1.0%           |
| Value (global)  | 0.9%            | 1.2%            | −5.7%           | 4.2%            | 9.3%            | 6.0%            |
| US Credit Spread | −154.1%      | −168.0%         | −253.2%         | −186.0%         | −206.8%         | −60.1%          |
| US Term Spread  | 155.3%          | 171.9%          | 225.6%          | 191.6%          | 201.2%          | 55.5%           |
| 5-Year US Govt Rate | 64.8%        | 62.7%           | 143.7%          | 62.4%           | 56.6%           | 58.1%           |
2008 crisis saw the proliferation of numerous alternative funds designed to manage portfolio risk by creating returns that are loosely correlated with the market. Sadly, the definition of “alternative” is even less agreed-upon than that of diversification. It’s been applied to everything from real estate investment trust (REIT) funds to market-neutral funds. The key selling point, however, is that when added to a traditional portfolio, they increase efficiency. However, this diversification often comes at a cost that can make these funds unattractive.

Looking at Morningstar category averages, fees for alternative vehicles range from 160 to 225 basis points (bps). With the category average for intermediate-term bond funds at 81 bps and the average for large-blend stock funds at 106 bps, this seems steep (to say nothing of index funds). These are for strategies that, for the most part, aren’t designed to produce high long-term returns. For example, the bear market category average fee is 196 bps—and this for a fund type that is expected to lose money in the long run. Other strategies, such as market-neutral and long-short equity, were designed for institutional investors and designed to use considerable leverage. But the Investment Company Act of 1940 limits exposure to leverage, and, therefore, these funds cannot be expected to generate returns high enough to justify the nearly 200 bps they typically charge. (Leverage does, of course, increase risk considerably, but the chance of making an outsized return can justify the higher fees.)

An example is in order here. Using historical estimates of U.S. equity, government bond, and alternative returns, I conduct a Monte Carlo simulation in which the impact of fees on portfolio efficiency is measured by Sharpe ratio (see figure 2). I begin by defining a traditional portfolio of 60-percent stocks and 40-percent bonds and supplement this by adding a representative alternative strategy using data from category averages. I add an alternative strategy to each traditional portfolio at 10-percent, 25-percent, and 50-percent increments. Fixing fees for the traditional portfolio at the category averages (large-cap core and intermediate-term bond), I examine the impact on efficiency for each of the alternative allocations while varying fees from 0 to 2.5 percent. As the results show, once alternative fees hit 19 bps, a 50-percent allocation to alternatives cannot be justified. For a 25-percent allocation, the breakeven point is about 80 bps.9

This is an admittedly rough estimate, and 25 percent and 50 percent are big allocations. Additionally, alternative allocations are often sourced from bonds (though in this case, that would have made the results look worse) but the point is clear: Diversification cannot be divorced from fees. So diversification and cost are indeed key words for successful investors, but they must be viewed through the lens of efficiency. Alone, diversification and cost mean little.

**Conclusion**

The term “diversified portfolio” has become synonymous for “good portfolio.” But diversification is neither universally defined nor desirable in and of itself. Investors want efficiency—the tradeoff between expected return (which includes costs) and risk, where the definition of risk could vary from one investor to another. People have different goals, different financial positions, different risk tolerances, and different levels of confidence in their views on the market. All of this must come into play when developing and managing investment strategies.

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**Endnotes**

1. Though technically separate, this asymmetry also applies to risk capacity where being overfunded relative to a liability schedule provides little marginal benefit and proportional underfunding is often catastrophic.


3. Proxies are defined as the total return indexes for the following: S&P 500, IA SBBI Small US Small Stock Index, MSCI EAFE, IA SBBI US Intermediate-Term Government Bond Index, IA SBBI Long-Term Government Bond Index, IA SBBI 30 Day T-Bill Index.

4. Portfolios were constructed using a quadratic optimization approach similar to that taken by de Finetti (1940) with the diagonals of the covariance matrix representing a noise component but the forecast represented by geometric returns. As such, these are not MV portfolios.

5. Specifically, this is a principal-components analysis performed with covariance matrices derived from rolling 84-month (seven-year) periods. The eigenvalues in each period are then scaled to percentage terms.

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**Figure 2: Alternative Fund and Traditional Portfolio Tradeoff**

[Diagram showing Sharpe ratio changes with varying alternative fund fees and allocation percentages.]
The first principal component is characterized as the “common market factor.”

6. The Critical Line Method of Markowitz (1952) is formally different and involves estimating the entire frontier, but the resulting portfolio is identical to a constituent of that frontier.

7. Derived by backing out the implied total return of the 20-year Constant Maturity Treasury (CMT) Index.

8. In the typical problem, the optimization is performed using a preference for surplus risk and a funding ratio. In this case I assumed a funding ratio of 1. The constraint on return obviates the need (or logic) for a surplus risk aversion number.


References
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